

JUNE - JULY, 1936

Vol. 7 No. 3

IN THIS ISSUE:

The Crosley Auto
Expressionator

The Three Point Oscillator-
Preselector Adjustment

Okey-Doke 22, Come On In

Complete Index on Page 21



NATIONAL RADIO NEWS

WASHINGTON, D.C.



The President's Page

By J. E. SMITH, President, N. R. I.

It seems only a short time since the day of the crystal set and earphones, when Radio was looked upon as a curiosity and a doubtful source of extremely limited entertainment. Who would have thought then that it would be only a few years until Radio would not only play a vital part in our lives but would even decide the fate of presidential elections?

Yet one keen observer of economic and political conditions has just made the statement that *Radio will elect the next president!* More than all the graphs, charts, and statistics, does this one fact enable us to grasp the tremendous power Radio has attained.

The political parties will soon hold their conventions and select their candidates. In fact, the country will be kept in constant touch with proceedings at the conventions, by Radio. The starting gun will have been fired—the parties and their candidates will be off in their race toward election!

But no longer do the newspapers, political meetings, gatherings of all sorts before which candidates for public office formerly made their pre-election speeches, constitute the scene of the race. They have all been squeezed out by the microphone and the receiver. Mr. Everyman and his family grouped around his receiving set of an evening for a few hours of entertainment—when multiplied by the twenty-one million, five hundred thousand homes having receivers in the United States—comprise a far greater audience than could possibly be contacted at one time under any other conditions known today.

Even where groups or meetings are addressed by speakers in person, the speaker is heard by far vaster audiences and with complete ease by means of the public address system, again showing the adaptability of Radio and its far-reaching influence in our everyday life. The thousands of other uses of Radio, the many important needs it meets in industry, in art and in science, are too numerous to mention here. I refer to Radio at the moment only in regard to its almost limitless power as a means of communication.

The men who invented or took part in the development of other marvels of civilization—the steamboat, the railroad, the telephone, the automobile, the airplane—must have derived a great deal of personal satisfaction from watching their brain children grow to their present importance in the scheme of things. How much more, then, should each and every one of us who is contributing even only a small part to its development, feel when we daily behold the extent to which mankind is served by the greatest of all inventions, Radio?

An "Old Grad" Writes Mr. Smith

March 10, 1936.

Mr. J. E. Smith,
National Radio Institute,
Washington, D. C.

Dear Sir:

I have made a very nice living in Radio sales and service, theatre equipment installations, and public address. There is more than enough business in this region to keep two fellows busy during summer and early fall. I have between twelve and fifteen hundred dollars in equipment, which is all paid for.

I am enclosing a photo of my PA trailer, and am quite proud of it. The trumpets are driven with 25 watt units, the directional horns with hi-fidelity dynamic speakers, and I have four other units not shown. The main amplifier has an output of 40 watts in a 500 ohm line, and by paralleling all outputs I can develop nearly 90 watts of audio. There is a common pre-amplifier mixing panel (six position) and voltage amplifier which feeds the drivers; there is an additional portable outfit having an output of 15 watts.

Each winter the equipment is rebuilt to follow the latest design and practice in my endeavor to have an outfit just a little better than any of my competitors', and it really pays. When I first started about six years ago, I kept the cost down by skimping on the quality of the parts, but soon learned that plenty is lost this way, so a rebuilding plan started which resulted in the trailer and really good audio quality. This trailer is 12' long, 8' high and 6' wide, with concealed wiring and thoroughly insulated inside for sound. An operating table is provided at the front, which provides the control operator with a clear view in three directions, and there is available a telephone circuit which can be used on local telephone lines or in connection with the towing car when used for advertising purposes, and which saves a lot of time in exchanging information, etc.

The towing car has a 250 watt, 110vAC 60 cycle generator driven by its engine, which makes special amplifiers unnecessary and provides uniform equipment throughout. The trailer is so planned and arranged that every piece of equipment necessary to a large job can be packed within the trailer, thus making a more businesslike and pleasing appearance when arriving "on location."

