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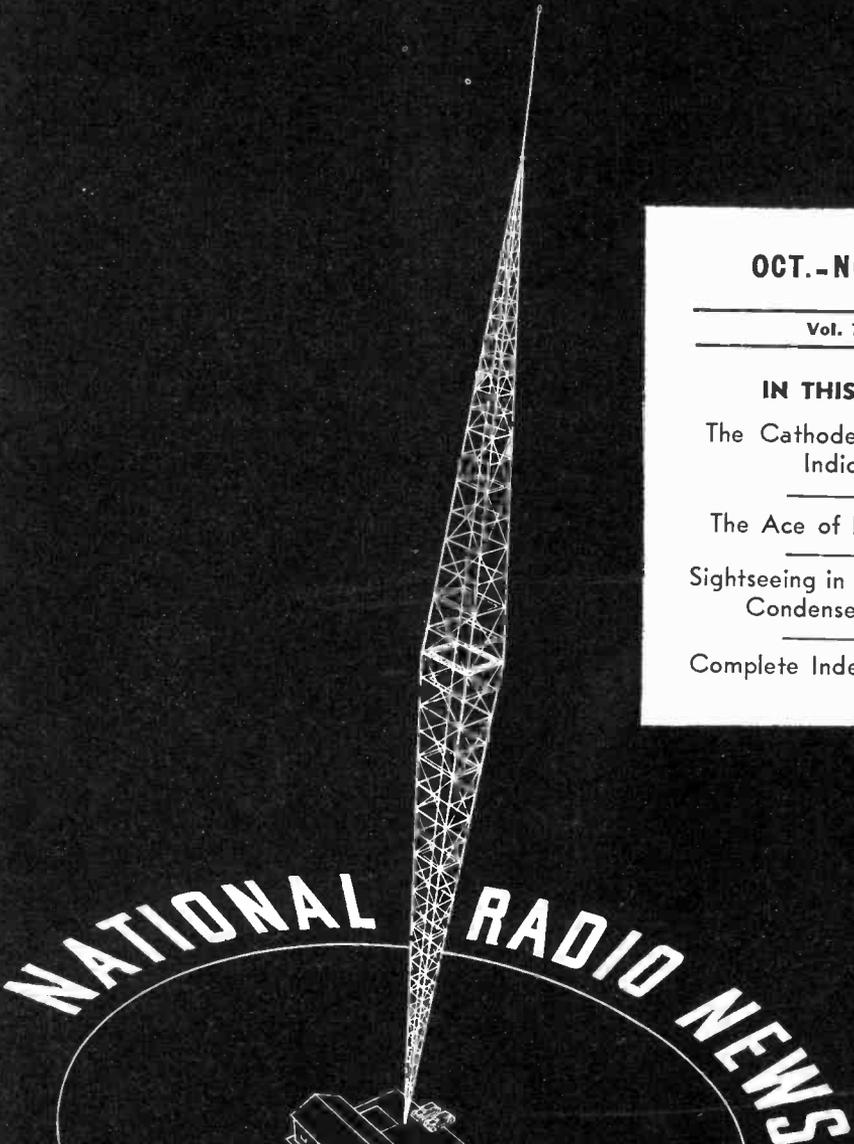
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NATIONAL RADIO NEWS

WASHINGTON, D.C.

Harvest Time

It means a lot to the farmer, harvest time.

It is toward the harvest, when he will receive the reward for his labors, that he works and sweats in the broiling fields all summer long.

And his reward, the abundance of his crops, will be in exact proportion to his labor in planting and caring for his fields.



There are other "harvests" than those of crops. In fact, there are "harvests"—or their absence — throughout the lives of everyone of us. Just as with the farmer, the abundance of our crops is in exact proportion to our effort; we "reap as we sow." If the farmer is lazy, careless and indifferent in sowing and tending his fields, at harvest his crops will be poor and scanty. So, too, with us. If we are lazy, careless, and indifferent in our efforts, our

"crops"—our rewards—will be poor and scanty.

We all know this to be true. We all know that you can't "get something for nothing," that you can't command great rewards in return for poor or little effort. Yet many of us forget it at times or have become so lazy through habit that we can't make an "about-face" all at once, even when we do remember it.

It's therefore up to you and to me to keep it ever before us that we are going to "reap as we sow," and that we must "sow" to the very best of our ability in order to earn a harvest worth having.

J. E. SMITH,
President.

The Cathode Ray Tuning Indicator

By J. A. DOWIE, Chief Instructor



J. A. Dowie

THE desire of some set owners to add a "magic eye" to improve the tuning adjustment of sets lacking a tuning indicator has become a most profitable source of income to the Radio-Trician. Indications now are that that desire can be even better fulfilled than heretofore, with a resultant increase in the Radio-Trician's profits, through the introduction of a novel tuning device called the Cathode Ray Tuning Indicator, tube type 6E5, more popularly known as "the magic eye," which can be installed on receivers using an automatic volume control.

To use the 6E5 visible tuning indicator tube to the best advantage, a thorough understanding of its construction and operation is essential, so let's give the device a little study.

We can get a pretty good idea of what the tube looks like from Figure 1 showing the glass bulb and the location, structure, and identification of the electrodes. Structurally, the tube contains two parts; a triode, which functions as an ampli-

fier, and the electron-ray device.

The cathode when heated provides a source of electrons which are attracted to a positively charged fluorescent coated circular target at the top of the tube. This target glows when the electrons strike it. Between the cathode and the target is an electrode attached to the plate, the purpose of the electrode being to control the glow area on the target.

When no voltage is on the grid of the tube, the unlighted sector covers about one-fourth of the area of the fluorescent coated target; when negative voltages are applied to the grid the edges of the lighted portion close in over the previously unlighted or shaded sector, just like closing a fan, until the shaded portion is eliminated and

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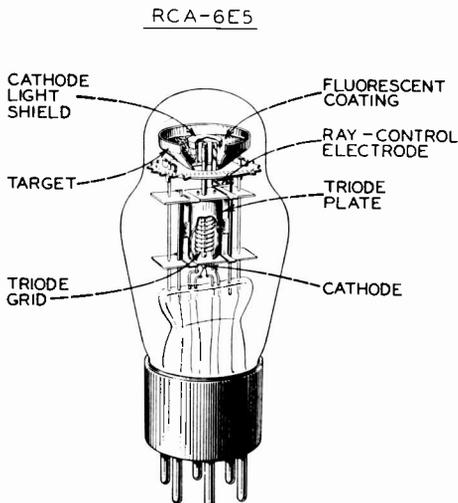


Fig. 1



Fig. 2. Fluorescent patterns, viewed from the top of 6E5 tube, left with zero grid bias, right with negative grid bias. The dark sector extending downward from center narrows as you tune to stations; when it is narrowest, it indicates set is in perfect tune or resonance with incoming signals.

The Cathode Ray Tuning Indicator (Continued from page 3)

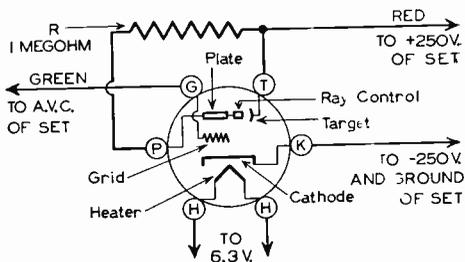


Fig. 3. Showing how 6E5 tube is connected to AVC system of set. (6.3 volts for filament may be obtained from set or from an extra filament transformer if set has 2.5 volt tubes.

the target becomes uniformly lighted. This is shown in Figure 2 by the shaded area for the two extreme conditions, zero bias and approximately 8 volts negative.

Figure 3 shows how the tube 6E5 is connected to the varying negative voltage in an A. V. C. circuit. A series resistor of one megohm is placed between the plate-control electrode and target; this resistor supplies a negative potential to the ray control electrode with respect to the target due to R I drop across it when plate current flows.

For example: At zero bias on the grid, maximum plate current will flow, producing a voltage drop between the target and plate-control electrode, therefore the ray control is negative with respect to the target. This will reduce the number of electrons attracted from the cathode to the target and in particular the area back of the ray control electrode. A shadow angle about 100 degrees on the target is produced. As the negative voltage on the grid is increased, less plate current will flow. The ray control electrode becomes less negative with respect to the target and repels less electrons in its general direction, causing the shadow to close up. If this varying negative voltage on its grid is obtained from the A.V.C. circuit, the shadow gives an indication of resonance when the unlighted portion of the target is at minimum.

Figure 4 shows a Cathode Ray Tuning Kit which can be purchased direct from any wholesale Radio house or RCA Parts distributor. It consists of:

- 1 6E5 Electron-Ray Tube.
- 1 Socket and cable.
- 1 Tube mounting clamp and bracket assembly.
- 1 Eye-Type escutcheon.
- 2 Mounting Bushings.
- 2 Mounting screws complete with nuts and washers.

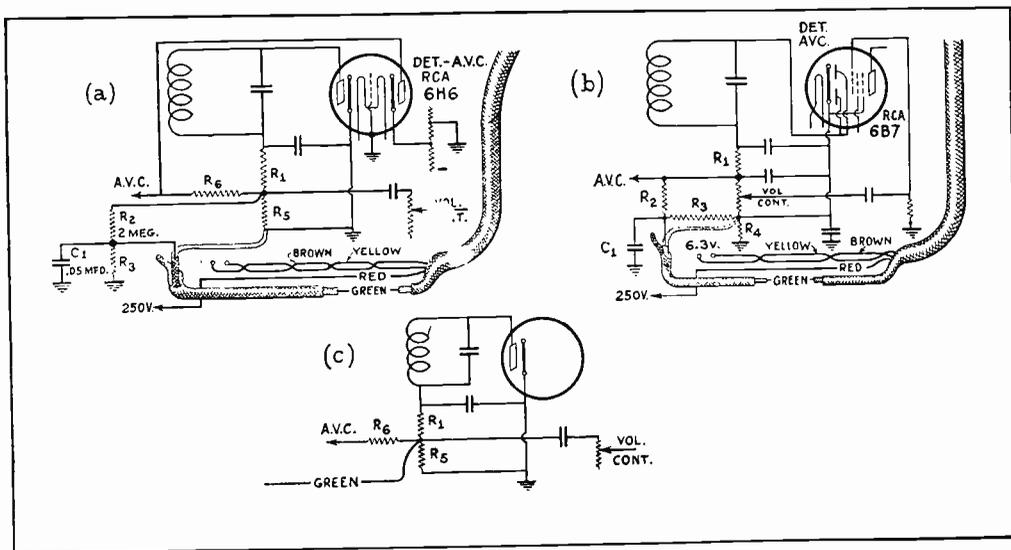


Fig. 5. Typical Connections of R.C.A. Cathode Ray Tuning Indicator Kit

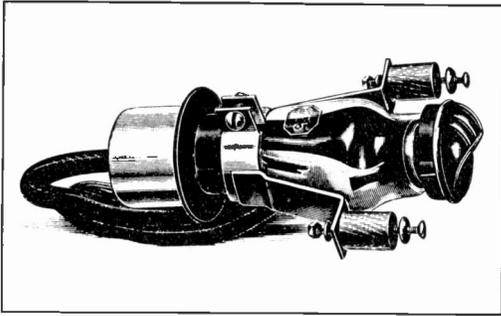


Fig. 4. R.C.A. Cathode Ray Tuning Kit

- 1 Clamp screw complete with nut and lock washer.
- 1 Rubber gasket.

With the above kit of parts, installation is made very easy. All that is necessary is to drill one hole, install three screws, make a few connections and the job is finished.

Figure 5 (a), (b) and (c) show typical connections using the RCA Cathode Ray Tuning Kit.

