NATIONAL RADIO NEWS

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Electronics, Inc., Stages a Hallowe'en Party

Alumni Association News

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THE AGE OF OPPORTUNITY

Your father or your mother will remember the excitement which swept the country when "moving pictures" were first introduced. Today, scarcely thirty-five years later, you are enjoying the marvels of natural-color talking pictures. Within a single lifetime this great progress has taken place, bringing opportunity, success and fame to countless thousands.

About the same time that movies became popular, the Wright brothers were making their first flights at Kitty Hawk, North Carolina. The aviation industry was born—and look at it today!

It was just eighteen years ago that station KDKA thrilled the nation with the first broadcast of presidential election returns; today Radio is ranked among the billion-dollar-a-year industries, with Radio servicemen taking in sixty million dollars last year for their labor alone in repairing Radio sets. Radio is still expanding—still creating new opportunities for trained men!

And today, under our very eyes, another huge new industry is being born. Television transmitters are already feeding picture signals into the ether, and television receivers are reproducing these pictures with a quality approaching that of home movies. No one can predict how soon television may emerge from its experimental stage, creating countless more good jobs for men having the necessary fundamental Radio training.

Today, also, the electronic control field offers unlimited opportunity. The man who knows how to build and install robot electric eye devices, electric ears, electric noses, electric feelers, and electric tasters need never worry about his future—and this industry, like television, is still in its baby days.

Radio, television, electronics—growing despite business recessions—offering much today and promising more tomorrow—and best of all, one fundamental course of training can prepare a man for any one. Truly we are living in an age of opportunity!

E. R. Haas, *Vice-President and Director*

Tailored Radio Waves

Directional antenna systems are quite the thing now for broadcast as well as short-wave transmitters, but did you know that up to a few years ago the hard-headed directors of radio stations scorned the idea that broadcast station signals could be aimed or concentrated in desired directions? This fascinating story by Alexander Maxwell, reprinted from "Scientific American" magazine, tells how directional broadcast antennas were born, how they are built, and how they work.

IN physics class it was taught that radio waves travel in an ever expanding circle, like the ripples created when a pebble is tossed into still water. They do, when left to their own devices, but not being satisfied with anything as simple as that, engineers have devised ways to make the waves radiate in the form of a fan, a shamrock, a four-leaf clover, a spatula, a double watermelon or an airplane propeller. These are only a few examples of the field patterns which can be secured by proper design of the transmitting antenna system.

An engineer named Southworth went to the bottom of the subject, and when he came up he had over 60 possible patterns for two antenna tower installations; not stopping there he kept on until he had worked out the possibilities of all combinations up to 48 towers. The patterns were startling and glorious to behold, for they ranged from starfish to daisies and then ended in one long, lean design no wider than a highway and stretching out for thousands of miles. That seemed to be what he was seeking—virtually a wireless telephone line. It worked like a charm and is now in use for transoceanic service.

Broadcasting station engineers pricked up their ears at the news. Here was something that looked interesting, for radio reception conditions were unbearable in congested locations. Government regulations curtailed activity; competition was intense. In short, the time was ripe for any improvement which would relieve the situation. The early history of all enterprises is practically identical. There is a pioneering period, one of floundering expansion, sudden regulative interference, then things settle down to serious business. Radio was no exception.

In 1920 the enterprising pioneers were already at work. It wasn't broadcasting then; it was fun, masquerading as experimental work. Existing commercial stations and amateurs both dabbled, and everybody had a good time. 8XK, the station of Frank Conrad in Pittsburgh, became the first commercial broadcaster under the call of KDKA. In 1923, broadcasting became popular and swept the nation by storm. Stations materialized over night; every able-bodied man who could read a blue print and handle a soldering iron built a radio receiving set. The thrill of hearing a voice a thousand miles away held most listeners spellbound. The favorite pastime became sitting in front of the radio, picking up one station after another and sending each a postcard. It was indeed the era of pioneering. It was new to broadcaster and listener alike; they both got a thrill out of it and everybody was happy. Pioneering, however, is always a transient stage and the end came rather abruptly.

In 1927 the Government decreed that the situation was out of control, so a department was created to regulate radio broadcasting. All licenses were called in, new wavelengths were assigned and maximum power was specified for each station. The assigned bands were classified as clear channel, regional, or locals, depending upon their purpose and coverage. Many, which could show no real reason for existing, were dropped from the list.

The problem was settled, as far as the Government was concerned. The stations were placed so that no two occupying the same wavelength were within conflicting distance of one another. This was 100 miles for locals and up to 700 for regionals; a clear channel station had its own wavelength all to itself. To make this system work out in practice many of the less prominent stations were granted daytime hours alone; others were permitted to use full power before sunset, but, for example, only one fifth as much in the evening. Station requirements were tightened and, to be permitted to use the air at all, the transmitter and program policy had to come up to rigid specifications.

While the situation was decidedly improved, many station operators felt that they were not covering their territory as completely as they should. Suppose, for example, that it took 1,000 watts consistently to put a satisfactory signal into a certain neighboring city, and the station was allowed to use only 500 watts. Increasing power was out of the question, for the station would then interfere with the others that shared the same wave. The only way out was to use a more efficient antenna, and so the engineers turned to the charts Southworth had prepared, as the next logical step. They talked controlled radiation, plans were drawn on table cloths in

restaurants, and conventions and meetings were given over to discussion, but those who held the purse strings were still reluctant. Twenty thousand dollars was the very least it would cost to make the change. How did the hard-headed business men who directed the destinies of radio stations know that the idea would work? Let George do it first. If it works for him, then will be soon enough to talk.

And sure enough, George did it. A small and practically unknown station on the west coast of Florida, WFLA-WSUN, put in the first two-element directional broadcast antenna. Radio engineers and station executives alike figuratively held their breath; when tests were made, hundreds of receivers were tuned in. It worked; the field pattern was no longer a perfect circle; it was warped into exactly the shape the engineer specified.

WIND, at Gary, Indiana, was the second station to try the experiment. The radio world at large was still not convinced that the idea was practical. In the fall of 1933 the redesigned station was ready to go on the air. The purpose of the directive system was to concentrate as much energy as possible in Chicago, and not waste it covering the uninhabited expanses of Lake Michigan. A second time the system worked. Engineers breathed easier and, with the consent of station owners, went to work to settle their own problems in the new way. Today there are 39 stations on the air having directive antennas, and more are being built.

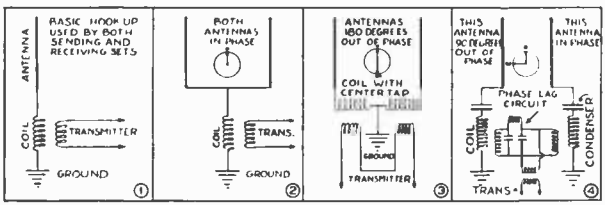
How does it work? The principle of the directive antenna is simple and quite old. In fact, the first antenna ever used was directive. Hertz, father of radio, used a parabolic reflector, 'way back in the '80s, to direct his radio energy toward another antenna in a second parabolic reflector. That is the whole story. The placing of the reflector governs the shape of the field pattern.

Hertz, himself, discovered that a wire parallel to the antenna had the same effect as the reflector and was much easier to handle. Commercial systems using wire reflectors have been in use for a number of years, particularly in point-to-point transatlantic code stations.

The basic circuit, shown as diagram number 1, at the bottom of this page, consists of an antenna, a coil of wire wound on a form, a ground connection, and either a transmitter or a receiver coupled to the coil. The diagram is quite familiar. It is the one used in your present radio, the one men struggled with 12 or 14 years ago when they built their first receiver; in fact, it is the same as is used in almost every wireless or radio set in the world, large or small, sending or receiving. Hertz used it, Marconi used it, and no one has ever found a better one. A station using this antenna system would radiate in all directions, like the expanding circle of ripples set up when a pebble is tossed into still water.

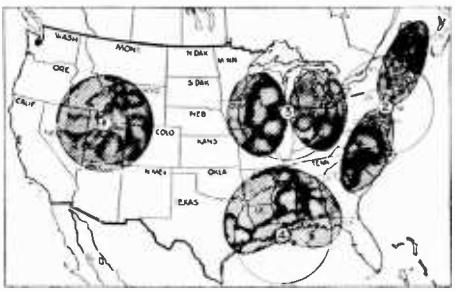
The extended or directed field pattern shown at 2 on the map has but slight resemblance to a circle. A station located in Philadelphia, for example, which with a single antenna would cover the territory bounded by a circle, could, by using a two-element system with both antennas in phase, cover the Atlantic Coast from New Brunswick to Georgia, and at the same time be completely inaudible out on the ocean or west of the mountains. With this system, the two antennas are connected to the top of the coil mentioned above. The antennas must both be exactly alike, and the lead-in wires must be the same length down to an inch. When both antennas are connected to the same end of the coil as in circuit number 2, they are in phase. The distance between the antennas governs the length of the pattern. With the towers spaced ¾ of a wavelength apart, the pattern is one third longer than it is wide. Put the towers ⅝ wavelength apart and the pattern is just twice as long as it was originally. With this latter pattern tiny side lobes form. Pulling the towers still farther apart will lengthen these lobes and shorten the two long ones until a four-leaf clover results.

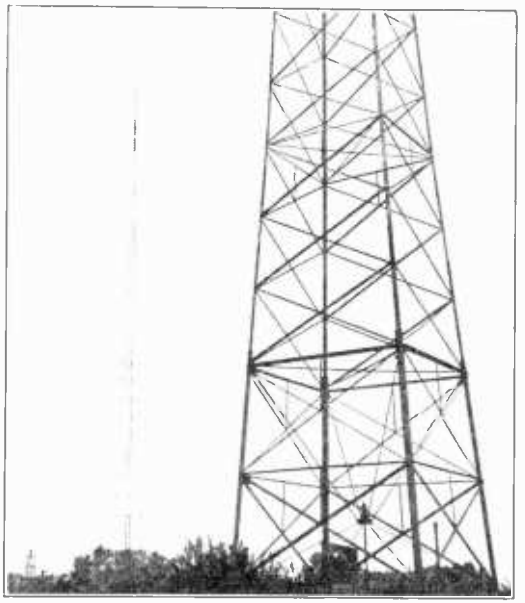
At first glance one is apt to get the impression that this is a fine way to get something for nothing. Such is not the case, for no matter how fantastic the final pattern, the total energy



Courtesy Scientific American

The basic antenna circuit at 1 above produced the circular field pattern shown at 1 on the map, while antenna circuits 2, 3, and 4 produce patterns 2, 3, and 4.





Courtesy Scientific American

The twin towers of a directional transmitter, from which energy is directed toward two cities.

radiated is never greater than that which would go into a circular pattern from a non directional antenna. What actually happens is that the energy is directed toward a predetermined destination and suppressed elsewhere. Much good can come from turning the energy loose in New England, while the results of catering to the Atlantic Ocean are dubious.

The next complication which arises in the design of odd-shaped field patterns involves antennas which are out of phase. Alternating current, of which radio energy is composed, is first positive, then negative. In the house lighting current these changes take place rather slowly, usually only 60 times a second, so we call it 60 cycle current. In radio the alternations are much faster, but the principle is the same. So, with an antenna system that is 180 degrees out of phase, when one antenna is positive, the other is negative, and they are one half cycle apart. This sounds very complicated, but all that needs to be done is connect an antenna to each end of the aforementioned coil and the ground to the middle, as shown in circuit number 3.

