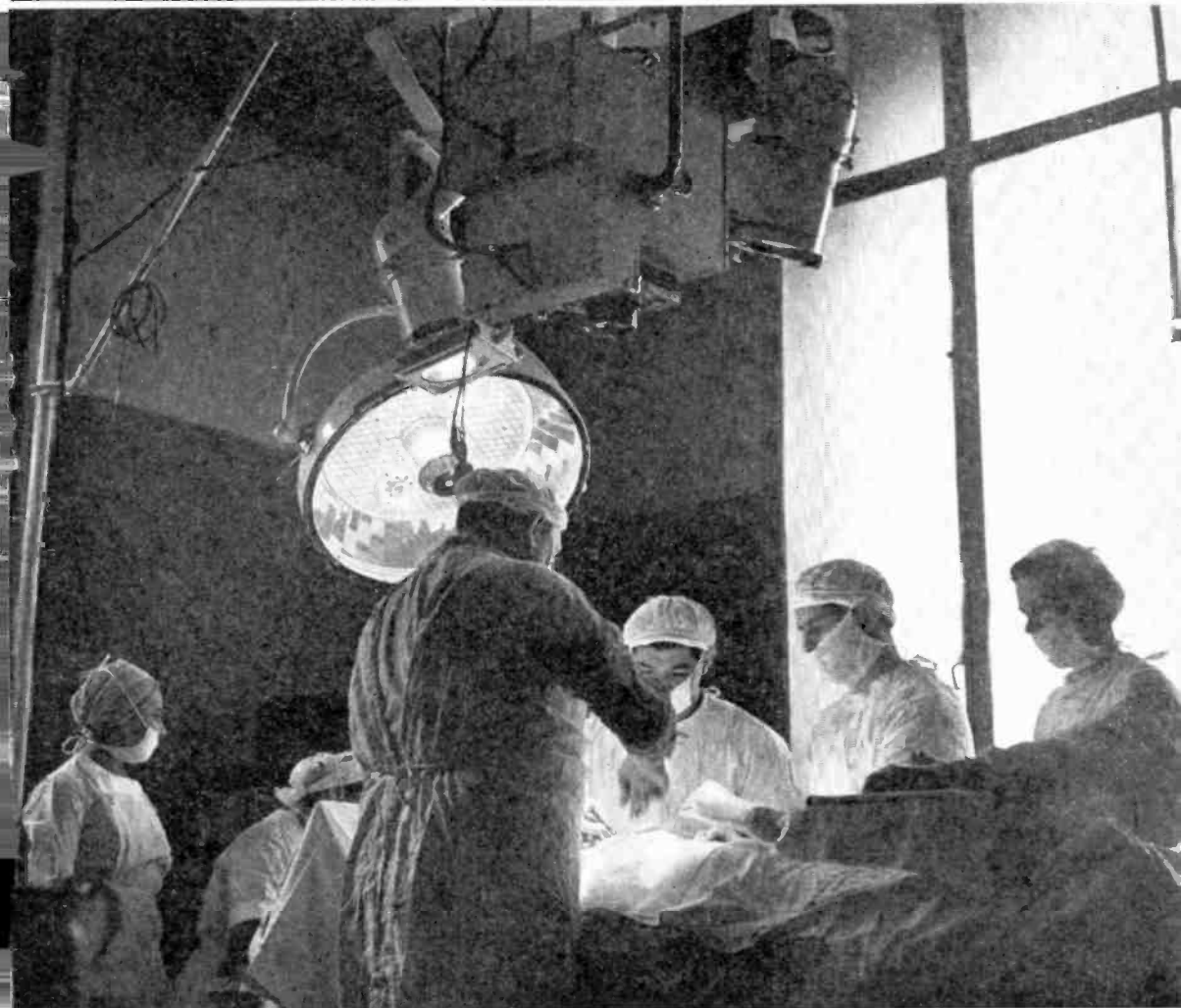


NATIONAL RADIO NEWS



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Alumni Association News

JUNE-JULY
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SOME DAY MY CHANCE WILL COME

This condensed story is about a man we all greatly admire.

At the age of twenty-two he was operating a cross-roads store. He failed and lost every penny of seven years' savings. Two years later he had saved enough to try again. He took a partner. The partner dissipated all the profits and they went deeply in debt. They sold the business. The new owner failed to make his payments, sold all the stock and fixtures and left town. Then the former partner died, leaving our man

to pay all the debts. This he did. On his thirty-ninth birthday he paid the last dollar of indebtedness.

In the meantime he had secured a job as a surveyor but one of his creditors levied on his property and they took away his instruments and his horse.

Then his dearly beloved wife died. Fate seemed cruel to him. He broke down in health and returned to his parents' home to avoid a mental collapse.

Ten years later he was elected to Congress. But after serving two terms he was defeated for re-election. Again he failed.

Some years later he was a candidate for Senator. His opponent, persuasive in speech, experienced in politics, was too much for him and he was badly defeated at the polls.

At fifty he was down and—well, down but not out. For thirty years he had tasted nothing but the bitter dregs of failure. But his indomitable spirit moved on. He believed in himself. He had said, "I will prepare myself and some day my chance will come." He had learned how to accept adversity. He *had* prepared himself.

Two years later he was elected President of the United States.

When things seem to break badly for you, when you begin to feel you "never had a chance," think of Abraham Lincoln, the bare-footed wood-chopper, self-educated, who used the back of a shovel for a slate and read by the light of a candle. His life should be an inspiration to every man with red blood in his veins.

E. R. HAAS, Vice President and Director

1939 Is Television Year!

Ending years of rumor and premature conjecture, Television's birth is officially scheduled for the year 1939. With the opening of the New York World's Fair regular Television broadcasting service was begun. Los Angeles also has been broadcasting Television programs on a limited schedule. Service in 1939 seems probable only for New York City and Los Angeles. It may be another year before there will be Television shows in any of the other principal cities. It may be five years—perhaps ten—until Television shows pay their way.

"Business Week," a McGraw-Hill publication dealing with current affairs, prepared a most enlightening report on the status of Television. In the preparation of this report Business Week had the valued assistance of Donald G. Fink, managing editor of Electronics, also a McGraw-Hill publication, which for the past eight years has followed intensively the technical developments in the field of Television.

The editor of NATIONAL RADIO NEWS is very grateful to the McGraw-Hill Publishing Co., for permission to bring extracts from this report to readers of NATIONAL RADIO NEWS.

Technically, Television is an achievement of the highest magnitude. Under average conditions the pictures received in favorably situated homes are steady, clear, reasonably bright, and contain sufficient detail for the presentation of nearly any type of subject. In the words of one Radio network executive: "The technical problem of Television, so far as I can see, can be considered solved. If the programs are half as good as the pictures, we'll have little to worry about except meeting the demand."

Thus, in the opinion of those who know the field, it appears that the system is amply good enough to offer the public. Yet it cannot be forgotten, as these men warn in the same breath, that there are limitations, especially geographical limitations, from which at present there is no visible avenue of escape.

Then there are technical or geographical limitations—perhaps the most serious of all. The range of a transmitter is limited by the height of the transmitting antenna and the character

of the surrounding terrain. Except under extremely favorable conditions, fifty miles is the operating limit for an antenna a quarter of a mile high; an antenna 400 ft. high—perhaps the highest to be expected in many of the smaller cities—can serve with an adequate signal only receivers within 25 or 30 miles.

Another difficulty is the fact that Television receivers must be installed with care, especially in regard to the antenna installation. "Ghost images" are very common in cities where tall buildings may cause signal reflections. Automobile ignition systems and other sources of static may interfere seriously with the picture reproduction. These latter difficulties are most serious on the outer fringes of the service area.

The necessity of using ultra-short waves brings with it the limitation of transmitting range. Ultra-short waves do not bend and follow the curvature of the earth, as longer waves do; rather, they pursue a straight line. Consequently, upon transmission from the antenna, these waves travel as far as the eye can see—that is, to the horizon. Thereupon, they glance off the surface of the earth and are lost in the heavens beyond. It is a good working rule (but not without occasional exceptions) that the limiting range of a transmitting station is the distance to the horizon, viewed from the antenna. Consequently, the higher the antenna, the further away the horizon, and the wider the range of coverage. (For mathematicians the relation is a very simple one: The distance to the horizon, in miles, is equal to 1.23 times the square root of the antenna height, in feet.)

The moral of this is obvious: If you want to cover a wide area with a Television station—and the wider the coverage, the bigger the market—locate it on the highest possible point near the center of the population. Two of the highest spots have already been taken. They are the Empire State Building and the Chrysler Building in New York, taken over by the National Broadcasting Co. and the Columbia Broadcasting System, respectively.

Skyscrapers are not the only solution, of course. High mountains near important cities, as in the case of Chattanooga or Pittsburgh, may prove

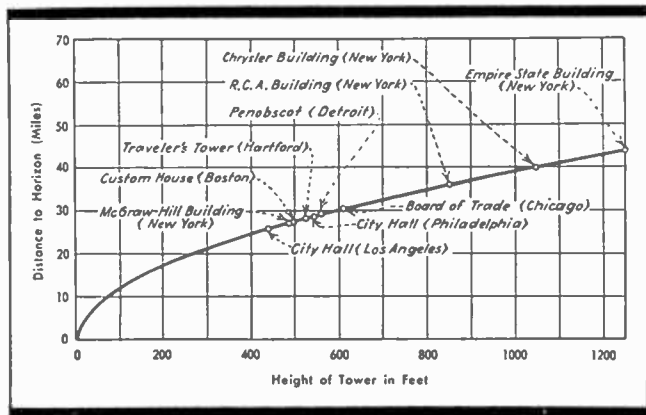
quite useful, but high buildings are more apt to exist in centers of population. The only limitation is that most skyscrapers fall far short of the 1,000-foot mark; hence horizons and coverage areas are correspondingly shortened. The chart shows the horizon distance for the tallest building in several of the chief market areas in this country.

How the Modern Television System Works

A Television program begins in the Television camera, which "views" the live talent in the studio or through which movie film is run. The camera is a large box carefully mounted so

by the lens of the camera, they acquire a positive electric charge. The amount of charge acquired by each drop is in direct proportion to the amount of light falling on it. In consequence, the lights and shadows are transformed into a latent image in electric charge.

The electric charge is then removed from the plate, bit by bit, through the agency of an electron beam which scans the plate in much the same way as the eye scans a page of printed matter. The scanning motion is in a series of fine parallel horizontal lines, which are explored from left to right, one after the other,* in the same manner as each line is read in a column of type. (*Actually the individual lines of the image are sent in interlaced order—that is, the odd-numbered (first, third, fifth, etc.) lines are sent first, and the lines between are blank. The blanks are then filled in with the even-numbered lines (second, fourth, sixth, etc.) The picture area is thus covered twice for each complete picture, a technique necessary to eliminate flicker in the images.)



Courtesy of "Business Week"

You've got to get up to get out—that's what this trick chart boils down to. Unlike the longer waves used in sound broadcasting, the ultra-short ones that carry television do not bend to follow the curvature of the earth. Consequently the horizon is about the limit of the television antenna's transmitting range. And the higher you get, the farther the horizon. The chart brings out this relationship up to the height of the Empire State Building (world's tallest) in New York City, from which NBC puts its television programs on the air.

that it can be swung in all directions to follow the action of the program. The box contains a lens at one end which focuses the scene on a flat plate, mounted in a vacuum within the camera. This plate serves the same purpose as the plate in an ordinary camera—that is, it serves to transfer the image focused upon it into a latent image.

In ordinary photography, the latent image is photochemical in nature and is developed chemically. In Television, the latent image is photo-electrical in nature. Actually, the sensitive plate is a mica sheet on which are deposited millions of tiny drops of silver whose surfaces are sensitive to light. When light is focused on these drops

The electrical "highlights" and shadows of the image—the electrical charges which exist on each silver drop in each line—are removed by the beam in the form of electric charge impulses and impressed on the transmission circuit. The variations in charge are transmitted by the circuit, which must preserve faithfully all the subtleties of electrical "shading." After arriving at the transmitter, the impulses are impressed on an ultra-short carrier wave and radiated from the antenna.

At the receiver the process is reversed. First, the ultra-short wave is picked up and amplified by the receiver and then "detected." The detector tube restores the signal to a form which is substantially the same as it was when it left the camera in the studio. This signal controls the image-reproducing tube (cathode-ray tube). This most essential tube is an evacuated, funnel-shaped, glass structure containing a source of electrons which are sprayed, something like water from the nozzle of a hose, on the fluorescent screen that forms the wide end of the funnel. This closed and slightly rounded end of the cathode-ray tube is the screen on which the image actually appears.

When the stream of electrons strikes the screen it creates a spot of light. The brilliance of this spot is controlled by the picture-impulse signal. Furthermore, the direction of the beam is controlled electrically, so that the spot moves across



Courtesy American Television Corp.