Where difficulty is experienced with complete closing of the shadow of the 6E5, it is recommended that the 6G5, a tuning indicator tube similar in appearance and application to the 6E5, be substituted for the latter. The triode of this tube has been changed from that of the original tuning indicator so that the plate current cut-off occurs around minus 22 volts instead of minus 8 volts. This characteristic makes for a better tube in that it is possible to use all the developed AVC voltage. This results in a tuning shadow being indicated with weak signals which will be as large as possible while the strongest signals will not entirely close the shadow.

— n r i —

Radio Emergency Call Service for Doctors Contemplated

A new and important use to which Radio is planned to be put became known when the Doctors' Telephone Service of New York made application to the Federal Communications Commission for a single frequency in the ultra-high band from thirty to sixty megacycles. The organization explained its purpose of establishing a Radio emergency call service for doctors in order that they might be reached outside their offices or homes, on their way to and from calls, etc.

The idea is to tune each doctor's receiver to respond only to his own call numbers so that only the doctor in demand would be contacted. Thereupon the doctor would go to the nearest telephone to get the complete message, thus saving precious minutes so important in emergency cases.

WHY WE CHANGED OUR PLAN OF SENDING LESSONS

A little over a month ago, N. R. I. changed its system of returning graded answers to you with a new lesson text, in a duplex envelope.

All students have received notice of this change. They understand why they now receive their answers back by first-class mail.

But in order that EVERYONE may thoroughly understand our reason for making this change, I want to point out the advantages. For several months we conducted a very extensive survey to determine the amount of time lessons were delayed in the mail because they were mailed in duplex envelopes with text books in the back. We knew that such mail received only slightly better than third-class handling, even though we had to pay first-class for the front part.

Our survey showed conclusively that we could get the graded lesson back by first-class mail from one to ten days faster, depending upon location. The AVERAGE time saving was OVER THREE DAYS! Naturally, this seemed to point squarely to the fact that we should make the change without delay, but we also carefully considered the other side of the question—in particular, the convenience of having new reference and text books reach a student at the same time he received his graded examination.

We then asked a good many students whether they preferred this convenience, or preferred the advantage of getting their graded answers back separately on an average of three days sooner. The answer seemed to be overwhelmingly in favor of making the separation so the graded examinations would come back by first-class mail and thus save over three days' delay.

So—we got busy and worked out our new plan. Now ALL answers are sent back to you by first-class mail and the new texts are sent separately.

Quite a number of students have written to tell us of their gratification for this new evidence of N. R. I.'s desire to give its students the BEST service possible at all times, no matter how much extra expense and work is involved here at the Institute.

S. M. ARMSTRONG,
Service Director.

Governor Landon's Radio Equipment

A short time ago a nine-car train pulled out of Estes Park, Colorado, and started on a journey that would carry it almost to the shores of the Atlantic.

Interest in the train was high. It was the Governor Alf Landon Special, and from an observation car at the rear of the train the Republican Presidential nominee was to address ra. lside gatherings on the long trek East. Wherever the train halted, crowds gathered to listen to Governor Landon's talks and, incidently, to admire the big, flag draped and sunflower adorned observation platform.

If anybody in the Governor's audiences had been curious enough to take a look at the far side of the observation platform, he would have seen a thick black cable strung from the single microphone the Governor uses up to a car just behind the engine and tender. If the still more curious followed the 875-foot cable to the end of its journey they would have seen an ordinary looking railroad baggage car.

The inside of this baggage car would be a revelation to both layman and experienced political campaigner. The car, a very completely equipped Radio and movie sound laboratory, is an innovation in political campaigning. At one end is a small engine driving an electric generator which furnishes the power for broadcasting and also for recording on movie sound film Governor Landon's addresses. Whenever the train halts on a scheduled or "spur of the moment" speaking stop, a special crew of technicians springs into activity and in a moment the motors are whirring out their electrical energy.

In another corner looms what resembles a technical section from a Hollywood movie studio. It is a light unit made up of large Kleig lights for the newsreels, floodlights for the newspaper cameramen, and a score of spotlights.

Lining the walls are panels with a bewildering maze of switches, coils, and tiny, blinking, multi-colored lights. They are the Radio, public address and newsreel sound control boards. It is at these boards that the expert technicians "mix" Governor Landon's voice so that his immediate and Radio and movie audiences will hear every word of his vitally important messages. There is also a little cubbyhole, and in the stygian darkness behind its closed doors is where the cameramen load their cameras.

The general public sitting at the breakfast table and reading about this "special technical car" probably will be astonished to learn that this is the first time such a car has accompanied a Presidential candidate, or for that matter, a candidate for any office on a speaking junket.

National Union to Promote Sales of P. A. Units

R. M. Coburn, Assistant Sales Manager, National Union Radio Corporation of N. Y., announced this week that National Union is firing the opening guns in a wide sales campaign to encourage Radio service experts to reap the profits of the Public Address field.

In discussing the new sales program, Mr. Coburn stated:

"During the past six months, National Union has conducted an extensive market survey to determine the outstanding profit opportunity for Radio experts in today's picture. Our findings indicate that the coming year will see a sensational advancement in the sales of Public Address equipment. Someone in, or associated with the Radio industry is bound to capture the major profits accruing from this growth, and it is our feeling that the Radio service expert is best equipped from the standpoint of past experience to carry away the market. Those familiar with the National Union selling program will recall that in early 1930—National Union grasped an understanding of the needs of the service industry and proceeded to make available to the man in this field, the instruments and equipment which were so vital to his growth. Now that we have adequately rounded out a program which provides equipment for the service men, we have felt that the next step is in order. To our mind, that step lies in the direction of putting service experts into the Sound business in a big way.

"National Union, of course, realizes that in any untapped market such as P. A., the service man hesitates to make investments in order to determine whether the profit possibilities which seem obvious will actually materialize. With this factor in mind, and in full confidence that service experts once they get the full sense of the situation, will cash in, National Union has designed a program to provide the necessary sound equipment for service men to try their wings."

It is reported, that National Union has made arrangements with Webster, Chicago, manufacturers of sound equipment, so that high efficiency sound systems are to be supplied to service experts free with the purchase of National Union Radio tubes.

Further highlights of the National Union sound equipment program call for elaborate educational work to show service experts where sound sales can be made and how to make them.

— n r i —

Be slow to promise, but once your word is given, make it as good as your bond.

The Laboratory Page

By GEORGE J. ROHRICH



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

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.

Experiment No. 51:

Object: To show that a resistor conducts alternating current as well as direct current.

Apparatus Required: Power supplied to outlet which is known to be A. C. with voltage between 100 and 120 volts; power limiting panel described for Fig. 81 and Fig. 82 in preceding laboratory page; a 10-watt lamp; test prods attached to plug; 30 ohm resistor (Item No. 14); an extra socket connected to two 45-volt batteries (or any combination of batteries of the A, B or C battery variety for providing 90 volts to 120 volts D. C. Of course, if you also have 110 volts D. C. available at an outlet then the batteries are not necessary).

Apparatus Assembly: Connect the parts as shown in Fig. 83. Plug No. 1 may be inserted and used in socket No. 1 for A. C. or D. C. in any convenient manner, but it is advisable to insert it in the special way explained for Fig. 81. Insert the plug with test prods in socket No. 2. Place one 10-watt lamp in one of the lamp sockets in the power limiting panel.

Experimental Procedure:

1. Insert plug No. 1 in the socket No. 1 for A. C.
2. Touch the two test prods together and note that the lamp will light.
3. Hold the test prods on the 30 ohm resistor and note that the lamp will light again.

4. Remove plug No. 1 from the A. C. socket and insert it in socket No. 1 for D. C.

5. Repeat experimental procedures Nos. 2 and 3, noting in each case that the lamp will light. It is advisable to make these tests with D. C. of short duration as the drain of approximately 90 milliamperes from the batteries for lighting the lamp will quickly exhaust the small cells used regularly in B and C type batteries. Observations can be made with A. C. where you need time to check the behavior for long periods.

Observations: The observations allow you to draw your own conclusions that current from an A. C. source or D. C. source will pass through the 30 ohm resistor. In this experiment we note no apparent change in the brilliancy of the lamp while either kind of current (A. C. or D. C.) passes through any part of the entire length of the wire used in the 30 ohm resistor. It would appear that the resistor does not resist the current and is therefore defective, or that the resistor is useless for controlling current. However, this is not the case as several of the "peculiarities" which I said previous would exist, are now being noted and an explanation is necessary.

Theory of Action: The chief purpose of using a "resistor" is to conduct current. This experiment clearly points out that a resistor does conduct (carry) the current. However, the length of wire as well as the diameter of the wire and the kind of metal has a great deal to do with the amount of current which will be conducted.

The lamp also is a resistor
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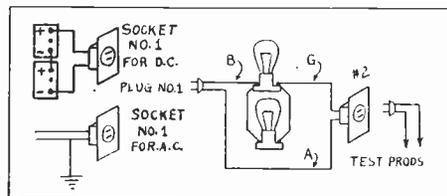


Fig. 83

The Laboratory Page (Continued from page 7)

and likewise its purpose is to conduct current. Reference to the table given on the previous laboratory page shows that a ten watt lamp will conduct 9/100 amperes per 115 volts. This is an approximate value and more accurately it is closer to 87/1000 amperes per 115 volts.

An "ampere per volt" is a name for the unit which measures the "conducting ability" of a wire. The "conducting ability of a wire" is also called "conductance." Therefore, an "ampere per volt" is one name for measuring the conductance. A "mho" is another name for an "ampere per volt."

The word "per" means "divided by." This allows us to understand that 87/1000 amperes per 115 volts is the same thing as 87/1000 divided by 115 "amperes per volt," which means that the "conductance" of the lamp is .000756 mhos.

The fact that "ampere per volt" is a unit can be understood by noting that "mile per hour" is a unit of speed. If an automobile travels 36 miles per 4 hours we have a speed of 36 divided by 4 "miles per hour," or 9 miles per hour. There is no other name for "miles per hour." However, there is another name for "amperes per volt."

While conducting 87/1000 ampere, the lamp will withstand or "resist" 115 volts. The "resisting ability" of the wire in the lamp then is 115 volts per 87/1000 amperes. This is the same as 1320 "volts per ampere." An "ohm" is another name for a "volt per ampere." So we say the "resistance" of the lamp is 1320 ohms. There will be no confusion in regard to using "ohms" or "mhos" for expressing the conducting ability of a wire when we note that one means "volts per ampere" while the other means "amperes per volt." The use is similar to that of "miles per hour" for fast speeds or "hours per mile" for slow speeds.

The "resisting ability" of the resistor we tested is specified as 30 ohms. This means it will resist 30 volts for each ampere. However, we are told the greatest amount of current conducted through the lamp (and therefore through the other resistor also) will not exceed 9/100 amperes. So in this case the "30 ohm resistor" will only resist 2.7 volts per the 9/100 ampere.

A study of the above proves that the whole story in this case is, that the voltage across the lamp stays well within 3 volts of that available from the power line or from the battery. A change of this small amount of voltage has no noticeable effect on the current flowing through the lamp.

Another way of readily understanding that the inclusion and removal of the 30 ohm resistor has no noticeable effect on the current, is to note that a change from 1320 to 1350 ohms simply means a change from 115 volts per 87/1000 amperes to a value of 135 volts per 87/1000 amperes. Here we see that the change in current is only two-thousandths part of an ampere.

Experiment No. 52.

Object: To show that wires can safely conduct only limited amounts of current.

Apparatus Required: Same as for Experiment No. 51. Several 110 volt lamps, including 25-watt, 40-watt, 50-watt and 100-watt sizes.