Complexity begins and the engineers work for their money when one antenna is tuned to the desired wavelength, and the other is deliberately thrown a quarter cycle out of phase by means of a phase-lag circuit like that shown as circuit number 4. The resulting field pattern at point 4 on the map is a fan, or it can be made into a heart or spade by varying the tower spacing, and is used where it is intended to concentrate all energy in one hemisphere and suppress it completely in the other. The piece de resistance of the phase-lag is a choke coil. A choke coil causes an alternating current to lag; a condenser makes it lead. By juggling the chokes and condensers, the exact amount of lag desired is obtained. This need not be 90 degrees; it can be anywhere from 1 to 359, depending upon the pattern desired.

One engineer worked for months designing a four-element antenna system. His problem was exceptionally complex, for the station was located at the base of a peninsula. One narrow beam was to cover the tongue of land, and a wide fan was to cover three important cities on the mainland. In addition, a local station was to use one of the four towers simultaneously on a higher frequency, operating non-directionally. The engineer designed the station, built it, tuned it in mid-winter, with the temperature below zero and the snow up to his armpits, and when at last the job was completed and the station working, he threw up his hands and said, "I don't know why it works but it does."

(Page 10, please)

Courtesy Scientific American

An engineer here checks the field intensity map (on the wall) against the computed field pattern for a directional broadcast antenna. Results can be computed beforehand with an amazingly high degree of accuracy.

WHAT'S NEW IN 1939 RADIO RECEIVERS

By J. A. DOWIE, Chief Instructor

THE 1939 models of Radio receivers have been announced by most manufacturers, and the new Radio season is now well under way.

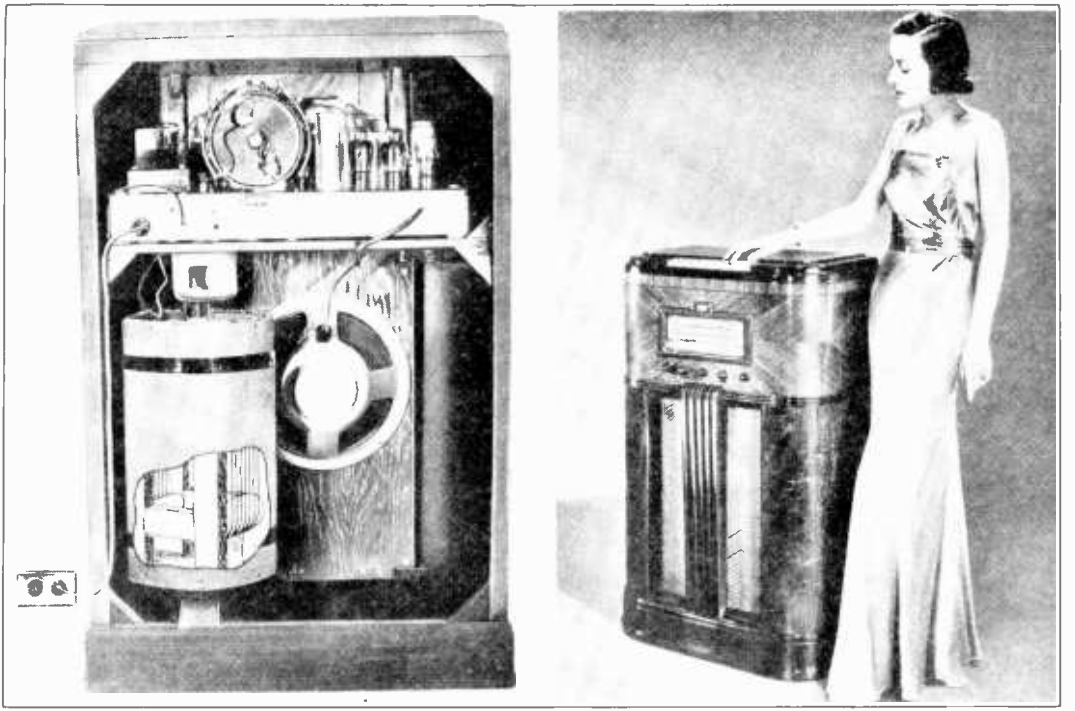
Let us see what the next year will hold in store for the Radio man. Looking over the many attractive table and console models, we see that automatic tuning is really reaching the stage where it is considered an essential requirement. In the smaller sets we find mechanical and electrical automatic tuning systems running neck and neck in a race for supremacy, while in the larger sets the battle is between the electro-mechanical (motor-driven) and the electrical (trimmer condenser) systems, with automatic frequency control right at hand in many sets to correct the mistakes of these ingenious button-controlled robot tuners.

Naturally we cannot hope to cover every new feature of these sets in this single article, so let us select a few at random and give them the once-over. A little study and a little remembering of fundamental Radio principles will reveal the secrets of these new gadgets.

Philco Mystery Control. This, the biggest new feature of them all, is at the time of writing this article still a mystery insofar as circuits are concerned. Let's try it out first to see exactly what this attractive little control box, with no external wires whatsoever, can do to a Radio set, and then let's see if we can figure out for ourselves what's in this magic box.

With the Philco mystery control, any one of eight different stations may be tuned in automatically by anyone within enjoyable hearing distance (up to 100 feet) of the receiver, in much the same manner as one dials a single number on an automatic telephone. Volume can

A 1939 Stromberg-Carlson Radio receiver with automatic push-button tuning is behind the front panel of this splayed foot cabinet in early American design.



Front and rear views of General Electric model G-105 receiver with built-in beamascope antenna and keyboard touch tuning. A portion of the beamascope shield is cut away on the rear view to show what is inside. The entire beamascope is pivoted at top and bottom.

be varied from zero to maximum, and the receiver can even be switched off from the mystery control.

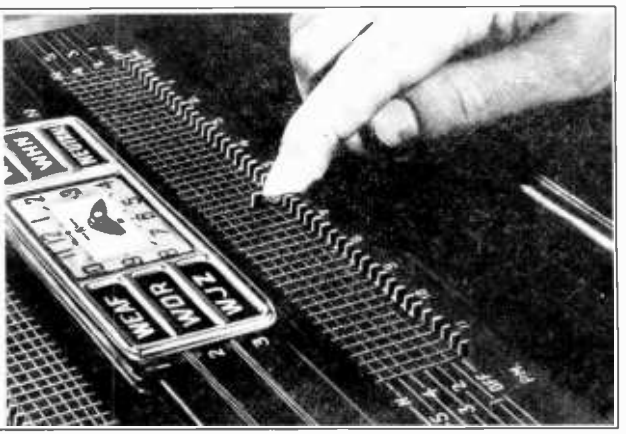
Naturally, this unique type of remote control has been reserved for the higher-priced models in the Philco line; one of these is the model 116 RX, illustrated on the front cover of this issue. It is a fourteen-tube receiver with a balanced field Cathedral speaker, inclined sounding board, and streamlined full vision tuning dial for broadcast and short wave bands. Illuminated windows indicate which one of the eight favorite stations is being tuned in by the mystery control at any time. At each side of the tuning dial are milled-edged discs which replace the conventional tuning knobs and simplify accurate tuning of short wave stations.

In view of the fact that no wires are required from the mystery control to the Radio receiver or power line, this control is undoubtedly a compact short wave transmitter, with possibly a single tube operating from midget batteries. A station is tuned in from the mystery control by inserting a finger in the correct depression in the dial, rotating the dial until the finger reaches the stop, then releasing the finger. A spring returns the dial to its original position, opening the transmitter circuit a definite number of times when doing this (an ordinary telephone dial works the same way).

In the Radio cabinet must be a small auxiliary receiver tuned to the frequency of the control box transmitter and feeding into a telephone-type selector switch; the circuit which this switch closes depends upon the number of current pulses received. This switch, then, controls the electro-mechanical automatic tuning mechanism in exactly the same way as ordinary push-button switches, and in addition, must control devices which change volume and turn the set off.

Each mystery control box-receiver combination must be adjustable to a different carrier frequency; this would explain how several receivers and several control boxes can be in the same room without interfering with each other. Remember this explanation is simply one way in which the mystery control could work; we do not claim it to be the exact method used by Philco. In early demonstrations, watchful Philco engineers have managed to prevent inquisitive

What is inside this attractive little box that is so widely publicized as the Philco Mystery Control? This article gives you some pretty good clues.



General Electric 24-hour automatic time-tuning control in use. The lever being pushed up will make this modern electrical robot tune in station 2 (WOR) at exactly 6:15 p.m. The levers above the clock are used for a.m. times.

persons from prying into the mystery control cabinet.

General Electric Beamascope. A built-into-the-cabinet Radio antenna known as the Beamascope is one of the outstanding new features in the 1939 General Electric receiver line.

The beamascope eliminates antenna and ground connections when only high-fidelity reception of nearby stations is desired. It is merely necessary to plug the receiver into an electric outlet and rotate the beamascope for minimum noise when tuned to a station; this means that the receiver can be moved from one room to another with no more installation difficulties than are present with a floor lamp.

As you can see from the cutaway view of the beamascope, this new indoor antenna is essentially made up of a carefully designed loop antenna known as the acceptor circuit, wound on a specially treated wood frame; this loop is surrounded by a cylindrical shield or rejector circuit made up of many fine wires woven together and grounded to the receiver chassis. This shield is of the Faraday type, which completely shields the loop antenna from electrostatic components of Radio signals, while allowing electromagnetic components to reach the loop.

General Electric Time Tuning Unit. The General Electric time tuning device, mounted beneath the hinged top cover of the higher-priced G-E receiver models, makes it possible to preselect any one of five different stations for a full twenty-four hours ahead. Referring to the photograph shown in this article, you will note that there are 96 tiny levers, one for each fifteen-minute period of the day, grouped around a Telechron electric clock. The contacts in this clock and lever assembly are simply the equivalent of extra push-buttons in shunt with the regular station selecting buttons on the receiver, with the clock acting as a robot button-pusher at the beginning of each fifteen-minute period. The clock contacts close for only 7 seconds each time, but this is more than long enough for the tuning motor to drive the gang tuning condenser to the correct setting for the desired new station.

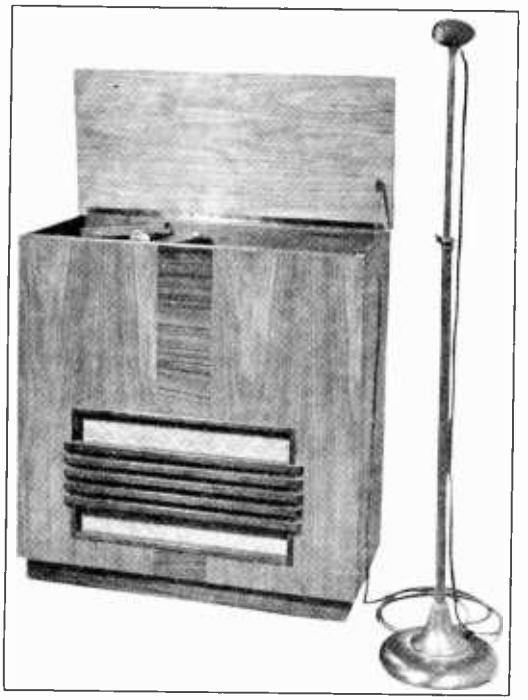
A great many of the new General Electric receivers are equipped with keyboard touch tuning, an improved version of the automatic touch tuning used in last year's models. Separate keys resembling those on a piano are provided for each favorite station; these operate as simply and smoothly as piano keys.

Remote keyboard control is offered as auxiliary equipment with some of the new G-E models. This is connected to the receiver by means of a cable. In addition to the station keys, there are provisions for controlling volume.

