NATIONAL RADIO NEWS

IN THIS ISSUE

Remote and Automatic Time Control—1939 Version

Kinks and Short Cuts in Radio Servicing

Alumni Association News

DEC.-JAN.
1938-1939

VOL. 8
No. 6

The universal joy of Christmas is profoundly wonderful. Ever since we were old enough to remember, we have looked forward to Christmas. This deep-rooted love for the Christmas Season does not diminish with the passing years. At Christmas the whole world tastes again the joys and wonders of childhood.

Surrounded by the members of our families, the ageless Christmas message is said and sung again to the sound of bells, the twinkle of candles, and all the kindly sentiments of the Season. Candles of restless anticipation sparkling in the eyes of children—candles of sacred memories for the grown-ups.

Christmas is truly a season of peace and good will, and once again the Staff of the Institute joins us in wishing you a full measure of Christmas Cheer and a bountiful, prosperous New Year.

J. E. Smith, President
E. R. Haas, Vice-President

7

REMOTE AND AUTOMATIC TIME CONTROL—1939 VERSION

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

You and your friends may be home during the holidays and may be at this very moment enjoying some of the pleasures made available by the recent development in remote and automatic time control of radio receivers. Some of these devices incorporate new features which may be well to know about when not only operating but servicing these units. I will therefore discuss some of the problems and at the same time point out the operating principles by using theoretical circuits. Before doing this let me briefly point out to you some of the desirable features as well as some of the possibilities made available by remote and automatic time controlled radio receivers.

PAUL H. THOMSEN

First, what is the difference between remote and automatic time control? By remote control I refer to the tuning and the operation of receivers from a remote point in the room where the receiver or loudspeaker is placed. Automatic time control of a radio receiver is accomplished by using an electric time clock tuning mechanism. In this case the receiver may be not only turned on and off but also may be tuned to a selected group of stations automatically. The volume may also be regulated automatically during the selection of the stations. With this latter system of control, it is possible to select a group of programs which are transmitted throughout the day (24 hours) and merely let the automatic controlling mechanism tune the set. With these remarkable automatic features it will be difficult for me to point out all of the possibilities made available, however, I will point out several of them and let you use your own imagination.

Remote control systems can be divided into three classes: wired, wired wireless, and wireless. Wired remote control makes it possible for you to remain seated in your easy chair and select any one of a group of pre-selected stations or in some instances you may even select any station in the band of frequencies covered by merely pressing a button on a small portable control unit clamped or laying on the arm of your chair. The volume and tone may also be controlled in some cases by either pressing a button or rotating a knob.

Wired wireless remote control incorporates a small semi-portable radio frequency oscillator which transmits the controlling signal over the power line to the receiver. This form of control makes it possible to plug in the remote control unit into any power outlet within the house and obtain control of the radio receiver.

Wireless remote control units make it possible for you to control the radio anywhere in the house and at the same time dial the station, adjust the volume and even turn off the set. Since there are no wires connecting to the remote control units you may control the radio from the living room, dining room, kitchen and even the recreation room, in fact from any room within the house. In this case a small portable battery operated radio frequency oscillator is employed as the portable control unit. A section of the receiver chassis is designed to intercept the signal radiated by the portable unit. With this type of remote control it is possible to have any number of portable units within the home. The several units may be operated at different points thereby making it unnecessary for you to carry a control unit from room to room. The last unit which is operated will naturally control the operation of the receiver. It is therefore possible for several members of the family to control the operation of the receiver by merely operating the portable control unit which is located nearest to them.

Wired Radio Control Units

In general, any radio receiver that employs an electric motor driving the tuning condenser shaft

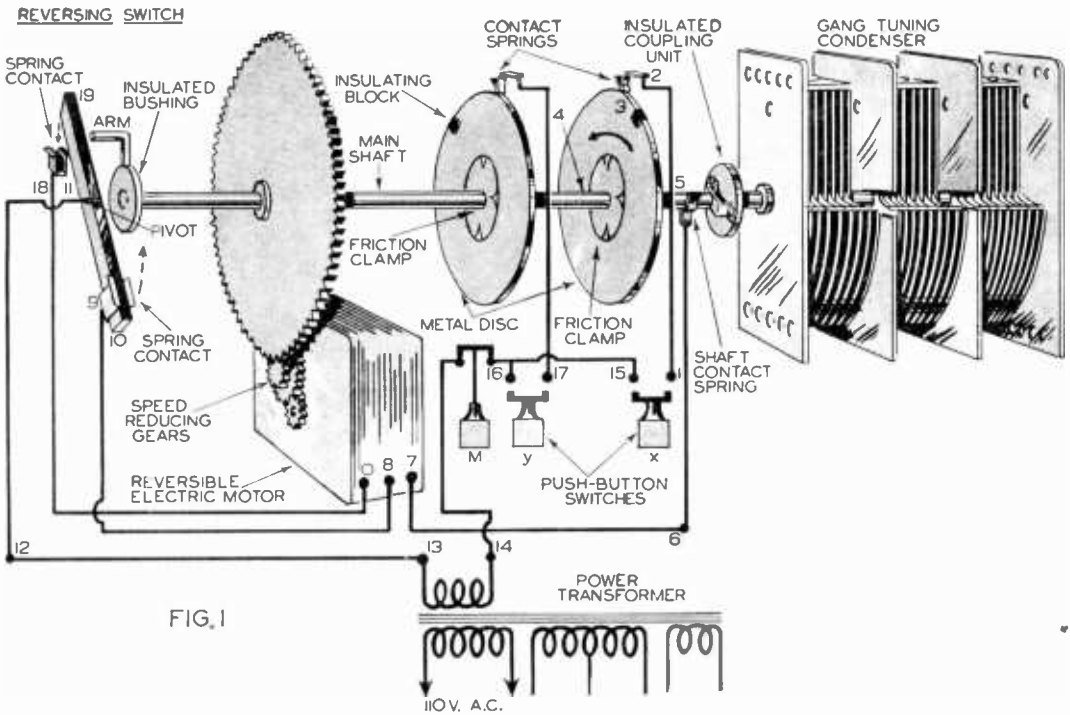


FIG. 1

can be operated by remote control. The remote control unit may be located at any point in the room. This unit is about the size of a small book, is connected to the receiver by a single flexible multiple-conductor cable. This cable is oftentimes flat and thin enough to be placed on the floor and under a rug. The cable will usually have a common return wire or when the volume is also controlled will have two or three more wires than the number of push buttons used on the control for the selection of the stations. A single lead of the cable connects to the hot side of each lead going to the push button switches in the receiver. In other words the remote control unit is merely an extension of the control leads to the tuner in the radio receiver.

In the motor driven tuning unit we will usually find a small reversable electric motor driving the shaft of the main tuning condenser through a combination of speed-reducing gears. These gears are necessary because the midget motors used in these systems rotate at a very high speed. The essential features of a motor driven automatic tuning system for remote control purposes are shown in Fig. 1. For simplicity I have shown only a two station push-button arrangement. These push-buttons are identified as x and y. For each push-button in the receiver there is one metal disc on the main tuning condenser shaft. This disc is held rigidly to the shaft by a friction clamp. An insulating block is set into the circumference of each metal disc as indicated in the Figure. Above each disc there is a contact spring which normally makes contact with the disc but which is insulated from the disc whenever the insulating block is directly under the spring.

Let us study in greater detail the operation of the automatic tuning system shown in Fig. 1. Let's start with point 1 at push button x and trace the circuit through the motor to the point 15. Following through from point 1 to point 2, then through the contact spring to point 3 and the metal disc provided for this button. From this disc we trace through the tuning condenser shaft from point 4 to point 5 and then through a shaft contact spring to points 6 and 7. From point 7 we know that current must flow through the motor and come out either at point 0 or point 8. Tracing from point 0, we find an open circuit at point 18 and know that current cannot flow over this path at this time. We will trace from point 8 to point 9 and then to point 10, the other terminal of the reversing switch. From point 10 we go to the metal arm of the reversing switch to point 11, to point 12, to point 13 through a secondary winding on the power transformer which provides the required voltage for the operation of the motor to point 14, through the manual

tuning switch M, and finally we are back at points 15 and 1.

When the push-button x is pressed it completes the circuit between 15 and 1. With this complete circuit for the motor between its terminals and the source of power, the motor begins to rotate, and the direction will be such that the tuning condenser shaft and the metal disc will rotate in a counter-clockwise direction (as indicated by the arrow on the metal disc) until the insulating block in this disc comes directly under the contact spring. This then breaks the circuit between points 2 and 3, opening the motor circuit and stopping the motor. If the position of this metal disc on the condenser shaft is properly chosen, the tuning condenser setting will now be exactly correct for the reception of the station assigned to button x.

Should we desire to receive the station assigned to button y we will push the button y. The pressing of this button automatically causes the button x to release and open that portion of the circuit between points 1 and 15. The button y shorts points 16 and 17. Since the arm at the left end of the condenser shaft has not yet touched the reversing switch, contacts 9 and 10 are still together and the circuit traces from point 17 through the left-hand metal disc, through the shaft, through the shaft contact spring to point 7, through the motor to point 8, through contacts 9 and 10 and the reversing switch to point 11 and then through the power transformer winding, the switch M to points 16 and 17. The motor rotates in the same direction as it did for button x, and the insulating block on this metal disc moves away from its contact spring. The motor continues rotating in this counter-clockwise direction until the arm at the end of the shaft flips the reversing switch over to a position which opens the circuit between points 9 and 10 and closes the circuit between points 18 and 19. Now the circuit through the motor is from point 7 to point 0 and the internal connections of the motor are such that this reverses the direction of rotation, making the tuning condenser rotate in a clockwise direction. This continues until the insulating block has moved under the contact spring and opens the motor circuit.

The speed of the motor is so high that this tuning action takes place in a few seconds. During the tuning process, the station-selecting knob on the panel of the receiver is rotating and the dial pointer is moving, since both are driven by the tuning condenser shaft. Of course the manual tuning mechanism has been omitted from the diagram in Fig. 1.

Courtesy Meissner Mfg. Co.

The Meissner #9-1000 Push-button Remote Control Unit shown here and also on the cover of this magazine, is a broadcast converter similar to the short-wave converters that preceded all-wave receivers, but operates entirely in the broadcast band and provides arm-chair control of a radio receiver.

Courtesy Galvin Mfg. Corp.

The Motorola wired remote control unit is compact and has eight push buttons. Six buttons for the six stations, two buttons for loud and soft adjustments and two buttons for the on-off operations.

It is understood that the leads to the remote control unit connect to the points 16 and 17 as well as 15 and 1 in order to obtain remote control action when pressing the push-buttons on the remote control unit for the stations indicated by the push-buttons y and x.

Although Fig. 1 does not show a means for silencing the audio system of the receiver during the interval when the motor is driving the tuning condenser, a switch is provided in order to prevent annoying blasts of sound as the receiver is tuned past strong undesired stations. Further-

more, when automatic frequency control is employed a switch must release the circuit temporarily while the tuning motor is in motion or just after it stops. The latter is necessary in order to allow the A.F.C. system to hold the desired station.

The Converter Method of Remote Control

Remote control operation of receivers may also be obtained by using a converter which is designed to cover the broadcast band and to feed into the radio receiver at a frequency of approximately 550 kilocycles. The converter consists of a 1st detector-oscillator and usually employs an electric tuning system which changes the amount of inductance or capacitance in these circuits. The converter unit also contains a simple power pack and may be connected to the nearest power outlet. The output of the converter must feed through a shielded lead to the antenna and ground terminals of the radio receiver. The circuit connections are as shown in block diagram form in Fig. 2.

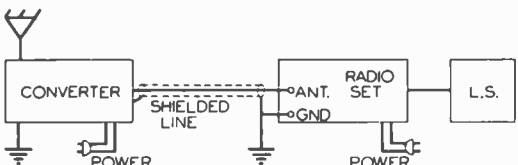


FIG. 2.

Wired Wireless Remote Control

The portable remote unit for the wired wireless control system may be very simple in design. A typical circuit of such a unit is shown in Fig. 3A. Note that a 30 type tube is employed as an oscillator. The R.F. generated may be of the order of 50 to 400 kilocycles and is fed into the power transmission line. The circuit is unique in that the low frequency current required to supply the filament and plate voltage for the oscillator must pass through the coupling coil L_1. The filament circuit is closed when the telephone dial type switch, the face of which may appear as shown in Fig. 3C, is rotated to the right by the section A of the two-gang rotary switch attached to it. The section B of this switch breaks the plate circuit so that the radio frequency developed will be interrupted. The number of interruptions in the plate circuit will determine the station or the control desired on the receiving mechanism.

At the receiving end of the wired wireless system we may employ a circuit such as that shown in Fig. 3B for the controlling element. The series resonant circuit consisting of the condenser C and inductance L is adjusted to resonate at the frequency of the transmitter. The voltage drop across coil L is used to operate the gas glow discharge relay tube. The type 0A4-G is a triode having a cold cathode K and an anode P1 and an anode P2. I might state that in operation a small amount of energy will start a glow-discharge between the cathode and started anode P1. This discharge (ionized argon gas) produces free electrons which assist in starting the main discharge between the cathode and anode P2. The anode current is of such magnitude that it will operate any relay connected in the circuit between points 1 and 2.