Like the remote loudspeaker in Radio, the "kinet," product of American Television Corporation, New York, picks up the televised picture at any distance in the home away from the receiving cabinet itself. Adjustable and portable, the device shown here obviates crowding around the screen of the cabinet. By the use of one or more of these extensions, the television program may be viewed in comfort at several points in a building or apartment. Each kinet is equipped with its own cathode ray tube and lens to magnify the image.

The screen in a series of lines, fluctuating in brilliance as it goes. The motion of the spot causes it to scan the screen surface in exact synchronization with the moving electron beam in the Television camera. The moving spot traces out the highlights and shadows of the scene, line by line, until a complete picture is covered. This process consumes 1/30th of a second. Thereupon the spot moves to the top of the screen and traces out another picture in the next 1/30th of a second, and so on.

Some idea of the technical problem present in "photographing" and reproducing the image may be gained from the fact that the electron beam (in the camera and cathode-ray tube) moves across each line in the image at a rate of about *2½ miles per second*, and that it changes in intensity (to recreate the detail of the image) *every 1/50th of an inch*. The image contains about 400 lines (actually 441 lines are used but roughly 40 of these are not active in forming the visible picture).

The sound accompanying the picture is taken care of by a separate transmitter. A microphone in the studio is moved about to follow the action of the program and is kept out of the view of the camera, in the same way as in the filming of

movies. The microphone feeds into amplifiers and then into a separate broadcast transmitter.

At the receiver, the sound signal is amplified, detected, and applied to the loudspeaker. The circuits are so arranged that only one tuning dial (or push-button) is required to tune in both sight and sound. Hence it is impossible to mix the picture from one station with the sound from another.

An ordinary sound Radio set contains three controls: one for station selection, one for volume, and one for tone. The Television set has these controls, and a minimum of two others for fixing the brightness of the picture and regulating the contrast of range of light between highlights and shadows. Other subsidiary controls to regulate focus, centering, and the width and height of pictures are available, but are usually not adjusted after the installation of the receiver.

A very high voltage (judged by ordinary standards) is required to operate the image-reproducing tube—from 1500 to 7000 volts depending on the size of the tube and required brilliance of the picture. Care is taken to protect the user



Courtesy Allen B. Dumont Labs.

The DuMont standard table-type model cabinet, in handsome wood, measuring 24" high x 15½" wide x 25" deep, is shown above. Excellent synchronized sound is obtained from the 8" dynamic speaker. For months past, the Allen B. DuMont Labs., Inc., Passaic, N. J., have been in production on huge cathode-ray tubes and television receivers for home use. Many such sets have already been sold in the New York metropolitan area alone.

from this voltage, and it need be no more dangerous than the 15,000-volt hazard associated with spark-plugs in an automobile, if the circuit is properly designed.

The cost of the receiver depends primarily on the size of the cathode-ray tube employed. The width of the picture varies from a lower limit of about 2½ inches in the smallest tube to about 10 inches in the largest. Most receivers will contain complete equipment for both sight and sound (this arrangement is considered to be the best engineering practice), but some of the cheaper receivers will be "vision only" units. Although a model of this type will not contain sound equipment, it will be equipped with a frequency-converter circuit which will allow it to be used with an ordinary short-wave sound receiver. This latter system is at best a makeshift, but it offers one solution of reducing the price to the \$100 range without sacrificing too much in the picture-reproducing equipment.

Television Frequency Assignments

Toward the end of 1937, the FCC revised its allocation of the ultra-short wave lengths. According to this new schedule, definite Television channels, each 6,000 kc. in width, were set up as follows: 44,000-50,000 kc.; 50,000-56,000 kc.; 66,000-72,000 kc.; 78,000-84,000 kc.; 84,000-90,000 kc.; 96,000-102,000; and 102,000-108,000 kc. These seven channels constitute those which Radio engineers are agreed can be put to use immediately. Accordingly receivers are designed to receive any or all of these channels.

One interesting angle of the frequency assignment problem is the fact that not all of the seven channels are equally desirable, because the higher the frequency, the more difficult it is to build a transmitter of a given efficiency and the less sensitive are the receiving circuits. Thus, the channel from 44,000-50,000 kc. may be looked upon as the prize catch, the channel from 50,000-56,000 next best, that from 66,000-72,000 next, and so on. Actually, there is little preference in the first three channels, but it is nevertheless to the advantage of a station to obtain as low a frequency assignment as possible.

Life of Tubes

Present prices range from \$25 for a five inch tube to \$95 for the larger sizes (12 and 14-inch diameter screens). A tube may be expected to last several hundred hours, possibly well over a thousand. On the prospective program schedules of 4-5 hours per week it should have a useful life of one to four years. The tubes must be carefully protected, since the external air pressure on them (against the vacuum inside) amounts to several tons. If one collapses, the resulting "implosion"

may scatter glass over a wide area. Many receivers will be provided with protecting plates of shatterproof glass.

Two types of fluorescent screen are available: producing green light (green and black pictures) and white light (black and white pictures). The green screens are more stable and have somewhat longer life, but the white screens seem to be the unanimous choice of manufacturers at present.



Courtesy American Television Corp

The Videor Console was designed by American Television Corporation for home reception of sight-and-sound programs. This model is equipped with 4-band receiver (standard Radio, shortwave, police and television sound). Cabinet designed by Lurelle Guild, one of America's leading industrial designers. Videor employs a 5" cathode ray tube, which is supported by 15 other tubes in chassis.

A GLOSSARY OF TELEVISION TERMS

AUDIO (Latin, "I hear")—Pertaining to the transmission of sound.

BLIZZARD HEAD—A blonde actress, to studio technicians who have to worry about proper lighting for her hair to avoid flares.

BROAD—A general illumination unit used in lighting the set.

BUSINESS—Anything in television for which a technical designation is lacking or forgotten by the speaker. Badly overworked.

CATHODE-RAY TUBE—Evacuated funnel-shaped tube containing the screen on which the picture is reproduced in the receiver.

CONTRAST CONTROL—A knob on the receiver for adjusting the range of brightness between highlights and shadows in a picture.

COAXIAL CABLE—Special telephone cable suitable for conveying television signals.

FOCUSING CONTROL—A knob on the receiver for bringing the picture into sharpest definition.

FRAMING CONTROL—A knob or knobs on the receiver for centering and adjusting the height and width of pictures.

FRAME—One complete picture. Thirty of these are shown in one second on a television screen.

GHOST—An unwanted image appearing in a television picture as a result of signal reflection.

GOBO—A light-deflecting fin used to direct light in the studio and protect the camera lens from glare.

HOT LIGHT—A concentrated light used in the studio for emphasizing features and bringing out contours.

ICONOSCOPE—A type of television camera tube.

IMAGE DISSECTOR—A type of camera tube developed by Farnsworth.

INTERLACING—A technique of dividing each picture into two sets of lines to eliminate flicker.

KINESCOPE—A receiving cathode-ray tube developed by RCA.

LINE—A single line across a picture, containing highlights, shadow, and half-tones; 441 lines make a complete picture.

LIVE TALENT—Participants in a program picked up directly in the studio, as distinguished from film presentations.

PANNING—A horizontal sweep of the camera. (From "panorama.")

SAWTOOTH—A wave of electric current or voltage employed in scanning.

SCANNING—The action of the electron beam in exploring (in the camera tube) or reproducing (in the cathode-ray tube) the half tones in a picture.

SCOOPS—Multiple lighting units in the studio.

SPOT—The visible spot of light formed by the impact of the electron beam on the screen as it scans the picture.

TELECAST—A television broadcast.

TELECINE TRANSMISSION—A movie program.

TELEVISION—The transmission and reproduction of transient visual images by Radio.

TILTING—A vertical sweep of the camera.

SYNCHRONIZATION—The process of maintaining synchronism between the scanning motions of the electron beams in the camera tube and the cathode-ray tube in the receiver.

VIDEO (Latin, "I see")—Pertaining to the transmission of transient visual images (cf. "audio").

WINDSHIELD—A perforated metal cover which fits over the microphone and protects it from drafts caused by the powerful air conditioning system used to remove heat caused by the lights in the studio.

WOMP—A sudden surge in the signal strength resulting in a flare-up of light in the picture.

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Television Makes Medical History

The photo on our cover, through courtesy of American Television Corporation, 130 West 56th St., New York City, shows scene during demonstration of television as used in surgical education. Electric television camera is suspended with water-cooled lights above operating table, the lens focused on area covering surgeon's hand and instruments in direct contact with patient. Closeups of actual surgery are conducted by coaxial cable to training school auditoriums two buildings (more than 500 feet) away from operating room. Surgeon may consult monitor screen on switchboard so that he can see exactly what detail he is transmitting to his audience. Microphone above surgeon's head carries his comments to the student observers.

Philco Shows 1940 Radio Models

Philco will announce its new 1940 Radio line at a national convention to be held at French Lick, Indiana in June. In addition to the introduction of sensational new advances and innovations in Radio, Philco, at this convention will announce and show for the first time a line of Television receivers which will embody startling developments in the Television field.

"Television makes its debut as an industry this summer," declares Mr. Larry E. Gubb, Philco president, "and Philco's Television receivers contain the results of almost ten years of constant and unremitting research and invention in Philco Television laboratories. These efforts are now bearing fruit in a concrete manner for the public.

"However, we have maintained and we still maintain that Television will supplement and not supplant Radio, 90% of this year's market will still be American and Foreign Radio receivers, and will remain on an ever-expanding basis with continual new developments creating a constant tremendous demand."

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Television Will Add To, and Not Detract From, Popularity of Sound Broadcasting

I am glad to see that Mr. Gubb, Philco's President, frankly admits that 90% of their 1939-1940 production will be on sound all-wave receivers. For the Radio receiver industry as a whole, this will be a very conservative figure. Although Television technically is here, its general introduction as a service to the public will be a slow process of evolution.

Television, already introduced in New York and Los Angeles, will be available in the next few years, or perhaps in the next few months, in the larger municipal centers such as Chicago, San Francisco, Washington, Philadelphia, Boston and a few places like Schenectady, where it is to the advantage of a Television manufacturer to have a direct control over field developments. Chaining of programs will be the only solution to a wide national service, and as conditions exist today, this problem has not been completely solved.

We should emphasize at this point that regular sound broadcasting will continue to be a national service, something apart from Television service. In fact, most Television developers are insistent that Television will be a supplementary service to sound broadcasting for many, many years. There are many factors indicating that such a statement is true.

Sound broadcasting stations are just as energetic today as they were in the past, getting

permits to redesign and to improve their sound broadcasting facilities, and surely money would not be invested for these improvements if the broadcasters, who should know, felt that their services would be replaced.

Television receivers suitable for entertainment and education by means of sight and sound programs are costly, and for many years only a few people will be able to purchase them. The result will be that the programs will be on a limited basis, until a sufficient audience is available to attract buyers of Television time.

The Federal Communications Commission still insists that Television transmission is on an experimental basis, for they have not yet been convinced that it is ready to become a major industry.

Field tests have shown that individuals can only sit fixed before a Television screen for a limited number of minutes before eye-strain appears, and that in the majority of cases only a limited time can be devoted in any day to this fixed attention. The other time, which will by far be the greater, will be devoted only to listening to Radio programs.

Let it not be overlooked that Television is a supplementary service to sound broadcasting. It is the opinion of almost every one that it will not detract from our present popular form of sound broadcasting, but will actually increase the appreciation of our present Radio service by widening the scope of it.

JOSEPH KAUFMAN,

Director of Education, N. R. I.

— u r i —

N. R. I. Student Develops Temporary Hook-Up Clips

While working on a series of radio experiments, N. R. I. student Morton E. Phelps conceived the idea of using small spring clips, soldered to flexible test leads, to connect together the various parts.

His final design, submitted to Chief Instructor Dowie for inspection, is an ingenious unit bent from a single length of spring steel music wire, combined with a two-inch length of rubber tubing which insulates the entire clip except for the contact points. The clips can be instantly attached to soldering lugs, exposed wire leads, or to sheet metal up to 1/4" thick. As many as four wires can be held together by one clip. The clips eliminate the need for resoldering connections each time a circuit change is desired.

Mr. Phelps has offered to make up these clips for N. R. I. students and graduates at a very reasonable price. For further information, write directly to him at the following address: Mr. Morton E. Phelps, 1002 Welch St., Little Rock, Arkansas.

The Laboratory Page

By GEORGE J. ROHRICH, Engineer in Charge N. R. I. Laboratory

EXPERIMENT NO. 67

Object: To study the properties of a tube and to generate oscillations.

Apparatus Required: 0.5 milliammeter (item No. 1) ; headphone (item No. 2) ; type 30 tube (item No. 10) ; 4-prong socket (item No. 11) ; 0.50 voltmeter (item No. 12) ; 10,000-ohm potentiometer (item No. 13) ; one dry cell ; one $4\frac{1}{2}$ -volt C battery ; one 45-volt B battery ; audio transformer (item No. 24).