Apparatus Assembly: No changes.

Experimental Procedure:

1. Insert an additional lamp into the extra lamp socket of the power limiting panel, beginning with the 25-watt size.

2. Hold the test prods on the 30 ohm resistor, and watch carefully for excessive heating of the wire on the 30 ohm resistor. *Painful burns may result if the heated wires touch your body.*

3. Remove test prods as soon as the wires on the resistor begin to smoke. *Do this to prevent damaging the resistor.*

Observations: The resistor can safely carry the current allowed to pass through the smaller lamps. Using a 100-watt lamp causes the resistor to heat excessively so it will be evident that the resistor can be damaged if large amounts of current flow through it.

The small diameter of wire and the manner in which the wire is wound closely together on the resistor-frame do not allow the heat to radiate readily from the wire. Chiefly for these reasons the resistor becomes heated to a greater extent than the other wires used in the circuit. Close inspection of the wires in the filament of the lamps ("fil" is the French word for "wire," while "filament" is the French word for "very small wire") shows these are the smallest wires in the entire circuit as far as their respective diameters are concerned. This shows the greatest heat is concentrated in the smaller wires, while the larger wires remain comparatively cool. If we increased the current in these larger wires they also would become heated excessively and eventually melt or burn out.

The resistor known as Item 14 uses No. 30 wire, which we find can safely carry up to .66 amperes. A current of .66 amperes is allowed to flow when we use a 75-watt lamp (or a combination of lamps that total 75-watts). Therefore, to prevent scorching and possibly damaging this resistor, larger lamps than 75-watts should be avoided.

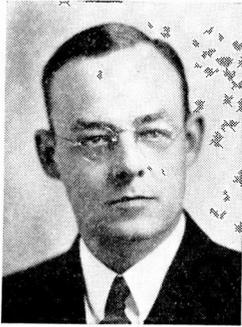
Similarly, the 10,000 ohm potentiometer which is known as Item 13 uses No. 38 wire. Care must be exercised while testing between its terminals to limit the current to less than .016 amperes, although it can withstand a current of .09 ampere (limited by a 10-watt lamp) for a short period. This means you can test between terminals 1 and 2 on this Item 13 while using a 10-watt lamp in the power limiting panel, provided you watch carefully and remove the test prods as soon as scorching of wires becomes evident.

Theory of Action: The current-carrying capacity of a wire used in any circuit or electrical instrument is dependent on the size of the wire. It is customary to allow 1000 circular mils of cross-sectional area for each ampere where copper wire is exposed to good ventilation. Where the wire is used so the air cannot reach it freely for carrying off generated heat, it is customary to allow 1500 circular mils for each ampere. The cross-sectional area of various wires is shown in any wire table.

For instance, a No. 30 wire has a cross-sectional area of approximately 100 circular mils. This wire may be used for carrying a maximum of .1 ampere where the wire is exposed, and it may be used to carry a maximum of 66 milli-amperes where the wire is confined to close places. A No. 30 wire will burn out with 10 amperes.

A No. 38 wire, one of the smallest used in meters and other delicate apparatus, has a cross-sectional area of 15.72 circular mils and is rated to carry 16 ma. and 10 ma. under the two conditions. This wire will burn out with 2.5 amperes.

For ordinary purposes, it is well to remember that a wire will not burn out until a current of 50 to 150 times the allowable current-carrying capacity of the wire flows through the wire.



The Service Forum

Conducted by

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

I wish to thank Student Oliver J. Ruth, Jr. for his aid in preparing the service notes for this issue.

WESTINGHOUSE WR-22 HUM
Check the electrolytic filter condensers.

WESTINGHOUSE WR-22 VOLUME CONTROL REPLACEMENT

Check the new volume control with an ohmmeter, as the shaft may be insulated from the contact arm. If so, ground the arm of the new control.

WESTINGHOUSE WR-22 MICROPHONIC HOWL

Try a new 6D6 tube.

R.C.A. MODEL 121-122 DEAD

If there is no voltage on the anode grid of the 2A7 tube, check the 4 microfarad condenser C-22, as it may have shorted.

FADA MODEL 104-B DEAD

Check the filter choke coil for an open.

ZENITH MODEL 50-60 INTERMITTENT RECEPTION

Replace the condenser in the plate circuit of the 27 first A. F. tube with a .25 microfarad 600 volt unit. Disassemble the volume control and clean the parts with alcohol. No alcohol is to be applied to the resistance strip itself—just wipe it clean with a dry cloth. When re-assembling set the pressure washer tightly between the inner face and roller arm.

R.C.A. VICTOR MODELS R-37, R-38 LOW VOLUME AND DISTORTION

Replace resistor R-8, a 60,000 ohm unit between

the oscillator grid and cathode of the 2A7. The value frequently decreases to as little as 6,000 ohms. If the tone is clear, but weak, check the 10,000 ohm bleeder resistors R2 and R4, replacing with 10 watt wire wound units. These resistors are the two large units (in series) located between the filter condenser block and the volume control.

WELLS GARDNER MODEL 872 BROAD TUNING AND LOW VOLUME

Go over the soldered connections to the R. F. and I. F. coils with a hot soldering iron. Try a new 57 type tube. If the trouble continues, realign the I. F. amplifier (I. F. equals 175 kc.). To prevent interaction between the signal generator and the I. F. circuit, connect a .05 mfd. or smaller condenser between the antenna post of the signal generator and the grid of the first detector.

ATWATER KENT MODEL 465Q DEAD OVER PORTION OF BAND

This is generally caused by run-down B batteries. Instead of securing new batteries, however, reduce the value of resistor R2 (10,000 ohms) to 5,600 ohms.

ATWATER KENT MODEL 246 CUTS OFF

Check for a poor contact on the filter choke at the point where it connects to the plate of the first detector tube. Corrosion at the connection is generally the cause of the trouble.

ATWATER KENT MODEL 40 STARTING HOWL

This may be prevented by shunting the secondary of the first A. F. transformer with a 250,000 ohm resistor.

R.C.A. VICTOR MODEL R-7 WEAK and OSCILLATION

This is generally due to a change in value of the (Page 21, please)

The Ace of Microphones

By RAY S. LYON

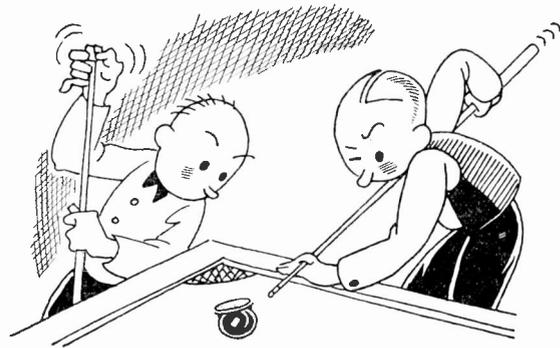
Development Engineer, WOR

(By Special Permission of the Western Electric Co.)

A SINGLETON is this new picker-upper—this latest creation of the Wizards of West Street. The dignified Graybar Sales Department knows it as the 630A Transmitter, but the Radio broadcasting brotherhood has dubbed it the "8 ball mike." The moniker fits and bids fair to stick, for it does look the part of the proverbial 8 ball of the cushioned rectangle: except, of course, for the perky little sailor hat primly set

of his trousers keeps him from falling off as he talks secretly and confidentially with his boss in the control room over a private wire protected by a noise-proof vest that foils any attempt at wire tapping by wanton bandits from the underworld of man-made interference. A kilocycle villain sneaks up behind him and hisses his threat (that's my mistake—you can't sneak up behind this chap because he has ears on all sides).

High-falootin' folks say it's non-directional—but I wouldn't know about that—So-o-o-oh! The seldom handsome hero shouts defiance as he rides down the studio on his recorded sound effects horse, the dying gasp of the heroine's father, the shriek of violins in the "bridge music" and this little veteran of many such scenes wears a "dead-pan" expression. Like a good sports announcer, he passes on an accurate account of the whole business; but there's the orchestra playing the final theme—the "guest announcer" shouting out the commercial blurb, fiddles, bass drums, horns, tooth-paste, corn cures, box-top lures, all blend in a cacophony that only a truly calm and collected microphone could translate into perfect electrical impulses—or whatever it is—that reaches your loudspeakers in perfect relation and fidelity (if your midget can take such things). Ah, yes! this is indeed a microphone!



on its ebony brow. This sailor hat is an acoustic shield, the sound scientists say.

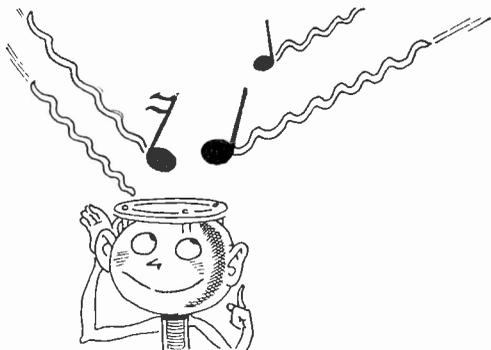
An apple on a stick—a mike—a 630A—the 8 ball—a singleton—Yea! but a microphone! This chap sits alone, a rather obese little flagpole sitter, atop his chromium-plated flagpole in the broadcast studio, surrounded by temperamental artists, singers, wailing saxophones, zooming bass fiddles, shrieking violins, a truckload of sound effects (canned noises to you), and worst of all—an excited accumulation of dramatic actors—all in one show, mind you, oh yes! and a couple of announcers (the regular one and the "guest announcer").

At times the onslaught on the lonely flagpole sitter assaults as if it would topple him from his precarious perch, but a snug fitting socket in the seat

"But why a ball?" you say—Well, good sound waves, the wise ones say, move with a stride like a Garter snake or any kind of a snake you please.



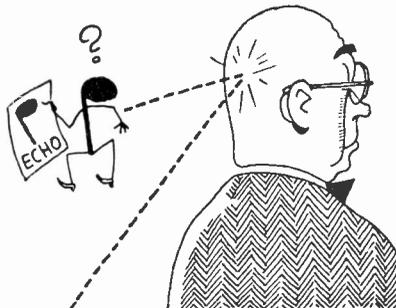
Jack Poppele. Jack, you know—or should know—is head man of the technical headquarters of the head-light station WOR. This Poppele person swings a mean genealogy in things technical. He called from its dust laden sepulchre the original microphone—if such it could be called—used in the pioneering days of long age (the early twenties) by WOR. A truly terrifying piece of boon-dogging it was too!—a combina-



Any obstacle in their path makes 'em mad and they swirl and writhe and tie themselves in knots—they become weird misshapen things which lose their true identity—never to regain it.

This 8 ball is kind to these “soundy-drivers.” When they meet him they don’t have to detour on their merry way, and he doesn’t object to their symmetrical serpentine progression. They approach him will full assurance, tuck their message under his hat and slip onward, unsullied and unsuspectingly to annihilation in the trap cunningly laid for them in the craftily concealed acoustic treatment on the walls of the well-designed studio. If the trap is well set, these vagrants are imprisoned forever in its soft downy meshes from which they can never return to wave a carbon copy of their message in his disgusted face. If you’re a good detective, you’ll track down these dastardly criminals—raid their base of operations and build modern prisons for their incarceration where they will be no longer a menace to a fidelity loving microphone.