The operation of the circuit is quite simple. The starter-anode P1 is supplied with a 60 cycle voltage from the bleeder resistor R1 and R2 which is connected directly across the line. The voltage across the resistor R2 is applied to P1 and is at least 65 volts which is almost but not quite enough to initiate a starter-anode discharge on the positive peak of the line voltage. The application of the R.F. voltage to the line causes a higher voltage to be applied between the electrodes P1 and K which in turn causes the starter-anode to discharge and the anode P2 to pass maximum current for the positive portion of the power line A.C. cycle. This high current operates in the relay in the anode P2 circuit. Since the anode P2 is made negative for ½ the A.C. cycle the tube does not draw a high current the instant the R.F. voltage is removed.

Now that we have a controlling device, we may connect the output of the device in the circuit as shown in Fig. 3B to the input of the receiver controlling device mechanism as shown in Fig. 3D.

The receiver operating mechanism shown in Fig. 3D consists of two relays connected in series which are identified as the stepping and locking relays. These relays are mounted with respect to the ratchet wheel No. 1 so that this wheel may be rotated and thus perform the operation necessary to tune the radio receiver to not only the various stations selected, but also to assist in the operation of the volume control. The ratchet wheel No. 1 is concentrically mounted with respect to the ratchet wheel No. 2, although not coupled directly to it. This latter ratchet wheel rotates the rotary switch which selects the stations or the push-button circuits so that the electric motor driven tuner may function.

Let us analyze the operation of the remote control mechanism shown in Fig. 3D carefully. When the receiver is turned on and the telephone type tuning dial as shown in Fig. 3C is dialed from the loud position to the finger stop and released then two pulses are transmitted even though only one contact is made on the section B of the switch SW in Fig. 3A. This occurs because the telephone type dial is rapidly rotated to the stop—so rapidly that the relays cannot function fast enough to follow as the contacts are closed at such a high rate of speed. The re-

lays will close once thus making the first step from position 1 to position 2. Then as the dial is released, the dial rotates to the left and makes a contact causing the stepping relay to make a step on the ratchet wheel No. 1. At the same time the locking relay which has a very low time constant holds the armature of the locking relay into the ratchet wheel No. 1. Since this wheel has moved two steps the contact arm on this wheel will contact point No. 3 which is connected in the motor driven volume control circuit of the receiver. This will then cause the volume control to advance. As the telephone type dial cannot go to its normal position because the thumb is used in holding down the push-button just to the left of the finger stop, see Fig. 3C, the motor operating the volume control will continue to rotate and raise the volume. Naturally releasing the telephone type dial opens the filament and plate circuits of the oscillator and thus the relay opens and the motor stops. The locking relay releases ratchet wheel No. 1 allowing the contact arm to return to the off position.

The volume can be reduced by the same process as the rotation of the telephone type dial from the soft position to the finger stop in Fig. 3C and at the same time holding down the mechanical stop which is operated by the thumb push-button permits the contact arm to move to position 4, which closes the motor circuit for a rotation in the opposite direction. The length of time that the push-button is held down will regulate the amount of volume reduction which is introduced into the A.F. amplifier circuit of the receiver.

When operating the telephone dial for the selection of a station the stepping relay will start rotating the ratchet wheel No. 1 with its contact arm from the off position at the left to the position indicated in Fig. 3C. At the movement the stud on the ratchet wheel No. 1 contacts the holding spring on wheel No. 2, it releases the

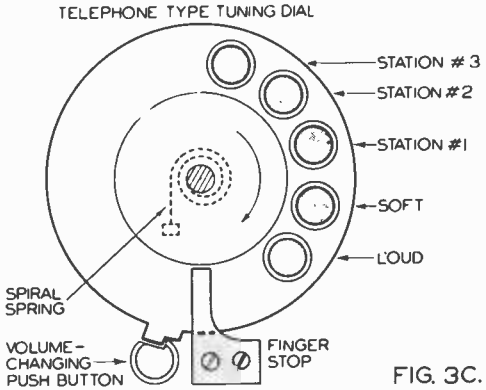


FIG. 3C.

ratchet wheel No. 2, causing this wheel to rotate rapidly and return to its starting point or the lowest frequency station selected. This is accomplished because wheel No. 2 is directly coupled to the station selector rotary switch which selects the first detector and oscillator circuits in the receiver. Naturally the rotation of this wheel will select the desired station. Immediately after the stud on wheel No. 1 has released the holding spring on wheel No. 2, the stud strikes the stud on wheel No. 2 which now starts to rotate wheel No. 2 in the counter-clockwise direction. Each pulse received will operate the stepping relay and in turn rotate the wheel No. 2, stopping at the desired station.

Immediately after the telephone type dial has stopped rotating the locking relay will open and the ratchet wheel No. 1 will return to the off position, however, wheel No. 2 is held by its holding spring. The volume may now be adjusted by dialing either the soft or the loud position and holding down the thumb push-button the required amount of time to give the desired change in volume.

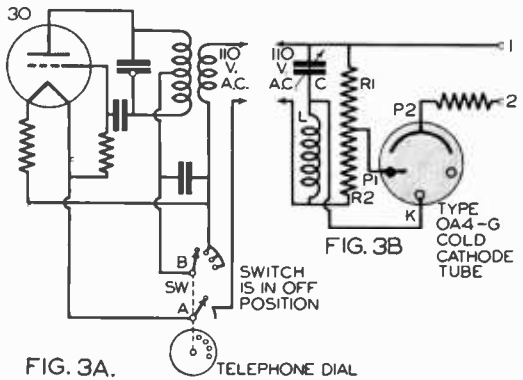


FIG. 3A.
FIG. 3B

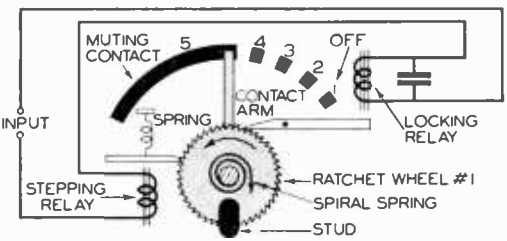
Wireless Remote Control

Since you now understand the operation of the wired wireless remote control system just described, it will not be difficult for you to understand how the wireless remote control system will function. In this case the oscillator, as shown in Fig. 3A, is designed to work from batteries and the inductance in the tank circuit is made up in the form of a loop antenna. The radiation of electromagnetic waves from this loop induces a voltage in a loop within the receiver tuned to the frequency of the portable transmitter. The output of the radio frequency amplifier is in turn fed to a thyratron tube. This tube is a triode acting as a rectifier, which is controlled by the incoming signal. In the plate circuit of this tube we must then connect the controlling mechanism as described in Fig. 3D. The operation of the mechanism is now similar to the wired

wireless combination described in detail. However, in this case there is no direct conductor for radio waves.

Automatic Time Controlled Radio Receivers

There are two distinctive types of automatic time controlled radio receivers on the market. The



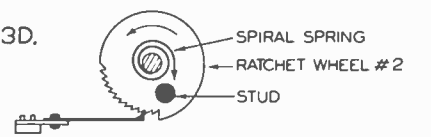


FIG. 3D.

first type employs simply an electric clock which turns the receiver on and off at the desired time. In this combination there is no attempt made to tune in different stations. The receiver must be tuned manually should different stations be desired. Then there are the receivers which are automatic in that they not only turn themselves on and off at the proper time, but also tune in the desired stations automatically. The latter system is quite similar to the remote control of receivers employing the motor driven tuning unit, as the device works in parallel with the regular push-button switches, that is, tuning in the respective stations selected for the fifteen minute periods through the day and night. This operation is accomplished at the proper time by switches operated by a synchronous motor. There are various mechanical ways of obtaining the desired control of the receiver during the ninety-six quarter hours throughout the day. I will explain one method employing a special switching mechanism.

For an example let us consider that we have a receiver with five push-buttons. We will then select a six-section rotary switch and mount it in the vertical position so that its shaft can make one complete revolution in twenty-four hours. Let each section of this switch have ninety-six contacts which represent the quarter hour periods of the day. The wiring of such a switching arrangement is shown in part in Fig. 4. Note that the common lead from the push-button tuning system connects to all of the ninety-six leads of the rotary switch. As the time clock mechanism rotates the twenty-four hour hand, the sliding contact completes the circuit to the push-button lead for the desired station. For example in Fig. 4 the third quarter hour of the day will make contact with push-button No. 1 as indicated as the twenty-four hour hand rotates the rotary switch. When the twenty-four hour hand reaches the fourth quarter hour, then a contact will be provided between the common push-button lead to conductor No. 2 going to the No. 2 push-button switch, and naturally the station assigned to this button will be tuned in.

When the twenty-four hour hand rotates covering the ninety-six quarter hour divisions, the individual push-button circuits are completed in each section and consequently, the desired station is tuned in automatically. If no program is desired the quarter hour contacts are left in the off position and the receiver does not operate. In order to obtain greater accuracy in turning on and off the receiver at the proper time, we generally find that a special contact mechanism or switch is employed which is operated by a cam rotated directly by a synchronous motor through a series of reduction gears. This switch is then coupled in this manner and always has a definite relationship with the hands on the clock. It will naturally close and open the receiver power circuit at the proper time throughout the day.

I have discussed the theoretical operation of the different types of remote and automatic time control units for radio receivers. The controls used in actual practice may be found to differ from the foregoing examples in mechanical details although the electrical circuits will be quite similar. Many of the controls discussed are found in the 1939 receivers, with of course, some modifications.

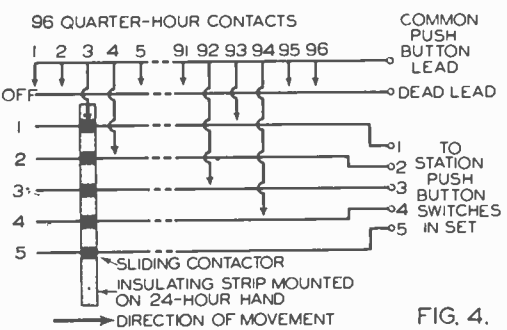


FIG. 4.

It is interesting to know that the Philco Mystery Control unit is a wireless remote control unit employing a mechanical tuner similar to that shown in Fig. 3D.

The automatic time controlled systems will be found in the General Electric and Motorola sets. In each case the mechanical time control switch-

(Page 11, please)

The Laboratory Page

By GEORGE J. ROHRICH

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

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

THE PARENTS OF INVENTION

"Necessity is the Mother of Invention." That is the often quoted statement which is credited to each of several authors. Richard Franck is credited with using it in 1656 while George Farquhar is given credence for its original use in 1707. These and other authors could lead us to believe that *Invention* is an only child or that *Necessity* is an only mother. However, *Talent* and *Genius* also are acknowledged parents of inventions. Henry Frederick Amiel the Swiss essayist and poet describes these parents as follows:

"Doing easily what others find difficult is *Talent*; doing what is impossible for Talent is *Genius*."

History reveals other parents: *Philosophy* or "Love of Wisdom," *Desire*, *Knowledge*, *Deduction*, *Observation*, *Suggestion* and *Accident*.

I would add still another—*Challenge*.

Challenge, itself, is a revolting but sincere child of *It Can't Be Done* who has great faith in the statement of an unnamed author who said:

"Never say that something is impossible because you will often turn around and see it done."

You and I have met and will meet many of these parents and children in our chosen profession of radio. One or more of these is your constant companion. Learn their habits. You will then learn at least one new thing each day and thus can cover yourself with their cloaks. Each one of us can and should wear the cloak of *Talent*. We then can do easily what others find difficult.

I shall describe two inventions disclosed to me recently in the laboratory. Both of these are twins, I am unable to trace their parentage definitely but they are evidently related to *Knowledge*, *It Can't Be Done* and *Challenge*.

Knowledge had already disclosed the well known facts that an oscillator produces fundamental signals, and also harmonic signals, and that these harmonic signals are equally useful as any fundamental frequency. Your experiments and experience with the low frequency oscillator which you assemble from Figure 78A in the Experimental Outfit 5BA-1 will verify these facts.

For example, connect a modulated oscillator, which produces a fundamental frequency of 200 kc., to a radio receiver. We know that sounds will be heard from the signal when the receiver is tuned to receive any one of the following frequencies: 200 kc., 400 kc., 600 kc., 800 kc., 1000 kc., 1200 kc., and so on for every additional 200 kc. until the signal from the additional harmonics is too weak to produce further responses in the loudspeaker.

In fact, when we can hear signals at all of these adjustments, we know the oscillator is set so the fundamental frequency is 200 kc. because the difference between any two signals is 200 kc. when measured on a calibrated receiver.

It Can't Be Done had inferred the belief that with no other *higher* frequencies than 200 kc. available from an oscillator to check the places where

The Laboratory Page (Continued from page 9)

these responses were heard, it was difficult, if not impossible at times, to identify exactly what setting was being used on an unmarked or incorrectly marked receiver dial.