Stromberg-Carlson Cabinets. New Radio cabinet designs made by master furniture craftsmen are featured in the 1939 Stromberg-Carlson line. The model shown in this article is an exact replica of an early American splayed foot table, the original of which is in the Pennsylvania museum in Philadelphia. Other cabinet models are authentic Chippendale and Duncan Phyfe designs. One particularly interesting early American model is so designed that it can be located in a corner of a room right up against

the wall. The cabinet has a carefully designed back chamber which prevents annoying cavity resonance and echoes such as are obtained when an ordinary receiver is placed close to a wall.

Ultra-Modern Sound Recorder. The Presto Recording Corporation announces a new console recording phonograph of modern design (also illustrated in this article). Solid walnut is used in the construction of the cabinet. The unit is really a combination sound recorder, high-fidelity electric phonograph and three-watt public address system; there are provisions also for installing a Radio tuner for making recordings of favorite Radio programs. Additional information on this can be obtained from Presto Recording Corporation, 139 West 19th Street, New York City.



A complete Presto sound recording system is built into this attractive modern cabinet, intended for use in schools, music studios, and in the home.

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The platinum wire used in the 1/100 ampere fuses which protect some delicate radio meters is 30 times finer than a human hair. One pound of this fuse wire would be about 4,750 miles long and would cost almost $11,000,000 at present prices.

Philco Mystery Control Demonstrated at N.R.I.-R.M.S. Receiver Servicing Party

More than one hundred members of Radio Manufacturers' Service, including many N. R. I. students and graduates, attended a double-feature radio party held recently in the sales room of Columbia Wholesalers, Inc., in Washington, D. C., under the joint sponsorship of Philco and N. R. I.

The first feature of the evening, a unique servicing-without-tools game developed by N. R. I. this year for Alumni Association meetings, went over with a bang. Each person attending was given a circuit diagram of a 1939 Philco receiver of conventional design, along with a set of questions, each of which described one receiver defect (such as an open filter condenser) and listed five different effects. Those participating were to encircle the one correct effect in each case. After thirty minutes of head-scratching, the papers were collected for grading, and Mr. Joseph Kaufman, N. R. I. Director of Education, proceeded to analyze each question in detail, while Mr. Paul Thomsen, N. R. I. Communications Consultant, produced each defect in turn on the actual receiver as a dramatic verification of the technical analysis.

The second feature of the evening, introduced by Mr. J. R. Jackson, Philco Service Engineer, and presented by Mr. Blodgett, also of the Engineering Staff, (both coming to Washington from the main Philco plant in Philadelphia for this meeting) was a fascinating demonstration of the Philco Mystery Control. It worked perfectly--upside down, sideways, in every corner of the room—but how it worked remained a mystery as Philco engineers laughingly refused to verify the many guesses fired at them.

Potato chips, pretzels, cheese and refreshments received equally as hearty a welcome as the two main features of the evening.

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Radiomerriments

Push-Pull—An accordion.
Cat-whisker—A mouse detector.
Feedback—A football player.
Wave-Trap—A storm-reducer used on ships.
Skin Effect—A peculiar feeling experienced when the hand is placed across a 110-volt A.C. power line.
Pick-Up—A beautiful blonde.
Shield—Device for keeping mice out of a Radio part.
Broadcast Band—Ben Bernie and all the lads.
Plug-in—Last finisher in a horse race.
Lightning Arrester—A speed cop.

Tailored Radio Waves (Continued from page 5)

The actual building of a station is the least of a radio engineer's worries. Months before the construction starts he must make his plans. A map is drawn showing the present primary service area. If these figures are not available, or the station is new, a test transmitter must be erected and the service measured in the field. This task alone takes two or three weeks. When the map is made, if the area covered does not include all the points desired, a directive field pattern is selected which will warp the energy into the proper shape.

The patterns are available in printed form, but each station is an individual case, and all the details must be worked out carefully. A very slight error is often enough to throw the whole array out of balance. To make certain, the formulas compiled by Southworth are fitted to the case and then worked out. Fifteen pages of equations are not uncommon in the figuring of a single station. Balancing this against an expenditure which may top fifty thousand dollars, the effort is well worth while. So accurate are the equations that it is possible to know the exact size and shape of the field pattern long before the station goes on the air. One engineer makes a practice of deliberately under-estimating the anticipated coverage in his first report, so when the actual range of the station is measured it is consistently ten miles more than figured. This pleases the owners.

At the present time no broadcasting station uses more than four antennas. Point-to-point stations, both phone and telegraph, however, have found an array of multiple antennas to be both economical and advantageous. A typical radiotelephone station consists of a double row of vertical antennas, carefully spaced and situated so that their broadside is "aimed" directly toward the destination. Each pair of antennas is so connected as to be 90 degrees out of phase. In reality they are only a modern version of the old antenna with its reflector which Hertz used almost 50 years ago. Twenty-four pairs make the standard array—a total of forty-eight antennas. This combination produces a beam which is compressed into a pencil of energy, placing the full signal at the receiving end, and is inaudible a few miles on either side. It is practically a telephone line without wires. By using it on the eastern coast of the United States, five kilowatts places a strong signal in England. By the conventional non-directional method it would take 130 kilowatts to do the same work and the phone message could be picked up just as easily in San Francisco. Radio beacons on shipping lanes, and radio range systems on airlines are also modified forms of arrays.

So, by scientific use of the power available, the broadcasting stations which felt they were being discriminated against ten years ago are now in a position to offer better service than was then possible by the best. Interference is almost a thing of the past, and, by careful planning, a number of channels have been made available for new stations—all because broadcasting has ceased to be broadcast and is now a scientific distribution of radio energy, to serve the most in the best way possible.

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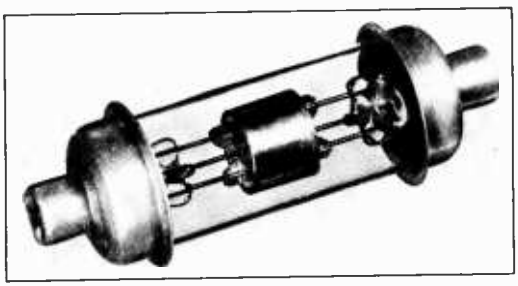
Eimac Vacuum Tank Condenser

Ordinary air-dielectric condensers capable of withstanding the high R.F. voltages present in the tank circuits of transmitters are quite large and cumbersome because of the need for spacing the plates far enough apart to prevent flash-over, with this greater spacing making necessary the use of a large number of plates. Eitel McCullough, Inc., of San Bruno, Calif., manufacturers of Eimac transmitting tubes, have developed a new vacuum tank condenser which eliminates the use of the old-fashioned, bulky and inefficient unit by observing the simple principle that a high vacuum is almost a perfect insulator.



It looks like some new radio transmitting tube, but actually this metal-ended glass tube is a plain, ordinary fixed condenser. Some day you may find it in television apparatus, but today its chief use is in broadcast and short-wave transmitters.

The plates of this new condenser are spaced close together and mounted rigidly inside a highly-evacuated glass envelope having a terminal at each end. These terminals or contact prongs are designed to fit standard 60 ampere fuse clips, making it possible to interchange the condensers in a few seconds when necessary. Single units, approximately six inches long, are available in capacities from 6 mmfd. to 50 mmfd., and are capable of withstanding peak R.F. voltages of up to 32,000 volts.

The Laboratory Page

By GEORGE J. ROHRICH

The purpose of this department is to furnish supplemental experiments to students who have completed their Home Laboratory Course, but who wish additional laboratory experience. You are not required to perform these experiments, but you will gain increased knowledge by doing so. Most of the material required will be that received as part of the Laboratory Course. Any other material necessary can be purchased very reasonably and will constitute an investment rather than an expense, as it will serve as replacements in service work or be useful in your shop later.

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

AN EXPOSITION OF EXPERIMENT NO. 30

Inquiries have been received for information on testing the Wheatstone Bridge circuits and parts for Experiment No. 30 when failure is noted. Frequently, such requests fail to make clear if Experiment No. 30 appears in the instructions for Outfit 3BA or 3BA-1.

Experiment No. 30 originally was operated with a dynatron oscillator in the instructions for Outfit 3BA. This circuit is reproduced below. Occasionally, trouble is experienced by failure of this dynatron circuit to produce oscillations easily for supplying the A.C. voltage needed in the bridge circuit. This failure is noted most frequently when using a type 30 tube of recent manufacture and is caused by the fact that these tubes are now purposely made to produce the least amount of secondary emission. Naturally, as dynatron oscillators depend upon secondary emission it is reasonable to expect failure often in the original circuit.

The original circuit of Fig. 3S in 3BA often can be made to oscillate by increasing the grid voltage to 112 volts. However, this practice no longer is recommended. It is better to use one of the simpler arrangements suggested by the two remaining diagrams for Fig. 3S which are reproduced below.

Realizing the cause of frequent trouble with Experiment 30 in 3BA, this experiment is now replaced with the feed-back type oscillator and this revised instruction sheet is now identified as Outfit 3BA-1. The difference in the two diagrams is the only change noted in the two instruction sheets.

If you also experience trouble with Fig. 3S of 3BA-1 then test this circuit as follows:

Attach the test prods to the terminals of the milliammeter as shown in Fig. 3 of Outfit 1BA-1.

(Page 12, please)

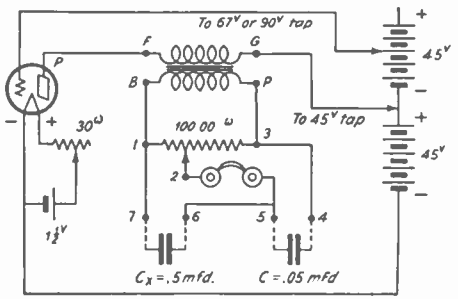


FIG. 3S in 3BA

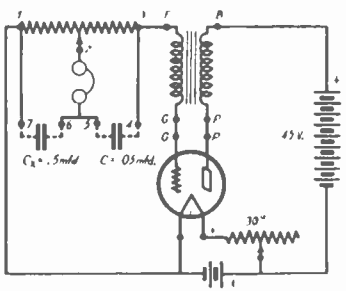


FIG. 3S in 3BA-1

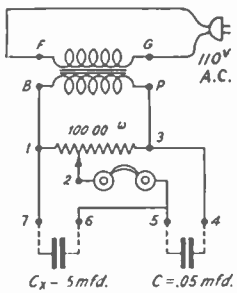


FIG. 3S A.C. operated.

The Laboratory Page (Continued from page 11)

Test the "A battery" by holding the black test prod on the negative terminal while the red test prod is held on the positive terminal of this battery. The milliammeter should deflect to a value of approximately 1.5 milliamperes. This will indicate that the battery is delivering approximately 3 volts. If you find that the deflection is less than 1 milliampere, this will indicate that the "A battery" is exhausted.

Insert the tube. Now test the filament voltage by holding the black test prod on the negative terminal of the socket while the red test prod is held on the positive terminal of the socket. Now adjust the center contact on the 30-ohm resistor until the meter shows a deflection of 1 milliampere. This will indicate that the filament is receiving the proper amount of 2 volts. If the milliammeter does not respond to changes in the position of the center contact but remains always at 1.5 milliamperes, then this will indicate that the filament of the tube is burned out. Of course, the tube would have to be replaced.

Remove the tube. Now test the headphone. Rotate the potentiometer dial to zero for this test and hold the black test prod on terminal No. *5* while you hold the red test prod on "A+." You should obtain a reading of .6 milliampere. If you do not obtain a deflection, this will indicate that the headphone is defective.

Remove the tube. Now test the potentiometer. Rotate the dial to *50* for this test and hold the black test prod on *F* on the transformer while you hold the red test prod on *B* on the transformer. You should obtain a deflection of approximately 4 milliamperes. If you do not obtain a deflection, this will indicate that the potentiometer is burned out.