The ancestry of this latest newcomer in the world of pick-uppery would make a motley crew if assembled, and indeed they were recently resurrected from their tombs and assembled by

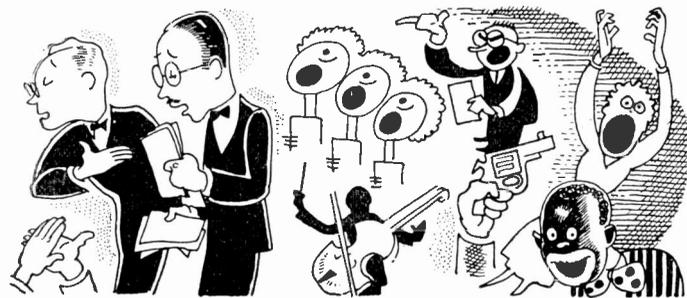


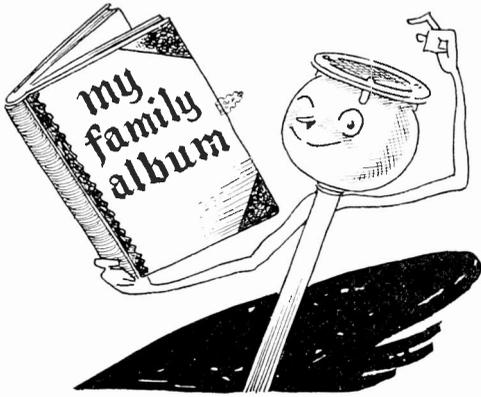
tion of a run-of-the-mill varsity rah-rah megaphone and a gay nineties edition of a wall telephone—minus the crank and bell.

Into this thing the voices of great celebrities were hurled from a distance of six inches—a deep basso voice came out the other end in a rasping falsetto but everybody thought it was swell—so what? Then—inspired by a true sense of responsibility for ridding the world of such contraptions—the zealous Zacharias—the Wizards of West Street—scratched their prematurely bald heads and after much—oh very much—effort aided and abetted by the cream of the nation’s brain factories produced a new microphone—a marvel—a carbon mike—a 373A. This masterpiece held the attention of the WOR boys for many an hour, but it really had an ability to pickup sounds of something approaching the real McCoy. The only bug in this gadget was the villain-like hiss that rose and fell with annoying perseverance if the gain-cranker overstepped his bounds of technical propriety—Result: for an orchestra of over five pieces and singer, a forest of these hissing devils had to be planted among the moosickers and the studio gain-cranker had to be a centipede to keep the trombones out of the fiddle mikes and vice-versa.

After some members of the gain-cranking fraternity had actually

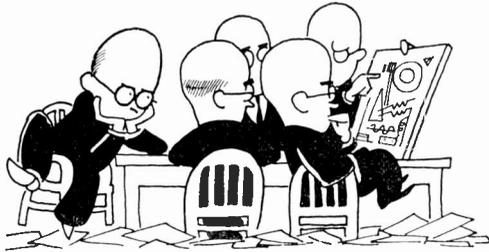
(Page 12, please)





stranger—the 630A—the disdainer of direction. WOR tried one—bought 24 more—tried 24 and bought 10 more—that's history now—See Western Electric ad for proof—or ask the men who

sprouted five hands on each arm as a result of the foregoing, they pounced down on the sleepless know-howers of Bell-dom and came out carrying a hiss-less howling success—(the howling was soon amputated). It was the 394-W Condenser Mike. The broadcasters promptly dubbed this a bullet mike—they would! No hiss—no noise—at least very little—and only one or two to a studio did the trick. The gain-crankers' extra hands shriveled up and dropped off—their ears heard sweeter music and everybody was gay again—you couldn't carry this new gadget around in your pocket exactly, and the stands



use 'em at WOR—they say it's the dream come true—an apple on a skewer—a flagpole sitter—an 8 ball—but what a microphone—Whee!

that held them aloft were as big as traffic semaphore poles, but anyway they were—as the Broadway yokels say “the nuts.”

By now the Boys-of-Bell-dom were going places fast. Next thing WOR'S head man knew—the man from Graybar dropped in with a 618A Dynamic Mike in his catalogue-filled brief case. A beauty if there ever was one—say we. No racket in the back yard—no tubes—and we just got used to that when along pops this roly-poly little





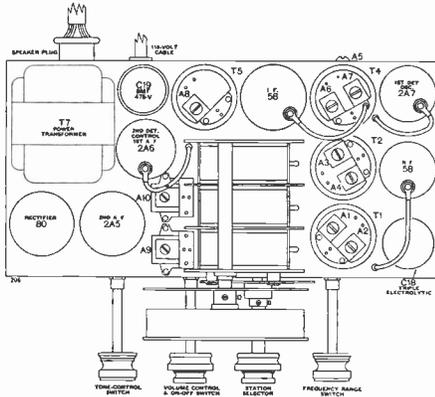
RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

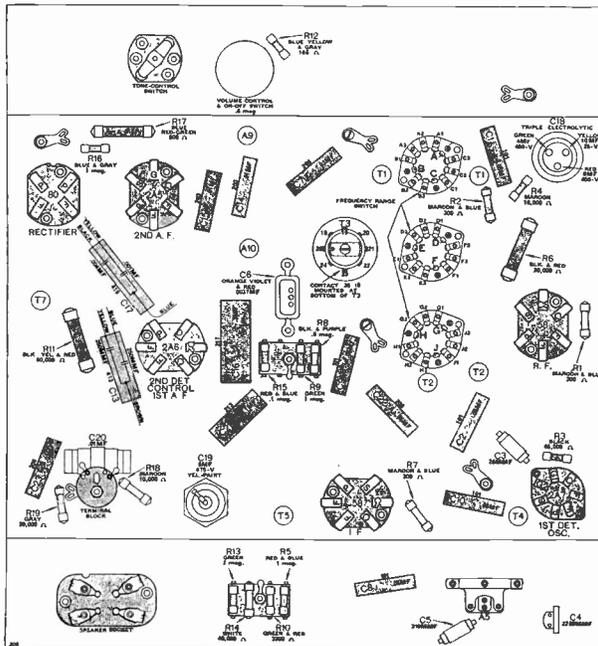
ATWATER KENT Models 206 and 376 (1st Type)



R. F. TRIMMERS ON MODELS 206 AND 376

	Short-Wave Range	Police Range	Broadcast Range
R. F.	A1	None	A2
1st-Detector	A4	None	A3
Oscillator	A10	None	A9
Tracking	None	None	A5

The I. F. trimmers are A6, A7 and A8.



Readers who file Service Data in separate binders remove page carefully, trim on dotted line for same size as data published heretofore.

\$15 or \$150 a Week?

By JAMES G. HOLLINGSWORTH

N. R. I. Vocational Advisor

I HAD an interesting conversation the other day with a student from South Carolina who, while passing through Washington, dropped in to see me. I showed him around the Institute, and upon returning to my office and seating ourselves comfortably for a chat, I asked him how he was getting along in Radio.

"Very well," he replied, "with my Course. It is clear and interesting, and I know that if I can learn Radio at all, I can learn it from N. R. I. quicker and better than any other way."

He went on talking about the Course, the Lesson Texts, Outfits of Experimental Apparatus, and so forth, but all the while he seemed to be holding back something, to have something "on his chest" that he'd like to get off, but didn't know how. Finally he said, (as well as I can remember his exact words):

"Yes, I'm getting along fine, but—well, I don't know. To tell the truth, I'm somewhat in doubt about whether I should go into Radio. You see, just before I left home I met a friend I hadn't seen for a long time, and when I told him I was studying Radio with N. R. I., he shook his head and asked why I wanted to get in Radio. He said he had been a serviceman for over a year, and was making only \$18 a week. This started me thinking! I make more than that in my present job. What's the use of getting into something that pays less?"

The cat was out of the bag at last! I asked him what his present occupation was. "A wholesale grocery salesman," he said, and in answer to my question as to salary, "\$25 a week."

I went on: "Now you make \$25 a week as a salesman. Do you happen to know the salaries of any other salesmen?"

"Sure," he replied, "there are two others with the firm I work for. One makes \$22 a week, and the other \$18. One came there about the time I did, or a little before, and the other one has been there several years longer. One has had about as much experience as I have, and the other much more than either of us."

"Yet, you are worth more than the other two men, when one has had more experience than you, and the other equal experience and length of service. Why?"



James G. Hollingsworth

He squirmed in his seat. "I don't know exactly. Because I get more orders, I suppose."

"Is the territory you cover any better or worse than the other salesmen's?"

"Oh, there's not much difference. All things considered, they are about the same."

I sat back in my chair. "There you have the whole story in a nut shell. Here we take three salesmen employed by the same firm, give them all territories pretty much alike and put them to work under practically identical conditions, and one does noticeably better than either of the others. Isn't the answer simple: that it is not altogether *the opportunities that exist* that count, but *what a man makes of those opportunities?*"

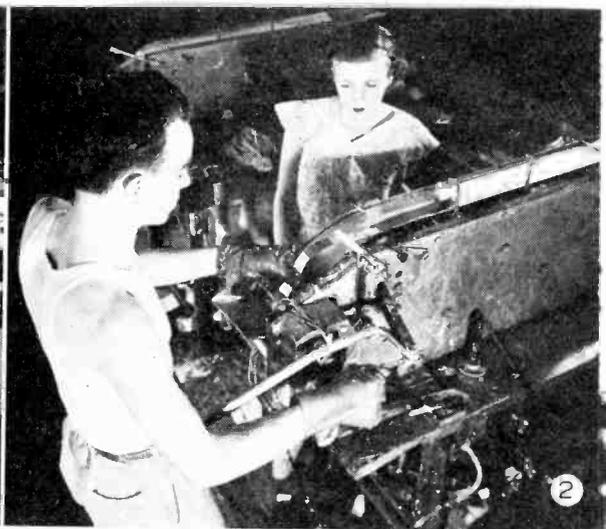
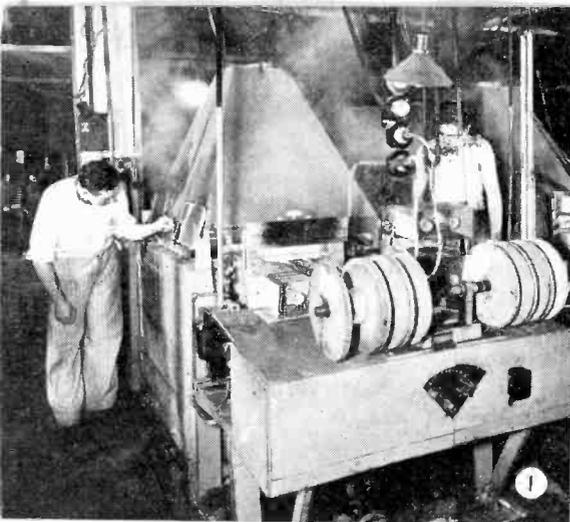
"There are opportunities in all fields—in every kind of job—in every walk of life. There always has been, as long as a single job existed in that field, for obviously *somebody* had to fill it. And the one that did fill it, was the one who made the most of his opportunities of getting it, otherwise he wouldn't have gotten the job. That's plain, isn't it?"

The student agreed — at least, he nodded his head—but I could see he didn't quite grasp what I was driving at.

"Let's look at it another way. Do you have a family doctor?"

He said he did, and was very familiar with him, his being a cousin. "Could you give a guess as to

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Sightseeing in an Electro

By L. J. MARKUS

N. R. I. Associate Technical Writer

Photographs accompanying this article were supplied through the courtesy of P. R. Mallory & Co., Inc., Indianapolis, Ind. Manufacturing processes described and pictured here are those used in the Mallory plant, and may differ in certain details from those used by other condenser manufacturers.