Challenge had inferred the belief that these positions could be identified definitely.

For example, while using the 200 kc. signal there may be a question arising sometime whether the receiver is actually tuned to 1000 or 1200 kc., that is the fifth or sixth harmonic, or probably one of the other values. This question would arise when someone accidentally or unknowingly shifted the trimmer condensers in the receiver by the small amount which made the actual value a doubtful value.

The first invention for definitely identifying the particular harmonic at any uncalibrated setting was somewhat elaborate, requiring an oscillograph and an extra 200 kc. oscillator, making a total of three instruments.

The oscillograph was connected in the audio system, across the voice coil of the loudspeaker.

Each of the two oscillators in this case produced unmodulated signals. These oscillators were connected at the same time to the aerial and ground binding posts of the receiver. The action from a single unmodulated oscillator produced no sound in the audio system of the receiver. Consequently, neither was there a vertical deflection produced on the screen of the oscillograph.

However, when the two oscillators were working at the same time they produced a beat note when one of the oscillators was adjusted a few cycles above or below the value of 200 kc. This beat note was heard in the speaker. Adjustments were then made with the sweep frequency in the oscillograph so this beat note was also reproduced as a single sine-wave curve on the screen of the oscillograph during the time the receiver was tuned to 200 kc.

Now, when the receiver was retuned to the *second* harmonic, the beat note in the receiver speaker doubled in value and the screen of the oscillograph automatically showed *two* sine-wave curves. Thus the picture on the oscillograph screen definitely identified the setting to be the second harmonic.

Continuing to retune the receiver to 600 kc., I saw three curves on the oscillograph screen. Three times 200 was 600 kc. Thus the third harmonic was identified definitely.

Now, regardless of the harmonic order for which I tuned the receiver, the number of curves told me definitely which harmonic was being used. I only needed to count the number of curves shown on the oscillograph screen.

Repeated checks with all values of frequencies have verified the usefulness of this equipment and method for checking a badly aligned receiver at several points on its receiver dial.

Challenge further inferred that a simpler method than the above could be developed for identifying the value of harmonic signals.

The following method was evolved. It is so simple that anyone who has only a modulated oscillator can use it. The only requirement is that two values of frequency are accurately calibrated on the oscillator. One of these values can be any frequency you may care to choose. For our working example we will again choose 200 kc. The other value *must* be *half of the first* one you have chosen at random. In our example this now must be 100 kc.

I have chosen 200 and 100 kc. respectively, chiefly because these values can be readily calibrated from the information found in the instructions of Experimental Outfit *5BA-1* while working there with Figure *8A*.

Now connect this oscillator to the aerial and ground terminals of a broadcast receiver. Turn on the power switch of the receiver and adjust its tuning dial to receive either the fundamental or one of the harmonic signals from the 200 kc. setting of the oscillator.

Now, when you reset the oscillator dial to the half-value position, you will *always* hear another response. Your problem, which will be no problem at all, is to listen if there are *any additional signals* resulting when the dial of the oscillator is moved between the two calibrated values. Then add "one" mentally to that number of signals which you have heard and counted.

If you find *no other* signals resulting from the movement of the oscillator dial, you know that the highest frequency of the oscillator is putting the *fundamental* frequency into the receiver. "No signal" plus "one" is one, meaning the first or fundamental. One times 200 equals 200 kc.

If you find *one extra* signal between the two originally calibrated values, then the receiver is adjusted to the second harmonic of the higher calibrated value. "One signal" plus "one" is the second harmonic. Two times 200 equals 400 kc.

"Two signals" plus "one" is the third at 600, etc.

Remote and Automatic Time Control

(Continued from page 8)

ing units have remarkably simple mechanical and electrical features. That is, they are compact and yet made with simplicity and will give reliability as well as ease of operation.

As an example of the converter remote control system we find the Messiner push-button converter. The unit is compact and operated in much the same manner as the controls on a regular push button receiver.

The Motorola automatic Time tuning Mechanical assembly unit designed for the tuning in of six different stations through the day and night.

The wired wireless system has been developed although not yet used commercially. It is covered here as it may be introduced at any time. It has some advantages over the wireless system in that little or no interference is radiated.

The wired push-button systems are found on many different models, for example, on sets made by Midwest, Motorola, R. C. A., etc.

In case you are required to service or adjust a new receiver which employs any of the special controls you may find it necessary to refer to the manufacturer's instructions, however, a knowledge of the fundamental operating characteristics should prove to be of real help to you in understanding the method employed.

Wholesale Radio Service Company Announces New 1939 "Master" Catalog

Wholesale Radio Service Company of 100 Sixth Avenue, New York City announces the release of their new 1939 Fall and Winter "Master" Catalog Number 73.

An entire section is devoted to the newest in short-wave receiving and transmitting equipment. Two perfected television kits for the experimenter appear for the first time in any catalog. The usual thoroughly complete listing of test equipment, accessories and parts for the serviceman and setbuilder is also included.

Copies of the new catalog may be obtained by writing to or calling at Wholesale Radio Service Company, Inc., 100 Sixth Ave., New York, N. Y., 901 W. Jackson Blvd., Chicago, Ill., 265 Peachtree St., Atlanta, Ga., 110 Federal St., Boston, Mass., 219 Central Ave., Newark, N. J., 90-08 166th St., (Merrick Rd.) Jamaica, L. I., or 542 East Fordham Rd., Bronx, N. Y.

Stark Rural Meter

Those who live in rural areas, not equipped with electrical current may be interested in a circular describing the Stark Rural Meter, a battery operated Tube Tester and Analyzer.

This instrument requires no external connections. With it battery radios can be serviced, right in the owners' homes.

Three DC voltages range 0-10-100-300; three resistance ranges 0-1000-100,000-1 meg. Circuit arrangement provides accurate test of self-contained batteries directly on meter by flipping of a switch.

For free descriptive circular, write Stark Electrical Instruments, 118 S. Wells St., Chicago, Illinois.

A Modern Antenna for Apartment Houses

An answer to the problem of providing good Radio reception in apartment houses and other multi-unit dwellings, and at the same time eliminating the jungles of wires which are a frequent eyesore in large cities, is offered by General Electric in the form of a new all-wave multi-coupler antenna system, just announced by the G-E construction materials division, Bridgeport, Conn. The new multi-coupler antenna offers a solution to apartment houses, schools, hospitals, and similar structures in which a large number of Radio receivers of assorted types may be operating at once. The new device would in many cases be appropriate for installation in large private residences.

Electrolytic Condenser Book

"Electrolytic Capacitors," a 276-page book written by Paul M. Deeley and published by the Cornell-Dubilier Electric Corp. of South Plainfield, N. J., is just off the presses. Those engaged in the design, manufacture and testing of wet and dry electrolytic condensers of all types will find in this book a most complete and valuable discussion of the procedures and processes involved. The book is fully illustrated, and should make interesting reading for anyone interested in this phase of Radio.

Watch for Next Issue of News

National Radio Institute will celebrate its 25th Anniversary in 1939. The next issue of NATIONAL RADIO NEWS will be our 25th Anniversary number. It will be a specially prepared enlarged issue, full of good things. This is just a tip-off—don't miss the next issue of the NEWS.

New Radio Devices for Airplanes

A tiny speck of green light moving on a screen of frosted glass shows airline dispatchers the exact direction of approaching planes, according to an announcement by Paul Goldsborough, President of Aeronautical Radio, Inc., following recent tests of a new development for locating airplanes in flight. Even though visibility is completely masked out by fog or blinding rainstorms, the new device, which operates by Radio waves, enables airport personnel to follow precisely the oncoming plane and, by return Radio telephone, to guide its pilot to the field.

This major contribution to air navigation was developed by Bell Telephone Laboratories for the Western Electric Company. When used in connection with the Civil Aeronautics Authority's beacon system, the new instrument will enable airline operators to ascertain the location of their aireraft at any time.

The system provides for indication on any of ten wave lengths which may be selected remotely. As each pilot talks, the spot of light moves instantly to its correct position on the circular screen of a cathode ray tube. Compass markings inscribed around the screen's edge enable the airport dispatcher to give the pilot his exact bearings by return Radio telephone. A pick-up antenna of special design is employed and this may be situated at any remote point. Connection between the antenna and the dispatcher is made over a single telephone line.

Another instrument which gives airplane pilots their height above the ground over which the plane is flying was demonstrated recently by the Western Electric Company and United Air Lines. Claimed to be the first successful altimeter showing terrain clearance, the new device operates by Radio, using the shortest wave ever employed for aviation purposes, officials of the companies state.

Following additional service tests, which are planned for the near future, the new altimeter will be installed on all United planes and will be made available to the industry generally. The principle employed in the present device, shown to be a practical solution to the Airlines' problem, is the result of research work done in Bell Telephone Laboratories. Basically it involves the transmission of a Radio signal from the airplane, the reception of the signal as reflected from the earth, the measurement of the elapsed time between the transmission and the reception, and the translation of this time interval into a direct reading of the plane's altitude in feet as shown on a meter. Due to its use of ultra-high frequency the new altimeter is entirely free from static interference.

RADIO-TRICIAN
REG. U.S. PAT. OFF.
Service Sheet
Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D.C.

ZENITH CHASSIS 5528, MODELS 5R303, 5R312, 5R316, 5R317, 5R337

NOTE

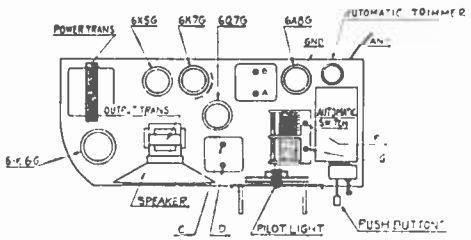
Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected—volume control on full.

Line voltage 115 v. Consumption 45 watts.

Power output 3.5 watts.

(A) Bias for 6A8-6K7 and diodes of 6Q7 measured across resistor R9.

(B) Bias for triode section of 6Q7 and 6K6 measured across R8 and R9.



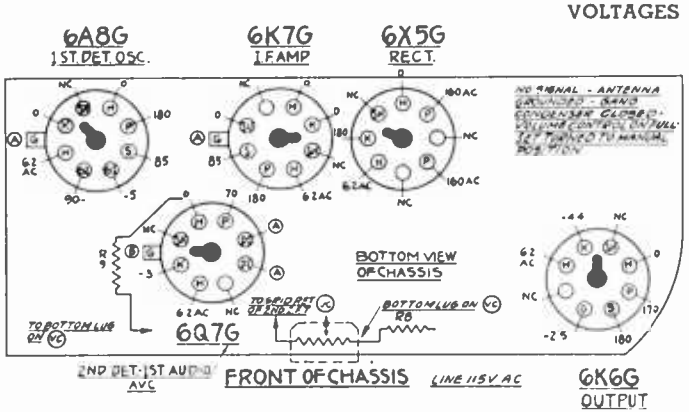
Location of Tubes and Trimmers

No Signal—Antenna Grounded—Gang Condenser closed—Volume Control on full—set turned to manual position.

LEGEND

NC—No Connection
VC—Volume Control
SH—Shield
H—Heater
P—Plate
S—Screen
G—Grid
SU—Suppressor
D—Diode
K—Cathode
F—Filament

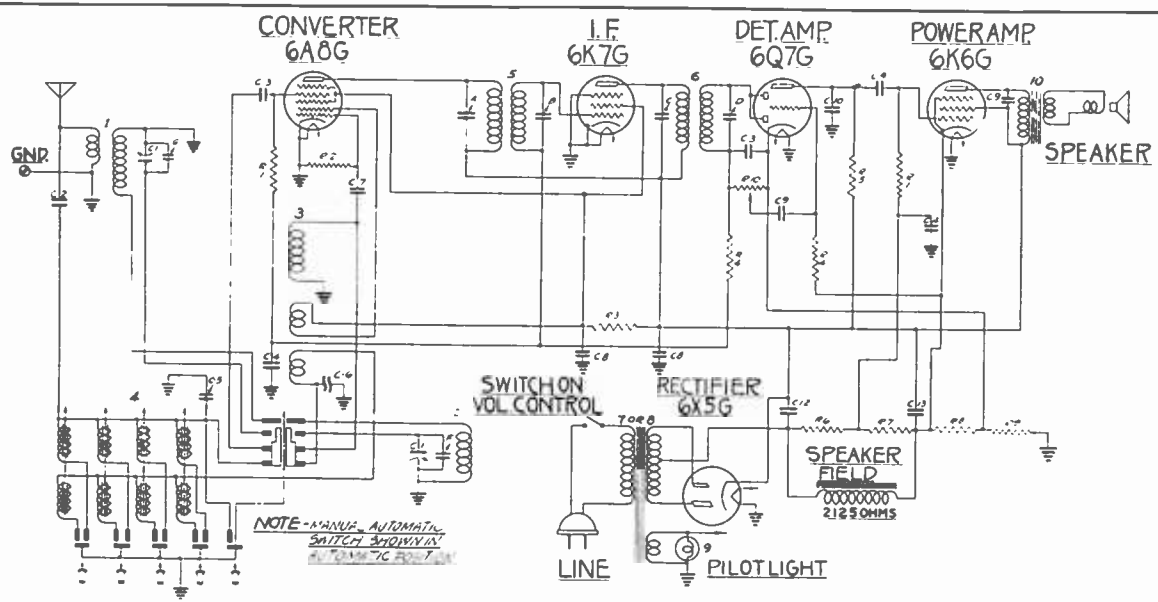
SOCKET VOLTAGES



ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial at	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	455	Br'dc't	600	ABCD	I. F. Alignment
2	Rec. Ant. Lead	200 Mmfd.	1500	Br'dc't	1500	F	Set Osc. to Scale
3	Rec. Ant. Lead	200 Mmfd.	1500	Br'dc't	1500	G	Al'gment of Ant.