If you obtain a reading of approximately 4 milliamperes in the above test, then you can continue with testing the secondary winding of the audio transformer. Hold the black test prod on terminal *G* of the transformer while you hold the red test prod on terminal *B* of the transformer. You should obtain a reading of approximately 3.2 milliamperes. Failure will indicate that the secondary winding is burned out.

If you found that the potentiometer was in good condition, then you can continue to make this next test for checking the primary winding of the transformer. Hold the black test prod on terminal *F* of the transformer while you hold the red test prod on terminal *P* of the transformer. You should obtain a reading of approximately 3.8 milliamperes. Failure will indicate that the primary winding is burned out.

Insert the tube. Test for oscillation by holding the red test prod on terminal No. *1* of the potentiometer while you hold the black test prod on terminal No. *3* of the potentiometer. You should obtain a deflection of approximately 1 milliampere, up to 4 ma., depending upon the setting of the center contact on the 30-ohm resistor. If you do not obtain a deflection, then this indicates that the transformer is improperly marked and you will have to carry out the second procedure of experiment No. 21. In other words, reverse the wires leading to terminals *F* and *G* of the transformer.

Again test for oscillation. A deflection on the milliammeter will accompany a sound in the headphone, even if the potentiometer is defective. Therefore, if you hear a sound while the meter is connected but do not hear a sound when the meter is removed, this will again show that the potentiometer is defective. If no reading is obtained this probably indicates a defective tube, in which the grid touches the filament. If you get a reversed reading this indicates a defective tube, in which the grid touches the plate.

You are now ready to check up on the condensers. You should be able to hear a sound in the headphone while rotating the dial between *0* and *100*. You should also be able to observe that the weakest sound is heard near *9* or *10* on the dial while the condensers are connected as shown in Figure 38. If the weakest sound is heard at *0*, then this will indicate that you have either a short circuit at terminals *6* and *7* or that the condenser across terminals *4* and *5* is open. On the other hand, if weakest sound is heard at *100*, this will indicate that the condenser across terminals *4* and *5* is short-circuited or that the condenser across terminals *6* and *7* is open.

These last observations will let you make further practical use of the Wheatstone Bridge while testing condensers. In other words, if the signal balances at *0* while testing a doubtful condenser at *Cx* you will know that this condenser is shorted. If the signal balances at *100* while testing a doubtful condenser you will know that this condenser is open. It is suggested that you note these additional facts by adding the word "*SHORT*" at *0* in Fig. 39 of your regular instruction sheet. Also add the word "*OPEN*" at *100* in Fig. 39.

An extra circuit is given here for the benefit of those servicemen who desire to operate the Wheatstone Bridge with 110 volts A. C. However, a fairly high-pitched sound is generally most effective and desirable, especially when measuring very low capacities. Therefore, if the A.C. operated circuit of Fig. 38 proves troublesome from this source, then return to the circuit for Fig. 38 in 3BA-1, where the high pitched sound is obtained by regulating the 30-ohm resistor.

SEEING THROUGH FOG WITH THE ELECTRIC EYE

By ALBERT A. ARNHYM, N.R.I. Graduate

President, Arnhym Laboratories, Inc.

DURING the past few years the photo-electric cell or electric eye has become one of the most important tools of modern science. One of the factors which make the photo-electric cell so valuable as an "electric eye" is its ability to "see" infra-red light, which is invisible to the human eye but penetrates fog, haze, smoke, the human skin, certain types of wood, rubber and other materials.

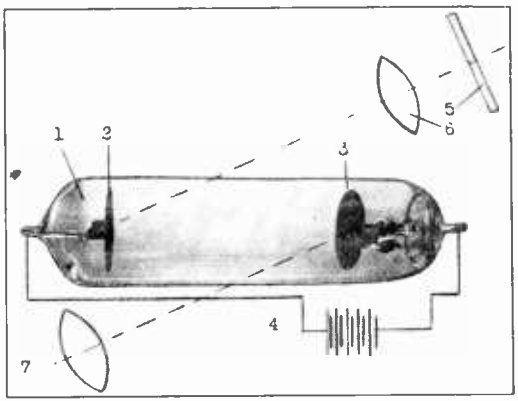
Some time ago, the writer and his staff developed a new type of phototube which converts infra-visible pictures into visible pictures instantaneously. One of the tubes which has been used for this purpose is shown in Fig. 1. The numeral *1* indicates a glass envelope which has been evacuated to the highest possible degree. At *2* is the cathode, a round metal disc coated with a light-sensitive material which emits electrons when exposed to either visible or invisible infra-red light. At *3* is the anode, a similar round metal disc which has been treated in such a manner that it will fluoresce brightly when hit by electrons. At *4* is a voltage source; this can be either A.C. or D.C. as each photocell is self-rectifying.

The scene which is to be made visible first goes through light-filter *5*, which passes only infra-red light. This eliminates all undesirable, reflected or distorted visible light. Lens *6* focuses the now entirely invisible picture onto the cathode.

From each point of the cathode which has been hit by light rays, electrons will be ejected, their number depending on the amount of light falling on the point. These electrons are accelerated toward the anode by the applied voltage; the electron rays hit the anode at high speed, causing it to glow or fluoresce. The brightness of each fluorescent point depends on the density of the particular electron ray hitting it. This again depends on the amount of invisible light falling on the corresponding point on the cathode, so we see on the anode a small, green and clearly visible image of the invisible scene picked up by lens *6*. We can observe this image more easily through magnifying lens *7*.

Theoretically, this sounds very simple, but a number of problems arise in practice. The materials used on the two electrodes are different and tend to suppress each other; the voltage required to cause fluorescence is 2000 to 10,000 volts, which is considerably higher than can be safely applied to the average photocell; the beams of electrons tend to repel each other, since they are all negatively charged, with image distortion resulting; the glass envelope acquires a varying charge which causes further distortion. The use of an electron lens between the electrodes can reduce distortion effects considerably, however; this lens is simply a coil of wire wound around the tube. Current sent through the wire produces a magnetic field which stabilizes, focuses, and magnifies or reduces the image on the anode.

In experimental set-ups very surprising results have been attained with tubes of this kind. It was possible to "see" pictures through rubber, certain types of wood and other normally opaque materials. A jar filled with artificial fog or smoke was easily penetrated. The effect is such



that the person looking at the fluorescent image in the tube has the sensation of seeing the invisible object directly.

Though this device is still in the development stage, a large number of applications can be foreseen for it. With additional development work it may be possible to mount two of these tubes side by side in the manner of binoculars, for use in seeing through fog on land or sea, through haze, smoke screens, etc.; in industry they may be used to detect flaws in rubber, to study the under-layers of old master paintings, etc.

Even at this early stage scientists are predicting that the photoelectric effect, in the course of the years, will become one of the most useful and important servants of humanity.

Electronics, Inc.

L. J. Markus

By L. J. MARKUS
N. R. I. Technical Editor

Jay and Ozzie bring their Radio and electronic gadgets to a Hallowe'en party, with surprising results for all concerned, in this timely science-fiction story about a millionaire who didn't like parties.

BUSINESS was lighter than usual that cool mid-October morning in the trim, super-efficient Radio service shop operated jointly by youthful Jay Green and his chubby, mechanically-minded partner, Ozzie, under the firm name of Electronics, Inc. Ozzie was putting the finishing touches on an A.F.C. alignment job, while Jay busied himself in the front office with circuits and designs for more of the ingenious electronic gadgets which were his hobby. Truly a profitable hobby it had become, too, for these little vacuum tube affairs played important roles in the capture by Jay and Ozzie of two notorious, reward-plastered criminal gangs which had thwarted all efforts of Washington police.

The jangle of a telephone interrupted this peaceful scene. Jay answered with his usual "Good morning, Electronics, Inc.," listened for a few minutes, then responded, "Yes, Mr. Rockingham, I am sure we can fix up something shockingly different in the way of a Hallowe'en party without exceeding your top limit of $1,000. Suppose we experiment a bit in the shop this week and bring detailed plans over to you next Monday."

Homer Rockingham apparently agreed, for Jay hung up with a smile of satisfaction, and called Ozzie into the office. "Here's where these electronic toys of ours go to work again," Jay announced with a smile of anticipation. "Mr. Rockingham, that millionaire who recently bought a huge mansion out on Massachusetts Avenue, wants us to stage a party which will permanently cure his wife of her party-staging mania. He's one of these home-loving men, with no interest whatsoever in the group of socialites being entertained so lavishly and so frequently in his home. Our job is to put on a party which will get underneath the affected mannerisms of these people and reveal their true natures to his wife."

"And we charge up to $1,000 for doing this!" marvelled Ozzie breathlessly. "But where do our Radio and electronic gadgets fit into the picture?"

"You just leave that to me, Ozzie. Take that set you've been playing with back to its home and collect your twelve bucks; by that time I'll have our party plans laid out, and we can get to work," stated Jay.

An hour later, both were in the laboratory ready to start on one of the most unique assignments of their career. Naturally they could not make final plans until they were familiar with the personal habits and traits of each person to be invited to the party, but Jay knew enough about human nature in general to go ahead with preliminary experiments and work up a general plan for presentation to Mr. Rockingham next Monday.

"Ozzie, see if you can find some of those leakage reactance transformers we bought from Allied Radio for $2.25 each a few weeks ago," requested Jay. "They're a lot better than spark coils for our purpose, since they are entirely harmless and can be left on for hours at a time with not a bit of hum or noise. The 600-volt shock which one of these puts out may have some surprising effects upon the guests."

It was but a few minutes work to connect a line cord and plug to the primary winding, and measure the maximum secondary current by connecting a milliammeter across the secondary

Stages a Hallowe'en Party

terminals. Jay was completely satisfied with the 8 milliampere meter reading on a direct short circuit, for he knew that this had been accepted by scientists as a safe current for the human body under all conditions. The construction of the transformer was such that it would never deliver more than this 8-ma. short-circuit current.

Fun-loving Ozzie suggested they try the effectiveness of the unit on Pluto, a huge police dog who had a habit of rummaging through every can and box in back of the shop regularly every morning in search of forbidden food scraps; Jay agreed that it might be an interesting experiment, so they grounded one terminal of the secondary to a water pipe and connected the other to a likely-looking metal can on which Ozzie carefully arranged the contents of a sardine can as bait.

Pluto's sensitive nose soon led him to the trap. With never a thought of danger, his huge tongue made perfect contact with the metal can—and six hundred tingling volts of electricity made Pluto sit suddenly back on his haunches with a yelp of indignant surprise and with not even a taste of the tempting sardines.

More cautiously Pluto approached the second time, but his sniffling black nose made equally as good contact with the can as his tongue had before. Pluto had a sensitive nose, and his sudden backward somersault was truly a comical sight. Ozzie howled with glee, and encouraged Pluto to try again. Pluto did, after considerable meditation, and this was enough to send him homeward with no further interest in anything resembling a metal can.

"No wonder a single wire on frail posts 60 feet apart, hooked up to one of these leakage reactance transformers, will hold back the biggest herd of cattle in the country," exclaimed Jay. "And electricity is just about as bewildering and mysterious to the average person as it is to these animals."

Photoelectric control equipment next received the attention of Jay and Ozzie. Careful adjustments made each of their units so sensitive that the flame of a match a few feet away from the electric eye was sufficient to operate the relay even when the shop lights were on. It was no trick at all to make the units respond equally as well to interruption of light beams which were made invisible by the use of infra-red filters.

Enthusiastically they worked on one unit after another, tuning them up while making plans for the forthcoming party.