Apparatus Assembly: Connect the parts as shown in Fig. 106. The 0.50 voltmeter is used as a primary circuit milliammeter in this experiment.

Procedures and Observations: 1. Set the potentiometer dial at zero and attach *L* to *Q*. Now rotate the potentiometer dial from zero towards 100, steadily as well as unsteadily with periods of waiting, but always in a clockwise direction, while watching both meters. These clockwise rotations of the dial increase the primary current, and each increase should give a momentary increase in secondary current, indicated by a momentary up-scale deflection of the secondary circuit milliammeter. If the deflection is down-scale (to the left of zero) reverse the connections to the transformer secondary winding. This experiment shows that *increases* in primary current produce induced voltages of a given polarity in the secondary.

2. Rotate the potentiometer dial now in a counter-clockwise direction. Note that each *decrease* in primary current gives a down-scale deflection on

the secondary milliammeter, indicating that the polarity of the induced voltage is opposite to that in procedure No. 1.

3. Remove *L* from *Q*. Insert the type 30 tube in the socket and set the potentiometer dial at 100. Hold *L* on *PL* without connecting *M* to *N*. Note that no current flows in the primary as the filament is not heated, and hence there is no circuit through the tube.

4. Hold *L* on *PL*, then touch *M* to *N*. Note that there is a *gradual* increase in the primary milliammeter reading. Also note that a *prolonged* and steady *up-scale* deflection occurs on the secondary milliammeter as long as the primary current is increasing. A comparison of procedure No. 4 with No. 1 shows that we have similar actions. Therefore, we see that the space between *PL* and *N* within the tube serves as a variable resistor, giving the same action as the potentiometer did in procedure No. 1.

5. Holding *L* on terminal *PL*, disconnect *M* from *N* while watching both meters. As the tube filament cools, the internal resistance of the tube increases, causing a gradual decrease in primary current. The effect on the secondary milliammeter should be similar to that obtained in procedure No. 2.

6. The resistance of a vacuum tube can be varied by changing the filament temperature, for this varies the electron emission. This resistance change causes the plate current to vary. This

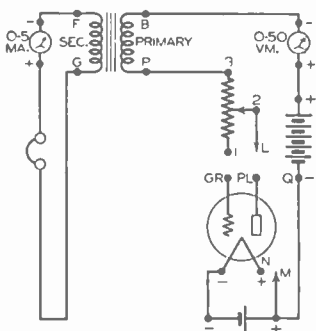


FIGURE 106

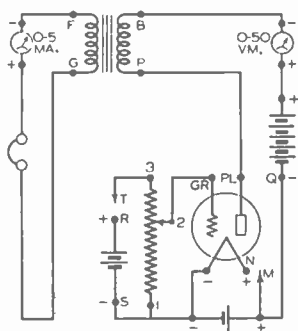


FIGURE 107

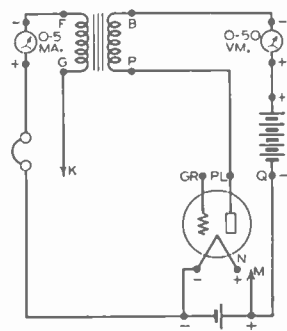


FIGURE 108

The Laboratory Page (Continued from page 9)

method of controlling plate current is too slow for practical purposes, as the filament takes an appreciable time to heat up or cool. We must find a faster, more direct control in order to vary the resistance rapidly.

The plate current through a vacuum tube will vary if the plate voltage is changed. The tube resistance also will change if the supply voltage is varied, due to the effects of the electron cloud within the tube. This double variation changes the circuit constants undesirably in many cases. In addition, plate voltage changes are not always easy to make.

The grid of the tube, located between the filament and plate, remains as a possibility to be investigated. By making the grid positive or negative, it will attract or repel the negatively charged electrons, thereby increasing or decreasing the plate current.

7. Rewire the circuit as shown in Fig. 107. Insert the tube in the socket and connect *M* to *N*. Rotate the potentiometer to zero, then connect *T* to *R*. If the potentiometer is properly set and in good condition, this connection will not affect the plate current. Now rotate the potentiometer from zero toward 100 steadily, as well as unsteadily with periods of waiting, but always in a clockwise direction. This makes the grid more and more positive, causing further increases in the plate current, and the observations will duplicate those of procedure No. 1.

8. Rotate the potentiometer dial in the opposite direction, decreasing the plate current. The observations of procedure No. 2 will be repeated.

9. Reverse the polarity of the 4½-volt battery by interchanging terminals *R* and *S*. Touch *T* now to *S* and repeat procedures Nos. 7 and 8. Note that the observations are now *reversed* with respect to potentiometer dial rotation. This is due to the fact that a rotation from zero toward 100 now makes the grid *more negative*, thus decreasing instead of increasing the plate current.

10. The grid can be used to control plate current by changing the internal resistance of the tube, as proved in procedures Nos. 7, 8 and 9. Furthermore, the grid changes the plate current instantaneously, and relatively small changes in grid voltage will produce large changes in plate current. This indicates that the tube "amplifies." Much larger variations in plate voltage would be required to furnish the plate current change produced by a given grid voltage variation.

As the change or control is so rapid, it would appear that application of an a.c. voltage to the

grid would cause a corresponding a.c. variation in plate current. This is true, although the method of proof must be indirect. The meters have inertia, and hence cannot follow the rapid variations of an a.c. plate current. However, if the a.c. is within the audio range, the phone may be used as an indicator. Although any audio voltage could be used, let us generate our own.

11. Rewire the circuit as shown in Fig. 108. Fasten *K* to *GR* and touch *M* to *N*. Note the meter actions and listen to the phone. The meters will assume a steady reading, higher than before, and an audio tone will be heard in the phone. A voltage is being induced into the grid circuit at an audio rate and the tube is furnishing the means for keeping the current varying continually. The grid voltage is varying the plate resistance, and hence is varying the plate current. The varying current in turn is causing the grid voltage to vary, due to induction through the transformer.

Remember that increases in plate current (primary current) cause a voltage in the secondary having a certain polarity. Decreases cause an opposite secondary polarity, while a steady current condition induces no secondary voltage. If we apply this induced voltage to the grid with the proper polarity, oscillations will be maintained. This connection must be such that increases in plate current result in positive grid voltages, and vice versa. The grid will then aid the plate variations. When the plate current increases, the positive grid voltage increases it further until a saturation point is reached. The plate current cannot increase further so it is steady momentarily, inducing no voltage into the secondary with the result that the induced grid voltage snaps from a high positive to a zero value. This reduces the plate current, causing the grid to grow increasingly negative until the plate current is cut off. The grid then snaps back up to zero voltage, starting a plate current increase, and repeating the cycle over and over.

It is impossible for the meters to indicate this rapid variation. The increased steady reading is due to the *average* currents flowing. A current flows in the grid circuit on the positive pulses, as indicated by the secondary milliammeter. The positive grid naturally attracts the negative electrons. On the negative half-cycles, current does not flow; the meter is too slow to indicate this stopping of current flow. The phone proves that an audio variation exists, as sounds can be heard in it.

The frequency of the tone produced depends primarily upon the inductance and capacity present in the circuit. The capacity is between turns in the transformer.

AIRCRAFT RADIO DEVELOPMENTS

TWO-WAY RADIOTELEPHONE INSTALLATION ON FORTY-TWO PASSENGER DOUGLAS AIRLINER

Among the fastest-developing branches of Radio is that associated with aircraft, particularly with the huge new passenger airliners. The larger the craft, the more and more important becomes the need for continuous and reliable two-way Radiotelephone communication with ground stations during flight.

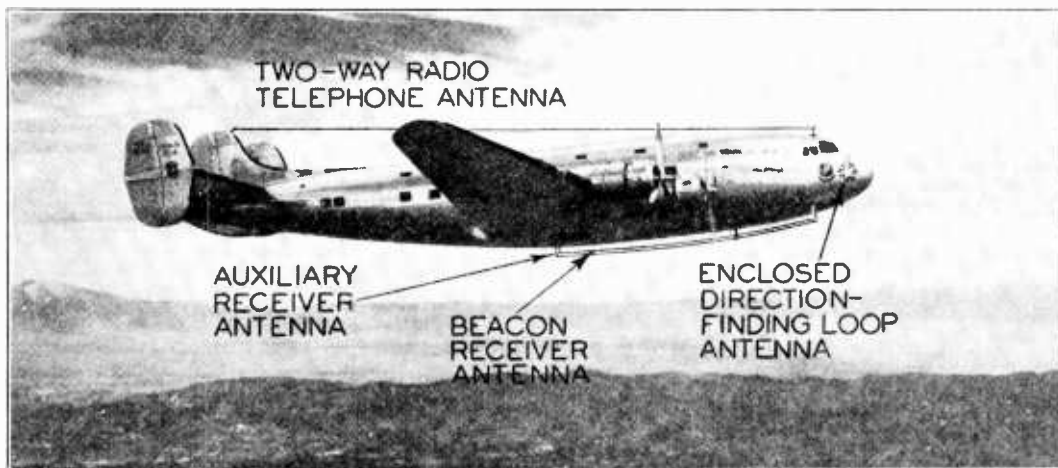
The most powerful and complete Radio installation yet developed for commercial air transport service is that employed on the giant new Douglas Airliner DC-4, so let us see just what part Radio plays when this monster transport plane roars into the sky with her full load of forty-two passengers and three tons of air express she carries.

So essential is Radio as a navigating instrument, as a means for communicating weather information, and as an aid to flight scheduling and flight controlling generally, that airline officials now class it second only to the use of multiple engines as a safety device. To those charged with building our air transportation system, progress in aircraft Radio, as exemplified by the equipment used on the new Douglas Airliner, means increased financial security, because it enables larger planes, carrying more passengers, to fly longer distances at lower operating cost per passenger mile.

A 250-watt Radiotelephone transmitter built by Western Electric Company, five times more powerful than conventional airplane transmitters, is the heart of the Radio system aboard the DC-4. The use of such a high-power transmitter is possible because power for the Radio equipment is obtained from the 800-cycle auxiliary lighting plant aboard the ship.

When the airliner is in flight the pilot is assured of reliable contacts with ground stations, for he may select any one of ten different frequency bands provided by the new transmitter, and at the same time operate a special direction-finding loop which enables him to check instantly the ship's position with respect to various ground stations. The transmitting antenna runs almost the full length of the plane above the fuselage.

All major components of the new installation on the airliner are assembled to form a panel placed on the "bridge" immediately behind the co-pilot's position. This unit, operated remotely from a master control panel which rises between the pilot and co-pilot, is entirely self-contained, and includes the 250-watt transmitter; the communication, beacon, auxiliary, and marker receivers; and the intercommunicating system amplifier. Individual control panels, mounted at both flying positions, switch either earphone



Douglas DC-4 four-motor transport plane in flight. The positions of the four radio antennas are clearly indicated.

of a head-set independently to any or all receivers without affecting what is heard in the other earphone of the head-set.

Facilities are included in the individual panels for switching the microphone either to the ship's transmitter or to the intercommunicating system, for signaling the various telephone stations connecting the intercommunicating system, for adjusting head-set volume, and for placing the new transmitter into operation.

As the ship passes from one Radio zone into the next, frequencies of the transmitter and the communication receiver are shifted simultaneously through five pairs of "day" and "night" frequencies by means of a rotary dial on the transmitter panel. The communications receiver is a crystal-controlled superheterodyne, with its aerial supported between two short struts under the fuselage. Its maximum sensitivity is adjusted from the master control panel and is regulated automatically by a special vacuum tube circuit. Crystal quartz-plate oscillators of new and superior design keep the transmitter within its assigned frequencies. A forced draft ventilation system cools the active elements of the new transmitter with filtered air, thus insuring reliable operation at high temperatures.

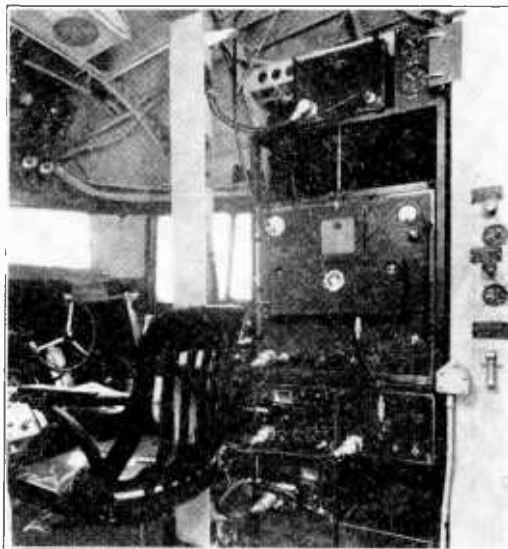
The beacon receiver is basically similar to the communications receiver, but differs in its purpose and in several minor features of mechanical design. Provision is made for reception from either a conventional single-wire antenna, which is located beneath the fuselage (parallel to the communications receiver antenna), or from the shielded direction-finding loop enclosed within the ship's wooden nose. The receiver is continuously tunable between a frequency limit of 195 or 415 kilocycles by means of an illuminated dial on the control panel which also contains the sensitivity control knob and an indexed dial showing the relative loop positions.