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



Diag. No.	Part No.	Description	
C-1	22-695	Two Gang Var. Cond.	
C-2	22-289	50 Mmfd.	600V
C-3	22-162	.0001 Mfd.	600V
C-4	22-250	.05 Mfd.	200V
C-5	22-519	Trimmer Cond.	
C-6	22-729	Compensating Cond.	
C-7	22-182	.00025 Mfd.	600V
C-8	22-212	.05 Mfd.	400V
C-9	22-196	.01 Mfd.	600V
C-10	22-147	.0005 Mfd.	600V
C-12	22-691	8 Mfd. Electrolytic	450V
C-13	22-692	8 Mfd. Electrolytic	350V

Diag. No.	Part No.	Description	
R-1	63-597	470 M Ohm	1/4W
R-2	63-593	47 M Ohm	1/4W
R-3	63-208	12 M Ohm	1W
R-4	63-271	1 Megohm	1/4W
R-5	63-296	220 M Ohm	1/4W
R-6	63-658	390 M Ohm	1/4W
R-7	63-260	100 M Ohm	1/4W
R-8	63-563	80 Ohm Wire Wound	1/4W
R-9	63-686	150 Ohm Wire Wound	1/2W
R-10	63-955	220 M Ohm Vol. Cont.	

ZENITH CHASSIS 5528, MODELS 5R303, 5R312, 5R316, 5R317, 5R337

New Sprague Paper Condensers Supplied in Metal Containers

Sealed in aluminum cans, priced attractively low, and having many distinctive features, Sprague Capacitors known as Type DR are proving highly popular among servicemen who prefer paper condensers for replacement purposes.

The new units are made in capacities of 4, 8, 4-4 and 8-8 mfd. They have the appearance of standard electrolytics, although capacity runs from 1/3 to ½ that of electrolytics. Leakage and power factor characteristics are negligible and the new units have an advantage in that there is no polarity to observe.

Full 600 Volt rating assures ample safety factor on practically any replacement job.

Units are designed for handy, inverted screw mounting. An 8 mfd. Sprague Type DR Condenser lists at $1.35 and brings to the serviceman a sturdy, fully reliable paper unit for a wide variety of economical replacement uses.

These new condensers along with numerous other Sprague developments for service and amateur needs are detailed in the new Sprague Catalog just off the press. A copy will gladly be supplied on request to the manufacturer, Sprague Products Company, North Adams, Mass.

———— *n r i* ————

Additions to N. R. I. Ham List

The following call letters have been reported since the last issue of the NEWS. In spite of the large number of call letters so far reported, it is felt that there are many N. R. I. amateur operators whose call letters have never appeared in the NEWS. If you are one of them, make it a point to report your call letters the next time you write N. R. I.

Edward Schantz—W8OVH—Springfield, Ohio.
Jack Tallant—W5HLH—Kenner, La.
George Minich—W7HCS—Seattle, Wash.
C. Stanley Field—Longueuil, Que., Canada.
Julius C. Vessels—W4UV—Chattanooga, Tenn.
John Hermanson—W2SWL—Brooklyn, N. Y.
Elmer K. Denlinger—W3BRZ—Lancaster, Pa.
Wm. S. Doty—W8SIQ—Cleveland, Ohio.
Leonard Young—W1LMN—Dorchester, Mass.
Edmund Krampert—W2KVS—Secaucus, N. J.
T. B. Winstead—W4ALT—Elm City, N. C.
Edward N. Callahon—W8QEJ—Coalport, Penna.
J. R. Martinson—W9NLJ—Minneapolis, Minn.
Phillip E. Clark—W1BKN—Houlton, Me.
N. C. Willis—W5JK—Dierks, Ark.
R. H. Schaaf—W9KVG—Ft. Wayne, Ind.

Maps Offered to Aid "Hams"

Two azimuthal world projection maps prepared by the Radio Department of the General Electric Company at Schenectady, N. Y., are available to Hams, gratis upon request. One, designated GES-1996, is centered on Schenectady and is for use only in the Northeastern United States. The other, GES-1999, is for amateurs in the western part of the country and is centered on Oakland, Calif.

Principal cities throughout the world are indicated on the maps, and determining the paths of signals, as well as distances between points, is simplified.

———— *n r i* ————

Condensed Catalog on Condensers

Listings of all standard items of the extensive Aerovox condenser line, with the most popular types of carbon and wire-wound resistors as well, are provided in the handy form of the new Aerovox condensed catalog. The new catalog also features three pages of exact-duplicate replacement condenser listings and two pages of exact-duplicate motor-starting capacitor replacements. A copy may be had either through the local jobber or direct from Aerovox Corporation, 70 Washington St., Brooklyn, N. Y.

———— *n r i* ————

New Allied Radio Catalog Is Out

More valuable to Radiotricians than ever before is the new 1939 Allied Radio Corporation catalog, crammed with interesting and useful reference data on Radio parts, servicing instruments, and everything else connected with Radio.

N. R. I. students can acquire a wealth of knowledge about new and old Radio parts by paging through this catalog; graduate Radiotricians can keep abreast of new developments and price trends. Beginners can well carry one of these catalogs in their tool boxes, for use as a guide in determining cost of parts when giving estimates for service work.

To get your copy, just send your request (a postcard will do) to Allied Radio Corporation, 833 West Jackson Boulevard, Chicago, Illinois.

It is always a good idea to mention that you are an N. R. I. student or graduate when writing to Radio firms.

Kinks and Short Cut

By George J. Rohrich, N. R. I. Cor

"So *that's* the way you get around that job which caused me no end of worrying!"

Sam Hathaway greeted me with this ejaculation which expressed a satisfied feeling that he had learned something new after I had remounted a repaired I. F. transformer can, in what appeared to him, a surprisingly short period of time.

Several times previously I have been greeted in the laboratory with the above or similar statement when all that I did was to apply some simple "knack" which to me seemed so obvious that I thought everyone should have done likewise or better.

"Well, it is simple, isn't it?" I countered when he made his opening remark. "You would have figured it out for yourself soon enough, I am sure. Why, everyone does that unconsciously when needed."

"Yes, it is simple," was Sam's answer. "But I didn't think of it and Bill Gregory didn't do any better than I because he tried the same as I did. Why don't you describe it in the NATIONAL RADIO NEWS?"

Sam Hathaway's last remark was the beginning of this article. I'll describe some of the "kinks" which I have used at various times in radio servicing and in the laboratory with the hope that others may profit and perhaps tell us of some of their own methods for doing these or similar jobs in a better way.

The particular "kink" which started this article was in regard to replacing the mounting screws in the two holes in the base rim of an intermediate frequency transformer which fastened to the chassis, down among a maze of closely fitting parts and wires. The problem was to quickly get the screws with their lockwashers into the threaded holes in the chassis, without these screws repeatedly rolling away, thus avoiding much loss of time and also avoiding a bad case of "Nerves."

First, I simply held the I. F. can in my left hand, out in the open. Then I placed a lockwasher over one hole in the rim of the I. F. can. Next, I inserted the screw through the lockwasher and into the hole in the rim. I did likewise with the other lockwasher and screw. Figure 1 illustrates the arrangement of these parts. Then I carefully guided the can downward among the maze of parts until one tip of one screw barely touched the chassis right over the threaded hole but I was careful to hold the can at a very slight angle so the other screw would not touch the chassis and be pushed out of its hole and roll away while working with the first screw. Now I picked up the screwdriver and gave the first screw one or two turns, just enough to get it started into its threaded hole in the chassis. I next did likewise with the second screw while still holding the can far enough above the chassis until the point of the screw was started properly in its threaded hole. Then I could release the hold I retained on the can with my left hand and the rest of the job of tightening the screws was easy.

Sam commented that he had tried the job "the hard way" by first putting the I. F. can in place and then "trying" to wiggle the point of the screw into the lockwasher and threaded hole with the help of pliers and a screwdriver, while gravity did everything to the head of the screw to keep the head from being raised higher than the point. Then I told Sam that if he wanted or had to first put the rim of the can down on the chassis, he could use another "kink" which I have often used successfully. I'll describe it now.

Put the part down where it belongs. Then take a piece of bare No. 24 wire about a foot in length.

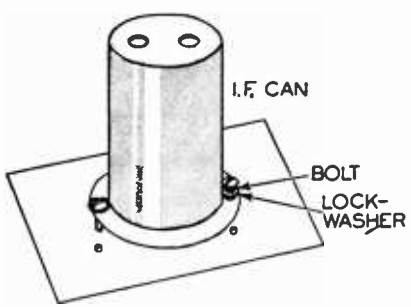


Figure 1

Bend a loop at one end of it. Insert the screw loosely, with its lockwasher attached, into this loop. Refer to Figure 2. Then bend an angle in the wire near the head of the screw so the remaining length of wire will serve as a handle for lowering the screw, with its head up and its point down, and guiding it downward among the maze of wires and parts. You can now guide the point readily toward its threaded hole and then apply the screwdriver. As soon as the threads have caught, pull out the wire.

s in Radio Servicing

sultant on Laboratory Instruments

The use of the wire for a guide reminds me of another simple "kink" for placing and starting nuts on the threads of a screw which has its point facing upward or sideways but located also among a maze of wires so the nut cannot be started with your fingers. Refer to Figure 3. In this case hold a straight piece of bare wire with the fingers of your right hand, then slip the point of this wire through the nut and then through the lockwasher which are held together with the fingers of your left hand. With your right hand guide the point of the wire downward against the point of the screw. Let the lockwasher and nut drop out of your left hand fingers. These parts will now fall into position against the point of the screw. Transfer the upper end of the wire to your left hand. With the aid of the blade of a screwdriver "kick" the nut on the threads. A few spins of the nut will soon cause its threads to catch on the threads of the screw. The wire then can be removed and the job finished with the aid of a socket-type wrench or a pair of pliers.

On other occasions for starting screws and small nuts in seemingly inaccessible places I have used sticky substances, such as pitch or quick-drying "rubber cement" applied to the blade of a screwdriver or to the inside of a socket wrench.

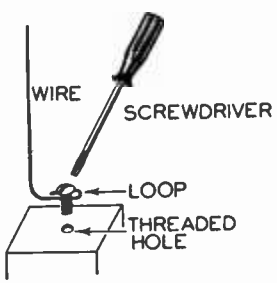


Figure 2

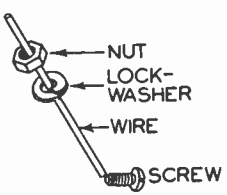


Figure 3

Automobile tire-cement, or the cement for patching and gluing the diaphragms of loudspeakers serve nicely for this purpose. Dip the blade of the screwdriver lightly into the cement, expose this coating of cement to the air for a short while until the solvent evaporates, or speed up the drying process by blowing your breath on the coating. Then stick the screw or nut to the prepared driver and guide it into position.

The above "kink" was the indirect result of a suggestion made to me many years ago for making home-made screwdrivers for starting screws, long before I used or even heard of commercial types of "hold-fast" screwdrivers. The man who made the suggestion told me to fashion screwdriver blades on the eraser ends of pencils with the aid of a razor blade. The "rubber blade" purposely was made a trifle wider than the slot in the head of a screw. This allowed the "blade" to be forced into the slot and grip its sides. The idea was effective until the rubber blade became smooth and worn. On one occasion a tube of rubber cement was handy and I processed the smooth rubber blade. Then I extended the idea to processing metal blades and the inside of socket wrenches. I mention this original idea in event that you find rubber cement or commercial type hold-fast screwdrivers are not handy.

Incidentally, when socket wrenches are missing, you will find that rubber cement applied to the eraser end of a pencil is very effective for starting the larger nuts. This is due to the extra friction obtained between the rubber eraser and the face of the nut. Of course, in this case the job is finished with the aid of pliers.

While speaking about screws I am reminded of the wooden cabinets and loudspeaker frames which are held together with wood screws. Frequently you might attempt to drive these screws into new or tight fitting holes in hard wood where much effort is needed or where the screws are damaged unless soap is applied to the threads of the screws. Simply moisten the bar of soap with water, rub the threads across the soap and use the prepared screw. You will wonder probably if this screw fits tight enough because so little effort is needed now to turn it. However, the same holding power is present while you have simply made your work easier with the aid of lubrication with soap.

Soap applied to the runways of windows, desk or shop drawers, or other sliding objects such as slide rule guides will overcome friction.