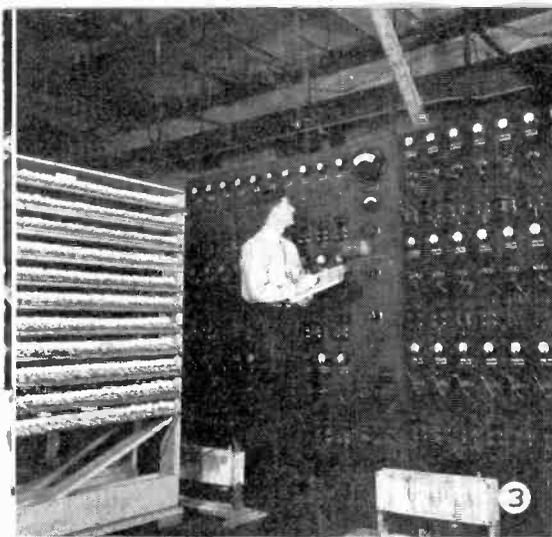
FASCINATING in its simplicity is the manufacture of a modern dry electrolytic condenser, that "concentrated capacitor" which has, in the past few years, taken the radio industry by storm. Walk along with me down the production line of a great condenser factory, where millions of these units, in every conceivable size demanded by the radio industry, are manufactured each year; see just how they are made.

First of all, let's take a completed dry electrolytic condenser apart, to see exactly how it is possible to squeeze such a large capacity into such a small space. Unroll the contents of the wax impregnated paper carton and you will find two sheets of aluminum foil, known as plates, which are separated by sheets of gauze filled with the paste electrolyte. The foil sheets are seldom more than a few feet long and six inches wide, whereas ordinary types of paper condensers may have foil strips hundreds of feet long.

The secret of the high capacity of the electrolytic condenser lies in a very thin oxide and gas film which is formed electrolytically on one of the plates, this film serving as the dielectric of the condenser. The capacity of the condenser depends upon the thickness of the film and upon the overlapping area of the plates; etching the plate with acid to produce irregularities in it gives a greater surface area exposed to the electrolyte and therefore a greater capacity. Only one of the plates, the anode, has a dielectric film; the other plate is pure aluminum.

Now you are ready to go through the condenser plant. The first and perhaps the most important department is that where the plates are "formed," or given their layer of dielectric film. The metal foil used for the plates comes rolled on large wood spools; these strips of foil are pulled through the forming tanks, in which voltages of various values are applied between the moving foil strip and fixed electrodes in the tank. The value of voltage applied determines the thickness of the film; the lower the voltage the thinner is the film and the higher is the capacity of the finished condenser. On the other hand, electrolytic condensers cannot be used at voltages higher than those at which they were formed, so units capable of resisting high voltages will have thick layers of film and lower values of capacity for a given plate area.

A typical scene in the forming department appears in Fig. 1; you can see the spools of foil in the foreground, with electric heaters directed on them to keep the foil at a constant tempera-



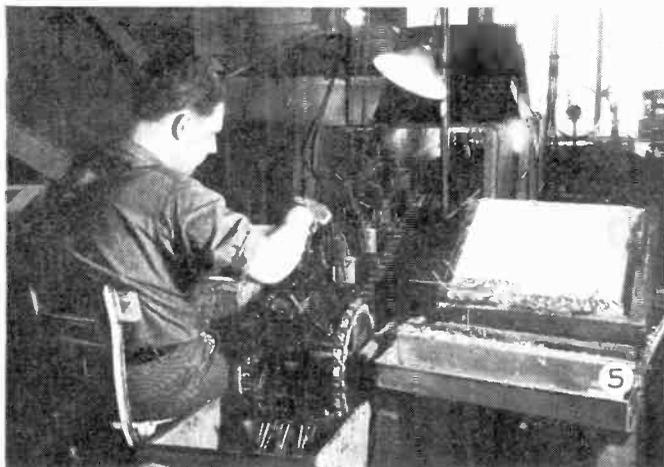
alytic Condenser Factory

ture; the forming tanks are in the background. Hoods above the tanks carry off fumes released by the hot electrolyte. The temperature of the forming solution must be checked regularly and kept constant; a temperature check is being made by the man at the left in the photograph. Once the plates have been formed they must be kept perfectly clean: for this reason all employees who handle plates wear either rubber or cotton gloves.

Dry electrolytics are wound on hand-operated machines which are so constructed that the foil plates and the gauze separators pass through a bath of the paste electrolyte. Some of the electrolyte adheres to the plates, and a great deal

is absorbed by the gauze; any excess electrolyte is squeezed out by the tension under which the condensers are wound, giving a uniform spacing between the plates at all points. In Fig. 2 you can see the winding machine used for this operation. The different strips are fed from separate spools to the mandrel directly in front of the operator, on which they are all wound together. When higher capacity units are desired, the operator simply winds on a few more turns before cutting the strips. The ends of the foil strips are slit by the machine and brought out to serve as terminals for the condenser, or separate terminal strips are attached to the plates. After the condensers are formed, they are placed

(Page 18, please)



Sightseeing in a Condenser Factory (Continued from page 17)

on aging racks like those shown in Fig. 3 and subjected to a voltage higher than their rated value for a definite period of time, to make sure that they are able to meet specifications.

Condensers which pass this preliminary aging test satisfactorily are given a special heat treatment, then placed on the assembly line. Here they are sorted according to size and rated voltage, flexible wire leads are firmly attached to the foil plates, and the units are placed in cardboard or aluminum containers. The nimble fingers of trained men and women, each trained to do a particular part of the assembly job, put the finishing touches on the rolled sheets of foil and gauze, scrape off the insulation for perhaps half an inch at the end of each terminal lead, slip the units into cardboard boxes and seal the covers of the boxes. When aluminum cans are used as containers, small presses clamp the ends of the cans to form a tight seal around the insulating disc on which the condenser terminals are mounted. The assembly room, shown in Fig. 4, is one of the most interesting sections of the entire factory.

Electrolytics must be hermetically sealed so no moisture can enter or leave the units. We see how this is done in another section of the factory; the machine which dips the condenser unit in paraffin is shown in Fig. 5. To make doubly sure that the condensers are perfectly sealed, the rolled foil units are sometimes wrapped first in aluminum foil or wax paper before being placed in the cardboard cartons. Our guide tells us that all carton type condensers made in this factory have wax-impregnated fiber board containers, since their tests proved that wax forms a tighter seal than coated types of fiber board having a silver or gold finish.

The cartons for condensers are all stamped with the size in microfarads and the voltage rating beforehand; this procedure has proved far better than the use of labels, which sometimes come off, leaving the condenser without any marking whatsoever.

Testing is the final step in the manufacture of the dry electrolytics. The finished units move before the testers on a circular table or are brought to the testers in wood trays like those shown in Fig. 6. The tray has a metal lining which makes contact to all of the containers, so the tester simply has to move his test prod from one center terminal of a condenser to another while he watches the meters in front of him.

This completes our trip through the dry electrolytic section of this condenser factory; I will now review the characteristics of these condensers briefly. Actually these units are semi-

dry, for they contain a certain amount of liquid. They are called "dry," however, since they are sealed in airtight cartons which prevent any leakage of liquid under ordinary conditions.

Dry electrolytics must always be used at voltages below those at which they were formed, for otherwise they will break down and conduct electricity. Below the forming voltage, the resistance of an electrolytic is quite high and leakage is sufficiently low that it does not affect the performance of the condenser. Above the forming voltage, leakage increases rapidly and causes the condenser to heat up; excess heat causes an increase in power factor, a drop in capacity, and possibly breakdown.

The aluminum plate on which the dielectric film is formed is known as the anode; this must always be connected to a positive terminal in the circuit. Connecting a dry electrolytic improperly does just as much damage as exceeding the rated voltage of the condenser; reversed polarity causes a large current to flow through the condenser in the reverse direction, de-forming or removing the dielectric film. The anode lead is always red in color, and the cathode lead is black. Where metal containers are used the container is always a cathode, and is to be connected to a negative point in the circuit. Some types of electrolytic condensers have dielectric films on both plates; these are intended for intermittent use in A. C. circuits. Since their most common use is in connection with the starting of "split-phase" or "condenser-start" type motors, these double-formed condensers are often called "starting condensers."

Electrolytic condensers are really highly sensitive chemical devices which give excellent service when handled properly, but which deteriorate rapidly when abused by exposure to excessive heat, by operation above rated values or by careless handling. Always mount dry electrolytics as far as possible from any radio part which radiates heat. Dry electrolytics have no vent through which gas can escape.

Although wet electrolytic condensers have the same basic principles as the dry units, they are made in a different manner. The anode of a "wet" unit is a sheet of aluminum pressed into a cylindrical or grid shape and mounted in an aluminum can which serves as container; the anode is insulated from the container at all points. The container is filled with a liquid electrolyte in the case of the wet unit, or with a mixture of the electrolyte and glycerine which forms a thick, jelly-like mass and gives an almost spill-proof semi-dry electrolytic condenser. Both types, however, are provided with a vent which allows excess gases to escape.

The Service Forum (Continued from page 9)

bleeder resistor. Check the 14,300 ohm screen resistor and replace if it has dropped below 14,000 ohms. Also, check the 8,000 ohm screen-to-cathode resistor. Clean the connections between the plates of the tuning condensers and the chassis.

————— *n r i* —————

R.C.A. VICTOR MODEL 60

OSCILLATION

Connect a .25 microfarad 600 volt condenser from the B plus L. F. terminal on the power unit to the chassis.

————— *n r i* —————

RADIOLA MODELS 60 and 62

NO VOLUME CONTROL

Poor volume control action on strong signals may be attributed to a weak power tube. Low plate current on the power tube upsets the bias on the controlled tubes, preventing the volume control from functioning properly. In this set check the 20,000 ohm resistor in the power pack, as it frequently decreases in value. A 10 watt replacement resistor should be employed.

————— *n r i* —————

R.C.A. VICTOR MODELS R-32, RE45, R52 and RE75

HUM

The hum levels of these sets are quite high and instead of installing a 27 type tube in the first A. F. stage, as suggested in a previous service note, try shunting a 100,000 ohm resistor between the grids of the push-pull tubes.

————— *n r i* —————

GRUNOW MODEL 6D

SLOW HEATING UP

Try a new type 75 tube.

————— *n r i* —————

GENERAL ELECTRIC MODEL A-65

HUM

If everything checks o.k., connect a 50,000 ohm resistor between R8 (in plate circuit of 6C5) and +B. Place a .1 mfd. 600 volt condenser between the junction of these resistors and the chassis. Try a 250,000 ohm resistor in place of R8.

————— *n r i* —————

GENERAL ELECTRIC MODELS A-63, A-65

DISTORTION

This is generally due to a partial open or a complete open in resistor R8, which is in the plate circuit of the 6C5 amplifier tube. This resistor has a value of 50,000 ohms.

EDISON MODELS R6, R7

DISTORTION ON VOICE OR BASS

This is due to excessive movement of the voice coil which strikes the field housing. This may be prevented by inserting a card-board washer under the spider assembly, moving the voice coil out from the bottom of its passage.

————— *n r i* —————

R.C.A. No. 100, 101 G. E. K-43

MODULATION HUM

Trouble occurs only with aerial connected. To cure, connect a 10 millihenry or larger R. F. choke (or a 50,000 ohm resistor) between the aerial lead and the chassis.

————— *n r i* —————

PHILCO 600 SERIES

DEAD

Check the electrolytic filter condensers. There are three of them and it is usually necessary to make replacements with a good grade dry electrolytic.

————— *n r i* —————

R.C.A. 100, 101 G. E. K-43

LACK OF SENSITIVITY

If everything checks o. k., including alignment, try a new 6A7 regardless of manner in which the present one checks.