An auxiliary receiver, which may be operated from battery supply in event of power failure, covers all of the frequencies to which the pilot would normally have occasion to listen. It is tuned remotely from the control panel by means of flexible shafting, and can be connected to any available antenna.

The airliner also has a unit known as a "marker receiver," which indicates when the ship is directly over a Civil Aeronautics Authority marker beacon transmitter. These low-power ground transmitters employ special antennas which project directly upward either a fan or a cone-shaped signal pattern on a marker signal frequency of 75 megacycles. The new beacons thus create a trail of fixed Radio landmarks, so pilots can check progress on the airways during conditions of poor visibility, and can locate airport approaches. The marker receiver

is a crystal-controlled superheterodyne and requires no operating attention during flight. The marker receiver is also connected to signal lamps which give visual indication of the plane's position.

Provision is also made for an intercommunicating system which may be plugged into regular land telephone lines when the system is on the ground. The pilot, the co pilot, the flight engineer and the stewardess may speak directly to their respective ground departments without leaving the airliner.



This photograph shows five of the eleven major units of radio equipment which guide the giant Douglas DC-4 along the airways of the world. At the right of the flight engineer's chair is the radio rack. At the top of this is the intercommunicating system amplifier, with the 250-watt transmitter below it. The transmitter is coupled through flexible shafting to the communications receiver at its lower right. At the left of the communications receiver is the auxiliary receiver, with the beacon receiver below it.

— n r i —

648 Tubes for Television Broadcasting

Pity the poor Television studio technician if one of the tubes in his transmitting equipment goes bad. According to C. A. Priest, General Electric Radio engineer at Schenectady, N. Y., his company's Television station scheduled to go into operation this year will have a total of 648 vacuum tubes—all essential to putting a broadcast on the air!



RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

Compiled Solely for Students and Graduates

NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

ADMIRAL MODEL 5L AND 5LL

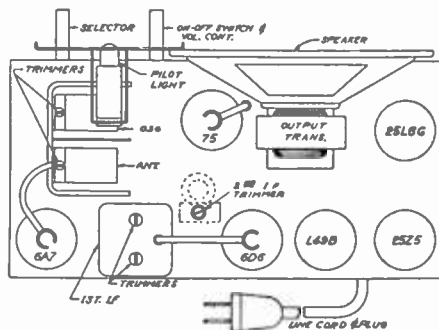
Alignment Data

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400, and 1730, and an output meter to be connected across the primary or secondary of the output transformers. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible, to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band alignment should be the next procedure.

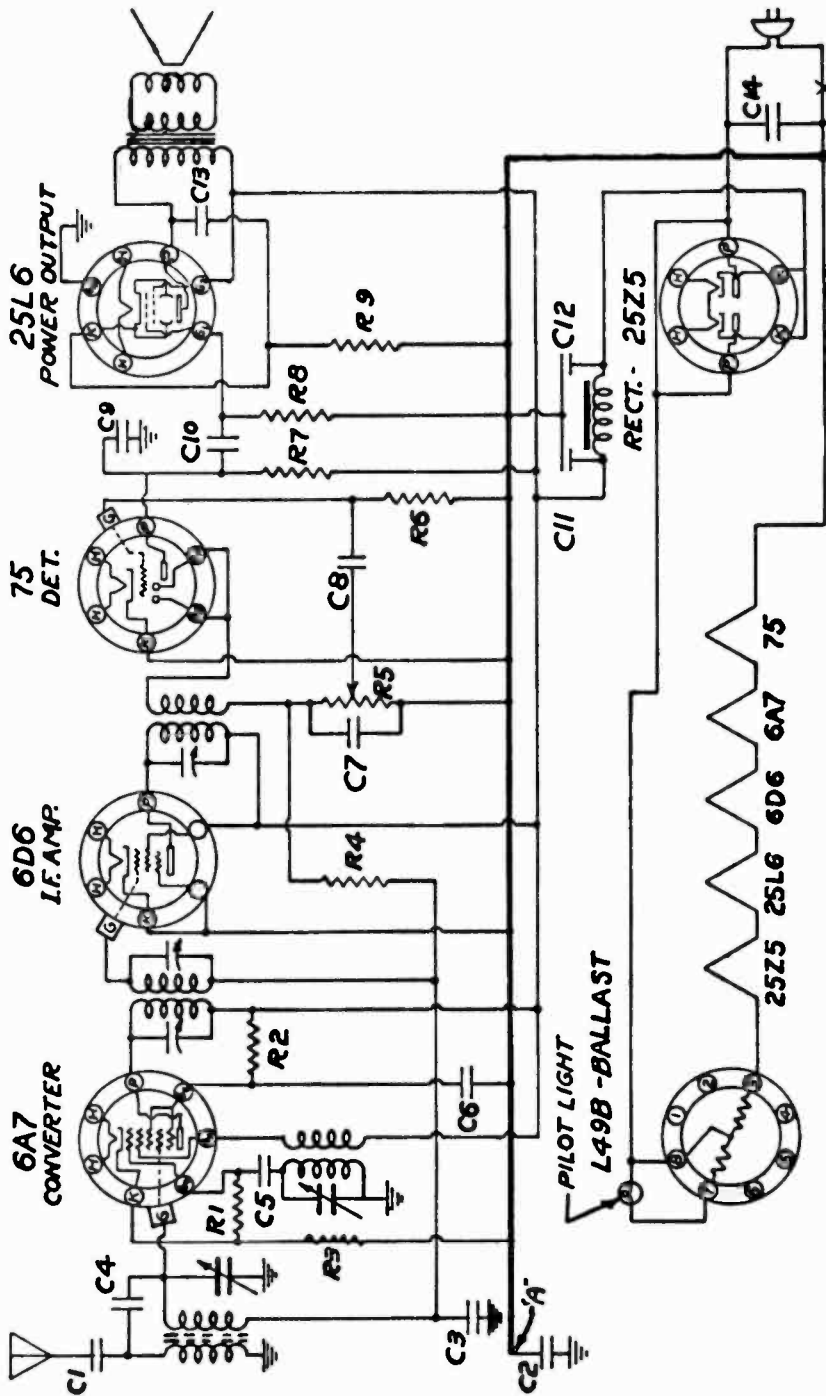
I.F. ALIGNMENT. Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (6A7) through a .05 or .1 mfd. condenser. Connect ground of test oscillator to chassis ground through a .1 mfd. condenser. Align all three I.F. trimmers to peak or maximum reading on the output meter. **BROADCAST BAND ALIGNMENT.** Adjust the oscillator to 1730 KC and connect the output

to the antenna lead, through a .0002 mfd. mica condenser. Set the gang condenser to minimum capacity and adjust the gang condenser trimmer (oscillator) to receive this signal. After this has been carefully done, the next step is to set the generator to 1400 KC and after tuning in the signal adjust the antenna trimmer to peak. This is all that is necessary for the alignment unless the plates of the gang condenser have been bent out of shape. In case of bent plates, set the test oscillator and the receiver to 600 KC and bend the plates into the position for maximum output.



PARTS LIST

CONDENSERS			No.	MFD.	VOLTS	RESISTORS		
No.	MFD.	VOLTS				No.	OHMS	WATTS
C1	.00025	MICA	C7	.00025	MICA	R1	50,000	1/2
C2	.25	200	C8	.01	400	R2	30,000	1/2
C3	.02	400	C9	.00025	MICA	R4	2,000,000	1/2
C4	.000005	GIMMICK	C10	.01	400	R5	500,000	1/2 VOL. CONT.
C5	.00005	MICA	C11	20.	150	R6	5,000,000	1/2
C6	.05	400	C12	20.	150	R7	250,000	1/2
			C13	.005	600	R8	500,000	1/2
			C14	.05	400	R9	150	1/2 ±10%

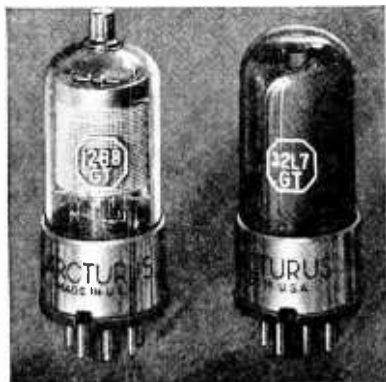


ADMIRAL MODEL 5L AND 5LL

NOTE: C2 used on Model 5LL only. On Model 5L point "A" is connected to chassis.

New Arcturus "2-in-1" Tubes

Two new "2-in-1" midget tubes pioneered by the engineering laboratory of the Arcturus Radio Tube Company, Newark, N. J., are now being marketed. According to Arcturus engineers who designed them, each of the two new tubes, actually serves as "two tubes in one" despite its miniature size.



Both tubes have been designed primarily for AC-DC receivers wherein very limited space is available. Tube Type 32L7GT, for instance, may be used in conventional half-wave high-vacuum rectifier and beam power amplifier circuits. Type 12B8GT has both a pentode and triode section, the former being used as a conventional RF or IF amplifier and the latter as a biased or grid-leak detector. Neither tube is any larger in size than the conventional GT Midget Tubes. Thus are made available to the trade two tubes giving results claimed equal to those heretofore available only with much larger and more costly sets.

Technical data sheets on both tubes are now available and will gladly be sent upon request to the manufacturer.

— n r i —

A Graduate of 1929 Writes

Accept my sincere congratulations upon the 25th Anniversary of the National Radio Institute. I graduated from your school in 1929 and I am proud to be a graduate of such a fine and outstanding Institution. Your training fitted me for my profession and the fine position I hold today. May there be many more successful years for the N. R. I. My best wishes to the Staff and its able President for continued success and happiness.

CLAUDE L. ALLDAY,
San Antonio, Texas.

Ordering Duplicate Condensers

The problem of duplicate condenser replacements receives full attention in the new Sprague Condenser Catalog, copies of which may be obtained from jobbers or by mail from the Sprague Products Company, North Adams, Mass.

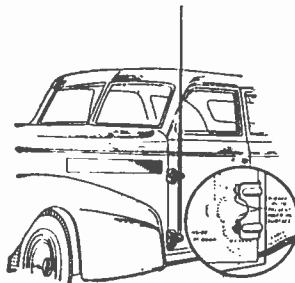


Besides the long list of exact duplicate replacements included in the Sprague Catalog, the manufacturer will supply any duplicate replacement promptly. To obtain the proper unit it is only necessary to give the set manufacturer's name, part number on the original condenser, the capacity, voltage, dimensions and state whether it is a can or cardboard type.

— n r i —

Universal Bracket Cowl Auto-Antennas

The new ICA Auto-Antennas require no drilling of holes—no marring of the car—they fit all cars. They carry a lifetime guarantee against rusting. They are made of fine quality Admiralty Brass Tube—Triple Chromium Plated and Stainless Steel Rod.



These patented Auto-Antennas mount easily by tightening four cushioned bolts. They take but a few minutes to connect; a screw driver is all that is required. Specially designed spring makes positive contact and prevents "rattling" of Antennas when telescoped. Insulators are made of Bakelite.

Eight page illustrated catalog may be had by writing direct to Insuline Corp. of America, 25 Park Place, New York City.

RADIO, TELEVISION, FACSIMILE A

Those triple geni of the air lanes, Radio, Television, Facsimile, will bring the story of New York World's Fair 1939 into millions of American homes and to palaces and huts across the seas.

Sound broadcasting, the elder brother of this trio, of course, takes the lead in recording the day-to-day history of the Fair, but Facsimile comes out of hiding as a full-fledged member of the family, and Television at last emerges from the laboratory to prove itself as a new medium of entertainment.

As Grover A. Whalen, president of the Fair Corporation, expressed it "The World's Fair will call on all the arts of Radio communication to depict the wonders of this advancing world and we will exhibit the most modern devices in this fascinating field."

The chief Radio networks, the National Broadcasting Company, the Columbia Broadcasting System and the Mutual Broadcasting System; station WLW, of Cincinnati, and local New York stations, WNYC, WMCA, WHN, WNEW, WINS, WQXR and virtually all others, have made the most minute plans—and at the same time the most elaborate—to "cover" the exposition as no Fair has ever been "covered" before.

The National Broadcasting Company has made elaborate arrangements to completely describe the Fair for the followers of its two networks. A. A. Schechter, special events director, has a crew of announcers and engineers on the grounds almost continuously to broadcast outstanding events such as President Roosevelt's address which was made on opening day, the scheduled visit of King George and Queen Elizabeth of England and the appearances of royalty and celebrities from this and other lands.