Soap applied to a nail, when driven into hard wood with a hammer, also will make a seemingly impossible or tedious job an easy one.

Yes, a serviceman does occasionally use nails and a hammer, when fitting up or improving his shop. He may find that the head of the hammer slips off of the head of the nail or tends to bend the nail when hammering. Nine times out of ten it is due to the head of the hammer being too smooth—rub the striking face of the head of the hammer a few times on a concrete or brick surface. Yes, it's simple but it works.

While fitting or cleaning up the shop, I wonder how many servicemen dust their analyzers and occasionally find that their meter needles temporarily have gone haywire and apparently cannot be reset to zero, making them wonder if the meter was accidentally burned out, or accumulated foreign matter during the cleaning process. If it happens to you, relieve your dire thoughts and suspect that the friction of rubbing the cleaning cloth over the glass face has temporarily placed a static charge of electricity on the glass which pulls the needle away from its normal zero setting. Simply open your mouth wide and gently blow a breath of warm moist air against the glass to dispel the static charge held on the cool dry surface of the glass. Many meters of recent design use special glass which cannot accumulate such a charge.

But perhaps your meter has actually accumulated dust inside the case of the meter which makes the needle stick or move with an erratic motion. You are confident that you can do a ticklish job of cleaning. Yes, you carefully take the cover from the meter and then realize how delicately adjusted is the needle—you want to try moving the needle with your ever increasingly clumsy fingers. Your reason tells you correctly that it is better to refrain from touching the needle. Here you can again make good use of your breath, this time opening your lips only slightly to emit a steady but well direct shaft of moving cool air against the needle. The needle will respond readily unless obstructed and there is no danger of bending or breaking the delicate parts, even when an obstruction is there.

During this time of inspecting the meter you may find that one of the delicately soldered joints needs resoldering. Again you realize that the regular service soldering iron is entirely inadequate for this job because the tip is much too large. In this case make a coil of four or five turns of bare No. 12 copper wire which fits snugly around the copper tip of the regular soldering iron. Then bend this piece of copper wire at right angles near the point of the regular copper tip in order to make a new but smaller tip which extends about half of an inch beyond the regular tip. This is shown in Figure 4. File this new tip slightly flat so it will retain solder readily. Then heat the iron, carefully timing the new tip and also applying solder along that portion of it which comes closely in contact with the original.

When working with this smaller tip you can solder the smallest wires which you will ever encounter in the repair of radio receivers and testing instruments. However, it is well to realize that the smallness of the tip and the distance with which it is located from the source of heat will tend to keep it much cooler than the point of the original tip, unless you carefully see to it that heat is properly conducted toward this small tip.

Heat has a tendency to rise. Therefore, keep the tip *up* by *lowering* the handle of the iron when more heat is needed.

This brings up several other servicing "kinks" while using the regular service soldering iron.

How often have I seen servicemen holding a soldering iron with its tip hanging downward while waiting patiently and often impatiently for it to reach the proper soldering temperature, then cussing because the *handle* gets hot while the *tip* fails to reach the desired degree of heat. Eventually the tip gets *almost* hot enough then they start their job, still holding the tip downward. Naturally, their job is slow and tedious. Often the job is unsatisfactory but they let it go at that, all because they are not aware that heat rises.

Of course, the remedy again is simple. *Keep the tip raised to obtain maximum heat in the quickest time at the tip.*

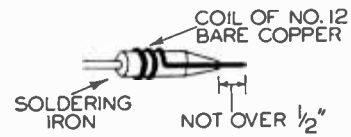


Figure 4

Also learn to rely on the *changes of color* in heated metals to tell you when you are ready to *begin* and *stop* soldering. These colors serve as thermometers to the experienced serviceman. They conserve their time and efforts.

For example, you can tell from the changing colors of copper when the tip of a soldering iron is too cold, or too hot, and also when it has reached the proper degree of heat by viewing a cleaned copper surface of the tip at a point which is not tinned. Stroke a single sweep of a file lightly over the copper tip. If this cleaned surface remains at a bright *copper color*, the tip is *too cold*. But if this cleaned surface immediately changes color and turns from bright copper to *purple* you can be assured that the *proper* temperature has been reached.

If the copper tip turns *cherry red* or *"red hot"* then the tip is *too hot*. A tip which is *too hot* is just as bad as *too cold* because you can't make solder stick properly. It just can't be done, so don't waste time trying.

It is well to test your iron in this manner before attempting to solder any kind of joint, from the simplest joint to a heavy or bulky connection, where the right amount of heat is needed always to do a job quickly and thoroughly.

Relying on the color of metals to determine their degree of heat also is useful for letting a serviceman know just when solder has melted and also

when solder has cooled to the point where it has "set," or changed to the solid state.

For example, melted solder has a bright shiny appearance which resembles mercury.

When melted solder cools to the point where it "sets," it changes its color and turns *white*. This change is *very pronounced*. You will learn to use it as a "stop signal," meaning that you will stop holding a tension on the soldered wires to keep them from moving until you are sure of having a solid connection.

Yes, these wires must be kept from moving. This is quite a problem in some instances where two or more wires are being soldered together. Of course, one or two wires often can be held readily with pliers against a terminal without running into trouble. However, if the ends of the wires refuse to stay in place, the simplest thing to do is to tie them together temporarily with a bare piece of No. 24 copper wire. Usually, you can remove this extra wire after the joint has been soldered but there is no harm in leaving it as a permanent part of the joint if you also have soldered it in place. Simply cut off the extra ends.

Frequently you may wish to remove solder from an eyelet or from the tip of a vacuum tube base. This can be done very easily by heating the part thoroughly and then *quickly* snapping the part which contains the eyelet. This rapid movement of snapping the part throws the solder out. Some practice may be required and often the procedure must be repeated several times until all of the solder has been dispelled. The "kink" is unsuccessful only if you wait too long between the time the heat is removed and the time that the part is snapped. The least trouble is experienced with larger parts where plenty of heat can be retained to keep the solder in a molten state within the eyelet.

Figure 5 shows a handy gadget made of wire and attached to a soldering iron which serves for a simple but effective stand. This wire stand is a time saver because it is permanently attached to the soldering iron and, therefore, it is ready for safely placing the heated iron anywhere on the workbench. Anyone can make this stand in a few minutes.

Specified dimensions are not important. Neither is the kind and size of wire of real importance. However, the approximate dimensions listed in the sketch will serve as a guide when making it, while it is suggested that aluminum or iron wire is chosen in preference to copper. This preference of the former kinds of wire will let the bottom of the stand remain absolutely cool although copper wire also can be touched with the hand without danger of scorching it.

Let us say you select a piece of No. 14 or No. 12 iron wire. The length can be seven inches or more. Bend this wire so you have about two inches at its center. Form a triangle by bringing the ends together, giving them a single twist, which will let this twisted joint be about one-half of an inch above the midpoint in the base. Then form the ends into a circle which fits around the metal handle, giving it another twist to hold it on the handle. This circular portion of the stand should fit loosely so the stand can swing freely. This will allow the base of the stand always to fall toward the bottom and, therefore, always be ready for placing it on the workbench.

If you need further elevation of the tip of the soldering iron, simply pull on the base which will give you greater clearance between it and the twisted joint, thus accomplishing your purpose.

Occasionally you may be required to remove enamel insulation from a wire or cable which

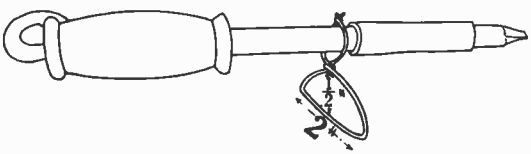


Figure 5

consists of several strands insulated with enamel. Of course, you could scrape this enamel with a knife and accomplish a satisfactory job. However, this work can be done very easily if the enamel wire is heated in the flame of an alcohol torch. You will notice that the alcohol flame consists of two cones, one cone within the other. The inner cone of flame is decidedly blue while the outer cone contains a yellowish tint. Hold the enamel wire *within* but at the *tip* of the inner blue cone of the flame until the wire becomes red hot. No other place will do the job well. Then quickly remove the heated wire from the flame and plunge it into liquid alcohol. The tip of the inner cone is void of oxygen and, therefore, removes the enamel and oxide from the wire, while plunging the wire into the alcohol prevents tarnishing during the cooling process. Therefore, the wires which are prepared in this manner can be soldered without trouble resulting from tarnished surfaces and nicked wires.

If you do scrape enamel or other insulation from a wire, be sure that you do not scar or nick the wire. The slightest nick in a wire will weaken it to the extent where it will break if you bend it more than two or three times. However, if such nicks are absent, the wire can be bent an innumerable number of times.

In order to prevent making nicks in a wire while scraping, I recommend that you use the *back* edge of your knife. Not only does it prevent these troublesome nicks but it also saves the cutting edge of the blade for purposes where a sharp blade is of greater importance.

Knives apparently are easily *lost* in a shop. I have never discovered just where or how they disappear, but I do know from experience that it is a difficult thing to keep a good knife on hand. I have often solved my problem by making my own knife from the broken blade of a hacksaw. Simply grind the edge of the saw on an emery wheel. This sharpened blade can be used without attaching an extra handle. However, I find it more convenient to form a handle by laying two thin sticks along the blade, and then wrapping the entire assembly with one or two layers of friction tape.

You may be interested in placing the stickiest side of the tape nearest the smoothest surface which happens to be the blade in this case. You may need to know which is the stickiest side. Grasp the tape between the thumb and forefinger, then separate them. You will soon find out now which is the stickiest side, because this side will remain clinging to either the thumb or forefinger.

Taping wires and soldered connections will be done very neatly in the average case of radio servicing if you will use tape which is about three-eighths of an inch wide. Most commercial tape is double this width. Therefore, if you will tear this standard tape in half, lengthwise, you will accomplish your purpose.

Tape attached at the ends of braided wires and lampcord will prevent the braid from unraveling and becoming unsightly. The narrow width of tape described above also is effective for this purpose. However, I prefer to make a neater and cleaner job by using a good grade of string or sewing thread of the variety used ordinarily for sewing on buttons. This string is placed over the end of the braid and tied with an *invisible knot*.

Figure 6 shows the details for making this invisible knot. Notice that you first form a loop of the string which is laid lengthwise along the braided wire. Then take the longest or No. 6 end of this loop and wind it in a circular manner around the braid which also covers the two ends, No. 1 and No. 3, continuing to wind the string *toward* the loop at No. 2 until half an inch or more is covered. Then insert the longer No. 6 end of the string into the No. 2 loop, pulling on the other or shorter No. 1 free end in order to decrease the size of the loop and thus draw the longer No. 6 end *under* the wrapping. You will find then that you have only the No. 1 and No. 6 ends showing at each end of the wrapping. Cut these ends close to the wrapping and the ends will become invisible, with the knot underneath.

When installing aerials, you will have to uncoil the wire which you have purchased for this purpose. It should be and *can be* uncoiled easily so the finished job is free of kinks and coils. No doubt you are aware that if you draw the wire from either the inside or the outside of the coil, you will have a spiral wire. However, if you draw the wire from the *outside* of the coil for three turns, then turn the coil all the way over and release three more turns, these coils will be in *opposite* formation and, therefore automatically unwind the original coils. By repeating this process of turning the coil all the way over for every three turns which are released, the entire length of wire will be free from coils.

Occasionally you may need a short threaded bolt or screw although a long one only is available. The natural thing to do is to cut the bolt to the required length with a saw, or probably with a pair of pliers. However, the average serviceman may have trouble in getting a nut to fit the threads after this much of the job has been completed. The reason is that the first turn of the cut portion of the thread has been damaged and distorted on the bolt, so the threads in the nut can not take hold.

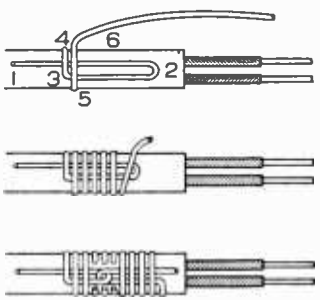


Figure 6

In order to prevent trouble of this kind, place a nut on the screw *before* the screw is cut. After the cut has been finished, *remove* the nut. This process will restore the damaged thread because the nut will readily force any projection out of the way while it is being removed. Then, when the nut is replaced in actual use, it can be put on without trouble.

Fastening toggle switches, volume controls and potentiometers to the panels of a receiver often can be done better without the aid of pliers and wrenches. This will avoid scarring the panel or the retaining nuts on the front of the panels and make a neat appearance. The thing to do is to first put on the nut in the regular way with your fingers and then tighten this nut by *turning the device itself from the back of the panel.* Due to the larger diameter of the part itself, very little pressure exerted here with your fingers will have greater effect than pressure applied with a wrench or pliers at the nut on the front of the panel. Therefore, simply tightening the part with the aid of your fingers will make a neater and tighter job than using mechanical aids.

RADIO-TRICIAN
REG. U.S. PAT. OFF.
Service Sheet
Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D.C.