The next Monday Jay unfolded his ideas to Mr. Rockingham step by step; each met with the millionaire's complete approval. There remained, then, the task of determining exactly how each guest was to be exposed. Ozzie suggested that Mr. Rockingham's staff of servants be ordered to chat with the servants of each guest, on the theory that servants often know a man's peculiarities and shortcomings even better than the man does himself; the other two agreed emphatically, and Mr. Rockingham also pointed out that servants could be depended upon to gather any choice bits of gossip and scandal which might be floating around. Mrs. Rockingham, according to her husband, was making her usual two-day shopping trip to New York just before the party for new clothes; this gave ample time to install the apparatus without arousing her suspicions.

❖ ❖ ❖

It was Hallowe'en Eve. For the fifth time, Mrs. Rockingham asked her husband, "Homer, are you *sure* this party is going to be a success? Here I've rushed from one shop to another in New York for two days, trying to get a really exclusive gown for this party, and what have you done? You promised a party I'd remember for a lifetime, but all I can see are a few shocks of corn and the usual orange and black decorations!"

For the fifth time, Homer reassured his spouse, but fortunately she was too interested in a last-minute check-up of her hair to notice the twinkle of anticipation in his eyes.

A tinkling of chimes announced the arrival of the first guests, and a moment later the butler ushered into the huge recreation room a muchly overdressed woman whose prim austerity gave the impression that formal society was her only world. Stepping through the doorway with hand extended in greeting, she passed between two shocks of corn. There was a faint click, and from the impressive Radio receiver at the far end of the room came the first thrill of the evening . . . a deep and spooky voice booming out a greeting: "Good evening, my dear Mrs. Van Eyster! What a lovely coat you are wearing! Did your husband buy it to keep you warm—or quiet?" Two gasps were heard; two women, looking about ready to faint, sat down hurriedly and mumbled conventional greetings to hide their confusion.

The first act of the party had worked perfectly. Concealed in one of the shocks of corn was a 32 candlepower auto headlight bulb mounted with a plano-convex condensing lens and an infra-red glass filter in such a way that this light source concentrated upon a photocell in the opposite corn shock a beam of light from which all visible wavelengths were absent.

It was an ideal set-up for the purpose—the electric eye could "see" the infra-red beam perfectly well, but no one else could. Interruption of this beam by a person entering the room cut off the light to the photocell, increasing its resistance many times. A vacuum tube amplifier and relay hidden behind orange-gold pumpkins at the base of the shock responded to this interruption of light, and the operation of the relay caused a faint click. This relay controlled a signal light on the temporary control board which had been set up in the basement, indicating to Ozzie that it was time for one of the "hello" speeches.

Ozzie then read his speech in a normal tone of voice before the microphone, but a low-pass filter inserted between the mike and the Radio set upstairs cut out all frequencies above 1000 cycles, giving a spooky deep bass effect which completely disguised his voice.

The clue as to who was interrupting the light beam upstairs each time came from Mr. Rockingham via ultra-short-wave Radio. In his coat pocket was a compact transmitter complete with batteries and aerial, operating on a wavelength of about 60 centimeters and controlled by a single push-button. With the attention of all focussed on the new arrivals, Homer unobtrusively reached into his pocket and slowly pressed the button according to a pre-arranged dot and dash code which had been assigned to the person about to enter the room. The filament of the acorn-type tube in the transmitter heated up almost instantly, permitting a circuit arrangement whereby current was being drained from the pencil size filament batteries only for the duration of each dot and dash.

A sensitive ultra-short-wave receiver in the basement picked up these interrupted continuous wave carrier signals and converted them into audible dot and dash sounds which indicated to Ozzie the speech he was to deliver when the signal lamp for the electric eye flashed on.

And now Mr. Van Eyster, looking for all the world like the typical middle-aged playboy who means money to nightclub proprietors and waiters, entered the room. The Radio voice spoke again, this time with a sardonic British accent: "Cheerio, Van Eyster! So glad to see you out with *your* wife this fine evening."

The infuriated Van Eyster glared his anger, but Homer quickly smoothed things over with a wave of the hand and the soothing words, "Tut, tut, old boy—just Hallowe'en, you know. Just Hallowe'en! Have a drink?"

Mr. and Mrs. Adolph Schultz were the next guests to arrive. Elizabeth Schultz was a small-town beauty, pert and trim of figure, who considered she was doing well by marrying the village bootlegger, Adolph; now that he had inherited some two million dollars from an almost-forgotten uncle in South Africa, she was sure of it.

Mrs. Rockingham suspiciously kept one eye on Homer as the new guests arrived, but he, with one hand nonchalantly in his coat pocket and the other holding a huge cigar, was the picture of perfect innocence.

The Radio voice spoke again. "Well, I declare Lizzie, that extra inch of heel on your shoes brings you almost up to Adolph's collar. You certainly are getting to be a climber these days."

That was Lizzie's own language, but her instant comeback was smothered by the realization that the words came from the Radio and not from anyone in the room. There was a challenge in her eyes as she stepped daintily into the room, pretending to overlook the insult.

Portentious, bay-windowed Adolph waddled through the doorway after his wife, wishing for all the world that he could loosen his two-sizes-too-tight formal collar. Scanning the room like a television transmitter, he spotted a chair against the wall next to the bar and made a beeline for it. The booming Radio voice shouted out, "Hi there, Adolph! Sure does look funny to see you in that monkey suit, and outside of a speak-easy. You'll feel right at home in that chair next to the bar."

Adolph brushed aside this jibe with a wave of the hand, and plodded determinedly through the room to his selected chair. Lizzie, who had been trying her hardest the last few years to make the world forget Adolph had ever been a lawbreaker, looked almost like a balloon ready to explode.

With appropriate variations this same reception greeted each of the other guests whom Mrs. Rockingham had invited to her Hallowe'en party. Most of these pretended not to notice the voice of the Radio, in accordance with the decrees of Emily Post, while those few who showed irritation were led to the bar by jovial Homer.

To those already present, the discomfiture of each new arrival proved a great source of amusement. Their loud laughter did nothing to soothe the frayed nerves of Mrs. Rockingham, whose thoughts in connection with her husband were becoming decidedly unpleasant.

(Page 21, please)

Electronics Inc. Stages a Hallowe'en Party (Continued from page 18)

With the last guest herded into the living room and pacified, conversation started up spasmodically, with Mrs. Rockingham sending out a bombardment of words whenever the party seemed about to die.

Adolph was bored, uncomfortable, and hot; furthermore, his stiff collar was actually hurting. At last, taking advantage of his wife's move to another part of the room, he decided to open the collar. Absent-mindedly he placed his lighted cigar on a nearby table, but hardly had he moved his hand away from the table before a fire alarm gong went off with a hideous clanging, and the Radio voice yelled out, "Adolph, Adolph—your cigar is burning that antique table!"

Hastily Adolph snatched up his cigar and puffed vigorously on it to hide his embarrassment. The alarm stopped the instant the cigar left the table, but Mrs. Rockingham cast many a worried look at Adolph and the table for a while.

An electric eye concealed in the table lamp and peeking out through a hole in the elaborately carved alabaster base had detected the glow of the lighted cigar butt and passed the news on to Jay and Ozzie by means of another signal lamp downstairs. Investigation by servants had revealed this particular trait of Adolph, and had even determined correctly ahead of time the exact chair which he would select, so Homer had no need to signal for this event or even to watch Adolph.

Mrs. Van Eyster was getting restless, a sure sign among those who knew her best, that a tour of inspection was coming up. Nonchalantly arising, she strolled around the room, seemingly to admire this vase and that picture, but in reality digging up news for her next gossip session. In due time she arrived at the fire-place. The mantel being just above the level of her eyes, she glanced furtively around to make sure she was unobserved, then daintily reached up and rubbed her finger across the top surface. But some person or some thing must have been watching, for the Radio set focused the attention of everyone present on her in a most embarrassing manner: "So sorry, Mrs. Van Eyster, that there isn't any dust on the mantel for you to rave about tomorrow afternoon at the Club tea."

Mrs. Van Eyster snatched back her finger as if the mantel were a red-hot stove, and angrily plopped down in her chair amidst the laughter of the party. Mrs. Rockingham was so incensed at the dust-hunter that she didn't even bother to glare at Homer this time.

A one-inch wide strip of tinfoil, insulated with a coat of varnish, had been placed across the entire length of the mantel, far enough back so it would not be noticed during casual inspection. With this foil connected into the oscillating circuit of a capacity control circuit concealed up the fireplace flue, a person's hand or even finger within a few inches of this strip changed the oscillator tuned circuit capacity enough to make the unit stop oscillating. The resulting change in oscillator plate current actuated a relay connected to another signal lamp on the downstairs control board—a lamp which, according to the statements of Mrs. Van Eyster's servants, could safely be assigned to her.

Adolph was beginning to feel at home. His chair, however, had a straight back. After a bit of fidgetting around, moving it away from the wall a distance which past experience had shown to be correct, he rocked backward. The calculations were correct—the chair back touched the wall—the feet did not slip—but Adolph was not to enjoy this comfort for long. The seat of the chair warmed up—became hot—Adolph's trousers began to smoke—and with a scream of pain Adolph leaped forward onto the rug, with the chair toppling on top of him.

Lizzie walked over to pick up the chair. Her muttered comment, "Serves you right, clumsy fool! Didn't I tell you not to do that when we're with company?" didn't help his feelings a bit—and how he yearned for a cake of ice on which to sit!

The chair looked perfectly normal, and the guests who touched the seat found it perfectly cool. No one believed Adolph's statements that it had been red hot—that is, none but Homer, who knew that the threads of the covering were asbestos rather than silk or cotton, and that beneath the covering was a large, pancake-like coil of copper wire, the terminals of which were shorted by a mercury switch only when the chair was tilted backward.

Beneath the floor was a similar coil, connected to the output terminals of a powerful short-wave transmitter. Normally this transmitter operated on low power, but the shorting of the coil in the chair increased the effective load on the transmitter; the resulting increase in output current actuated a series of relays which turned on the full transmitter power, and its coil induced in the chair coil circulating eddy currents large enough to make the wire red-hot. The asbestos covering transmitted this heat to Adolph without charring.

Mr. Van Eyster had, of course, forsaken his wife the instant they entered the room, and could now be seen on the sofa with Mrs. Schultz, enjoying her quick retorts while laughing with her at the troubles of the others. She responded with an

equal interest in his worldly airs and twinkling eyes. From positions at opposite ends of the sofa, they seemed to gravitate toward the center, a bit more each time a chance for a laugh occurred. With assumed carelessness his hand fell upon hers—Lizzie gave a shriek and he a yell as the entire sofa seemed to become alive with a million red-hot jabbing needles. Room lights dimmed ominously and a loud power hum conjured vivid recollections of movie-created electric-chair scenes as the couple tumbled forward onto the rug. And now the Radio voice made one terse comment: "Tish, tish, Van Eyster! Holding hands in public, and at your age!"

Fine copper wires cleverly woven into the patterned fabric of each sofa cushion did the trick. Each set of wires was connected to one secondary terminal of an electric fence transformer concealed under the sofa. The primary had been plugged into a nearby A. C. outlet all evening, but not until Van Eyster and Lizzie had completed the secondary circuit by touching hands was its presence noticed. (One terminal of an ungrounded 600-volt, 60-cycle A.C. circuit may be touched with no sensation of shock.) The slight increase in primary current when the secondary circuit closed was sufficient to operate a sensitive meter-type relay inserted in series with the wall outlet wiring, and the relay contacts in turn actuated a multi-contact power relay which inserted a resistor in the living-room lighting circuit wiring to dim the lights, and at the same time shorted the power pack filter choke in the Radio receiver up-stairs, producing the loud 120-cycle power hum.