Equally prominent in the picture is the microphones of the Columbia Broadcasting System, broadcasting under the supervision of Paul White, director of Public Events. Mr. White and his contemporaries, stage broadcasts from time to time describing unique attractions in the main exhibit and amusement areas.

The Mutual Broadcasting System comes to the Fair with its new Perifone "mike," styled to resemble the Perisphere and Trylon. G. W. Johnstone, Publicity Director, is in charge of the crews. Mutual has already inaugurated a coast-to-coast program titled "Welcome, Neighbor," presenting interviews with Fair officials and visitors.

In addition to sustaining programs, many sponsors of commercial programs who are exhibiting at the exposition have expressed interest in broadcasting from the site and it is expected that a number of top-flight network shows will carry the "dateline" "World's Fair, N. Y." for at least part of the summer.

Station WLW, owned by the Crosley Corporation of Cincinnati, operates from its own building in the Communications Zone. Many programs of interest to the Nation and especially to the Midwest will be fed to the parent station from a studio in the building and some will go to the Mutual and National networks.

The short-wave outlet of these broadcasters will circle the globe with the message of the Fair as their voices penetrate the fastnesses of Europe, South America, Africa and the Orient. Among the stations taking part in this action are General Electric's W2XAD and W2XAF, Schenectady, N. Y.; N. B. C., International Division, W3XAL and W3XL, Bound Brook, N. J.; Columbia, W2XE, Wayne, N. J.; Westinghouse, W8XK, Pittsburgh; and Crosley, W8XAL, Mason, Ohio.

With the inauguration of Television, the New York World's Fair may well go down in the history books as the "Television Fair." David Sarnoff, president of the Radio Corporation of America, and his company are using the Fair as a "springboard" to provide the first regular Television program service, at least within the metropolitan area.

Within the walls of the "Radio tube" RCA building, the theory and practice of Television is demonstrated in seven distinct sections; the Hall of Television, Television Laboratory, Radio Living Room of Tomorrow, "Telemobile" Unit, Television camera set-up and model Television transmitter, "Flask" type Television receiver (laboratory model), and Television receiver (stock model) in a clear glass cabinet.

Visitors to the Fair are seeing how moving images are projected through space and portrayed on the home screen by the electronic system of Television. The main exhibit includes thirteen of the latest stock model receivers and a projection type receiver which is focused on a six by ten-foot screen. The programs consist of shows from the NBC studios in Radio City, outside pickups by the "telemobile" unit and motion pictures picked up by means of a special scanning device.

T THE NEW YORK WORLD'S FAIR

The RCA-NBC "telemobile" furnishes many of the most interesting programs as it roams around the grounds picking up spectacular Fair events and moving into New York to catch outdoor incidents with topical news value.

The General Electric Company gives its Fair guests not only an opportunity to see Television in action, but to take part in its programs. A talent director guides them before the camera and gives them a short course in acting for their own amusement and that of their friends in the audience.

A studio in the GE building is equipped with a number of Television receivers, a camera and transmitting equipment, according to an announcement by Dr. W. R. G. Baker, managing engineer of the Radio division. The receivers will be able to pick up all the Television programs broadcast in the New York area during the Fair.

Visitors to the Westinghouse exhibit also are invited to speak and act for a few minutes before a Television camera. They go through their paces in a glassed-in studio and the audience in an adjacent room hears their voices and sees their images on one of four Westinghouse receiving sets. About 125 persons can be accommodated at a time.

Facsimile has been quietly demonstrating its worth for some months, but the general public is apparently not aware of the strides it has made. Mr. Whalen recently addressed a letter to Alfred J. McCosker, board chairman of the Mutual network, congratulating him on the inauguration of the first Facsimile network, linking WOR, Newark, WGN, Chicago and WLW, Cincinnati for experimental transmission.

"The new era we are entering," said Mr. Whalen, "demands adaptation of Facsimile broadcasting, natural companion of Television, to the many phases of our economic, cultural and spiritual life. It is fitting, indeed that this new means of communication should make its initial bow at an exposition dedicated to the World of Tomorrow."

Thus, Crosley stages the first large-scale demonstration of Facsimile in its Fair building. The main exhibit is the Crosley Reado, a printer designed by the Finch Telecommunication Laboratories, Inc. Visitors may see printed matter and pictures transmitted over the kilocycles and recorded on paper at the receiving end.

The R.C.A. building also is the scene of a pre-

tentious Facsimile exhibit. Scanning apparatus picks up the material as prepared in a "City Room" in newspaper style and reproduces it on receivers in the Radio Living Room of Tomorrow. This equipment transmits at the rate of one eight by twelve page every eighteen minutes and is intended for home use.

Closely allied to Facsimile is the Radiotype, exhibited by the International Business Machines Corporation. Invented by Walter S. Lemmon, division manager for IBM, this electric writing machine transmits written matter by short-wave from point to point with great speed. It is on view in the Business Systems and Insurance Building.

R.C.A. and its affiliates exhibit many other advances in the field of communications, including international Radio, marine Radio, phonograph recording and playing, a loud speaker system and a 250-foot antenna tower. Most striking, perhaps is a 53-foot Elco yacht, equipped with the latest devices for communication and safety, which rides in a marine basin at the rear of the building.

Supplementing the Fair's plans to keep the outside world informed of its progress and to acquaint its visitors with the marvels of communication is the public address system. This is operated by the Fair's Radio department for the purpose of entertaining the crowds and keeping them informed of events occurring on the grounds.

The system consists of four studios in the Public Address Center in the Communications Building, master control room with Master RCA Console recording library, two sound trucks for pickups, portable equipment, and 16 outlets located at such strategic spots as the Perisphere, entrance gates, the Court of Peace, the Court of States and various bridges.

From nine in the morning until two in the morning, the Public Address Center broadcasts a continuous stream of background music, broken at intervals with announcements of public interest. The music is of an institutional nature and varies in type and tempo according to the time of day and the section of the grounds to which it is directed.

The New York World's Fair radio department requires the services of fifty engineers, technicians and assistants and twenty production men and announcers in addition to the executive staff.

Spring Clips Prevent Loose Plugs

Spring bronze clips which can be slipped over each prong of an electric plug in a jiffy eliminate the annoyance and danger of loose plugs in wall outlets. Continued use of an outlet or socket often spreads the contact springs inside the socket, so they no longer grip a standard plug.

The clips work satisfactorily on practically all outlets; the only exception is in the case of outlets where the slotted openings in the bakelite face are too narrow to admit the two thicknesses of spring bronze along with the prong.



Previous to the announcement of these clips by the Acorn Products Corp., 600 S. Michigan Ave., Chicago, Ill., Radiotricians either had to make a costly replacement of the defective socket or bend the prongs of the plug out of shape to give a makeshift repair.

N. R. I. students and graduates can buy these clips in quantity lots directly from the manufacturer at wholesale prices, and resell them to customers at a good profit.

Proud Records

The record run for stage plays to date is held by "Tobacco Road," which is now entering its sixth year. "Abie's Irish Rose" was a world-beater with a run of four years, and "Lightnin'" did extremely well by playing to packed houses for three years.

Amos 'n' Andy, now in their second year on the air for the Campbell Soup Company, have entered their eleventh year in unbroken succession as a Radio team! National Radio Institute, celebrating its twenty-fifth anniversary, is proud of its record too.

Page Eighteen

Don't Forget

When requesting consultation service on lessons or on technical Radio problems, don't forget to supply all the data asked for on the "Request for Consultation Service" sheet. Give this same information when using plain paper for your letter.

If you forget to give your student number or the number of the lesson you are studying, we have to go to your record for this data, and this naturally delays your reply.

If you are asking for a circuit diagram or other data on a particular receiver, don't forget to give the manufacturer's name, the model number and a list of the tubes used. The name and model number are usually sufficient, but we always check the tubes against your list to make absolutely certain we have the right circuit. If you forget to give the model number, we may have to look through hundreds of cards in our cross-index file until we find a receiver having the tubes you specify. This may hold up a reply many hours, for student letters which give complete information are generally given the "right of way" by our technical staff.

Go Ahead and Shoot!

I remember that horrible night in the trenches as if it were but yesterday. There we stood, horrified. The kid knelt, his right hand raised, his face ashen white. Shells burst overhead, casting eerie shadows upon the faces of the panic stricken men. It could not happen!

"For goodness sake, shoot, go ahead and shoot," cried one of the men.

"Give him time, men! Take it easy," soothed the sergeant.

The kid drew back his arm slowly. The eyes of eight men were riveted upon his hand. Suddenly his arm shot forward. His fingers opened, and by the light of the flares in the skies, we saw the most ghastly impossibility happen! There it lay before our eyes, another seven. The lucky stiff had made eight passes in a row.—Reprinted from Asheville Amateur Radio Club Bulletin.

Doing Things Up White

A Hartford Radio repair shop left its downtown location, moved to the outskirts, painted the entire building white; calls itself "Radio Hospital," servicemen dress as internes, delivery car resembles an ambulance; did some clever advertising, increased its business 125 per cent. Moral: —Be progressive. Keep out of the rut!

THE HOME STUDY SYSTEM

A college man, who has completed twenty-three home study courses, compares correspondence study with resident school work.

By George B. Thompson, M. D., Los Angeles, Calif.

N.R.I. Graduate and past Vice-President of the N.R.I. Alumni Association

"Some time ago Mr. Smith suggested that I might, if I felt inclined, write an article for NATIONAL RADIO NEWS. This I am glad to do because any word of appreciation that might be helpful or encouraging to others is but a small contribution toward how I feel about N. R. I. training. This article may be somewhat lengthy, but it is only a small part of what I would like to say." GEORGE B. THOMPSON, M. D.,

I do not know who originated the Home Study or Correspondence System of self-education. If I knew I would gladly tell you, but this information has slipped away into the dreamland of forgetfulness. The biography of this man's life would be an inspiration to help you see the goal instead of the apparently insurmountable obstacles. If his name and record had been written into the introductory chapter of some wide awake correspondence instruction course it would be a matter of easy access. Equally as thrilling and inspiring would be the story of how Anne Lindbergh overcame the impossible task of learning the code and acquiring the necessary technical knowledge required to pass the technical examination for her amateur ticket.

The originator of this splendid system of study was a great benefactor of the ambitious young man who was handicapped by lack of funds to carry him through a two or four years' college course and was forced to forego a life ambition, and here again, for lack of a horse a kingdom was lost. The necessity of protecting and providing for dependent ones at home made a college course for him impossible. At an earlier date this embarrassing condition presented a most difficult problem; but thanks to the man whose name few know or can remember, he provided the formula which made the solution of this problem as simple as Ohm's Law.

There is, of course, much to be said in favor of the resident college course with its laboratories and its teaching staff, and demonstrations and explanations by efficient laboratory attendants, as well as cultural associations of college life where some lasting friendships were formed that will remain forever sweet memories as we pass along some of life's rough and rugged highways; but even these have faded somewhat and are still fading with the passing of time and the assuming of new obligations and new responsibilities. Then, too, there still lingers in our memories of the past something to haunt us and take away some of the glamour, especially as we look back in retrospect over the many wasted and unproductive hours we spent in fun and idleness, while dear old dad and mother at home toiled from sun to sun to make it easy for us. Not that I would rob Jack of any fine pleasure or play or burden him with any regrets, but going away to college, if looked at aright, should rate as a serious piece of business. In that day, then, just as now, too many failed to see their opportunities or live up to their responsibilities.

In the after years when you had finished college or college had finished with you, and you settled down to your first job and suddenly ran up against some tough problem, the speedy solution of which may have meant your job or your reputation; then, when you needed this important information most sorely and you realized that the underlying principle upon which it hinged had vanished into the oblivion of forgetfulness; then you had recourse to your notes, more or less indifferently kept because your understanding was perfectly clear at the time, only to find nothing of record to remind you of the lost word. I have seen this same "hand-writing" on the wall; it is a word picture of the dilemma that college training impressed upon you, but please be reminded that this was not the fault of the college, but yours and mine.

But you cannot permit yourself to attach blame to the school if you failed to take full advantage of all it offered you.

As I write these lines out under the cool spreading shade trees of the back lawn, I see the first fig of our new crop bursting into ripening. By this simple observation I am reminded that self-sustaining life for each of us begins under our own vine and fig tree, and that ever thereafter we are on our own. What we are is the result of what we have thought and planned and done, and that by the same token and in the same manner we shall build our future—and largely it will be of our own choosing.

College did for each of us all we permitted it to do! We can't go back over the trail and make any changes. Success for us lies not from here back, but from here on. If we are to prepare ourselves for newer and bigger and better opportunities we must now do it outside of college, and this is no criticism of the college. One incident of my college days comes often to mind. As a student body we were being gently called to task for "... not making hay while the sun shines." The chapel speaker made this pertinent statement, that a very prominent and clever educator, president of a noted eastern university, recently declared:

"A new day is dawning for the youth of the land who is ambitious to get somewhere, yet is so handicapped that he cannot personally attend college. He must be provided for, and his day is at hand. In my opinion, there is scarcely any subject even of major importance now being taught in college, that cannot be taught equally as well, if not in some instances better, by well arranged correspondence courses, than they are being taught in college. Colleges are gaining in notoriety by becoming athletic associations rather than seats of learning."