ZENITH MODELS 6S301, 6S304, 6S305, 6S306, 6S321, 6S322, 6S340
Chassis No. 5651

NOTE

Voltages measured from socket contacts to chassis using a 1000 ohm per volt meter. Antenna disconnected—volume control on full.

Line voltage 115 v. Consumption 60 watts.

Power Output 4.5 watts.

(A) Bias for 6A8—6K7 and 6J5 measured across X which is neg. 2.3 volts.

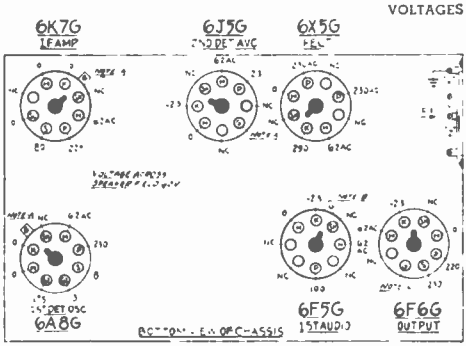
(B) Bias for 6F5 measured across X and Y which is neg. 3.8 volts.

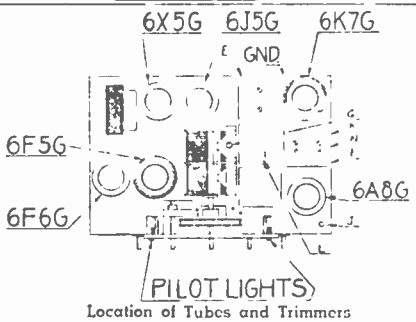
(C) Bias for 6F6 measured across XY and Z which is neg. 16 volts.

LEGEND

NC—No Connection
SH—Shield
H—Heater
P—Plate
S—Screen
G—Grid
SU—Suppressor
D—Diode
K—Cathode
F—Filament

SOCKET VOLTAGES



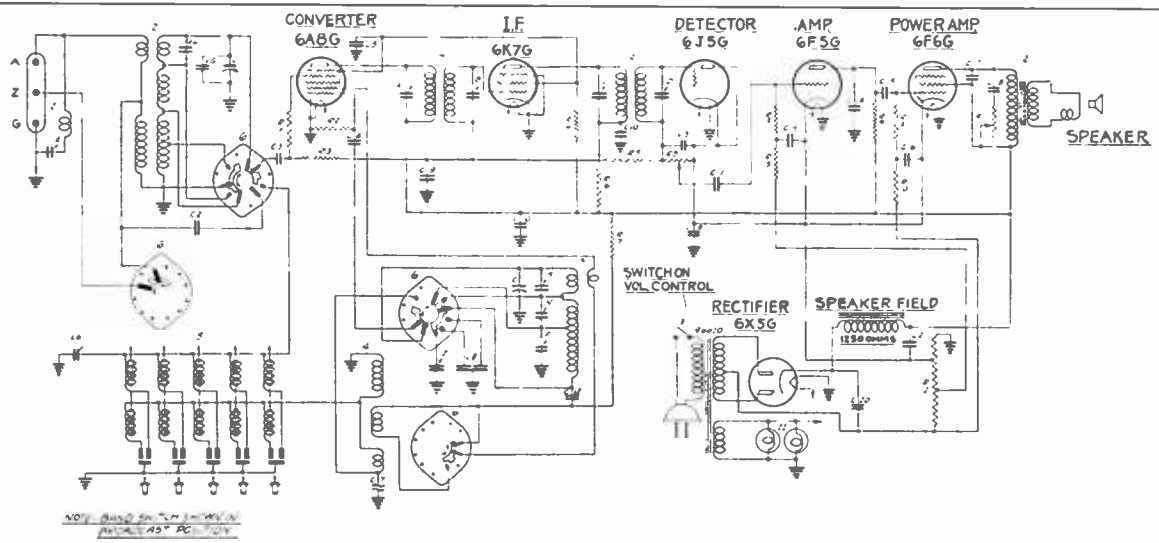


Location of Tubes and Trimmers

ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial at	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	455	Br'dc't	600	ABCD	I. F. Alignment
2	Rec. Ant. Post	200 Mmfd.	455	Br'dc't	600	E	See Note
3	Rec. Ant. Post	200 Mmfd.	1500	Br'dc't	1500	F	Set Osc. to Scale
4	Rec. Ant. Post	200 Mmfd.	1500	Br'dc't	1500	G	Alignment of Ant.
5	Rec. Ant. Post	200 Mmfd.	600	Br'dc't	600	J	Rock gang & adj. for max. output
6	Rec. Ant. Post	200 Mmfd.		Br'dc't		FG	Repeat 3 & 4
7	Rec. Ant. Post	400 Ohms	18000	S.W.	18000	K	Set Osc. to Scale
8	Rec. Ant. Post	400 Ohms	18000	S.W.	18000	L	Rock gang & adj. for max. output
9	Rec. Ant. Post	400 Ohms	6000	Police	6000	N	Rock gang & adj. for max. output

Note: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.



Diag. No.	Part No.	Description		Diag. No.	Part No.	Description	
C-1	22-717	Two gang variable		C-18	22-171	.05 Mfd.	600V
C-2	22-289	50 Mmfd.	600V	C-19	22-185	.01 Mfd.	200V
C-3	22-162	.0001 Mfd.	600V	C-20	22-718	12 Mfd. Electrolytic	450V
C-4	22-127	25 Mmfd.	600V	C-21	22-719	16 Mfd. Electrolytic	350V
C-5	22-170	.1 Mfd.	400V	R-1	63-621	39 Ohm	1/4W
C-6	22-519	Trimmer Cond.		R-2	63-592	33 M Ohm	1/4W
C-7	22-740	Compensating Cond.		R-3	63-597	470 M Ohm	1/4W
C-8	22-708	Dual Fixed Padder		R-4	63-677	33 M Ohm	1W
C-9	22-250	.05 Mfd.	200V	R-5	63-271	1 Megohm	1/4W
C-10	22-212	.05 Mfd.	400V	R-6	63-605	1000 Ohm	1/2W
C-11	22-327	.02 Mfd.	200V	R-7	63-680	10 M Ohm	1W
C-12	22-358	.002 Mfd.	600V	R-8	63-983	220 M Ohm Vol. Cont.	
C-13	22-190	.1 Mfd.	200V	R-9	63-296	220 M Ohm	1/4W
C-14	22-147	.0005 Mfd.	600V	R-10	63-595	100 M Ohm	1/4W
C-15	22-435	.02 Mfd.	600V	R-11	63-982	Tone Control	
C-16	22-219	.03 Mfd.	200V	R-12	63-984	3 Section Candohm	
C-17	22-492	.002 Mfd.	600V				

CHASSIS NO. 5651, MODELS 6S301, 6S304, 6S305, 6S306, 6S321, 6S322, 6S340

Novel Radio Items

–BY L.J. MARKUS–

Radio Locates Harpooned Whales!

A tiny Radio transmitter mounted on a flag harpoon may reduce losses of whales during foggy weather. The transmitter radiates a signal which enables the whaling ship to locate the dead whale by means of Radio direction-finding apparatus.

Invisible Light Unfair to Burglars!

Police Radio squads recently trapped a burglar in a factory just as he had begun to select his loot. On the way to the police station, the surprised criminal asked: "Who called the cops?" It was explained that he had done it himself by walking through the beam of the A. D. T. invisible ray burglar alarm system. "You mean they got a light there that a guy can't even see?" he indignantly protested. "Say, listen now, that ain't fair!"

London Buses Located by Radio!

Tiny radio transmitters atop London buses keep dispatchers informed as to the whereabouts of buses at all times. At key points along the bus route are overhead antennas which pick up the signals of each passing bus and feed them into receivers which in turn actuate a clock and checking mechanism at headquarters. The range of each bus transmitter is only a few feet, and hence no interference problems are created by this unique radio control system.

Intercommunicator Tells All!

One Kansas radio dealer has one unit of an intercommunicating system outside his show window, so he can listen to the comments of window-shoppers and get clues to possible sales.

For Excitement, Be a Radiotrician!

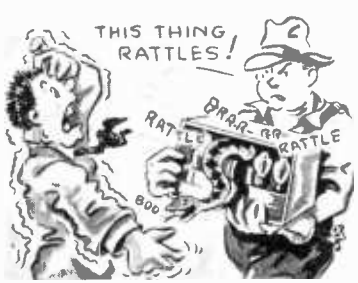
"That's what makes the tubes burn out," said the Radio serviceman as he pulled a stack of letters, telegrams and cancelled checks from behind the tubes in a radio set. For fixing the set he collected four dollars, but the judge decided the letters were worth $300 a week alimony to the wife.

Why Radio Operators Get Headaches!

In setting up the transmitter line for a special orchestra broadcast from a remote location, WOW engineers unwittingly crossed a private telephone line. Right in the middle of the broadcast, an unidentified housewife and her husband cut in with an animated discussion of what the husband should eat. Engineers hurriedly switched over to an emergency line.

Coil Tester Sees Through Copper!

The testing equipment used in one transformer factory is sensitive enough to indicate a single partially shorted turn anywhere inside a 50,000-turn coil.



RATTLESNAKE RATTLES IN RADIO! An oil worker in Atlanta, Texas, brought his Radio set into the office of the local electric company with the statement, "The darn thing won't work. It rattles!" The Radio serviceman discovered a 30-inch diamondback rattlesnake among the tubes, and spent the next two hours gingerly removing the "surface defect."

ELECTRIC EYE GUARDS SOMNAMBULIST! In one New York home the clatter of a buzzer signifies to the inhabitants that "papa" is walking in his sleep again. A light source at the foot of the bed throws a beam of light on a General Electric photo-electric relay at the head; interruption of this beam by the sleep walker is detected by the electric eye.

ELECTRIC FENCE BACKFIRES! To demonstrate the shocking qualities of his electric fence unit, a salesman placed a cow in an electrified enclosure. Neither tempting food nor coaxing could induce the cow to touch the wire; the salesman tried shoving, but bossy retaliated by chasing him into his own fence. The audience applauded the "wrong-way-Corrigan" stunt.

N.R.I. ALUMNI NEWS

P. J. Dunn ..... President
Dr. Geo. B. Thompson, Earl Bennett ..... Vice Pres.
Allen McCluskey, F. E. Oliver ..... Vice Pres.
Earl Merryman ..... Secretary
Louis L. Menne ..... Executive Secretary

CANDIDATES FOR NATIONAL OFFICES ARE NOMINATED

It was requested that every member of the N. R. I. Alumni Association do his duty and cast a ballot for his choice of candidates for National offices for 1939. The response was more than gratifying. The vote in the primary just closed was the most spirited in recent years.

The plan of submitting a long list of qualified candidates widened the field considerably and an unusually large number of members received votes for one office or another. It is impossible at this time to list all of the candidates who received votes. We will have to confine ourselves to some brief comments relating to those who received the highest number of votes and who are thus nominated for candidates in the final run-off.

Pete Dunn set an example this year by refusing to be a candidate to again succeed himself. He is perhaps the first President in history who placed only his own name on a purge list. Pete will step back into the ranks with the very best wishes of all of the members who know that he will be back in the running again, after some of the other members have had an opportunity to serve in the high offices. As a matter of fact, in spite of the admonition that Pete was not a candidate, a considerable number of members insisted upon voting for his nomination.

The two candidates receiving the highest number of votes for President are Earl R. Bennett of Evanston, Illinois, and Dr. George B. Thompson of Los Angeles, California. Both of these men served the Alumni Association as Vice President during the past year. You are asked to cast your ballot for one or the other for National President of the Alumni Association.

In the field of Vice Presidents, we have an interesting contest with two present officers renominated in the persons of Earl Oliver and Allen McCluskey, with two former Vice Presidents again renominated—namely, Clarence Stokes and R. H. Rood, with Louis J. Kunert, Secretary of New York Chapter, a candidate, with C. B. Morehead, Editor of Chicago Chapter Chatter, also a candidate, with a good strong Canadian in the person of E. H. Symons of Regina and with an outstanding Radio serviceman from one of the smaller communities, J. D. Wood of Archer City, Texas.

Secretary Earl Merryman received an overwhelmingly strong vote for renomination, as did also Executive Secretary L. L. Menne. Merryman is opposed by Clarence Steed of Washington, D. C., who was a candidate for office last year, and Menne is running against a worthy candidate in Harry W. Merchant of Arlington, Va.

In the contest between Earl Bennett and Dr. Thompson, the Alumni Association is assured a strong leader. Both are very capable men who have a deep rooted interest in the Alumni Association and who can be expected to work hard for the benefit of Radio servicemen everywhere.

Please turn to page 30 of this issue where you will find a ballot conveniently arranged for you to select your candidate for each of the offices. All elected officers shall serve a term of one year, starting January 1, 1939. Vote for one man for President, four men for Vice Presidents, one man for Secretary, and one man for Executive Secretary. By all means do not overlook this opportunity to take an interest in the affairs of your Association. Cast your vote promptly.

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.*

MAJESTIC MODEL 92 — FRYING NOISE

If this trouble occurs at all settings of the volume control it may be due to a defect in the line ballast. You can disassemble the ballast and you may then disconnect the long screw running through the porcelain insulator. Clean the top of the ballast with sandpaper and also the screw. On reassembling a good contact will be obtained and the noise will be eliminated.