"Adolph—your cigar is on the table again!" called out the Radio an instant later, as Adolph concentrated his entire mental facilities upon the plight of his wife without having the slightest idea what was going on.

Van Eyster showed no further interest in the fair lady; in fact, he now took a separate chair, quite peeved at being exposed. It was Homer's Radio, he reasoned, so Homer must be to blame; how could he get revenge? Minutes of deep thought, and at last his face brightened. Make Homer jump, too—a hot-foot would do the trick. Matches were on the table—safety matches, too, which would light readily on Homer's shoes.

Van Eyster watched his chance, slipped out of the room when interest was no longer centered on him, and a short time later was crawling stealthily in again through a door just next to Homer's chair.

At last reaching the proper position without being detected, Van Eyster applied the match with a skill and dexterity possessed only by fraternity men—but he never had a chance to wedge the match in place. An electric eye under Homer's chair detected the first flash of flame, and the relay in its circuit applied 600 volts of animal-shocking electricity between two patches of fine bare copper wire woven into the rug, one approximately under Van Eyster's knees and the other under his hands. The unexpectedness of this shock made it all the worse, and involuntary muscle reflex action sent him sprawling on the rug. This, too, had all been planned beforehand.

"Heh, heh, Van Eyster—will you never outgrow those kindergarten pranks?" chided the all-seeing Radio voice as the disgruntled play-boy gingerly rubbed a mustache sadly singed by the match flame.

Harder and harder it became for Mrs. Rockingham to keep up the conversation, as one guest after another was placed on the spot and some pet habit exposed. Adolph sounded the fire alarm gong a dozen times more, to the annoyance of everyone, and the Radio howled in sympathy when one would-be soprano insisted on singing two octaves higher than nature had equipped her for.

Catty whispered conversations among the female guests were picked up by two microphones concealed in the overstuffed sofas, each mike feeding through a separate audio amplifier to one of the headphone units worn by Jay; he could thus listen in on two separate conversations, and when a particularly choice bit of gossip came through, could feed it into a silent crystal loudspeaker concealed in the back of Mrs. Rockingham's favorite chair. Since it was her habit to sit with head back against the chair when not talking, she heard some most illuminating remarks about her dress, her hair, her home and her parties. So perfect was the fidelity of the system that she simply accepted these reproduced whispers as being real without ever giving a thought as to how she was hearing them.

Lights dimmed and sparks flew when souvenir addicts attempted to grab silver ash-trays left temptingly in out-of-the-way corners—and not once did the Radio make a mistake in bringing these actions to the attention of Mrs. Rockingham and the other guests.

Supper was a welcome relief for the embarrassed and bewildered guests, and none tarried long after that. As the last couple left, Mrs. Rockingham turned to look for her husband—but he, wisely, had vanished.

Down in the basement, he was describing the evening with great relish to Jay and Ozzie, exclaiming over and over again, "That was the only party I ever enjoyed in my whole life. I don't see yet how you did some of those things, but you boys have sure earned this check. There'll be a bonus in the mails for you soon, too, for judging from the way my wife looked toward the end of the evening, we've really put an end to those silly parties!"

Novel Radio Items

-BY L.J. MARKUS-

Radio Beams Guide Ferry Boats!

Radio beams have recently been assigned the mammoth task of guiding ferry boats across the Straits of Mackinac (between Lake Huron and Lake Michigan). Frequent fogs and the presence of dangerous shoals made necessary this unique procedure ordinarily used only by airplanes.

Radio Trap Catches Gambler!

The conversation of a man attempting to bribe a Washington, D. C., policeman for gambling "protection" was picked up by a concealed microphone in the officer's car and broadcast by a small transmitter to another police car parked a short distance away. It was there recorded by a stenographer, and used to secure a conviction.

Cathode Ray Tube Is Compass!

An unshielded cathode ray tube can be made to serve as a compass. When the tube is held vertically, with the screen facing upward, the action of the earth's magnetic field upon the electron beam will make the spot move due west from the center of the screen, just as a current-carrying wire is moved in a magnetic field.

Lamp Posts May Talk!

One of the problems encountered during recent war defense demonstrations in European cities was that of identifying cross-streets when driving through city streets during air raid "blackouts." A New York scientist suggests that corner lamp posts be equipped with loudspeakers and electric phonographs which repeat softly and continuously the names of the intersecting streets.

Pencil Changes Transmitter Frequency!

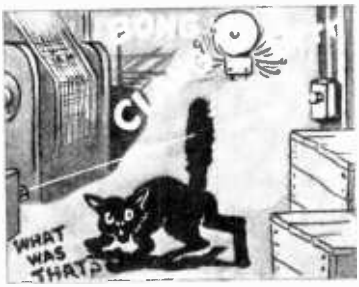
Amateur Radio fans have learned that they can lower the oscillating frequency of a transmitting crystal simply by applying India ink to one or both faces of the crystal. An ordinary lead pencil can be used for the same purpose; heavy penciling on both sides of the crystal can be used to shift the frequency as much as 5 kc. from a value of 3.5 megacycles. The penciling can be erased.

Woven Glass Insulates Radio Wires!

In a new Vitrotex wire made for Radio coils by the Anaconda Wire and Cable Co., threads of glass are woven around the copper wire to serve as a compact, strong and flexible insulation.

STRIPED KITTY WINS! Two Radio amateurs ready to try out a new ¼-kw. transmitter spotted a beautifully-striped black and white pole-kitty sound asleep on the power pack. Electrocution seemed the only solution to this ticklish situation, so they slammed in the main switch and hoped that 2000 volts would be enough. It wasn't—kitty leaped into the air with a screech, quite alive and ready for war. A gas attack two blinded and choking hams leaped pell-mell through a convenient but unopened window - and the victorious skunk retired honorably—gone but not forgotten.

ELECTRIC EELS EDUCATE PUSSIES! When the five cats which are kept in the New York aquarium for mouse-catching purposes began to annoy the sword fish, the curator simply placed a few electric eels temporarily in the same tank. Several good 500-volt jolts from these living batteries convinced the cats that all monsters of the deep, from minnows up, were bad business. (An electric fence unit hooked up to the water in a goldfish bowl will work just as well on your pet cat.) Even more effective results, from a cat-educating standpoint, were secured by placing an eel on the floor.



CAT'S TAIL CALLS POLICE! When an electric eye burglar alarm system in a Kansas City hosiery warehouse sent in a series of false alarms, police investigated. They discovered that whenever Black Boy, the official warehouse cat, walked under the invisible infrared light beam, his erect tail blocked it long enough to cut off the light to the photoelectric cell; this in turn caused a latch-in relay to operate, closing the circuit to the alarm gong and keeping it closed even after the cat had walked through the beam. Raising the light source and the electric eye unit a few inches solved the problem.

N.R.I. ALUMNI NEWS

NOMINATIONS FOR 1939

It seems like no time at all since we asked you to make your 1938 nominations for Candidates for National Officers of the N. R. I. Alumni Association. Yet here we are with the same request for the year 1939. Like little Rollo, who socked his dollar watch with a hammer to see whether it was durable, we exclaim, "doesn't time fly!"

But this is serious business—this matter of selecting our Officers. We have been mighty fortunate in our choice of leaders. We have had good men at the helm. Our affairs always have been conducted in complete harmony. Our Chief Officers have been and are men blessed with initiative, enthusiasm and loyalty to a cause. That is one of the reasons why the N. R. I. Alumni Association has grown steadily since it was organized in 1929.

N. R. I. Alumni Association is recognized by the Radio industry as a progressive fraternity with just one goal—to help its members earn more money in the Radio industry under the most ideal conditions. Wherever necessary—wherever possible — we have extended our influence and strength to the advantage of Radio servicemen.

On page 29 of this issue is a list of the Officers who served you during the year of 1938. Only Peter J. Dunn, of Baltimore, Md., our National President, will not be a candidate for reelection. Pete very graciously is retiring for the one reason that he wishes to give some one else an opportunity to occupy the Chair of President which he has held for the past four consecutive years. Dunn will not relinquish his activities in the Alumni Association by any means; he will be a Candidate for Chairman of Baltimore Chapter. In office or out of office you will always find Pete Dunn with his shoulder to the wheel wherever the Alumni Association is concerned.

All of your present Vice-Presidents are Candidates for reelection. In fact, you will probably want to move one of your Vice-Presidents up to the office of President. You may select men now holding office, or you may select entirely new men—you may nominate yourself if you desire.

Fill out and mail the ballot which you will find on page 30. Return it promptly to National Headquarters. The two men who have the highest number of votes for each of the offices will be selected as Candidates, and in the next issue of the *News* you will be given the opportunity of making a final selection of the Officers who are going to serve during the coming year.

In the August-September issue of NATIONAL RADIO NEWS an effort was made to give you a wide list of names from which you might select your Candidates. This was done because Headquarters has no desire to limit the field to a small number. Moreover, Headquarters wishes to give recognition to men who have been very loyal to the Alumni Association and who are excellent material for a National office. As previously mentioned, it is impossible to list all of the men who could well be entrusted to an important office, but by giving you a considerable number of names, we believe you will be in a better position to select your candidates.

For your convenience and benefit we repeat the list of names. You are to select one Candidate for President, four Candidates for Vice-President, one Candidate for Secretary, and one Candidate for Executive Secretary.

(Page 28, please)

The Service Forum

Conducted by

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

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

TRUETONE MODEL 80-A — **DEAD**

Check the .1 mfd. condenser used as plate by-pass for the three 24 type tubes. If the condenser has broken down a 600 volt paper replacement should be employed.

———*n r i*———

WELLS GARDNER ALL MODELS — **SHIPPING BOLTS**

With the exception of Models 5K and 4C failure to remove the shiping bolts will prevent the chassis from floating freely on the rubber cushions and microphonic noises will be the result, particularly on the short waves. Not only must the bolts be removed when the set is installed but also in show rooms if a good demonstration is to be made.

———*n r i*———

EMERSON MODELS 321AW AND 250AW — **MOTOR BOATING AND INTERMITTENT**

Replace the .01 mfd. coupling condenser feeding the grid of the 43 type tube. A 600 volt replacement should be used. The 250,000 ohm grid resistor in this circuit should be reduced to 100,000 ohms.

———*n r i*———

EMERSON MODELS 108 AND 110 — **HUM**

If the difficulty is not due to the filter condensers, look for a possible short circuit between the pilot light resistor and the chassis. A 25 ohm 10 watt wire-wound resistor may be used for replacement purposes. The replacement resistor should be well insulated from the chassis.

———*n r i*———

EMERSON MODEL 107 — **INTERMITTENT AND DISTORTED**

This is generally due to a defective filter condenser connected to the cathode of the 25Z5 tube. The condenser may be identified by its blue lead which goes into the condenser block. This condenser may be replaced with an 8 microfarad 200 volt electrolytic unit. The positive lead of the new condenser of course connects to the cathode of the 25Z5.

———*n r i*———

STEWART WARNER MODELS 1451A AND 1461A — **DISTORTED AND MUFFLED**

This is generally due to leakage in the coupling condenser between the 6F5 and the 6F6 power tube. A .02 mfd. 600 volt paper condenser should be used for replacement purposes.

JAMES F. BARTON, South Carolina.

———*n r i*———

STEWART WARNER MODEL R119A — **WEAK**

When this condition exists yet stations may be brought in all over the dial an audio defect is indicated. Replace the speaker cone assembly with a new one.

JAMES F. BARTON, South Carolina.

———*n r i*———

STEWART WARNER MODEL 1254A — **DEAD**

Check for a shorted by-pass condenser in the plate circuit of the type 41 power output tube.