In addition to the 250 watt generator on the auto we have a 500 watt generator driven by a small gas engine. Our microphones change as the improvements are introduced. The "old faithful" is a Western Electric 61SA dynamic, with which we have had very great success. In addition to the WE mike, there are two high

grade double button mikes, a velocity and a crystal. So far all situations have been satisfactorily handled. Our largest job was an open-air historical pageant last summer; the stage was 120' long and 90' deep. We were told that it couldn't be done satisfactorily, but after a lot of patience we put it over.

I am very interested in Radio and PA work, but mostly in the transmitting end.

This goal is at last realized. About two years ago I took the first class Radiotelephone examination, passed, and was recently appointed to the Radio operator's position that I had in view and for which I have been preparing myself, so for the indefinite future I will have to stop thinking and building PA equipment.

I can assure you that I will always have a mighty warm spot in my heart for N. R. I.

II. R. EVANS,
Albion, Ind.

— n r i —

Just how observant are you? See if you can find anything wrong in the above picture, then turn to page 24.—Editor.





The Crosley Auto Expressionator

By
J. A. DOWIE
Chief
Instructor

THE development of automatic volume control and tone control is evidence that Radio designers are striving to improve the fidelity of modern receiver reproduction. Going one step farther in this direction, engineers of the Crosley Radio Corporation have perfected and already incorporated in their medium priced receivers a device which not only offers automatic bass compensation but also expands the volume range of the receiver. This device, the Crosley Auto Expressionator, ingeniously and automatically increases the brilliancy of reception of the musical programs broadcast today and brings closer to reality the Radio engineer's dream of a receiver which will reproduce perfectly all voice and music frequencies.

The depth of modulation employed in transmitters today cannot in general handle a musical rendition in which the intensity of the softest and loudest passages varies more than 100 db. Electrical limitations inherent in broadcasting equipment make it impossible to cover such a wide volume range, and the methods used by broadcasters in bringing their programs to the listener further narrows the range. The limiting factor is usually the ratio of signal to noise level in the various studio and transmitter circuits; under ordinary conditions the greatest volume range used today by most broadcasters is limited to or held within 45 db., approximately one-half the range necessary for true high fidelity broadcasts. The operators of the broadcasting stations have no particular desire to increase this volume range, for effective signal intensity would have to be sacrificed. (The average percentage of modulation must be reduced so that the louder passages may be reproduced without over-modulation. Naturally when the percentage of modulation is reduced, the soft passages will often make the program disagreeable to listeners located in the outer service area of a broadcasting station, by dis-

appearing into the noise level. Many receivers cannot handle wide ranges of volume because of the particular type of detection employed. Thus the useful signal transmitted by the broadcasting station must be maintained above a given value to insure the large audiences.

Even if broadcasters increased the volume range of their transmitters to 75 db. today, only certain types of music or entertainment, free from large volume changes, would be selected and transmitted. Then, too, large volume changes would be of little value to the listener employing an inexpensive receiver unable to handle the volume range effectively. Of course, if the broadcaster must, due to the many reasons outlined, limit the volume range, the expression of the musical program is usually impaired. To overcome this condition the auto expressionator was developed. It increases the volume range, artificially restoring the brilliancy or depth of the reproduced program.

The auto expressionator, employing a simple Wheatstone Bridge circuit, is connected between the secondary of the output transformer and the voice coil of the dynamic loudspeaker. Inasmuch as it is connected after the detector, any irregularities in detection will be introduced into the output of the receiver; it is therefore necessary to use a form of detection which is free from distortion.

Theory of Circuit

To understand the theoretical operation of this volume-expanding circuit, examine Fig. 1. Note that there are two resistors connected in series with the voice coil of the loudspeaker. It can readily be seen that the voice coil will receive power from the secondary of the output