—n r i—

ATWATER KENT MODEL 667 — EXCESSIVE BASS RESPONSE

When a customer complains of extraordinarily heavy bass response you may eliminate this by changing the .02 mfd. condenser in the plate circuit of the power tube to a smaller value, such as .006 or .01 mfd. 600 volt condensers should be used.

—n r i—

ATWATER KENT MODELS 165, 185 AND 525 — OSCILLATION

Replace the double 250 micro-microfarad condenser with two separate mica condensers of the same capacity. This condenser connects from the plate of the 58 I. F. tube to the diode plate of the second detector. The condenser may change in capacity sufficiently to cause the trouble and a replacement is the quickest way of checking on it.

—n r i—

ATWATER KENT MODEL 82 — NOISY WHEN JARRED

Check the coil shield of the I. F. transformer as it may be loose. The shield should be either bolted or soldered to the chassis.

—n r i—

PHILCO MODEL 39-40 — NOISY AND HUMS

Check the spaghetti insulation over the plate wire on the 6J5 tube. In some cases the wire may wear through the insulation partially grounding this circuit.

—n r i—

PHILCO MODEL 602-C — DEAD

Check the trimmer condenser in the oscillator tuning circuit. This condenser is located on the oscillator main gang tuning condenser and may be shorted.

ARVIN MODEL 618 — EXCESSIVE HUM

Check the soldering lug which is riveted to the chassis at the 6Q7 socket as it may not be making good contact. The lug may be bent over and soldered directly to the chassis.

—n r i—

BELMONT MODEL 600 — NEW VIBRATOR INSTALLATION

When installing a new vibrator in this receiver, be sure and include a buffer condenser between the rectifier tube plates. A .02 mfd. 1500 volt condenser will prove satisfactory.

—n r i—

CROSLEY MODEL C-178 — NOISY

Examine the soldering lug on the automatic tuning unit as it may have worked itself through the paper insulation under it and become shorted to the motor frame. The trouble may be eliminated by replacing the insulating paper.

—n r i—

WELLS-GARDNER MODEL 052 — INTERMITTENT

Check for corroded contacts on the wave band switch. The switch may be taken apart and the contacts cleaned with emery cloth.

—n r i—

CROSLEY MODEL 42S — WEAK AND NOISY

This may be due to the chassis bottom plate shorting to some of the component parts in the receiver—usually the center terminal on the volume control. If you find this to be true by pushing on the bottom plate at this point, you may glue a piece of insulating paper to the bottom plate thus preventing the short from reoccurring.

—n r i—

GRUNOW MODEL 11G — DEAD

Check the .1 mfd. screen by-pass condenser. A 600 volt tubular condenser should be used for replacement purposes.

—n r i—

GRUNOW MODEL 660 — DISTORTION

Replace the coupling condenser between the plate circuit of the 75 and the control grid of the 42 type tubes using a .01 mfd. 600 volt tubular condenser.

(Page 27, please)

Here and There Among Alumni Members

Extra! It's twins at the home of Robert J. Schene of Batesville, Indiana. A boy and a girl. Ain't that sumpin'?

———n r i———

Gerald Miller, who is Radio service manager for the largest Chevrolet dealer in New England, was recently elected President of "The Hartford Institute of Radio Technicians," a very active Radio club in Hartford, Conn.

———n r i———

That very sweet young lady, who accompanied Russell Heise of Wheeling, W. Va., when they visited the Institute, is his bride, Frances. They spent their honeymoon in Washington. Heise is with Radiotrician Charles Massina. Hope you come again soon, folks.

———n r i———

Had a nice letter from Hoyt Moore of Indianapolis, Ind., recently. Mr. Moore is a charter member of the Alumni Association, and was a Vice President in 1929, when the Alumni was organized.

———n r i———

Frank A. Seitz, President and General Manager of WFAS, White Plains, N. Y., was married to Marie Antoinette Nannariello recently. Best wishes.

———n r i———

R. Sigler of the Mexican Aviation Corp., Mexico City, writes that he has been grounded while he recovers from a slight stomach disorder. Upon recovery he will return to flight duty as Radio operator—a job which has plenty of thrills for the fellow who likes them.

———n r i———

Vice President McCluskey of Birmingham, Ala., went to Chicago on business and while there had a long and interesting meeting with Vice President Bennett.

———n r i———

S. E. Crozier is in the Government service at Radio Beacon Station, WWHN, Cleveland, Ohio. He is mighty proud of their transmitter.

———n r i———

William Lawson, Jr., of Toronto, Ont., Canada, received his second class Certificate of Proficiency in Radiotelegraphy and at once he got a job as Radio operator on a boat running in Lake Superior. And did he get a kick out of that job.

———n r i———

Herbert F. Lucke of Palmyra, Mo., has a prosperous Radio business. During the past summer he learned to fly—just for sport.

———n r i———

Certainly sorry to learn that Clifford Craig of Rimersburg, Penna., lost his home, Radio equipment and everything else in a fire. Worst of all his wife, small son and he suffered severe burns. There's a blow which would floor many men, but we are confident Craig will get a new start.

Fellow member Charles "Pete" Weber, Radioman first class U. S. Navy, has returned to the Naval Air Station, San Diego, Calif. And he is again attached to the flag allowance of commander aircraft battle force, in charge of Radio Lab.

———n r i———

Ed Butler of Dahlonega, Ga., recently returned from a hospital, minus his appendix. Ed suffered most because he couldn't attend to his Radio business, but he is catching up now.

———n r i———

Listen to this! From Savannah, Ga., comes word from our former Executive Secretary Phil Murray announcing the arrival of a brand new daughter. Congratulations, Phil, from all of us.

———n r i———

Mr. and Mrs. L. J. Vanek of Cincinnati visited us recently. Vanek is a charter member of the Alumni Association. Going strong in Radio, too.

———n r i———

Good luck to D. A. Lovell of Wankomis, Okla., who is pulling through a long illness and who is now in business for himself. Still quite handicapped physically, Lovell is showing the spirit that wins.

———n r i———

Ross Hull, a swell fellow who was doing a fine job as editor of QST, died as a result of a most unfortunate accident. He was affectionately known to Radio amateurs throughout the world.

———n r i———

Cortlandt Long of Philadelphia, Penna., writes, "I want to put in a good word for a fellow Alumnus, Allen Schiaroni, who, as an utter stranger, has helped me out considerably. If many of the fellows are like Allen, you have a fine bunch of members." So we have.

———n r i———

We wonder what ever happened to that orchestra which was organized by Chicago Chapter. And what about that theme song which Philadelphia-Camden Chapter was going to adopt? A little music is good for the soul.

———n r i———

They really did George G. Aurand of Flint, Mich., a favor when they laged him off at the automobile plant where he had been employed. Having just graduated he rented a store, dug in and in a few months, was doing as well financially as ever before—and growing fast.

———n r i———

J. D. Wood of Archer City, Texas, is another fellow who bought a home for which he is paying out of his Radio earnings.

The Service Forum (Continued from page 25)

MAJESTIC MODEL 15 — **CONTINUOUS NOISE**

This is generally due to corrosion in the primary of the first I. F. transformer. By checking the primary with an ohmmeter when the set is turned on, you will generally note a variation in the resistance reading. Also by removing the coil shield you can usually see the corroded spot. If it is at either end of the coil, you can make repairs but if the corrosion is in the middle of the coil or is not readily apparent, a new combination I. F. and oscillator coil must be installed.

PAUL HUMPHREY, Ohio.

RCA VICTOR MODELS 9K AND 9K1 — **DEAD BELOW 600 KC.**

This is of course due to failure of the oscillator and the trouble may usually be remedied by replacing the small condenser on top of the condenser gang which goes to the grid of the 6J7 oscillator tube. Use a .0001 mfd. mica condenser.

ZENITH MODEL 870 — **DEAD BELOW 700 KC.**

Check the .01 mfd. 400 volt condenser in the oscillator plate circuit as it may be shorted or leaky. If it is bad, use a 600 volt replacement condenser.

WELLS-GARDNER MODEL 2DL — **INTERMITTENT NOISE**

This is generally due to a defective contact in the candohm resistor containing the bias for the A. V. C. and audio tubes. The resistance of this section is approximately 156 ohms. For a permanent repair the entire candohm strip should be replaced with individual resistors. Most servicemen when replacing candohm units, employ 10 watt resistors.

RCA VICTOR MODELS 211 AND 118 — **INTERMITTENT HUM**

Replace the .05 mfd. 600 volt condenser used to couple the control grid of the 6J7 tube to the volume control.

KOLSTER MODEL 60 — **INTERMITTENT**

I found that the clip spring on the shaft of the variometer was weakened through age, allowing the coils to work apart. By cutting a small metal bar and working it firmly between the spring and its support and fastening with insulated wire, the trouble cleared up.

V. H. LANDRUM, Washington, D. C.

MIDWEST 11 TUBE 1936 — **DEAD AND SMOKES**

This is due to a shorted .05 mfd. condenser between the B plus connection of the I. F. transformer and the chassis. The condenser is located inside the I. F. transformer shield along with a 5,000 ohm one-quarter watt resistor. The smoking is due to excessive current through the resistor. Both the condenser and resistor should be replaced. A half watt resistor will prove satisfactory but you should employ a 600 volt condenser.

VICTOR L. HASTINGS, Massachusetts.

RCA MODEL 6K2 — **WEAK, DISTORTION AND INTERMITTENT**

The cause of this in most cases is a burned out 6H6 tube. Replace it with a new one when this condition exists. This can be proven by removing the tube altogether in a set of this type that is in working order.

EDWARD CASTILLE, Louisiana.

RCA MODEL 100 — **DISTORTION AND INTERMITTENT**

Caused probably by some defect in the primary antenna circuit. Connect a 100,000 ohm or higher resistor across antenna and ground. One can experiment for right value. This discovery was made by grasping both antenna and ground wires of the set. One can test in the same manner. The body acts as the resistance in this case.

EDWARD CASTILLE, Louisiana.

DELCO MODELS R-1116 AND R-1116A — **DISTORTION AND INTERMITTENT**

If .05 mfd. condenser that connects to the center terminal of the volume control and to the grid of the CF5G is O.K. try shortening the 25 ohm resistor (part No. 29) by soldering a wire across it or connecting the 1.1 megohm resistor (part No. 14) directly to the chassis. One can test for this 25 ohm resistor giving trouble by placing the hand on the grid of the 6F5G and the ground or chassis; the body acting as the 1.1 megohm resistance.

EDWARD CASTILLE, Louisiana.

COLONIAL MODEL 1707 — **NOISY**

Carefully check the oscillator coil as there may be a break in the coil due to corrosion or due to failure of a soldered joint.

HENRY HIRSCHWEILER, New York.

GENERAL ELECTRIC MODEL K62 ALSO VICTOR R12 — **INTERMITTENT**

Will fade out quicker with manual volume control wide open. Pull 27 A. V. C. tube. If signal comes right back, exchange A. V. C. tube with that of second detector. Set will then play normally. A slight amount of gas will prevent normal A. V. C. action but does not interfere with demodulation.

D. OWENS, Canada.

Chicago Chapter

At one of our recent meetings, we tried out an idea which was inaugurated by members of the N. R. I. staff on a visit to the Baltimore Chapter. The results were most promising and all present were greatly interested, so the idea will receive a thorough trial.

We won't attempt to describe it now, because of lack of space—it will do to say that it enables the individual member to check up on his weaknesses and at the same time supplies the information to overcome them. The whole thing is private, no one else sees what the individual is doing and one obtains needed information without exposing what he may feel to be ignorance to anyone else.

Problems aside from the technical will receive attention as well; advertising, the cheap set question, and general business practices and problems. We are going to have some meetings that you can't afford to miss. While we may not be the biggest association of Radio men in the country we'll defy you to find one you can derive more real dollars and cents benefit from.

Here is an idea which we have found is not original with us, but we still think it is a good one. How's about having each Local Chapter designate one of their "hams," or, if they haven't one as a member, get together and build and operate an amateur station, as an official means of communication with the other Chapters? We could have some worthwhile exchanges of information in this way, to say nothing of the fun and experience to be derived from its operation.

This idea was considered when the Local Chapters were formed, but was never pushed. At least one of our own members owns and operates such a station, and while we don't know if he would care to have his rig used as the official station of the Chapter, it wouldn't be much of a task to build one, nor would it cost the individual members any great sum.

We know that several other Locals already have members who operate amateur stations, so why not take advantage of the fact? It should stimulate interest in Chapter affairs, and if it would produce a spirit of friendly rivalry between Chapters everyone should benefit. Speak up, you "hams"—how's about it?

C. B. Morehead begins his fourth year as Editor of the Chicago Chapter Chatter. He has been ably assisted by Technical Editor, E. R. Bennett, and a vote of thanks is extended to these two members for their faithful and tireless work in the interest of the Chapter and our individual members.