If we studied that man's biography it would give us an inspiration fit to "pep" us up for any undertaking. It would help us to help ourselves, and it would help us to help others.

To my way of thinking the Home Study system of learning is the great modern democracy of self-education. It breathes the spirit of a new educational freedom. It is the way to get what you want in spite of obstacles. It is self-sustaining, economical, and well within even a small budget, without incurring any deficit, so that it falls easily within the financial reach of every ambitious student. The student is in a class by himself with unlimited time at his disposal in which to complete his lesson, and with unlimited help at his call. The lesson texts are, comparatively, inexpensive and expertly prepared to cover exactly the desired field. They obviate the college system of depending upon

notes taken at lectures. The texts are from point to point definite and clear, and are kept freshly revised and up-to-date—even up to tomorrow in anticipating what is to come. By carefully marking his texts at the most important points, and by making a personal reference index the student can quickly turn to any desired topic without loss of time.

As an additional help to the student most, if not all, Home Study schools publish a technical or a semi-technical journal which goes only to graduates and enrolled students for their guidance and information which keeps them up-to-date on every kink and new thing in their line, often giving them hints of new projects which are still in the experimental stage. Such journals are published by the schools that they may keep in close contact with their students and provide them with information on every new advance in their field. It is said that a smart man is one who is fully up-to-date and that a clever one is up to tomorrow. Colleges are smart, but Home Study institutions are clever.

During the years since my graduation from college where I received my degrees (B.Sc., M.S., and M.D.) I have completed twenty-three Home Study or extension courses. My first was in 1904, three years after my M.D. degree. Following this I took Civil Service examination for Contract Surgeon at Honolulu. That was a long time ago, and Honolulu was many ocean miles from civilization at that time, and I proceeded to forget all about it. Many of these courses were along the line of my chosen profession; others were not so closely allied, but were of a scientific nature, such as Radio.

So I can speak of the value of Home Study work from the standpoint of experience. I graduated some six years ago from N. R. I., and can say without reservation that any young man who is interested in electricity and any of its manifold applications to industry such as telegraphy, Radio, public address work, sound, television, or in any of the allied fields, can make no mistake by taking advantage of what the National Radio Institute has to offer: this is with the assurance that he will not be disappointed.

Of course, I need not say this to any N. R. I. man. But in a closing sentence I would like to say to every young man who feels the tingle in his blood to begin at the bottom in Radio, or to do advanced work, or become a better Radio-trician in the service field, or to keep in touch with the unlimited application of Radio principles in the rapidly moving industries of the country which are daily increasing with gathering momentum, set aside a definite part of your time for self-improvement, for each hour you give to study will pay you handsome rewards. Your destiny is in your own hands—make the most of it.



RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

Compiled Solely for Students and Graduates

NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

ARVIN HOME RADIO MODEL 508

Balancing Instructions

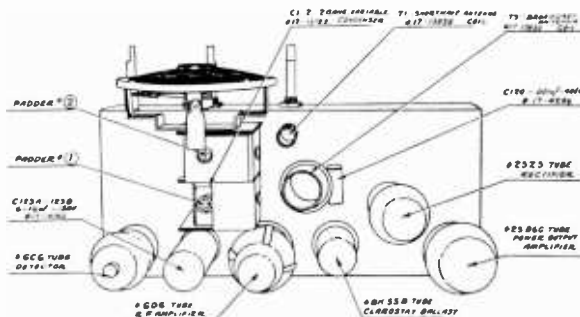
Rotate tuning condenser to extreme left and check to see that pointer lines up with horizontal lines across dial face. Connect balancing oscillator to antenna terminal through a standard 200 uuf. dummy antenna. Set dial of radio and output of oscillator to 1,400 K.C. Set wave band switch to Broadcast position.

Adjust padders 1 and 2 for maximum output.

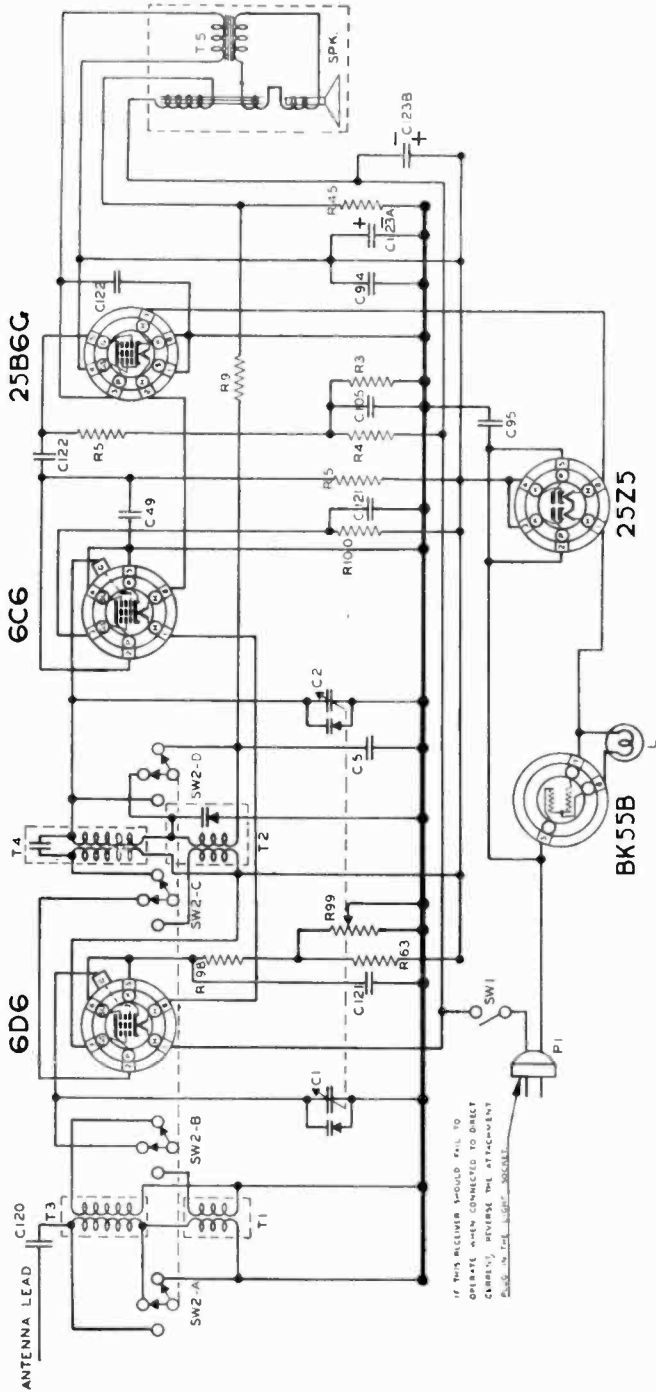
Set dial of radio and output of oscillator to approximately 2,400 K.C. Set wave band switch to short wave position. Adjust padder No. 3 for maximum output.

Coil, Transformer and Speaker Resistances

T1 Broadcast Ant. Pri.	60.0 ohms	T4 Short Wave R. F. Pri.	.5 ohms
T1 Broadcast Ant. Sec.	3.6 ohms	T4 Short Wave R. F. Sec.	1.0 ohms
T3 Short Wave Ant. Pri.	.3 ohms	T5 Output Trans. Pri.	110 ohms
T3 Short Wave Ant. Sec.	.2 ohms	T5 Output Trans. Sec.	.6 ohms
T2 Broadcast R. F. Pri.	60.0 ohms	Speaker Field	740 ohms
T2 Broadcast R. F. Sec.	3.7 ohms	Speaker Voice Coil	1.7 ohms



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



IF THIS RECEIVER SHOULD FAIL TO OPERATE WHEN CONNECTED TO DIRECT CURRENTS, REVERSE THE ATTACHMENT MADE ON THE "A" SIDE OF THE SPEAKER.

ARVIN HOME RADIO MODEL 508

LIST OF PARTS

R3	100,000 ohms	1/4 watt
R4	200,000 ohms	1/4 watt
R5	500,000 ohms	1/4 watt
R9	1 Meg. ohm	1/4 watt
R45	25 ohms	1/2 watt
R63	25,000 ohms	1/4 watt
R98	200 ohms	1/4 watt
R99	15,000 ohms	VC
R100	3 Meg. ohms	1/4 watt
C5	.05	200 Volt
C49	.0005	600 Volt
C94	.1	200 Volt
C95	.02	600 Volt
C105	.25	200 Volt
C120	.001	400 Volt
C121	.02	200 Volt
C122	.01	400 Volt
C123A	6	150 Volt
C123B	16	150 Volt

CONDENSERS

Novel Radio Items

—BY L. J. MARKUS—

Wireless Phonographs Sell Radios!

When antenna facilities in a home or store are inadequate for a proper demonstration of a radio receiver, or when man-made interference noise prevents satisfactory reception, a wireless record player will serve as a miniature broadcasting station, permitting a satisfactory demonstration. Let the prospect choose his favorite type of music.

— u r i —

Radio Ops Get Ocean-Going Apartments!

Radio operators lucky enough to be assigned to the new ships in one well-known line will have a modern apartment as their office, with modern furniture, plenty of locker space and an adjoining bath. Contrast this with the cramped quarters in which operators had to work and sleep twenty years ago!

— u r i —

KDKA and KYW Belong Out West!

Roughly, all radio stations west of the Mississippi river are assigned call letters beginning with K, while the calls of stations east of this river begin with W. KDKA in Pittsburgh and KYW in Philadelphia are exceptions. Being among the first commercial broadcast stations in this country, they were allowed to hold their original calls.

Ruler Measures Lightning!

The current in a stroke of lightning can be measured with an ordinary ruler if the bolt passes through a sheet of insulating material such as paper or glass. Measure the area of the hole in square inches, and multiply by 300,000 to get the current. Example: .16 square inches is about 50,000 amperes. Half-inch diameter holes (area .2 square inches) made by lightning are often found in window panes.

— u r i —

Radio Sends Hold-Up Alarm!

A compact portable Radio transmitter designed by a Chicago inventor is intended for concealment beneath the clothing of bank employees, payroll carriers and night watchmen for use as a hold-up alarm. To call for help, the wearer need only take an extra-deep breath. A band encircling his chest then closes the transmitter circuit, sending an alarm signal to a central receiving station.

— u r i —

Ultra-Short Waves Are Jam-Proof!

Plans have been perfected by the British Broadcasting Company for sending out news or propaganda programs to British citizens on ultra-short wavelengths in time of war. These waves ordinarily do not travel beyond the horizon, and consequently enemy radio stations cannot jam the programs by sending out interference on the same wavelengths.



ELECTRIC NOSE SOLVES TREE MURDERS!

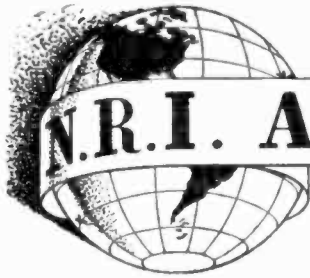
Each report of a tree death in the District of Columbia is investigated by a "detective squad" of the local gas company. Holes one inch in diameter and several feet deep are made near the tree with a pneumatic drill. Rubber tubing from a gas detector (electric nose) is inserted in each hole in turn, and the air is drawn past spongy platinum. If gas is present the platinum heats up, causing a deflection of the indicating meter. The leak must then be located and sealed. Illuminating gas has an injurious effect upon the root system of a tree.

SPARK TRANSMITTER GETS SILENCE FORBABY!

A search by one Radio amateur for the source of a terrific man-made interference noise ended at the home of an old-time ham who was using an ancient spark transmitter each night to make his neighbors turn off their Radios so his baby could go to sleep.

TRANSFORMER ATTRACTS LOVE-SICK BEETLES!

Line transformers at the transmitter of station WOR produce a peculiar loud hum which attracts beetles from miles around, and these in turn attract sparrows which feast upon the love-sick bugs. Entomologists state that the hum is much like the love song of the June bug.



N.R.I. ALUMNI NEWS

Earl R. Bennett	President
Clarence Stokes, C. B. Morehead	Vice-Pres.
Allen McCluskey, F. E. Oliver	Vice-Pres.
Earl Merryman	Secretary
Louis L. Menne	Executive-Secretary

BALTIMORE CHAPTER IS GROWING RAPIDLY PROGRESSIVE OFFICERS ARE PROVIDING INTERESTING MEETINGS



OFFICERS OF BALTIMORE CHAPTER

Reading from left to right: W. B. Giese, Ass't. Sec.-Treas., W. W. Jensen, Vice-Chairman, E. W. Gosnell, Librarian, P. J. Dunn, Chairman, J. W. Ganz, P. Biesi, Finance Committee, I. A. Willett, Sec.-Treas., C. Hachemeister, Publicity Manager, G. D. Parlett, Sgt.-at-Arms, was absent.