————— *n r i* —————

EDISON MODEL R4

DIAL CABLE INSTALLATION

To facilitate installation of a new dial cable, remove the two gang condensers on the left and the tuning mechanism and dial. Breakage of the cable is often due to insufficient turns on the drum shaft, which should have four or five turns on it.

————— *n r i* —————

EDISON MODELS R1, R2, C1, C2

RESISTOR TROUBLE

In this set, some of the resistors have asbestos washers at their ends. These washers absorb moisture, shortening the life of the resistors. Carefully check the 12,500 R. F. plate resistor and the 1,500 ohm center tap bias resistor for the 50 type tube. If defective, install new units. If they are o. k., replace the present washers with others made of bakelite or some other non-moisture absorbing material. Trouble is also experienced with the 25,000 ohm bleeder resistor in series with the R. F. plate resistor and the chassis. A 10 watt replacement unit should be

(Page 23, please)

\$15 or \$150 a Week? (Continued from page 15)

what income his practice brings him?"

"I know what it is, or about. The last year it was, roughly, \$3,000."

"Are there any doctors there in your home town who you believe make more?"

"Oh, yes! There's Doctor Johnson. He's the busiest doctor in town. I don't know, of course, but judging from the way he lives and the investments he makes around town, he must make at least \$10,000 a year."

I interrupted him here with: "Which merely brings us the same point. One of these doctors is either more able, or is better in selling his services than the other, or both. One must have learned more about curing human ills during his medical training, or he is more successful in actually curing human ills, or both; which is just another way of saying that one has made and is making more of his opportunities. That's the only logical answer to such a situation."

"As applied to you, and to Radio—well, you could take some other subject, train for another field, and succeed in it in proportion as you make the most of the opportunities in that field. Then why pick Radio, you might ask. Because no other field today permits as much in the way of opportunity to the average man. Where other industries offer one job, Radio offers half a dozen, because Radio is the least developed. Being young as compared with other industries, there is more room for growth and expansion. Where other industries offer \$25 a week, Radio might offer \$40, \$50, or \$75. Why? Because there are fewer trained men for Radio than other industries: therefore, they are worth more."

"You might look at it on a purely mathematical basis. Suppose by reason of training and your ability of selling that training—your personality, health, connections, etc. — you are capable of realizing only 80% of the maximum 100% of your opportunities. If the maximum opportunities in one field on the basis of income are \$150 a month, you will realize only 80% of that \$150 a month, or \$120 per month. If, on the other hand, the maximum opportunities in Radio on the basis of income are \$200 per month, then you will realize \$160 per month!"

After a little more discussion, I believed this student at least "caught my drift," and this was proved a couple of weeks later when I received a letter from him saying he had thought it all over, decided I was right, and was going after his lessons with more energy and determination than ever.

This student's mistake, as a result of which he might have made further and more serious mistakes, is not uncommon. It consists in judging our probable success or failure in a given venture by that of someone else, without knowing; or taking into consideration all the factors contributing to that other person's success or failure.

There is only one remedy: Weigh carefully *beforehand*, make your decision, then *stick to it*—let *nothing* interfere with your decision once you have definitely made and acted on it. The fellow who is forever in doubt whether he will finish a task, seldom ever does finish that or anything else. He is one of the "might-have-beens." I think everyone will agree that to finish a job, even badly, is better than never to finish it at all.

— n r i —

Sells Training for \$30 a Day

As I have finished my 55RH lesson and will soon finish the complete Course, I can say your training is the very best. I am enclosing a picture of myself which I hope to see in print with this letter in the NATIONAL RADIO NEWS.

Any man who wishes to get ahead, should train with N. R. I.

While I have been training I have
Page Twenty-two



Ralph F. Dougherty

repaired every make of Radio and built a few Auto Radios. I am now building a twenty watt P. A. system which I am signing a contract to operate at the Scott County Fair at \$30 per day.

I thank you very much for your service; and at the Fair I will say a good word over my P. A. system for N. R. I.

RALPH F. DOUGHERTY,
Nicklesville, Va.

The Service Forum (Continued from page 21)

installed. An open in this resistor will result in broken down condensers and oscillation.

—————*n r i*—————

PHILCO MODEL 38 DEAD OR INTERMITTENT

This is generally due to failure of the oscillator to work over the entire range. Replace the 6,000 ohm cathode resistor in the oscillator with another rated at about 2,000 ohms. A one watt resistor will prove satisfactory. If trouble is still experienced, bake the oscillator coil and dip it in paraffin. Generally, it is best to install a new oscillator coil when changing the resistor value does not clear up the trouble.

—————*n r i*—————

PHILCO MODEL 16 WEAK

If the voltages are below normal, check the electrolytic filter condensers. They may be open or leaky.

—————*n r i*—————

PHILCO MODEL 65 INTERMITTENT NOISE

Check for loose rivets on the cartridge type condenser containing the resistor. This is located in the plate circuit of the first R. F. tube.

—————*n r i*—————

PHILCO MODEL 81 JR. INTERMITTENT OSCILLATION

Replace the double condenser across which is shunted the wire wound power resistor. Each section has a value of .25 mfd. and 600 volt replacements should be used. One section bypasses the bias resistor for the 42 and the other connects from the line to the chassis.

—————*n r i*—————

COLUMBIA SCREEN POOR SENSITIVITY GRID 8

If the volume on these receivers has gradually dropped over a long period of time, look for a loose rotor section on the condenser gang. These sections are only pressed onto the shaft, and a section will sometimes loosen, slipping on the shaft until a short occurs between the rotors and stators. They should be moved back in place, drilled and the hub tapped for a set screw.

—————*n r i*—————

CROSLEY MODEL 814 DISTORTION

Check the 10,000 ohm metal clad (candohm) resistor used as a bleeder from the screen to the chassis. A 10 watt replacement job should be used.

MAJESTIC MODEL 90 INTERMITTENT BUZZ

Check for a poor contact between the prong of the ballast unit and the socket.

—————*n r i*—————

PHILCO MODEL 70, 70A, WILL NOT TRACK

Look for an open in the .00011 microfarad condenser between the oscillator coil and the plate of the oscillator tube. Try shunting it with a .0005 microfarad condenser. If this works satisfactorily the original condenser was open. In general when this condition occurs trouble will be experienced at the low frequency end of the dial.

—————*n r i*—————

EMERSON MODEL 250 DISTORTION

A new 43 type power tube should be tried regardless of the way in which the original tests. Due to the long filament employed in the tubes considerable trouble is experienced with them and an actual trial is necessary.

—————*n r i*—————

EMERSON MODEL 250 LOW VOLUME

Check the speaker field voltage. If it is low or non-existent there is probably a defect in that section of the rectifier feeding the field or a break down in the condenser across the field. To get at this condenser the regular receiver filter condensers must be unscrewed and pulled to one side.

—————*n r i*—————

CLARION MODEL 40 GENERAL TROUBLES

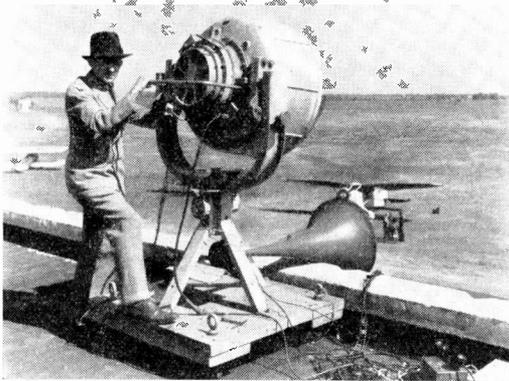
This chassis has a tuned filter system with all inter-connections inside a can. When any section fails the entire block must be replaced. Exact duplicates are difficult to obtain so the following is sometimes used as a substitute: Connect a .0005 from the 47 control grid to chassis, a .01 from one side of switch to chassis, a 12 mike electrolytic from high voltage end of Candohm resistor to chassis, an 8 mike electrolytic from 80 filament to center-tap of high voltage winding. A tone condenser may be connected between the tone switch and chassis if desired but in most instances this has been omitted by repairmen as it is rarely used. Capacity .02. Scratchy sound similar to defective audio transformer usually found in the Candohm. Cut wires inside unit for a considerable distance in each section with sharp knife, then solder a 10,000 ohm, 10 watt resistor across the high voltage section and a 5,000 ohm 10 watt unit across the low voltage section. The original terminals make excellent anchor lugs.

Mammoth Sound Projecting System Underway

The largest and most powerful sound projecting system ever constructed is being installed at Roosevelt Raceway at Mineola, L. I., New York, where Roosevelt Airport No. 1 used to be. The equipment is intended to be used for announcements of automobile racing events and to provide music and entertainment originated by artists in the studio on the premises. Program material sponsored by manufacturers in the automotive industry and associated lines, as well as Radio programs and electrical transcriptions, may be included in the entertainment furnished to the crowds through this medium.

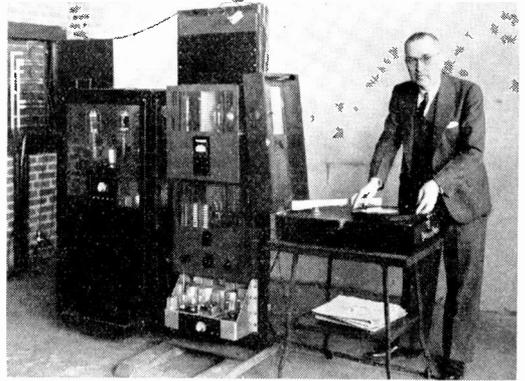
This new super-powered Western Electric sound system is designed to cover the entire one-half square mile expanse from a single source. The new system is a development of Bell Telephone Laboratories, and the equipment is being furnished and installed by the Guided Radio Corporation, as agent for the Graybar Electric Co.

Whereas in the past, it has been necessary to spot a number of loudspeakers at various points to cover so large an area, the new super-power sound projector makes it possible to literally "spray" sound out over the entire area from a single source. Interference between a number of different sound sources, which was experienced with former systems, is totally eliminated. No longer will the audience hear the words of an announcer coming from a nearby loudspeaker to the left, jumbled by the same words lagging slightly behind from another source at a greater distance to the right. Now all the sound will arrive simultaneously at any point, from a single centralized source, with no confusion.



The super-power sound projector trained upon a distant "target" so that voice or music may be delivered to that point without the usual waste of acoustic energy over a large area.

With the development of this high quality super-power sound projector, distances up to a mile may be spanned if necessary. At the Roosevelt Raceway, a 100 foot central steel tower is being constructed, at the top of which will be located a cluster of 19 mammoth sound projectors, pointed radially so as to cover the near and far reaches of the field. In addition, there will be 12 smaller loudspeakers located on the same tower to serve the nearby grandstand. This



The super-power amplifier which feeds 1000 electrical watts into the new "searchlight" sound projector.

arrangement provides uniform sound intensity throughout the entire premises.

Amplifiers having a total power of 20,000 watts, as well as the necessary input and power equipment, will occupy a room 25 feet square at the base of the loudspeaker tower. The control devices will provide for individual regulation of each sound projector so that the sound distribution may be adjusted to compensate for changes in the wind and in accordance with which parts of the field are occupied by spectators. Several special refinements will be included, such as automatic volume regulation to provide maximum intelligibility above the noise of the racing cars. The announcing studio will be a sound-proof glass enclosed structure atop the judges' observation tower on the main grandstand, 120 feet above the ground.

— n r i —

If all our misfortunes were laid in one common heap, whence everyone must take an equal portion, most people would be contented to take their own and depart.—Socrates.

Novel Radio Items

—BY L. J. MARKUS—

Death Rays Kill Insect Pests!