The experiment of meeting at the homes of members is not working out as well as we had hoped it might. However, it is perfectly natural that there would be some loss in attendance, because members living on the south side of Chicago find it extremely difficult to meet at the home of a member who lives on the north side and vice versa. Therefore, consideration is again being given to a meeting place downtown, as formerly.

SAM JURICEK, Secretary.

Baltimore Chapter

Our attendance has been good and steadily increasing. This indicates very clearly that the fellows appreciate the type of program which we are putting on and that they are benefiting through these practical demonstrations.

Mr. Straughn, of Headquarters, came over to assist us at one of our meetings. He gave us a very fine talk and demonstration on "Effect-to-Cause Reasoning." Executive Secretary Menne was also a visitor at this meeting and Chairman Jensen, Pete Dunn, Giese, Gough, Olmsted and others too numerous to mention kept things moving at a rapid pace.

Chairman Jensen is doing such a rattling good Radio business, he finds it difficult to give time to plan a full program in advance for each meeting and he asked for volunteers to assist him. The response was very gratifying. According to the present plan, at least two members of the Chapter will assist Chairman Jensen in preparing a program for the following meeting. This assures us of a well planned meeting devoted chiefly to a discussion of practical problems. Our next meeting has been turned over to a committee on arrangements headed by Olmsted, who promised to bring in a receiver and have everything in ship-shape so that we can get right down to business. These business-like meetings have caught the fancy of our members and account for the gradual increase in attendance.

All students, graduates and members in the Baltimore area are cordially invited to attend these meetings. They are held at Fishpaw's Hall, Baltimore and Gilmor Streets, on the third Tuesday in each month, at 8:15 P. M.

I. A. WILLETT, Secretary.

Detroit Chapter

Among other things, Detroit Chapter is extremely proud of its library. We have always made it a practice to keep our library orderly. We make excellent use of the text books it contains.

We now have a test bench equipped with a volt-ohm-milliammeter. We have authorized our Treasurer to purchase an all-wave oscillator and later we intend to add an audio oscillator and vacuum-tube voltmeter.

One reason why our attendance has been good, we believe, is because we keep our members posted two meetings in advance as to what is on our schedule.

We were very much interested in a letter from Chicago Chapter which was read to our members. It pertained to establishment of a "ham" station to represent our Chapter for the purpose of inter-chapter communications. We liked the idea very much, but we had to table it for lack of a Radio amateur in our Chapter at the present time. A good "ham" in the Detroit area would be most welcome at our Chapter.

We have started on the experiments which are given in the Course and we will continue to give some time to them at each of our meetings for the next several months.

Chairman Oliver passes the following message to all members and prospective members in the Detroit area and to all members of the Alumni Association at large:

"This is the beginning of a new year for Local Chapters. We are all ready to settle down to work for another year. Let's all get behind the wheel and do our level best to push N. R. I. Alumni out in front where we belong.

"After all is said and done, you and I, as members make the Alumni what it is. National Officers of the Alumni and the faculty of N. R. I. are ready and anxious to serve us at any time, in any way. This is an organization of cooperation.

"If you have not joined the N. R. I. Alumni Association, or if you are not taking a keen interest in its affairs if you have joined, you are neglecting your responsibility to yourself and to all Radio servicemen throughout the country."

A number of new members have been taken into the Chapter recently, including M. Yurcinis, John Kliff, T. Hunt, W. Leja, M. Halfin, and M. Clark. We meet at our comfortable headquarters at 11305 Woodward Avenue on the second and fourth Friday of each month.

C. H. Mills, Secretary.

New York Chapter

We regret to report that our Chairman, Mr. J. Barrette, was compelled to resign because of illness. In his place we elected our former Vice Chairman, Mr. A. Stock, who will serve as Chairman until our annual election in January. To fill the office of Vice Chairman vacated by Mr. Stock, we elected Mr. I. Gordy. Both of these men undoubtedly will be candidates for these offices for the year of 1939.

Mr. Gordy, by the way, is author of a number of technical articles which are appearing in magazines, including "Service." At some of our meetings Mr. Gordy discusses these articles and gives us a thorough explanation of each point. We find these meetings very interesting and profitable.

The big meeting which was planned for this fall was put off temporarily to give the new officers proper time to assume charge, but an announcement of it will be made very soon.

L. J. Kunert, Secretary.

Philadelphia-Camden Chapter

There is plenty of pep being shown at our meetings. Our attendance has been unusually good and this always means some lively discussions with plenty of fellows taking part.

At one of our recent meetings we had an attendance of ninety-one. Quite a crowd came over

(Page 30, please)

Election Ballott

Fill in this ballot carefully, following instructions given on page 24. Mail your ballot to National Headquarters immediately.

FOR PRESIDENT (Vote for one man)

☐ Earl R. Bennett, Evanston, Ill.

☐ Dr. Geo. B. Thompson, Los Angeles, Calif.

FOR VICE PRESIDENT
(Vote for four men)

☐ F. E. Oliver, Detroit, Mich.

☐ Allen McCluskey, Birmingham, Ala.

☐ Clarence Stokes, Philadelphia, Penna.

☐ E. H. Symons, Regina, Sask., Canada

☐ J. D. Wood, Archer City, Texas

☐ R. H. Rood, Los Angeles, Calif.

☐ Louis J. Kunert, Middle Village, L. I., N. Y.

☐ C. B. Morehead, Chicago, Ill.

FOR SECRETARY (Vote for one man)

☐ Earl Merryman, Washington, D. C.

☐ Clarence Steed, Washington, D. C.

FOR EXECUTIVE SECRETARY
(Vote for one man)

☐ L. L. Menne, Washington, D. C.

☐ Harry W. Merchant, Arlington, Va.

SIGN HERE:

Your Name .....

Your Address .....

City ..... State .....

Mail Your Completed Ballot to:

C. ALEXANDER, BOOKKEEPER

NATIONAL RADIO INSTITUTE

16th and U STREETS, N. W.

WASHINGTON, D. C.

CUT CAREFULLY ALONG THIS LINE

Philadelphia-Camden Chapter

(Continued)

from Headquarters, including Mr. J. E. Smith, President of N. R. I.; Mr. Joseph Kaufman, Director of Education; Mr. Paul Thomsen, Communications Consultant; Mr. J. B. Straughn, Consultant on Radio Servicing and Merchandising Problems; Mr. L. J. Markus, Writer and Editor of instruction material; Mr. E. L. Degener, Director of Publicity; and Mr. L. L. Menne, Executive Secretary of the N. R. I. Alumni Association.

Mr. Smith was enthusiastically received and he responded with a very fine talk. Mr. Menne, who acted as temporary chairman, made an earnest plea that members attend meetings regularly, give their support to the officers of our Local, and above all, maintain a deep and sincere interest in new developments in Radio so as to cope with present-day problems and the unusual opportunities which seem to be just ahead.

The serious business of the meeting then got under way with Mr. Joseph Kaufman in charge, and it was a humdinger of a session. Each person present was given a circuit diagram of a 1939 Philco receiver, along with a set of questions, each of which described one receiver defect (such as an open filter condenser), and listed several different effects. Those participating were to encircle the one correct effect in each case. Thirty minutes were allowed to complete the papers, after which they were collected for grading. Mr. Kaufman then proceeded to analyze each question in detail, while Mr. Paul Thomsen produced each defect in turn on the actual receiver as a dramatic verification of the technical analysis.

Cash prizes were given to the three who turned in the best papers. First prize was won by Allen Schiavoni, second prize was carried away by Al. Wysoczanski and the third prize went to John Prajko. Mr. Kaufman and his assistants were given a rousing big hand for a fine program.

Before concluding the meeting, Chairman Fehn again assumed charge and introduced all of the officers of our Local Chapter. In addition to appropriate remarks by Chairman Fehn, Mr. Clarence Stokes, our Treasurer, made a very fine talk outlining plans for the balance of the winter and inviting every member present and all of those in the Philadelphia-Camden area to participate with us in the exchange of ideas and practical demonstrations which make up our meetings.

With our increased attendance it is very probable that a new meeting place will be necessary. For the present, we are meeting at 3405 Kensington Avenue, on the first and third Thursdays of each month. Information pertaining to meetings can be had by telephoning Nebraska 7163.

ALLEN SCHIAVONI, Secretary.

Something New

I thoroughly enjoy NATIONAL RADIO NEWS especially the Laboratory Experiments and the technical articles, describing something new, such as "Seeing Through Fog with the Electric Eye," by Albert A. Arnhym. May the sun of success shine on you.

GUNNAR SOLSNES,
Seattle, Wash.

—u r i—

Electronics, Inc., Really is a Favorite

I always read NATIONAL RADIO NEWS from the front cover to the last page and can truthfully say I enjoy it. I especially enjoy reading the stories relating to Electronics, Inc. The stories are swell, educating as well as interesting.

WILLIAM MARSHALL,
Philadelphia, Penna.

—u r i—

Speaking of Radio Bugs

While a friend was visiting me the other day I was explaining to him that tubes are measured in terms of micromhos, the merit of the tube, etc. He looked at me and said, "we had some of those at home once and we had to spray them with a spray gun to kill them." He evidently referred to microbes.

GEORGE LABERGE,
Holbein, Sask., Canada

—u r i—

We Welcome These Suggestions

I like NATIONAL RADIO NEWS, especially Jay and Ozzie of Electronics, Inc. Let's have more of them. My work is confined to Police two way Radio communication. Maybe the Editor could give us a little dope on RCA transmitters and receivers.

R. YATES,
Trenton, N. J.

We Want Kicks Too

I must apologize for getting so hot under the collar when writing you last, but the RADIO NEWS is such a swell magazine I just hate to miss a number. The article on Portable Recorders was tops, also Push Button Tuning. When are we going to get another story about Electronics, Inc? I enjoyed the "true" story on gold filled teeth in the August issue.

FRED J. FELLOWES,
Winnipeg, Man., Canada

—u r i—

They Need to be Watched

I enjoy every word of the NEWS. It is just one tenth as large as it should be and comes just half as often as it should. I think the service hints are grand and we should have more of them if possible. Be sure and watch Jay and Ozzie. They might play one of their tricks on the boys at N. R. I.

GEORGE E. BEAN,
Stilwell, Okla.

—u r i—

We Hope So

I have only received a few copies of NATIONAL RADIO NEWS but I wish to tell you that I enjoyed them. They are swell. I am sure that all fellow students feel the same way about it.

R. CELESTINO,
Montreal, Que., Canada

—u r i—

Wants More Pictures

OUR NEWS organ is swell and so are some of its articles, among them Electronics, Inc. But the trend today is pictures of service shops and benches. How about a page where we can show off that place we are all so proud of? Many of us are building new benches and what not. Let's bring them out in the open.

BEN SWEET,
Bridgeton, N. J.

N. U. Display is Selling Aid

A brilliant, new window center piece nearly four feet high and more than two feet wide, lithographed in six colors and mounted to heavy board backed by a double wing easel, was released to the Radio trade through distributors by National Union Radio Corporation, Newark, N. J.

The figure of a girl on the display is the work of Jay Weaver nationally famous magazine cover artist. The original was painted in oils and faithfully reproduced through lithography. The selling idea of the display urges the consumer to keep his Radio set in good condition so he can enjoy news, comedy, drama, symphony, dance bands and opera as provided by the major networks and thus use his Radio as a major source of entertainment.

Philco Replacement Parts Book

A new Philco Replacement Parts book for all Philco home and auto Radio models is now available to all Philco distributors.

This parts book, running to twenty-eight pages, lists more than 300 models numerically and gives the part number and list price of the major parts for each set.

More than 5,000 Philco parts are indicated and cross-indexed in the book, thus giving the above information by part number and the model number on which that particular part is used.

The Replacement Parts book is considered by the Philco Parts and Service Division to be the most comprehensive and convenient parts catalogue ever put out by Philco.

New Arcturus Tube Data Chart

A revised edition of the well-known Arcturus Tube Data Chart including complete technical and application information on 166 types of glass, "G," Midget and Coronet tubes as well as 38 types of ballast tubes, has just been prepared by the Arcturus Radio Tube Company of Newark, New Jersey. A copy will gladly be supplied free of charge to any serviceman or dealer by Arcturus jobbers or may be obtained upon direct request to the factory.

Designed in handy form for service and engineering use, the chart gives full physical and technical specifications including pin connection diagrams of practically every tube type used in modern Radio equipment. 18" x 35" in size, it is printed on heavy paper suitable for wall mounting or, if desired, may be folded down to proper size for an ordinary letter file.

NATIONAL RADIO NEWS

FROM N.R.I. TRAINING HEADQUARTERS

Vol. 8 December, 1938-January, 1939 No. 6

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

NATIONAL RADIO INSTITUTE
Washington, D. C.

The Official Organ of the N. R. I. Alumni Association

Editorial and Business Office, 16th & You Sts., N. W., Washington, D. C.

L. L. MENNE, EDITOR
L. J. MARKUS, TECHNICAL EDITOR

NATIONAL RADIO NEWS accepts no paid advertising. Articles referring to products of manufacturers, wholesalers, etc., are included for readers' information only, and we assume no responsibility for these companies or their products.

Index