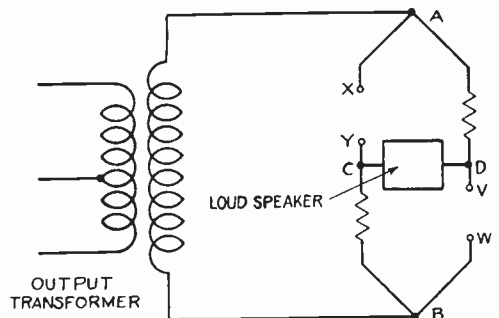


Fig. 1

transformer, even though some power is lost in the series resistors. Now if we connect another resistor of the *same value* across terminals X and Y, and a similar resistor across terminals V and W, the voltage across the voice coil of the loudspeaker will be zero because the circuit will be balanced. Each terminal of the voice coil will receive the same voltage from either A or B; that is, the voltage drop in the resistor connected between A and D will be the same as the voltage drop in the resistor between B and C, all resistors being of the same value. If both terminals of the voice coil are at the same potential, there can be no voltage to operate the diaphragm of the loudspeaker. It is now more evident that the loudspeaker will operate only when the impedances between AD and CB are *not* equal to those between AC and DB. By introducing devices having special characteristics between A and C and between D and B, we will be able to regulate the voltage between points C and D, which is the voltage applied to the loudspeaker. This is essentially the theoretical operation of the auto expressionator.

The Circuit

The actual circuit used in the auto expressionator is shown in Fig. 2. Switches SW₁ and SW₂ are opened and switches SW₃ and SW₄ are closed when the expressionator is to be used; ordinary operation of the set is obtained with the reverse setting of the switches. When the expressionator is removed, the voltage developed by the secondary of the output transformer is applied directly to the terminals of the voice coil of the dynamic loudspeaker. The devices marked X₁ and X₂ are the expressionator bulbs, made especially for the purpose by a special process. The resistance of the filaments of these bulbs is comparatively low when they are cold, but very high when current passes through to heat them. The tuned circuits CL₁ and CL₂ resonate at 40 cycles, and are used to bring up the bass response. The resistors R₁ and R₂ have slightly less resistance than the cold resistances of the bulbs X₁ and X₂. This fact must be remembered in order to understand the operation of the circuit.

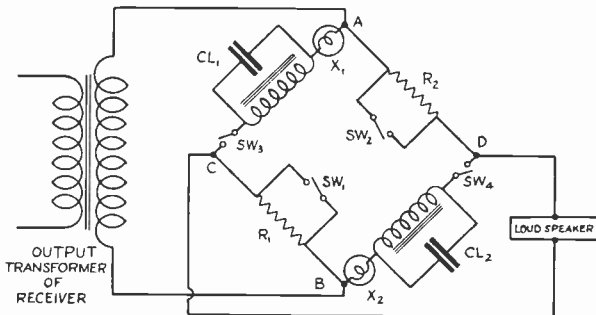
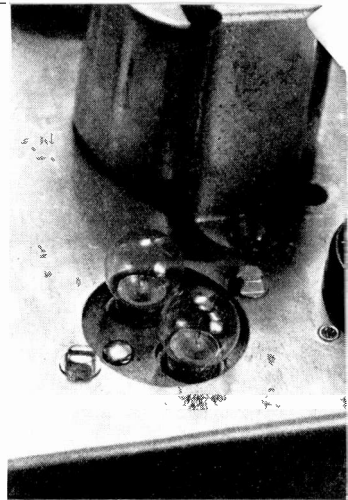


Fig. 2

The
Crosley
Auto
Expressionator



Operation of Circuit

You will remember that the auto expressionator circuit serves two distinctive purposes, automatic tone compensation and automatic volume expansion. Automatic tone compensation is a highly desirable feature, inasmuch as the conventional type of dynamic loudspeaker generally requires more power at the lower audio frequencies, and in particular below 50 cycles, to give the proper balance between the lows and highs in a high fidelity broadcast.

To analyze the automatic tone compensation circuit, let us assume that a frequency of 40 cycles is applied to points A and B of the bridge by the secondary of the transformer when the expressionator is in use, switches SW₁ and SW₂ being open and switches SW₃ and SW₄ closed. Since CL₁ and CL₂ offer a high impedance to the flow of 40 cycle current, we may consider the circuits between AC and BD to be open. (The impedance difference between circuits AC and AD will be at least 10 to 1.) The bridge will therefore be completely unbalanced, permitting maximum power to reach the loudspeaker. The bass response is consequently increased as the bridge becomes completely unbalanced. Of course, there will be a power loss (equal to I²R) in each of the resistors, R₁ and R₂, but any increase in the power supplied by the output stage of the receiver will produce a corresponding increase in loudspeaker volume.