Electrons shot out through the paper-thin glass windows of the new Westinghouse Lenard tube spell death for nearby insects. This tube requires a plate voltage of 100,000 to 200,000 volts D. C.; who can devise a portable high voltage power supply which will allow the mounting of several tubes on a farm tractor, thus replacing chemical sprays with electron bombardments which no insects could escape?

— n r i —

Fire Truck Is Radio Antenna!

A hook and ladder borrowed from the local fire department was used as an antenna tower by Radio Station WRAK of Williamsport, Pennsylvania, when trying out a number of new transmitter sites. A 20-foot pole was fastened to the top of the 75-foot fire ladder in such a way that the antenna could be raised and lowered in a few minutes. A portable transmitter, installed in an automobile, accompanied the fire truck on a tour of possible antenna sites.

— n r i —

Sailors Vote By Radio!

French sailors may soon vote at election time, even though they are on the high seas. A bill which has been introduced into the French Chamber provides that each ship shall contain a voting booth, over which the captain shall preside, the results being radioed to shore.

Ink Smears Operate Electronic Relay!

The extremely small current passed by a printed design or a pencil line on a sheet of paper is sufficient to operate one type of industrial electronic relay. The current passed between two contact fingers which press against the paper is amplified by an ordinary radio tube before being fed to the relay. Applications include control of paper cutting machinery by printed designs in the margin, and control of stamp perforating machines (Uncle Sam now uses the electric eye for this).

— n r i —

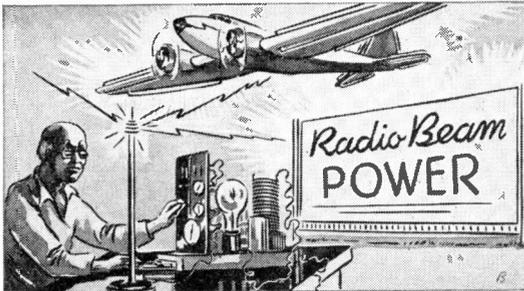
Cathode Ray Tube Gets Heat!

J. L. Baird, early television experimenter, was recently granted a patent for his method of heating the screen of a cathode ray television tube in order to get brighter images. Fine wire, embedded in the sensitive screen material, heats the screen just to the point of glowing; the impact of the electron stream brings out the televised scene in bright, incandescent form.

— n r i —

"THE SHADOW" Gets Call Letters!

The inductotherm machine used at Harvard University to "bake" injured athletes has been assigned a frequency channel and the call letters NDLA. Last year this and similar machines baffled radio men by creating mysterious radio interference which was called "The Shadow."



LIGHT IS SENT BY RADIO! Neon tubes mounted on the wings of airplanes can be illuminated by the power radiated from a microwave transmitter on the ground. Dr. H. Nagaoka, well-known Japanese electrical physicist, developed this improved method of sending power over radio beams. Neon signs on the ground can also be lighted by the power of these 20-centimeter long radio waves.



INVISIBLE CONTROL THWARTS THIEVES! The newest of applications for a simple radio oscillator causes alarm gongs to ring and lights to flash on when a safe, door, bed or other metallic object is approached. Changes in capacity between ground and the "feeler" antenna cause the relay in the plate circuit of the oscillator tube to turn on the alarm device. Several types of these capacity control units are now on the market.



N.R.I. ALUMNI NEWS

P. J. Dunn President
Clarence Stokes, Ed. Meyer Vice-Presidents
E. Witherstone, Earl Bennett Vice-Presidents
Earl Merryman Secretary
R. B. Murray Executive Secretary

Nominations for 1937

It's time to think about nomination of officers of the Alumni Association for 1937!

According to the Constitution and By-Laws, it is the duty of each member in good standing to submit two names for each office. There are seven offices to be filled: President, four Vice-Presidents, Secretary, and Executive Secretary.

The officers who served during the year 1936 are as follows:

- President, P. J. Dunn, Baltimore, Md.
- Vice-President, Earl Bennett, Evanston, Ill.
- Vice-President, E. J. Meyer, St. Louis, Mo.
- Vice-President, Ed. Witherstone, Toronto, Ont., Canada.
- Vice-President, Clarence Stokes, Philadelphia, Pa.
- Secretary, Earl Merryman, Washington, D. C.
- Executive Secretary, R. B. Murray, Washington, D. C.

On page 30 of this issue of NATIONAL RADIO NEWS you will find a NOMINATION BALLOT FORM. It is arranged so you can remove it without injuring the magazine. Just tear it carefully on the dotted line.

All of the officers of last year are candidates for re-election—you may nominate these or select others.

You will want to select the men who you feel are best fitted for the offices—the men who have worked the hardest—done the best jobs for the betterment of the Association. So feel free to cast your ballot for the men you want. This is your Association—your vote is worth as much as anyone else's. Every man has an equal chance—you may even vote for yourself. Of course, all

nominees must be Alumni Association members in good standing.

Fill out and sign the blank immediately and return it to National Headquarters. The two men having the highest vote for each office will be considered nominees—and in the next issue of the News their names will be submitted to the members for final selection of the officers to serve for 1937.

Be sure to get your ballot into National Headquarters promptly. There is quite a bit of work attached to handling the ballots. They must be sorted, counted and recorded, when they are returned to us. We, therefore, request that you give your immediate attention to this important matter of selecting your choice for next year's officers.

— n r i —

National President Returns from Tour

After spending a month and a half in the west, "Pete" Dunn from Baltimore, our National President writes: "The western trip was a great success." He had the opportunity to meet hundreds of N. R. I. students and graduates in Chicago, Detroit, Cleveland, Traverse City, and in many other cities. In the next issue of the News we want to give you the complete story of the trip in "Pete's" own words.

A business report of the trip was sent to Washington, so that National Headquarters might be guided in carrying out various promotional ideas in connection with Local Chapters. R. B. Murray, Executive Secretary, assures those Chapters in which Mr. Dunn has visited, that he will act upon their requests as quickly as possible. If Mr. Dunn is re-elected President next year, he will be the only president who has held the office for three consecutive years. Here's wishing you the best of success, Pete!

Baltimore Chapter

Recently, we had as our guest speaker for the evening, Mr. J. Kaufman, Director of Education at the N. R. I. He delivered a lecture entitled "Field and Bench Radio Testing." Mr. Straughn, a member of the Technical Staff, assisted Mr. Kaufman in a very novel way. Mr. Straughn helped to prime the audience with tactful suggestions and the result was that everybody asked questions and entered into the discussions wholeheartedly. Mr. Kaufman was kept busy answering members' problems for the full two hour session. Incidentally, Mr. Kaufman has helped in formulating the fundamental features of a number of Radio testing outfits that are now on the market.

We extend a welcome hand to the following new members:

T. A. Felks
W. M. Rohrback
R. F. Thompson

B. Diffenduffer
C. W. Braun, Jr.
C. Sorensen

W. Giese, dynamic Editor of the *Baltimore Bulletin*, should feel proud of his accomplishments while holding the reins as Editor. His little magazine is known far and wide as a "peppy" and interesting publication. We as members of the Baltimore Chapter are mighty glad, indeed, to know Mr. Giese has consented to serve as Editor until the end of the year—and we secretly hope for next year, too.

N. R. I. students and graduates will find a hearty welcome at our meetings. They are held the first and third Tuesdays of every month at the New Howard Hotel, 8 N. Howard Street, Baltimore.

— n r i —

Introducing Four Baltimore Chapter Officers

The gentlemen whose pictures appear below help to make the wheels go 'round at the Baltimore Chapter. They realize the benefits to be derived from organized effort and are out to see that Alumni members get their full share of enjoyment, education and profit by attending the meetings of the southern Alumni group.

Reading from left to right they are: Mr. F. Provini, member Financial Committee; top cen-

ter—Mr. I. A. Willett, Secretary and Treasurer; lower center—Mr. A. Grollman, Sergeant-at-Arms and Librarian; extreme right—Mr. B. M. Olmstead, member Financial and Publicity Committees.

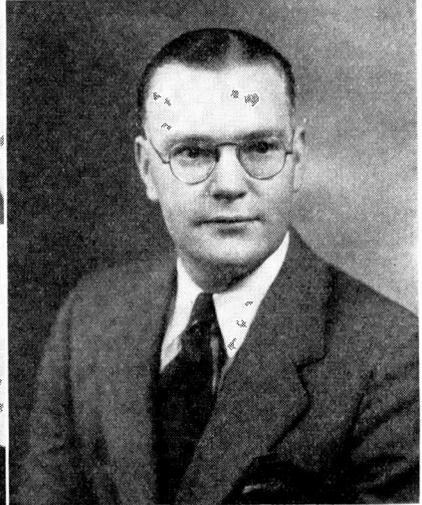
In the next issue of the News, we hope to bring you the pictures of E. O. E. Gralley and W. Giese—these two personalities have done a great deal to put the Baltimore Chapter on the map!



F. PROVINI



I. A. WILLETT
A. GROLLMAN



B. M. OLMSTEAD



New York-Metropolitan Area Chapter

FLASH FLASH FLASH

BIG MEMBERSHIP DRIVE IN N. Y. CHAPTER N.R.I.A.A. CAUSES SENSATION IN ALUMNI CIRCLES. NEW RATES, NEW PROJECTS, NEW IDEAS. WIDE AWAKE GRADUATES SWARMING MEMBERSHIP COMMITTEE FOR ADMISSION.

September 3rd marked the beginning of one of the biggest membership drives ever attempted by the N. R. I. Alumni Association. National Headquarters joined hands with the N. Y. Chapter in preparing an unusual program that no N. R. I. man with an eye to his future dared to miss.

Over one thousand invitations were mailed to graduates, students and Radio organizations in the New York area. The results was the meeting hall on September 3rd was filled to capacity. Mr. Allen Arndt, Chairman, ably conducted the meeting and proved that his *public speaking training* was not amiss, when confronted with the problem of talking before a large audience.

Bob Murray, Executive Secretary, came up from Washington to assist with the meeting. Also Dan Fairbanks, Sales Manager for the International Resistance Company, gave the "boys" some new slants on resistors and the various improvements that are being made.

The success of this meeting was overwhelming, and we want to take this opportunity to thank National Headquarters for their cooperation in helping the New York Chapter achieve, what we believe to be, one of the largest Chapter meetings ever held. It is the intention of the New York Chapter to follow up immediately with an interesting fall program.

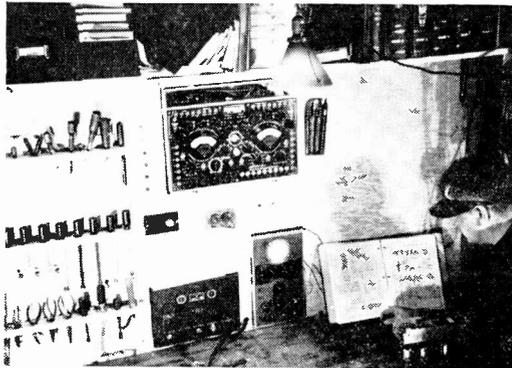
In the future the Tattler will be known as the Pilot. There will be plenty in store for the man who receives the Pilot. From now on we will mail the Pilot only to members in good standing. So in order to receive this interesting little bulletin, make sure that you have joined the New York Metropolitan Area Chapter.

Any N. R. I. student in New York or vicinity is invited to our meetings, held the first and third Thursdays of every month at Damaszeks Manor, 12 St. Marks Pl., 3rd fl., New York City.

Howard Waitt Visits National Headquarters

Alumni Member, Howard Waitt, recently motored down from New York City to visit National Headquarters of the Alumni. He had a long chat with our Executive Secretary, R. B. Murray, and told him some of the promising things that are happening in Radio in and around little old New York!