Baltimore Chapter

Mayor Howard W. Jackson of Baltimore, an honorary member of our Chapter was our guest speaker at one of our recent meetings. Mayor Jackson is a strong booster for our Alumni and is very popular with our members. His serious inspirational messages are always topped off with some of his ready wit. The boys enjoyed his talk immensely.

About sixty N.R.I. men attended this meeting, twenty-two of which either joined for the first time or renewed their membership in our Local. That's a rather good indication of the type of enthusiastic meeting it was.

Chairman Dunn, assisted by his committee, had the hall splendidly prepared for the occasion including a P. A. system which made a big hit with the boys. Pete Dunn is putting a lot of his old fire into the work of chairman and is ably assisted by Jensen, Glese, Gosnell, Parlett and Willett, all officers of the Chapter who are working in perfect unison in arranging and putting on the splendid programs our members are enjoying.

At the close of our business meeting Pete Dunn announced that refreshments would be served for those who cared to stay. Boy, it was a party and hardly a man left until midnight. Even the married men took a chance and stayed out longer than good husbands should.

Some pictures were taken. A vote of thanks is extended to McDormand, who brought down his photographic equipment to get these shots for us.

We are going strong. Have a splendid spirit. Even Gralley, our former Chairman, who has been so very busy as we all know, is with us tooth and nail and says he isn't going to miss a single meeting, come what may.

It is quite impossible to give mention to all of our members who are putting in such hard work for the advancement of the Chapter, but it is all very much appreciated. Yes, sir, Baltimore knows there is a live bunch of Radio service men in its city, working as one man for certain objectives which can be attained only through the kind of support and loyalty which we are getting from our members.

I. A. WILLETT, Secretary.



A MEETING OF BALTIMORE CHAPTER

A look at the expression on the faces of this group will tell you at a glance that Baltimore Chapter has a live and enthusiastic membership. The meetings are well attended. Not only are the meetings beneficial from a practical point of view, but there is plenty of good fellowship in this Chapter.

Here and There Among Alumni Members

Good news, O. M. Davidson, Jr., of God, La., is getting along nicely in his Radio servicing business. For several years he was in poor health. The best news is that he is now back in tip top shape.

—————n r i—————

It's a little girl at the home of Carl Blomberg, Poughkeepsie, N. Y. Congratulations.

—————n r i—————

Melli C. Panday sends a cablegram from Bombay, India, offering anniversary congratulations. Thanks, Melli, for the unique message.

—————n r i—————

Cran Baldwin of Arthur, Tenn., gets special mention this month. Recovering from a severe illness of several years he is confined to a wheel chair most of the time, but he conducts his Radio service business without interruption.

—————n r i—————

Calvin W. Rohr of Six Mile Run, Penna., broke his leg in an unfortunate accident. He expects to be inactive for about two months. That's tough luck.

—————n r i—————

George A. Pyle writes that he has a very fine position on the engineering staff at station WTAX, Springfield, Ill.

—————n r i—————

Stewart Tyson of N. Transvaal, S. Africa, recently returned from a long honeymoon. Good luck.

—————n r i—————

Joseph Kaufman, Director of Education, N. R. I., was the deciding judge in Triplett's Service Puzzle Contest. \$500.00 in prizes was awarded by the Triplett Electrical Instrument Co.

—————n r i—————

A. Michaels of Emigh, Penna., got a real birthday gift on his anniversary—his wife presented him with a bouncing baby girl. Nice timing!

—————n r i—————

Menne attended a meeting of Baltimore Chapter on the day of his birthday. The fellows had a real surprise party for him. The Program Committee is to be congratulated.

—————n r i—————

Joseph J. Bonzek of Stewart, B. C., Canada, conducts the Radio column for his local newspaper.

—————n r i—————

Carl Carver of Lodi, Ohio, is the proud daddy of a son. Mr. and Mrs. Carver are extremely happy to have the stork drop in for the first time in nine years.

—————n r i—————

Mitchel Diamond of Port Arthur, Ont., Canada, is serving a three-week training period as wireless operator in the Royal Canadian Navy.

—————n r i—————

Leonard Lee of Outlook, Wash., will be in a hospital for probably six months. Auto acci-

dent! Leonard was going good, too! Hard luck, old fellow, and let's all be a bit more careful.

—————n r i—————

We received a letter from a customer of Graduate **R**udolph Lampkins of Chicago complimenting us on the good work Lampkins does.

—————n r i—————

The U. S. Navy is in good hands. Walter F. Rickert joined recently. He is stationed at Great Lakes, Ill., preparing to take the examination for entrance to the Naval Radio School at Norfolk, Va. Happy sailing, Walter.

—————n r i—————

John Michuovez is a member of the operating staff at station WMAS, Springfield, Mass.

—————n r i—————

Bernie A. Brown of Foss, Okla., recently was married to the former Miss Kitty Preston. Good luck, Mr. and Mrs. Brown.

—————n r i—————

Julius C. Vessels graduated in 1925. He has been regularly employed in Radio ever since and now is Chief Engineer at WIOD, Chattanooga, Tenn., a 5000 watt station on the Columbia network.

—————n r i—————

A little Radiotrician, brand new, has moved in at the home of C. T. Retter of Dayton, Ohio. Paul Eugene is his name. Already he is boss of the place.

—————n r i—————

Harold Gordon is at the Good Samaritan Hospital, Lebanon, Penna., with a severe rheumatic condition in his arms, shoulders and legs. When that clears up he is going to give up his tonsils and some teeth.

—————n r i—————

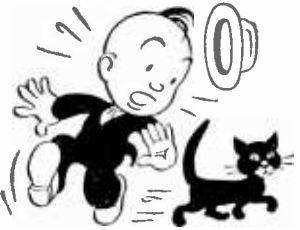
Art Moore of Whitwell, Tenn., sends a fine photo of his shop—before the fire. He had a total loss. Too bad, Art, but we'll bet you build up even a better shop.

—————n r i—————

Joseph Torgerson, who enrolled in 1926, is still going along in a big way with his Radio servicing business at Parshall, N. D.

—————n r i—————

This space is reserved for that news item you were going to send in—but didn't. How about ya for next issue?





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.

PHILCO MODEL 116B INOPERATIVE AT CODE 121 1500 KC.

If the receiver is entirely dead at 1500 kilocycles or tunes quite broadly on powerful stations, the trouble is due to failure of the oscillator. Moisture absorption by the coils and generally aging of parts will cause this. The solution to the problem is to replace the oscillator coil. In some cases baking the coil in an oven to drive off moisture will effect a temporary cure.

B. B. MARCH, New York.

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

PHILCO MODEL 625 WEAK AND DISTORTED

When this condition occurs accompanied by low plate voltage on the 75 type tube, replace the .01 mfd. bakelite encased condenser in the plate circuit of the tube. This is condenser No. 57 on the circuit diagram. You can use a duplicate replacement or a 600 volt tubular condenser.

W. ISABELLE, JR., Michigan.

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

MAJESTIC MODEL 66 DEAD

No voltage at any point on the B plus lead indicates a shorted condenser in the small can located directly beneath the I.F. tubes and riveted fast to the sidewall of the chassis. This is a four section condenser and the red lead that goes to the B plus section of the voltage divider (candohm) riveted next to this can is the faulty condenser lead. Clip the lead loose and install a .1 mfd. 600 volt tubular condenser. This fault usually causes the fuse of the vibrator to open up, so replace the fuse. If the vibrator works intermittently, this is due to failure of the fuse to make good contact to the holder and it may be soldered in place.

HAROLD Z. SNYDER, Maryland.

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

KOLSTER MODEL K60 HUM

If the usual cures do not eliminate the hum, try increasing the value of the 200 ohm resistor between the speaker field and chassis (R14 in the diagram) to 600 ohms. A 10 watt resistor should be used. It would also be advisable to replace the .1 mfd. coupling condenser to the control grid of the 47 and the .1 mfd. condenser in the control grid return circuit at the junction of the two quarter megohm resistors.

LEON AUTIN, Louisiana.

PHILCO MODEL 38-116 IMPROVED RESULTS CODE 125

To obtain better padding action in the oscillator circuit the following changes in the position of leads should be made: The white plate lead to the 6AS6 detector oscillator tube should be moved away from the oscillator coil. The orange lead of 1500 kc. paddler should be separated from the 4.5 megacycle paddler. The 6AS6 oscillator grid and plate leads should be kept clear of each other and away from resistor 19. These changes were incorporated in run 4 receivers.

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

PHILCO MODEL 38-116 PARASITIC CODE 125 OSCILLATIONS

To prevent parasitic oscillations and improve the performance of the oscillator circuit at 18 megacycles, a 100 ohm resistor is connected between the 6AS6 oscillator anode and the plate of the 6N7G. The brown wire, which formerly connected these two socket contacts is removed, the resistor replacing the wire.

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

STEWART WARNER NOISY AND MODEL 33K INTERMITTENT

This condition is often caused by defective mica condensers. You should also check the carbon resistors to see if they have increased in value. Connect the rotor of the variable condenser to ground by means of a flexible wire lead soldered at both points.

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

STEWART WARNER WEAK AND MODEL 102 DISTORTED

Remove the .1 mfd. condenser connected between the purple and yellow resistor on the resistor strip and try a condenser known to be in good condition at this point. Use a 600 volt paper condenser.

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

STEWART WARNER INTERMITTENT MODEL 900

Try a new .25 mfd. R.F. by-pass condenser. The condenser may be identified in the condenser block by its green lead.

(Page 29 Please)



Chicago Chapter

Gradually, but surely the meeting attendance is on the upswing. Each meeting sees more new faces, and more old faces that haven't attended for quite some time.

These meetings are exceedingly informative as all the best methods of running down old man trouble are cussed, and discussed. Each man bares his pet method only to have someone else pick flaws in it, thus each man finds, not only other methods of locating defects in various types of receivers, but lots of improvements in his own methods that he hadn't thought of before. The net result is considerable individual gain in service procedure by each member present—a knowledge that can be gained nowhere else. This fact is borne out by the increasing interest shown by individual persons at the meetings.

Some one person may start out to check a set on the bench, with several kibitzers around him, while others will merely sit around and carry on their own personal conversation—invariably, within ten minutes (unless the defect is found and remedied in the meantime) the kibitzers all are trying to get their hands on various and sundry condensers, resistors, henrys, electrons, anodes, etc., while the conversationalists are taking the place of the kibitzers. And if you don't think that excitement reigns high—just cum on up sumtin'.

RICHARD CORDERO, Secretary.

Darn It!

Our National Executive Secretary Memmo nearly walked into a catastrophe. He started to go—somewhere—and almost did—into the ladies' room at the Park Field House. Sam Juricek saw him in time to save him from being tossed out on his secretarial ear, or whatever secretaries land on whenever they are unceremoniously tossed out of somewhere, and the gang still holds it against Sam for spoiling the fun!—Chicago Chapter Chatter.

Hey, Ben! What do you mean by "Darn It!"? I suppose you wanted to see me get the old heave-ho, eh? Go ahead and laugh, you guys. The next time I visit you fellows I'll go all the way in and we'll all be thrown out.—MENNE.

New York Chapter

Our service forums have been quite popular with our members. Our attendance, for the most part, has been very good.

At one of our recent meetings Mr. Joseph Drummond, of the Engineering staff of National Union Radio Tube Corporation, addressed us. Mr. R. H. VanDusen and Mr. F. M. Paret, executives of National Union were also present. These men brought us a great deal of valuable information about the many tubes on the market. After the meeting refreshments were served. Fifty-three were present at this meeting.

With Television busting open here at the World's Fair it is only natural that we should plan a Television show. And that is exactly what we are doing. We have also completed plans for building a permanent service bench. This will bring the fellows out in increased numbers. Those who miss these meetings because of a little rain or some other weak excuse are losing out on some good things.

Radio and Television are getting a big play in New York this year. Keep up-to-date, buddy! If you live in the New York area you owe it to yourself to take in every one of our meetings.

L. J. KUXNER, Secretary.

Additions to N. R. I. Ham List

We shall be glad to list your call letters if you are an amateur operator. Give us your call letters the next time you write. The following have been reported recently.

- W9MFD—Elmer Shull—Warsaw, Ind.
- W5HZJ—Edward A. Gariel—San Antonio, Tex.
- W1FDX—Frank Courtney—Augusta, Ga.
- W5AVH—Dave Womack—Longview, Tex.
- VE2BB—Gordon Webster—Lashine, Ont., Can.
- W3GVC—Charles E. Helmuth—Atlantic City, N. J.
- W9MYS—Howard Crider—Fredonia, Ky.
- W1LTP—Samuel H. Bradish—Marblehead, Mass.
- W9DMO—Henry Spears—Louisburg, Kans.
- VE1APZ—Alvin L. Campbell—Burdett, Alta., Can.
- W2FGM—Walter Maslanka—Helmetta, N. J.
- VE1AFS—Garnet Cox—Wiseton, Sask., Can.
- W5JK—N. C. Willis—Dierks, Ark.
- W5HLL—Jack Tallant—Kenner, La.