As the output frequency is increased, the impedance introduced into the circuit by CL₁ and CL₂ becomes less and less, dropping practically to zero, and only the resistances of the lamps will remain between points A and C and between B and D (Fig. 2). Remember that the resistance of each expressionator bulb, even when cold, is slightly greater than the resistance of

(Page 6, please)

The Crosley Auto Expressionator (Continued from page 5)

R_1 or R_2 . The circuit is therefore in an unbalanced condition at all times, the unbalance becoming greater as the resistance of the expressionator bulbs increases. At low values of power output, when the circuit is most nearly balanced, only a small amount of the total output power is supplied to the loudspeaker. This decreases the intensity of the soft passages, and thus expands the volume range in this direction.

As the power output is increased, the expressionator bulbs will increase in resistance, throwing the circuit farther out of balance and causing the application of more power to the loudspeaker. This increases the intensity of the louder passages, expanding the volume range of these passages as well. The expressionator lamps are carefully designed to make expression changes smooth and pleasing. The time lag in the heating and cooling of the expressionator filaments is an important factor, for a change in expression must not occur during a low frequency note. The time lag of the expressionator bulbs now in use is between one-fifth and one-tenth of a second.

Although no definite data has been released regarding the amount of bass compensation introduced at 40 cycles, it must be at least 15 db. above the normal output at 1,000 cycles to be of any appreciable value. Likewise no information is given regarding the amount of volume expansion introduced by the auto expressionator, but an increase of at least 10 db. in both directions must be present to give the combination any practical value. This would then expand the volume range 20 db. above the volume range

used by the broadcasting station.

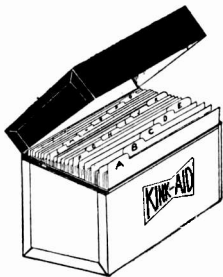
The parts necessary for the satisfactory operation of an auto expressionator circuit cannot be selected at random; they must be designed to work together and must be of the proper value. Do not attempt to install an auto expressionator in a radio receiver unless you purchase exact duplicate parts for such a combination, or you will run into trouble. In the first place the power output of the receiver must be doubled, because the expressionator, like any circuit which tends to equalize the over-all frequency response of an amplifier, introduces heavy losses. The receiver should employ class A amplification and have an output of at least 10 watts. Only under these conditions will the auto expressionator circuit function properly. If you have had considerable experience with the operation of similar circuits or with receivers using such devices, and wish to experiment with the installation of an auto expressionator in a radio receiver, purchase duplicate replacement parts, the output transformer, the two chokes, the two condensers, the two resistors, the four section switches and the two expressionator bulbs, as well as the loudspeaker for the complete job, from your Crosley distributor.

In conclusion may I add that the Crosley Auto Expressionator is one of several circuits now being used to change the frequency response and the volume range of a receiver. As yet we do not know how the listening public will receive these new developments; time will tell.

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Service Notes File

A collection of service notes and job-records, indexed and filed for ready reference, has been compiled by the Ak-rad Products Co., Akron, Ohio. Called "Kink-Aids," they are printed on filing cards, indexed by set name and model number, and filed in a steel filing case. Each "kink" represents a completed service job—describes symptoms, parts involved and method of repairing.



Announcing a New Department

Beginning with the next issue of the News, Mr. George Rohrich, engineer in charge of the N. R. I. laboratory, will conduct a new department designed to make available to students a means of obtaining additional instruction and laboratory experience through supplemental experiments. This new department is to be called "The Laboratory Page" and should meet with favor and enthusiasm as Mr. Rohrich promises some very interesting and instructive experiments.

Watch for the next issue!

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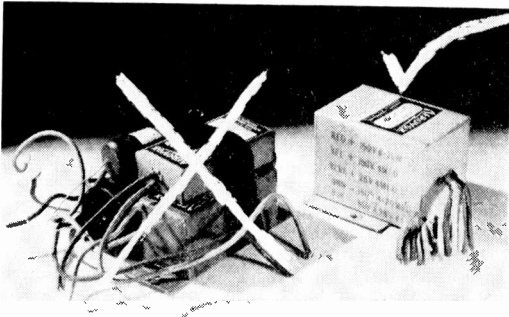
Word has just reached us of the passing of Graduate Clarence Brown, Indianapolis, Ind. We are indeed sorry to learn of this untimely end of one of N. R. I.'s most successful graduates and boosters. Graduate Brown will be sorely missed.