Howard brought along with him a number of photographs of his shop, the one below being



of his test-bench. I believe we will all agree he has a mighty fine arrangement.

Here are a few comments in Howard's own words about his history and ambitions in Radio, Howard said:

"I was a private chauffeur, but like every thing else that folded up with Wall Street, this job went by the boards, too. So, I wrote Mr. Smith for 'Rich Rewards in Radio.' Well, it was work, but the N. R. I. Course was so plain and helpful I started forging ahead.

"I had a few hard knocks in the beginning, but thanks to N. R. I.'s cooperation I now have a nice little shop and am getting my share of Radio work. To succeed, I believe all a fellow has to do is plug, study and keep up with the fast pace Radio is setting today. In return for what N. R. I. has done for me, I intend to devote a lot of my time to the New York Metropolitan Area Chapter, and take an active part with that group.

"New York City has enough N. R. I. men that if they will now attend the meetings held in our new hall, they will find much to interest them. There is plenty to be gained by close cooperation, such as N. R. I. has afforded us through the organization of Local Chapter units."

Well, friend Waitt, you have our best wishes for success and you will always find a welcome sign over the door of N. R. I.

Chicago Chapter

Secretary Sam Juricek is wearing a broad grin these days, he says the raffle took a load off his mind. The boys did rather well with their books, but one fellow "copped" all the prizes. St. Clair sold the grand prize ticket which won the Mix-master to Mr. G. E. Swenson, of 5954 Grace St. And then when the drawing was made for the members' prize, St. Clair's name popped up again, so he hauls home the soldering iron. Congratulations!

Here are a few of the fine lectures we have had in recent weeks:

"Cathode Ray Oscillograph and Associated Testing Equipment"—speaker from Allied Radio Corporation.

"Practical Mathematics"—by Bill Lewandowski.

"Sales and Service of Midget Sets"—by James Balsamello.

"Servicing Electric Refrigerators" — by J. Dickten.

We want to take this opportunity to thank each and every one of these speakers for giving us the benefit of their knowledge and extensive experience in the Radio field. Mr. Dickten, incidentally, is a Radio service man, but he knows his refrigerators!

You will find a good crowd of fellows at the Hotel Sherman. We meet the first and third Fridays of every month.

Full information on the Chicago Chapter's activities can be obtained by writing Mr. Samuel Juricek, Secretary, 4223 N. Oakley Avenue, Chicago, Illinois.

— n r i —

Toronto Chapter

Mr. E. O. E. Gralley, Chairman of the Baltimore Local Chapter, visited our fair city a few weeks ago. We deeply regret that it was not a meeting night, so that the boys could have met this interesting chap—we certainly agree with the Baltimore Chapter that they have a fine leader and energetic organizer.

A. Stollard, Chairman, assures the boys that things will be moving at a fast pace again this fall. Shortly there will be an announcement of the new meeting headquarters.

Every N. R. I. man living in the vicinity of Toronto, Canada, is urged to get in touch with Ed. Witherstone, 363 Nairn Ave., and learn how he can take part in our activities. Here's your opportunity, fellows, to hear some good Radio speakers and meet other N. R. I. men with the same goal in Radio.

Nomination Ballot

All Alumni Association Members are requested to fill in this Ballot and return it promptly to National Headquarters. This is your opportunity to select the men who you want to run your Association. Turn this page over—the entire other side is devoted to your selection.

After the ballots are returned to National Headquarters they will be checked carefully and *the two men having the highest number of votes* for each office will be considered as candidates for the 1937 election. This election will be conducted in the next issue of NATIONAL RADIO NEWS.

You may vote for the officers who served last year or select entirely new ones. Its up to you—select any man you wish just as long as they are MEMBERS IN GOOD STANDING OF THE N. R. I. ALUMNI ASSOCIATION. Be sure to give the city and state of your selections to prevent any misunderstanding. A list of the 1936 officers are to be found on page 26 of this issue.

Detach this slip carefully from your NATIONAL RADIO NEWS so as not to damage the book. Tear off the slip at the dotted line, fill it out carefully, and return it immediately to R. B. Murray, Executive Secretary, N. R. I. Alumni Association, 16th and U Sts., N. W., Washington, D. C.

Your signature

City State.....

(Over)

The 1937 nomination is a very important one. Choose carefully the men you desire to handle the reins of the Alumni Association for the coming year. Let's all do our part to help the staff handling the elections, by submitting ballots on or before October 15, 1936.

Nomination Ballot

R. B. MURRAY, *Executive Secretary*,
N. R. I. Alumni Association,
16th and You St., N.W.
Washington, D. C.

I am submitting this Nomination Ballot for my choice of candidates for the coming election. The men below are those whom I would like to see elected as officers for the year 1937.

MY CHOICE FOR PRESIDENT IS

.....
City State

MY CHOICE FOR FOUR VICE-PRESIDENTS IS

1.
City State

2.
City State

3.
City State

4.
City State

MY CHOICE FOR SECRETARY IS

.....
City State

MY CHOICE FOR EXECUTIVE SECRETARY IS

.....
City State

Philadelphia-Camden Chapter

Word has reached National Headquarters that the Philcam Radio Sales and Service has moved to 3347 N. Front St., Philadelphia. More ideal quarters for the service station and Chapter headquarters brought about this change. The phone number is still Nebraska 7163.

Every effort is being made to "pep up" our Chapter magazine *The Philcam Key* with intimate, lively stories on what our members are doing in Radio. Members are urged to send news items to the *Key*. Write—

William Trimble, Editor, 3034 N. Darien St., or Joseph Masny, Asst. Editor, 4632 Bermuda St., Philadelphia, Pennsylvania.

All of us men here at Philadelphia are staunch supporters for the re-election of Clarence Stokes as one of the National Vice-Presidents for 1937. The way in which he has worked toward improving our own Local Chapter and cooperated with National Headquarters is evidence that he has his heart and soul in Alumni work.

Charles Fehn, Chairman, of the Philadelphia-Camden Chapter, is doing his share to make "Progressive Champs," the nickname of the Local, means something more than just a name. His latest article in *The Philcam Key*, entitled "Local Application of Oscillator-Preselector Circuit" was very fine indeed.

We repeat, N. R. I. students living in Philadelphia, Camden and the vicinity are invited to attend our meetings. Full information concerning our Chapter activities may be obtained by writing Clarence Stokes, Secretary, 3347 N. Front St., Philadelphia.

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Directory of Chapters

Baltimore—I. A. Willett, Secretary, 2411 Arunah Ave., Baltimore, Md.

Philadelphia-Camden—Clarence Stokes, Secretary, 3347 N. Front St., Philadelphia, Pa.

New York—L. J. Kunert, 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—Samuel Juricek, Secretary, 4223 N. Oakley Ave., Chicago, Illinois.

Pittsburgh—Albert Maas, Secretary, 9 S. Howard Ave., Bellevue, Pa.

Detroit—F. E. Oliver, Secretary, 218 Alter Rd., Detroit, Mich.

Tear carefully along this line



N. R. I. HAM LIST

N. R. I. hams who have reported since the last issue of the NEWS.

Milton L. Pokress—W21MW—Brooklyn, N. Y.
John C. Yednock—W80VQ—Greensboro, Pa.
Howard A. Yuen—W60AA—Grass Valley, Calif.
B. G. St. John—W6MG1—Greenwood, Calif.
W. Shultz—VE4ACL—Winnipeg, Man., Canada.
Patrick McCreese—W8QDY—Columbus, Ohio.
W. L. Sonnenstuhl—W7FWS—Rawlins, Wyo.
W. D. Monroe—W60BU—Alameda, Calif.
L. D. Ascencio—HIIP—Port-au-Prince, Haiti.
C. W. Blackwell—W60DL—Los Angeles, Calif.

Although all N. R. I. students and graduates operating ham stations are invited to send in their call letters, there must be quite a few who have not taken advantage of the opportunity. Send them in, fellows, and watch the list of N. R. I. hams grow.—Editor.

—————n r i—————

Success—And Then Some

You will most likely be interested to know that my wife gave birth to twins July 29th—a boy and a girl—and that they are all getting along just as beautifully as can be expected.

In addition to this staggering event I received a nice boost in salary. Both of these happening at the same time still has me a little woozy.

Grad. ALLEN MCCLUSKEY, Birmingham, Ala.

—————n r i—————

One Year Search Ended

This lesson (No. 9) provided me with information which I did not find in a year's search thru Radio magazines and library technical books. I really am delighted with my Course. Thank you.

ADRAIN MCKINNON, Boston, Mass.

Submits "Shop Kink"

Prolonging the Life of the Soldering Iron

Excessive heating of a soldering iron pits the soldering tip. A handy method of keeping the iron at a satisfactory temperature without overheating is to arrange a 50 or a 75 watt lamp in series with the iron and a switch so that the lamp can be short-circuited when maximum temperature is required. The presence of the lamp in the circuit limits the current flow through the iron to a temperature which will keep the iron warm. The lamp is short-circuited a minute or two before the iron is to be used.

The correct lamp depends upon the normal wattage rating of the iron. A 50 watt lamp is satisfactory for soldering irons rated at from 100 to 200 watts; a 75 watt lamp for soldering irons rated at 250 to 300 watts. The switch should be of the knife blade type capable of carrying 5 amperes.

I hope that this information will help out some of my pals in the N. R. I.

HENRY HOFFMAN, Pittsburgh, Pa.

Incidentally, this is a further application of the power limiting panel described in the first "Laboratory Page," August-September issue, and continued in this issue.—EDITOR.

—————n r i—————

Likes N. R. I. Men's Service Tips

A word about our N. R. I. magazine. I think it a fine publication and I surely enjoy it; like to read the service tips from fellow servicemen, articles of visits to various factories. Also the service sheets sure come in handy. When through reading the book I always make sure to remove the service sheets for future reference. I have quite a manual of N. R. I. service sheets.

Graduate ALEXANDER C. HENDRIKSEN, Elgin, Ill.

Small Metal-Can Electrolytics for Large Capacities

The recognized lasting quality of the metal-can electrolytic, together with a marked reduction in bulk for a given capacity, is achieved in a new line of dwarf units announced by Aerovox Corporation, 70 Washington Street, Brooklyn, N. Y.

Known as the GLS series, these new electrolytics are of a uniform 1" diameter, but vary in height from 2-3/16" for the 4 mfd units, to 4-3/8" for the 16 mfd. Two voltage ratings are available—the GLS5 or 450 DC voltage, 525 surge peak, and the GLS250 or 250 DC voltage, 300 surge peak. Capacities of 4, 8, 12 and 16 mfd are offered.



The 1" can electrolytic, heretofore popular for crowded assemblies, is now packed with twice as much capacity for a given height, over formerly available metal-can units. In other words, far better filtering can now be provided in the same condenser bulk. Or, if the user must save on space, the same capacity may be had in half the height of former 1" can units.

— n r i —

Selectivity Plus

Two commercial travelers were exchanging tall Radio stories in the presence of an old country man whom they were trying to impress.

"You got a Radio set?" asked one.

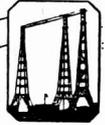
"Yes, sir" replied the country man, "a very good one, sir."

"Does it have good selectivity?" asked the traveler, with a wink at his companion.

"Well, yes," said the old fellow, "it has. The other night I was listening to a quartet and I didn't like the tenor, so I just tuned him out, and listened to the other three . . ."

Page Thirty-two

NATIONAL RADIO NEWS



FROM N. R. I. TRAINING HEADQUARTERS

Vol. 7

October-November, 1936

No. 5

Published every other month in the interest of the students and Alumni Association of the

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T. E. ROSE, EDITOR

S. M. ARMSTRONG, MANAGING EDITOR

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