Bennett and Morehead to Visit N. R. I.

Earl Bennett, President of N. R. I. Alumni Association and C. B. Morehead, Vice-President, are planning a trip to Washington this summer to visit Headquarters. They hope also to arrange their schedule so as to be able to visit some of our Local Chapters.

The Service Forum (Continued from page 27)

STEWART WARNER MODEL 1251 DEAD
This is often due to a break down in the .006 mfd. tubular condenser connected from the plate of the 41 type power tube to the chassis. A good grade 600 volt replacement condenser will prove to be satisfactory.

-----n r i-----
STEWART WARNER MODEL 1251 INTERMITTENT AND NOISY

This is often caused by the rotor wipers on the band change switch losing their tension and making poor contact. Hum in this receiver is often caused by an open in the line filter condenser.

-----n r i-----
SPARTON MODEL 931 INTERMITTENT

Look for a poor contact where the pin from the tuner connects to the amplifier. An imperfect ground between the tuner and amplifier will also cause this trouble.

-----n r i-----
SPARTON MODEL 333 PARASITIC OSCILLATIONS

Parasitic oscillations at the high frequency end of the dial may be eliminated by reducing the value of the oscillator grid leak connected from the oscillator grid to the cathode. A value of between 40,000 and 30,000 will work satisfactorily. In many instances it will be found that the original resistor has increased in value thus setting up the trouble.

-----n r i-----
SPARTON MODELS 577 NOISE LEVEL AND 537

Excessively high noise level may be due to defective I.F. transformers. Check the transformers with an ohmmeter while the set is turned off. Any variation in the resistance reading indicates a partial open and the transformer should be replaced. If a high range D.C. voltmeter is connected across the primary when the set is turned on, partial opens will be shown as erratic voltage readings, the readings occurring in time with the noise.

-----n r i-----
SPARTON MODELS 577 OSCILLATION AND 537

When oscillation occurs with the volume control adjusted to about mid-point, simply move the control grid lead of the 6Q7G away from the 6F6G power tube. The speaker lead wires should also be kept away from both of these tubes to avoid feedback.

-----n r i-----
ZENITH MODEL 6S128 INTERMITTENT

This trouble has frequently been traced to the voltage divider and the coupling condenser in the audio system. The volume control has also been known to cause this condition. Check the voltage divider by pulling on the lugs while the receiver is turned on and working the lugs back and forth very gently. Moving the condenser back and forth while the set is turned on will fre-

quently cause the trouble to occur thus isolating it to the condenser. Noise in the volume control or a rough control shown by a check with an ohmmeter indicates that the control may be causing the intermittent action.

-----n r i-----
ZENITH MODEL AUTOMATIC TUNING 5714 NOISY

Clean the contacts as dirt at this point could cause noise or might even cause the receiver to be dead. A warped contact strip shorting to ground may also cause this trouble.

-----n r i-----
WESTINGHOUSE MODEL WR342 ERRATIC ELECTRIC TUNING OPERATION

This trouble occurs when the chassis projects too far forward toward the front of the cabinet. Check the small pulley on the motor shaft and make sure that it is tight and there is no play. Inspect the dial drive cable to see if it is still on the pulley and is operated by the lever arm controlled by the front panel knob designated as "manual-electric."

-----n r i-----
SONORA MODEL 708 HUM

If the position of the volume control has no effect on the hum, try a new 8 microfarad electrolytic condenser in place of the one located under the resistor condenser bank. The replacement condenser, if one is to be installed, should be rated at 450 volts.

-----n r i-----
PHILCO MODEL A80 OSCILLATION

When the receiver oscillates only when first turned on the trouble may be due to a 77 type tube intermittently shorting. Try a new tube and if the difficulty continues, install a new screen grid by-pass condenser. For this purpose a capacity of .5 mfd. or .25 mfd. will prove satisfactory.

-----n r i-----
PHILCO MODEL 86 DEAD

If there are no R.F. plate voltages check for a short in the .1 mfd. condenser sealed in the cylindrical container along with the plate resistor. Disconnect the condenser lead and substitute a separate .1 mfd. 600 volt tubular condenser.

-----n r i-----
PHILCO MODEL 37-602 DEAD AT HIGH FREQUENCIES

This is due to bad contacts between the wires and the lugs of the oscillator coil. Simply go over the connections with a hot soldering iron, making certain that the iron remains at the joint long enough to melt the solder thus assuring a good contact when the solder hardens.

-----n r i-----
RCA MODELS T6-9, T6-2 AND T6-1 HUM

Hum regardless of the volume control setting may be due to improper phasing of the voice coil and hum bucking coil. By reversing the voice coil lead this condition will be cleared up.

Philadelphia-Camden Chapter

Chairman Felm wishes to again point out that all meetings are being held at our new quarters at 4711 Longshore St., Tacony, Philadelphia. These meetings are held on the first and third Thursday of each month, at 8:15 P. M.

At recent meetings we have been reviewing N. R. I. textbooks under the direction of our members, William Grieb and Adolph Zintner.

Al. Wysoczanski has taken up the subject of the complete analysis of a late superheterodyne circuit. In doing this we are covering the circuit from beginning to end and checking the purposes and results obtained from the various component parts of a set, covering as much as possible in one evening and continuing along at following meetings.

Socially we are making some plans which will be announced soon. We have been discussing a dance or benefit performance.

N. R. I. men are always welcome at our meetings. Our attendance is good, but there is always room for a few new members or guests.

ALLEN SCHIAVONI, Secretary.

————— n r i —————

Directory of Chapters

Baltimore—L. A. Willett, Secretary, 2411 Arunah Ave., Baltimore, Md. Meet at Fishpaw's Hall, Baltimore and Gilmore Sts., first and third Tuesday of each month.

Philadelphia-Camden—Allen Schiavoni, Secretary, 1226 McKean St., Philadelphia, Pa. Meet at Longshore Radio Service, 4711 Longshore St., Tacony, Philadelphia, first and third Thursday of each month.

New York—L. J. Kunert, Secretary, 66-11 74th St., Middle Village, L. I., N. Y. Meet at Damanzeks Manor, 12 St. Marks Pl., New York City, first and third Tuesday of each month.

Chicago—Richard Cordero, Secretary, 3315 E. 89th St., S. Chicago, Ill. Meet at Eckert Park Field House, 1400 W. Chicago Ave., first and third Thursday of each month.

Detroit—F. E. Oliver, Secretary, 604 Alter Rd., Detroit, Mich. Meet at 10 Lawrence Ave. at Woodward, second and fourth Friday of each month.

————— n r i —————

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

Page Thirty

Detroit Chapter

We have been reviewing the N. R. I. experiments. We covered experiments number 21 and 22 with complete demonstration and analysis. Everyone was permitted to break in at any time with a question. These meetings were mighty interesting even to the old-timers.

Your secretary is building a vacuum-tube voltmeter for use at our meetings. We already have much very fine equipment. We are glad to explain how to use this equipment to any of our members who may not be familiar with it.

Our average attendance is good. We at Detroit Chapter have a fine group of regular members who are too wise to miss any of the meetings. We have been going along steadily for years, growing just a little bit each year. The spirit of our members is very gratifying to Chairman Stanish and other officers who do everything possible to make each meeting a live one.

We don't toot our horn very loud, but there is plenty of life in the Chapter out here. The latch is always out to any and all N. R. I. men in Detroit. Drop in and get acquainted.

F. E. OLIVER, Secretary.

————— n r i —————

Directory of Officers

(To Serve Until January, 1940)

President—Earl Bennett, Evanston, Ill.

Vice-Presidents—

Allen McCluskey, Birmingham, Ala.
F. E. Oliver, Detroit, Mich.
Clarence Stokes, Philadelphia, Pa.
C. B. Morehead, Chicago, Ill.

Secretary—Earl Merryman, Washington, D. C.

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

————— n r i —————

Chairmen of Chapters

Edward Sorg, Chicago Chapter, 6501 S. Harvard Ave., Chicago, Ill.

Peter J. Dunn, Baltimore Chapter, 713 N. Fulton Ave., Baltimore, Md.

Alfred E. Stock, New York Chapter, 650 Ocean Ave., Brooklyn, N. Y.

John Stanish, Detroit Chapter, 12551 Camden Ave., Detroit, Mich.

Charles J. Felm, Philadelphia-Camden Chapter, 3411 Helen St., Philadelphia, Penna.



Wind Chargers Article Was Timely

I am arranging to install six wind chargers and I'm thankful for the article on wind chargers in the April-May issue of NATIONAL RADIO NEWS.

WILLIAM BEFF,
Dunsmore, Penna.

— n r i —

Re-Novel Radio Item, April-May Issue

Here is something which I think might be of interest to the N.R.I. In reading the latest N.R.I. News I came across an item telling how Radio will locate the "Time Capsule" in 6038 A.D. I am very proud to say that the Time Capsule was built under the supervision of my father. Enclosed in the Capsule is a letter giving the history of the World up until 1938. It also has a list of the engineers who designed and built the Capsule, and at the top of the list is the name, Otto Starke, Sr.

OTTO STARKE, JR.,
McKeesport, Penna.

— n r i —

Wants More of Jay and Ozzie

Am looking forward to the next issue of the News. It certainly is swell, especially those special subjects such as "Wind Driven Battery Chargers," and "Romance of Radio from 1914-1939." I think all the fellows including myself would appreciate some more of "Jay and Ozzie." How about it, Mr. Markus?

E. C. HUGHES,
Fairview, N. S., Canada.

— n r i —

Modern Servicing Technique

I wish to express my pleasure with Mr. Kaufman's article, "Modern Servicing Technique." I would like to see more such information appear in succeeding issues of the N. R. News.

JOSEPH P. ADROSKO,
Elizabeth, N. J.

From a Graduate of 1920

I wonder if Mr. Smith or Mr. Haas remember me? I graduated about 1920 and am mighty proud of it, too. I can remember those good old days at 14th & U Streets, the code room, classroom, the long wave receiver and the spark set. Also when the school moved to Pennsylvania Avenue. That was a big job. Mr. Smith and Mr. Haas deserve a lot of credit for such a progressive school of Radio.

CORNWELL J. GRIFFITH,
Richardson Park, Dela.

— n r i —

Wants More Pictures of N. R. I. Staff

The data in the Silver Anniversary issue of NATIONAL RADIO NEWS was very interesting especially the story of the N.R.I. itself. The snapshots of the staff are very pleasing. I would like to see the others in future issues.

HERBERT L. SILVA,
Hilo, Hawaii.

— n r i —

Paging Jay and Ozzie

I have just finished reading the article on "Built-In Shielded Loop Antennas," appearing in our April-May, 1939 issue of NATIONAL RADIO NEWS. I enjoyed it very much— almost as much as Jay and Ozzie's little episode with Pluto and then the Halloween Party.

GEORGE R. GLANCY,
New Castle, Ind.

— n r i —

Service Forum Is Useful

The Service Forum is great. I always clip these out and catalog them in a notebook where they may be had for quick reference. I enjoy reading the Alumni news and especially "Here and There Among Alumni Members."

ROY ROBINAUGH,
Celina, Ohio.

Page Thirty-One

Dumont Console Television Receiver

So that sight-and-sound programs may be enjoyed in utmost comfort, a console television receiver definitely aimed at your easy chair is the latest achievement of the Allen B. DuMont Labs., Inc., Passaic, N. J.



The main feature of this receiver is the placement of the cathode ray tube at an angle so that its screen is tilted backwards. Thus the screen remains in correct position for those sitting close by or again those standing some distance away. The inclined screen lends itself to comfortable viewing whether the looker-in is seated in a deep upholstered chair or davenport, in a less comfortable straight chair, or again standing up.

— n r i —

New IRC Volume Control Guide

Standard and special replacement volume controls for every requirement in both home and auto radios are listed in an easy-to-follow style in Edition No. 2 of the IRC Volume Control Guide. The complete IRC lines of midget volume controls, regular metalized type controls and wire-wound controls are described, making this a valuable reference manual. Many money-saving short-cuts are given; for example, there are full details on how to use inexpensive standard volume controls for special jobs merely by cutting the shaft, grounding a terminal, adding the proper plug in shaft, or adding grid bias.



Copies of this guide are available free of charge to N. R. I. men; get a copy from your nearest IRC jobber or write directly to the International Resistance Co., 401 North Broad St., Philadelphia, Pa., for a copy, stating that you are a student (or graduate) Radiotician.

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NATIONAL RADIO NEWS

FROM N.R.I. TRAINING HEADQUARTERS

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