Exact Duplicate Replacement Condensers Prove Economical

Although everyone agrees that a replacement condenser should match the original absolutely, few service men realize that the exact duplicate generally saves money as well, points out Charles Golenpaul of Aerovox Corporation.

"In the usually crowded chassis every inch of space is utilized by set designer and manufacturer," states Mr. Golenpaul. "There is probably no room for any but the original kind of condenser. If a multiple-section unit, its replacement with several standard units not only may not fit the available space but the job cannot be as neat. The set owner is quick to find fault with a mess of condensers taped together in place of the original single, neat, business-like unit.

"Now it is no easy job for a manufacturer to work up a line of exact duplicates for the hundreds of different model sets. We have worked on this task for several years. So far,



The old way and the new.

we have four pages of listings, which may seem small. However, our listings are exact duplicate replacements. We do not refer to odd combinations of standard units taped together. Such improvisation, in our opinion, may serve in an emergency, but it is not the ultimate aim of Radio servicing.

"One more thing: The service man should check the cost of the exact duplicate replacement and the improvised group of units in each case. Generally, the exact duplicate unit will be found to cost less. Therefore, exact duplicates save money, a fact not generally appreciated.

"Ultra-compact general utility electrolytics have been made available during the past year, but in no sense can they be considered as doing away with exact duplicate replacements in better grade servicing."

Big Increase in Radio Activity This Summer

For the first few years of broadcasting, Radio was faced with what it thought was a serious problem: The summer "slack" season.

It has been the growing opinion of many that this was nothing more or less than a supposition on the part of broadcasting companies and advertisers that the listening audience would be considerably less in summer than in winter because of people being out of doors more, vacationing, traveling, etc., etc. So the broadcasters and advertisers decided to spend less money and less effort on summer broadcasting, some advertisers even discontinuing Radio advertising in spring and continuing again in the fall.

It is now felt that any summer "slack" period we have had in the past has been due to the broadcasters and advertisers themselves, through making broadcasts less appealing, through giving the public less reason to listen to such programs as were being broadcast. Now that it is no longer looked for, the slow season is gradually disappearing and its departure is being hastened by the automobile receiver, the answer to the problem of broadcasting to people outside the home, while they are at play, vacationing, traveling; by the improvement of summer broadcasts; and by the increased promotional efforts of Radio manufacturers and merchandisers.

Little if any "let-down" is looked for this summer. Instead, it is expected to be the biggest summer and fall thus far in the history of Radio because of the intense interest centering on the coming presidential election and the fact that most electioneering for important public office is done nowadays by way of Radio.

We all know to what extent political broadcasting was used in the last presidential election. It's going to be used much more in the coming election, partly because this is going to be such a hard-fought campaign and partly because of the great effectiveness of Radio politically. President Roosevelt has ably demonstrated this effectiveness in his broadcasts from the White House.

All this means that there is going to be plenty of business for the Radio man this summer. People will be anxious to keep in touch with events. Many will have to have their sets put in shape—others will want their out-of-date receivers replaced with modern sets—still others are going to buy their first receivers. So both the Radio service man and the salesman are going to benefit in the upswing of Radio sales and service.

The important thing is not to "let the grass grow under your feet." The business is going to be had for the taking, but even at that you will still have to *go and get it*.

Funds for Police Radio System Raised by Popular Subscription

So important has police Radio become that some cities, lacking the funds in the public treasury, have raised the necessary money and purchased the equipment by means of popular subscription. The activities have taken many forms, ranging from extensive campaigns to individual entertainments and other affairs planned to yield as much revenue as possible.

Usually the initiative is taken by police officials who know the value of Radio in police work and who can speak authoritatively on it, thus arousing the interest of other key men, and finally of the whole community. They have received hearty cooperation from fellow officials and from other prominent public-spirited citizens devoted to civic improvement.

Among communities which have raised funds for their police Radio equipment in this manner, the Western Electric Company reports, are Findlay, Ohio; Green Bay, Wis.; and St. Joseph, Mo. These cities range in size from 18,000 to 80,000 population. Findlay has a 500-watt, intermediate frequency transmitter; Green Bay a 100-watt intermediate frequency transmitter; and St. Joseph plans to install a two-way ultra-high frequency system with a 50-watt transmitter and 12 to 14 cars equipped with 5-watt transmitters and with receivers.