JAMES F. BARTON, South Carolina.

———*n r i*———

RCA MODELS 811K AND 813K — **ELECTRIC TUNING**

The buttons when depressed do not tune the set properly and in this case check the button latch. If it is all right, check with an ohmmeter from the latch to the station selector disc. The tuning condenser should be slowly rotated while watching for a make and break circuit. If this fails check the tension on the motor armature shaft spring which makes the motor disengage. If the tension is lacking the motor will pull the condensers a little too far, thus not tuning in the proper station.

JAMES F. BARTON, South Carolina.

———*n r i*———

DELCO AUTO RADIO MODEL 666 — **NO RECEPTION**

A and B voltages okay. Test continuity from detector grid of 6A8G to ground; if zero reading is obtained see if the tab protruding from top of R.F. coil can which is located directly beneath R.F. section of gang is not shorted to can.

A. E. BARWOOD, South Africa.

———*n r i*———

DELCO AUTO RADIO MODEL 665 — **NO RECEPTION**

Check lead from stator of gang R.F. section to coil which is below same for open connection at tab protruding from top of coil can.

A. E. BARWOOD, South Africa.

(Page 27, please)

Here and There Among Alumni Members

Harold E. McConnell is now on the engineering staff of station KPRC, Houston, Texas. And recently married, too. Congratulations.

———n r i———

Frank Pesek of Cicero, Illinois, who makes a speciality of diathermy apparatus received a severe 5000 volt shock. He says he hasn't got over it yet and probably never will, because of that nurse with the blue eyes, golden hair and teeth like pearls. Some guys have all the luck.

———n r i———

Noel Ray of Gadsden, Alabama, is one of the outstanding Radio dealers in the south. Ye Editor got a good look at some photographs of his strictly modern place of business. Said photos were reproduced in Radio Retailing, August issue.

———n r i———

James L. Pratt of Benson, Vermont, is now State Radio Aide for Vermont in the Army Amateur Radio System.

———n r i———

Glenn C. King is Treasurer of the Radio Association of Grand Rapids, Mich. He recently moved to larger quarters and now has one of the nicest stores in his locality.

———n r i———

We extend deep sympathy to Secretary Sam Juricek of Chicago Chapter, who recently lost his mother. A hard blow, Sam.

———n r i———

George W. Allen of Riverside, R. I., has a part time job of two days a week with the East Providence Police Department, as Radio operator, which he finds very interesting.

———n r i———

In the peaceful town of Rosebud, Texas, is a big Radio shop known as Little Bros. Radio Service. L. B. Little will be glad to hear from members in his vicinity.

———n r i———

John C. Staley of Sedalia, Mo., recently purchased a new coupe for service call transportation, which he uses in his full time Radio business.

———n r i———

Eddie Sorg of Chicago broke his leg. The boys of Chicago Chapter say Sorg was showing Oldrich Zilinsky how to do the Big Apple, and Zilinsky hasn't got his legs untied yet. Talk about your pretzel benders! Both are hustlers and we hope they get unraveled without further mishap.

———n r i———

Snorri Arnar of Raykjavik, Iceland sends an interesting snap-shot. He says at this season the sun sets about midnight in his country and daylight creeps in again about 2 A. M. From May to August they use no electric lights at all because they have continuous daylight. Arnar is a big man in Radio circles in Iceland.

"I now have seven employees," writes B. D. Rinehart of Richmond, Ind. "I now have eight," says O. E. Faulkner of El Dorado, Ark. Both have shown steady advancement.

———n r i———

W. L. Lasley of Speedwell, Tenn., has purchased a house and lot on a business corner in a neighboring town where he plans to open a modern Radio shop. We'll be glad to get a picture of it, Lasley.

———n r i———

The Editor of this page will appreciate personal comments. Please send them in. Anything of a personal nature makes good copy. Many fellows say they like this page, but it takes a lot of copy to fill it—so let's hear from you. How about you, buddy!

———n r i———

Just when things were going great for Clarence L. Calder of Baker, Oregon, he was the victim of a fire which did a lot of damage. But he is coming right along again.

———n r i———

R. J. Maney of Washington, D. C., dropped in to say he has a brand new baby in his house. Maney is doing all right by himself in more ways than one.

———n r i———

Executive Secretary Menne skipped away for a few days fishing and brought a mess down from the St. Lawrence River, some 450 miles, just to convince any doubters. Some of the boys still insist he bought them.

———n r i———

One of our members sent in a very complete business card for an opinion before printing. In fact it was so complete there was no room for his name and address. Or did he forget that detail?

———n r i———

We've been fortunate to have a very good looking girl on our covers for several consecutive issues. How do you like them—we mean the covers? And you fellows who have been writing to know who the girls are—well, just keep your mind on your work, will you?

———n r i———

Dr. George B. Thompson of Los Angeles, Calif., Vice-President of N. R. I. Alumni Association, is of course, a college graduate. He has received degrees of B.Sc., M.S. and M.D. But since he left college he has completed 23 home study courses. And does he believe in correspondence instruction! He has written a most interesting article which we hope to print in the NEWS *soon.*

The Service Forum (Continued from page 25)

ZENITH MODEL 4V-31 — **DEAD ON PART OF DIAL**

This trouble may be eliminated by raising the oscillator coil about one-quarter inch from the chassis with insulating washers. The difficulty is evidently due to absorption of energy from the coil thus preventing oscillation over the entire dial.

FRED E. BERRY, Kentucky.

———*n r i*———

GENERAL ELECTRIC MODEL E-126 — **WEAK**

Check the 2,200 ohm resistor inside the first I.F. transformer as it may be open and also check for a shorted .05 mfd. by-pass condenser in the plate circuit of the 6L7 mixer tube.

———*n r i*———

KENNEDY MODEL 20 — **INTERMITTENT HUM**

If hum appears when the signal fades out this indicates a poor connection on the filament lug connector and the power transformer. All connections at the power transformer lugs should be resoldered. If tar has oozed out on the lugs this may be wiped off with a cloth when soldering.

———*n r i*———

EMERSON MODEL 5A — **WEAK**

Remove the cathode bias resistor of the 85 second detector tube using a 14,000 ohm replacement. The electrolytic by-pass condenser in this circuit should also be replaced using a 10 mfd. unit.

———*n r i*———

EMERSON MODEL 26 — **HUM**

This may be due to an open in the filter condenser in the grid return of the 47 type tube. If connection of a new condenser in the circuit eliminates the hum the old one should be replaced.

———*n r i*———

CHEVROLET MODEL 601038 — **INTERMITTENT**

Replace the 30,000 ohm resistor in the screen grid circuits.

———*n r i*———

PHILCO MODEL 70 — **OSCILLATION**

If the oscillations will not yield to the general cures, by-pass the filaments of the R.F. tubes to the chassis with a .1 mfd. condenser. You may have to experiment in order to find the best position to eliminate oscillation. The oscillation is due to R.F. picked up by the filament circuit and in this way transferred from one stage to another.

———*n r i*———

PHILCO MODEL 70 — **DEAD**

If the rectifier plates become red hot and the filter condensers are O.K. check the filament leads of the tubes at the rear of the chassis at those points where the leads pass under the primary trimmer condensers of the I.F. transformer. These leads sometimes touch the edges of the condenser plates which will cut through the insulation on the wire thus shorting out the plate supply.

———*n r i*———

PHILCO MODELS 38-14T — **INTERMITTENT NOISE**

This may be caused by intermittent shorting of the high frequency trimmer condenser. In general this may not be located with an ohmmeter and a replacement will be necessary to definitely show up the cause of the trouble. Cleaning the condenser and replacing the mica will enable you to check up on this condition without purchasing a replacement part.

———*n r i*———

PHILCO MODELS 38-1 AND 38-2 — **OSCILLATIONS**

Parasitic oscillations may be eliminated by replacing the 6U7G R.F. tube with a 6K7G type tube. Also lengthen the green wire connecting to the screen contact of the R.F. tube to its by-pass condenser. Run this wire around the R. F. socket toward the front of the R.F. unit and then back to the condenser. Keep the wire as close to the base as possible. Remove the .00025 mfd. condenser from the I.F. screen circuit. After run 4, these changes were made at the factory.

———*n r i*———

MOTOROLA MODEL 124 — **TUNING MOTOR RUNS CONSTANTLY**

This is due to the fact that the white wire is grounded where it passes through the dial assembly. Eliminating the short at this point will allow the unit to operate properly.

———*n r i*———

AIRLINE MODELS 62-134 AND 62-139 — **DEAD**

This condition accompanied by lack of screen grid voltage is generally due to a break down in the .25 mfd. paper condenser connected from the screen grid to chassis. A 600 volt replacement condenser should be used.

———*n r i*———

CROSLEY MODEL 725 — **DEAD AND SMOKES**

This may be due to a defect in the tuning meter caused by a break down in the .01 mfd. 400 volt R.F. plate by-pass condenser. A 600 volt replacement should be used.

———*n r i*———

CROSLEY MODEL 706 — **INTERMITTENT**

This is sometimes caused by the screw on the aerial terminal working loose due to wearing of the thread. The trouble may be remedied by soldering a small length of wire to the lug under the screw and attaching the aerial lead to this wire instead of to the terminal.

Nominations for 1939 (Continued from page 24)

The two receiving the highest number of votes will be declared duly nominated, and the run-off or final election will take place in the next issue of the NEWS. Remember, with the exception of President Dunn, your present Officers are Candidates for the same Offices or for advancement: furthermore, you may select your candidates from among the following men, or vote for any one else who is a member of the N. R. I. Alumni Association.