While the campaign conducted at Findlay has already been widely reported, the one at St. Joseph presents certain novel features. Here the plan was initiated by Mr. Charles Enos, Police Chief of the city. With the cooperation of the City Council, Mr. Enos organized a policeman's

ball which was extensively publicized as the Police Radio Fund Ball. Two kinds of admission tickets were sold. Individuals were charged \$1.00 each. Special patron's tickets were sold at \$10.00 each to the larger industrial organizations, banks and stores of the city. The appeal was made to these institutions to bear a heavier share of the expense, because they in turn would receive greater benefits from the increased police protection and efficiency afforded by the Radio system.

As plans for the affair progressed and popular enthusiasm increased, the City Council entered into the spirit of it and offered to appropriate a sum equal to whatever amount the Police Radio Fund Ball might raise. At the time this offer was made, it was estimated that the Ball would do well if it yielded as much as \$3,000. A pleasant surprise was in store for the sponsors; it actually cleared over \$6,500.

In addition to these three cities, other communities are reported to be approaching their goal in a similar manner. Activities staged include besides dances, such affairs as card parties, picnics, wrestling matches, and barbecues. In at least one instance, policemen and firemen contributed a full day's pay to the cause. In another case, the management of the local theatre offered its facilities free for a night and a special show organized for the benefit of police Radio netted \$2,000.

Indications are that the movement is spreading and that the success of one city inspires others. Most of the campaigns so far reported have taken place in the middle west.

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Oxford-Tartak Builds New Plant

On March 1, the Oxford-Tartak Radio Corporation, manufacturers of Oxford Speakers and Accessories, moved to their new and enlarged plant at 915 W. Van Buren Street, Chicago. They were formerly located at 340 W. Huron Street.

Coincident with this new move, Mr. Tartak announces a new and improved type of speaker which answers an important replacement speaker problem often encountered.

A new exponential horn has also been designed for use with a special cone type trumpet unit for PA work. It is constructed of fabricated acoustic material, weather-proof and water-proof.

Oxford-Tartak products include theatre and public address reproducers; console electro-dynamic reproducers; trumpet cone reproducer units; midget and mantel electro-dynamic reproducers; and many other items.

World War Veterans! Friends of Veterans! ATTENTION!

Some of your comrades and friends who have wanted to get into Radio the N. R. I. way, but haven't been able to before now because of finances, will like a plan which will allow Veterans who get a bonus of \$80 or more to reduce the cost of their N. R. I. Training by a considerable amount. Tell me about the Veterans you know who are interested in Radio, as I can present that plan to them. And don't forget your enrollment commission on any that enroll through your original recommendation!

E. R. HAAS,
Vice-President & Director.

The Service Forum

Conducted by

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



Some of the service notes appearing in this issue represent the contributions of Students Hill, Pecklers, Ramsey, and Tews, for which I wish to take this opportunity to thank them. Let's hear from some of you other men. Remember, a tip to be a service note must concern trouble observed in more than one set and due to some cause other than defective tubes.

PHILCO MODEL 70 NOISY AND DISTORTION

Check the volume control and if found to be defective, replace with a new one.

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

PHILCO MODEL 116X DISTORTION AND OSCILLATION

Caused by a defect in the volume control. Remedy by bending the contact plate sufficiently to allow about 1/16" clearance.

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

ZENITH MODEL 5-S-29 6-A-8-G TUBE BURNS OUT

Due to excessive anode grid voltage. Replace the 11,000 ohm resistor with one having a value of 20,000 ohms. This reduces the current to this electrode and prolongs the life of the tube.

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

COMMON TO ALL RECEIVERS NOISY VOLUME CONTROL

If a volume control is noisy due to a loose shaft, it can be repaired by winding fine copper wire on the shaft between the shaft collar and bearing. After the wire is wound on, flow it full of solder to give a solid mass of metal at this point.

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

SPARTON MODEL 931 IMPROPER PLATE VOLTAGES

Check the 15,000 ohm 5 watt bleeder resistor in the power unit. The chances are that it has changed in value and a new one will clear up the trouble.

SPARTON MODEL 931 SHORT LIFE OF POWER TUBES

Check the 1,250 ohm bias resistor and if it has changed in value, replace with a new resistor rated at 10 watts. A value of 1,200 ohms will prove satisfactory.

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MAJESTIC (ALL MODELS) REPLACEMENT PARTS

Replacement parts for Majestic receivers and refrigerators can be obtained from Frank M. McKey, trustee, Grigsby-Grunow Co., 5801 Dickens Avenue, Chicago, Illinois.

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WESTINGHOUSE MODEL 801 DISTORTION AT LOW VOLUME

Check for a leak between the screen and cathode by-pass sections of the detector tube. A leak at this point increases the bias voltages, causing distortion due to improper grid bias.

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WELLS-GARDNER MODEL 5E IMPROVEMENT

Distortion often occurs when a 6 volt bias is applied to the grids of the 19 type power tube. A lower bias will give satisfactory results. To effect the change, connect the white battery lead with the C6 marker to the 4.5 volt tap on the C battery. If a separate 22.5 volt and 4.5 volt batteries are used for the C connection. Connect this lead to the 4.5 volt tap on the 22.5 volt battery.

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WELLS-GARDNER MODELS 9B AND 9M CHANGE IN BIAS ON 19 TYPE TUBE

Connect the white battery lead with the C6 marker to the 4.5 volt tap on the C battery. This lead and the green and yellow lead with the 4.5 volt marker will then be connected to the 4.5 volt tap on the battery.

(Page 10, please)

The Service Forum (Continued from page 9)

WELLS-GARDNER AUDIO OSCILLATIONS MODEL 65

This is generally due to a defect in the double 12 mfd. unit electrolytic condenser. Replacement of both condensers will clear up the trouble.

— n r i —

WELLS-GARDNER LOW VOLUME MODEL 65

Test the coupling condensers in series with the volume control, replacing with others rated at 600 volts as a precaution against recurrence of the difficulty.

— n r i —

APEX MODELS 28, 28A OSCILLATIONS AND 29

Test the .04 mfd. condenser for change in value by substitution. A .05 mfd. condenser rated at 600 volts will prove satisfactory for this purpose.

— n r i —

APEX MODEL 9A OSCILLATIONS

Test the 7,100 ohm section of the voltage divider as an open at this point will cause excessive voltages. Check the by-pass condensers for opens by substituting others of about the same size, connected across those originally in the set. If the trouble disappears when connecting across some condenser, that one must be replaced with a new one.

— n r i —

STROMBERG CARLSON AUDIO HOWL ON MODEL 82 STRONG SIGNALS

This is generally caused by vibration of the oscillator coil assembly. By removing the shield and placing several soft rubber washers or discs inside the coil form, the trouble will be eliminated. Paper has been successfully used in place of rubber washers.

— n r i —

SILVER MARSHALL MOTORBOATING ON MODEL Q STRONG SIGNALS

Check the resistance in the plate circuit of the automatic volume control tube and check the plate by-pass condenser across this resistor for an open. Also try a new condenser as a check for high leakage.

— n r i —

ATWATER KENT MODEL 55-55C-60 INTERMITTENT RECEPTION

Replace the 100,000 ohm detector bias resistor in the cathode circuit of the detector tube.

ATWATER KENT MODEL 55-55C-60 NOISY

Replace volume control strip if volume control is noisy. Remove condenser tension spring and clean and bend to restore tension, lining up condensers at 1400 kilocycles. A small amount of vaseline on the spring is permissible—do not use oil.

— n r i —

ATWATER KENT MODEL 46 HUM

Test the first A. F. transformer and connect an 8 mfd. electrolytic condenser between the 80 filament and chassis.

— n r i —

BRUNSWICK MODEL 16 DISTORTION AND LOW VOLUME

Replace the 14,000 ohm 2 watt resistor with a 10 watt wire wound resistor of the same value. Also replace the two 5,000 ohm resistors with 1 watt carbon or wire wound resistors. The resistors mentioned above change in value, usually decreasing.

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CROSLEY MODEL 158 DEAD

Replace the 4-8 microfarad condenser with an 8-8 electrolytic condenser. Replace the 25,000 ohm resistors with 10 watt 10,000 ohms in the upper section and 15,000 ohms in the lower section.