Carl E. Slater, Coolidge, Ariz.
Isaac T. Hudgens, Magnolia, Ark.
R. H. Rood, Los Angeles, Calif.
C. H. Woodruff, Olive, Calif.
John R. Kelley, Denver, Colo.
Fred G. Conklin, Hartford, Conn.
George W. Howell, Wilmington, Dela.
S. H. Daniels, Orlando, Fla.
W. S. Holloway, Tucker, Ga.
Oliver B. Hill, Moscow, Idaho.
C. B. Morehead, Chicago, Ill.
Edward Sorg, Chicago, Ill.
J. Verlin Hunt, Richmond, Ind.
Leonard E. Close, Mt. Pleasant, Iowa.
Harry Laborde, Perry, Iowa.
William B. Martin, Kansas City, Kans.
Karl Sonenberg, Cloverport, Ky.
W. B. Parrish, Frankfort, Ky.
Cecil Johnson, Alexandria, La.
Robert Beaule, Lewiston, Maine.
Robert C. Beall, Seabrook, Md.
Omer Lapointe, Salem, Mass.
Rex B. Smith, Sault Ste. Marie, Mich.
Jorgen R. Martinson, Minneapolis, Minn.
Harper Johnson, Jr., Senatobia, Miss.
Claude West, St. Louis, Mo.
Wm. Darlington, Butte, Mont.
Floyd A. Roberts, Scottsbluff, Nebr.
C. D. Parker, Lovelock, Nev.
E. Everett Darby, Woodsville, N. H.
Peter L. Munier, Passaic, N. J.
Wm. Prescott, Rochelle, N. J.
James E. Graham, Hobbs, N. M.
Charles W. Dussing, Syracuse, N. Y.
Glenn A. Williams, Cuba, N. Y.
Alison A. Lomax, Spencer, N. C.
Arvid Bye, Spring Brook, N. Dak.
Frank Moore, Portsmouth, Ohio.
C. A. Drotleff, Youngstown, Ohio.
W. G. Cordell, Oklahoma, Okla.
Henry W. Freeman, Portland, Ore.
Clarence Stokes, Philadelphia, Penna.
Albert Melezak, Pittsburgh, Penna.
Clyde D. Kiebach, Reading, Penna.
Karl R. Smalley, Cranston, R. I.
Horace C. Main, Georgetown, S. C.
Noel J. Lawson, Aberdeen, S. Dak.
Sam Juricek, Chicago, Ill.
Charles J. Fehn, Philadelphia Penna.
Joseph Barrette, Brooklyn, N. Y.
T. J. Telaak, Buffalo, N. Y.
L. J. Kunert, Middle Village, N. Y.
C. H. Mills, Detroit, Mich.
W. W. Jensen, Baltimore, Md.
J. B. Gough, Baltimore, Md.
Wilmer Giese, Baltimore, Md.
I. A. Willett, Baltimore, Md.
Clarence Steed, Washington, D. C.
A. Schiavoni, Philadelphia, Penna.
A. H. Ketelhut, Benton Harbor, Mich.
T. J. Bowman, Altavista, Va.
Harry W. Merchant, Arlington, Va.
W. A. Bunch, Miami, Fla.
W. P. Brownlow, Johnson City, Tenn.
J. E. Collins, Paris, Tenn.
J. D. Wood, Archer City, Tex.
L. H. Watkins, Ogden, Utah.
H. E. Monroe, Middlebury, Vt.
J. Walton Colvin, Orange, Va.
R. F. Keil, Seattle, Wash.
Howard C. Dittman, Wheeling, W. Va.
William Wiesmann, Ft. Atkinson, Wis.
Ivan H. Thompson, Laramie, Wyo.
Alvin L. Campbell, Burdett, Alta., Canada
J. H. Southey, Vancouver, B. C., Canada
Henry H. Sutton, Flin Flon, Man., Canada
Fred J. Fellowes, Winnipeg, Man., Canada
Wallace G. Conrad, Halifax, N. S., Canada
C. M. G. Smith, Barrie, Ont., Canada
George Duff, Ft. Williams, Ont., Canada
G. C. Gunning, Smiths Falls, Ont., Canada
J. L. Huard, Drummondsville, P. Q., Canada
Paul Provost, Montreal, P. Q., Canada
E. H. Symons, Regina, Sask., Canada

New York Chapter Is Going Strong

On page 30 we mention that practically all Local Chapters suspended meetings during August. An exception was New York. This bunch of live wires held meetings right through the summer.

Irving Gordy has been giving some mighty fine talks on Radio. He is a very interesting and qualified speaker. A number of our members are "ham" fans and the Chapter invites all interested in amateur Radio to come to meetings and join in the discussions. We talk about all phases of Radio—you can't afford to miss these friendly gatherings.

Meetings are held at 8:30 P. M. on the first and third Thursday of each month, at Damanzeks Manor, 12 St. Marks Place, New York. Do not confuse with a similar address in Brooklyn.

Directory of Officers

(To Serve Until January, 1939)

President—P. J. Dunn, Baltimore, Md.

Vice-Presidents—
Earl Bennett, Evanston, Ill.
F. E. Oliver, Detroit, Mich.
Dr. Geo. B. Thompson, Los Angeles, Calif.
Allen McCluskey, Birmingham, Ala.

Secretary—Earl Merryman, Washington, D. C.

Executive Secretary — L. L. Menne, National Headquarters, Washington, D. C.

Directory of Chapters

Baltimore—I. A. Willett, Secretary, 2111 Arunah Ave., Baltimore, Md.

Philadelphia-Camden — Clarence Stokes, Treasurer, 3405 Kensington Ave., Philadelphia, Pa.

New York—L. J. Kunert, Secretary, 66-11 74th St., Middle Village, L. I., N. Y.

Buffalo—T. J. Telaak, Chairman, 657 Broadway, Buffalo, N. Y.

Toronto—Ed. Witherstone, Secretary, 363 Nairn Ave., Toronto, Ont., Canada.

Chicago—Sam Juricek, Secretary, 4223 N. Oakley Ave., Chicago, Ill.

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

Detroit—C. H. Mills, Secretary, 5458 15th St., Detroit, Mich.

Are You Wearing Your Pin?

Recently there has been a great demand for the N. R. I. Alumni Association Pin. Our supply was soon exhausted but we now have a new lot available and we are ready to fill orders as fast as they are received. These pins really are beauties and every member of the Alumni Association should wear one.

J. B. Hunt of Richmond, Indiana says: "It is with a great deal of pride that I wear the little button identifying me as a member of the N. R. I. Alumni Association. Besides being a good advertisement, it lends dignity to one's appearance."

Only members of the N. R. I. Alumni Association may wear this pin. They are durably made with a patented safety clasp. The charge is only $1 and they are worth every penny of it. Address your letter to the Executive Secretary, National Radio Institute Alumni Association, 16th and You Sts. N. W., Washington, D. C. Enclose one dollar and give your name and address.

Tear carefully along this line

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 1939 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. It's up to you—select any men you wish 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 1938 officers are to be found in the opposite column.

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 L. L. Menne, Executive Secretary, N. R. I. Alumni Association, 16th and U Sts., N. W., Washington, D. C.

Your signature .....

City ..... *State* .....

(Over)

The 1939 *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, 1938.

Nomination Ballot

L. L. MENNE, *Executive Secretary,*
N. R. I. Alumni Association,
16th and You Sts., 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 1939.

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 .....

Local Chapters

Practically all of our Chapters suspended business meetings during the month of August. There were some strictly social shindigs on the side however.

Take the picnic held by Chicago Chapter, for example. There's an event which is on the calendar for every year because each succeeding picnic is better than the last one. And when that gang of live-wires in Chicago set their hearts on a celebration they make history.

The grounds in Cermak Park are beautiful and spacious, plenty of shade trees and one of the finest swimming pools anyone could ask for. The women and children enjoyed themselves immensely.

After lunch the fellows lined up for the annual ball game. No big league scouts were in the stands and it was just as well because the boys had an off day. The errors ran even pace with the hits and we've been tipped off that the game was called about the sixth inning because of exhaustion. The demand for sunburn lotion, horse liniment and arnica was something terriffic.

Other Chapters held some social meetings during the summer. Baltimore went over big with a party at which refreshments were served aplenty.

Well, vacation days are gone. Everybody is back on the job and meetings are being held on regular schedule again. Now, listen all youse guys—Bennett, Oliver, Fehn, Barrette, Jensen, Juricek, Schiavoni, Kunert, Willett, Mills, Stokes, Morehead, Sorg, and all the lads, you are expected to take typewriter in hand after each meeting and send an account to headquarters for mention in these columns. Thanks a lot for your fine cooperation during the first half of this year. You've been swell—all of you.

And now, with the coming of cool evenings, when frost will soon be on the ground, cider time, Thanksgiving in the offing, there is much work to be done and no better time of year to do it.

Chairman Barrette of New York Chapter has something up his sleeve for early schedule. Baltimore Chapter gets going again September 20. Chairman Fehn of Philadelphia plans a big meeting for about October 20. Earl Bennett, Chairman in Chicago always can be depended upon for a good meeting. The Detroit boys, with Chairman Oliver and Secretary Mills as leaders, do things in real style—yes, sir, big doings are on tap for this fall and winter.

So, let's tie in—and don't forget to send a few lines to headquarters now and then for yours truly.

L. L. MENNE,
Executive Secretary.

Article On Recorders Gets A Boost

I am taking this opportunity to thank the school for NATIONAL RADIO NEWS. I think it is wonderful. I received a lot of help through the Laboratory Page in the last issue. I enjoyed Mr. Paul H. Thomsen's article about Portable Recorders as a Profitable Side Line.

EDWIN G. TRAFTON,
New Castle, N. B., Canada.

How Do You Like This Issue?

Mr. Markus certainly knows his electronics. I believe in that old saying: "All work and no play makes Jack a dull boy." Electronics, Inc. is a revelation as well as good entertainment. I would like to see more Television and Code practice articles, if possible. Incidentally, that was a beautiful tribute to departed operators, by Mr. Haas. The New Radio Gadgets article was very good. And the Universal A.C.-D.C. article was the answer to any Radiotrician's prayer. I've found those little sets rather tricky sometimes!

PETE J. VARGAS,
Los Angeles, Calif.

Electronics, Inc. Scores Again

I would like to tell you what I think of the NATIONAL RADIO NEWS. I am still a student and to me it is worth at least two lesson texts. The stories, such as Electronics, Inc., are tops with me.

CARL J. CRAVEN,
Leesburg, Ohio.

Likes Inspirational Comments

Kindly accept thanks for your mental stimulator given always on the inside page of the cover of each lesson and in our magazine.

J. L. FYNE,
Cristobal, C. Z.

You Ought To See Us Now!

Mighty pleased to hear from you again, Mr. Smith. Just like hearing from an old schoolmate because in 1927 I met you personally in Washington, or maybe it was 1926, as I was passing through the city and you showed me around the school yourself. Fond remembrances, what? I met Mr. Dowie and Mr. Haas, too.

When I passed through Washington in 1931 I was amazed at what I saw that you men had brought about in so short a time. You sure started something. The Alumni Association is good and your messages through its pages have been an inspiration to me during the years to keep trying.

The President's and Vice President's page means something to me as I have met the men myself. I venture to say you are as well known in Canadian Radio circles as in the United States. Keep up the good work.

THOMAS B. LINKLATER,
Ottawa, Ont., Canada.

Recent Articles Are Appreciated

I appreciate such articles as "Electronics, Inc.," and the article by chief of the Service Forum, Mr. Straughn, on "Servicing Universal A.C.-D.C. Receivers." Articles like these, as well as that on "Push-Button Tuners" in the June-July issue by Chief Dowie put the N. R. I. students and graduates out in front where they belong.

REFEL A. MAXWELL,
Brooklyn, N. Y.

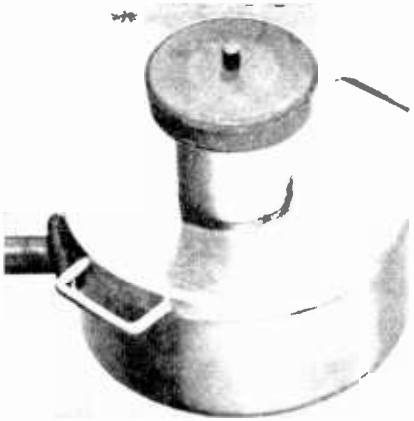
Gets Many Ideas From News

I greatly enjoy reading the NEWS and get many good ideas from it. Particularly interesting was the article on servicing Universal A.C.-D.C. sets. I also like the Radio Forum.

OCTAVE JUMONVILLE, JR.,
New Orleans, La.

Oscillograph Pickup Units

Several pickup units for translating various sound, vibration, impact, heart-beat and other phenomena into suitable electrical terms that can be observed as patterns on the cathode ray oscillograph screen, are now available through Allen B. DuMont Labs., Inc., 2 Main Ave., Passaic, N. J.



For studying sound there is the Type 108 M bullet-shaped dynamic microphone of special high impedance to operate most advantageously into an oscillograph amplifier. For highly localized sounds such as an engine noise, there is a small lapel crystal microphone.

For vibration studies and measurements, there are the Brush inertia type and the displacement type pickups.

A stethoscope or heart-beat pickup, whereby heart action can be observed on the oscillograph screen, is also available.

Service Helps Announced by Arcturus

A new list of more than fifty dealer and service helps, many available without cost and others at extremely low cost prices, has been announced by the Arcturus Radio Tube Company of Newark, New Jersey. An attractive four page catalog describing these helps in detail will gladly be sent upon request to any dealer or serviceman requesting it.

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