— n r i —

RCA MODEL 121 INTERMITTENT RECEPTION

Check the antenna lead on the primary of the first R. F. transformer as it may short.

— n r i —

PHILCO MODEL 5 DEAD

Generally due to a defective electrolytic condenser.

— n r i —

ATWATER KENT MODEL 60-60C INTERMITTENT RECEPTION

Replace bleeder resistors No. 1 and 2. No. 1 has a value of 10,000 ohms while No. 2 has a value of 7,500 ohms. It is also advisable to replace the two detector plate resistors. Each has a value of 65,000 ohms.

(Page 23, please)

The Three-Point Oscillator-Preselector Adjustment

By GEORGE J. ROHRICH



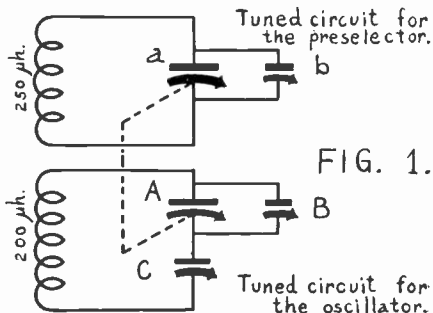
George J. Rohrich,
Engineer in charge
N. R. I. Laboratory

HAVE you ever been called on to service an all-wave receiver which you found badly out of alignment because the owner had tightened up on all of the "loose screws" he saw—including those of all trimmer and padder condensers? If you have, then you probably shudder when you recall what a time you had realigning it. No doubt you also hope you will never run across another job like it! However, this kind of job will present no greater problem than an ordinary alignment job if you apply a three-point check such as I have developed, which I will describe here for these unusual cases of bad alignment.

Let us look at the combination of condensers we find in the average superheterodyne but which for our discussion is reduced to a single stage in the preselector and the oscillator. We have a ganged variable condenser consisting of condensers *A* and *a* mounted on the same shaft as shown in Fig. 1. Suppose that the maximum capacity of each condenser (*A* and *a*) is 350 mmfd., with minimum capacity at 35 mmfd.

We will assume that that condenser *a* is in the preselector and that it is shunted with a trimmer *b* which is variable from 0 to 50 mmfd.; that condenser *A* is in the oscillator circuit and that it is also shunted with a trimmer *B* which is variable from 0 to 50 mmfd.; that the combination of *A* and *B* is in series with the padder condenser *C* whose capacity can be varied from 250 to 1000 mmfd.

Let us say that a 250 microhenry coil is used in the preselector and a 200 microhenry coil is



used in the oscillator and that the intermediate frequency is 300 kc. With this equipment arranged as shown in Fig. 1 turn to Table No. 1 and look at some of the possible combinations we can make in choosing values for the five condensers, all of which are suitable for tuning in a 900 kc. signal in the preselector. We will find that the combined values of condensers *a* and *b* will have to be 125 mmfd. as shown throughout the first column of Table No. 1 on page 12. The combined capacity of condensers, *A*, *B* and *C* will have to be 88 mmfd. as shown throughout the last column of Table No. 1. There is an infinite number of combinations we can select from the five condensers and still have the final values of capacities correct. This can be understood by studying Table No. 1 and noting that every one of the combinations listed there are correct for producing the final values of 125 and 88 mmfd. in the two circuits as required.

For instance, we readily realize that one way of getting 125 mmfd. in the preselector is to use a setting of 90 mmfd. for condenser *a*, then adjust trimmer *b* to a value of 35 mmfd. During this time it is obvious that condenser *A* will also have a value of 90 because it is mounted on the same shaft with condenser *a*. The problem is to select values for condensers *B* and *C* so that the total capacity in the oscillator is 88 mmfd. This can be done by setting *B* to a value of 10 mmfd. while condenser *C* is set to a value of 733 mmfd. All this can be seen in the first row of Table No. 1.

The second row shows we can leave the preselector set as above and get the proper combination again by increasing *B* to 15 mmfd. and reducing *C* to 544 mmfd.

The third row shows we can still leave the
(Page 12, please)

The Three-Point Oscillator-Preselector Adjustment (Continued from page 11)

preselector set as above while increasing B to 20 mmfd., provided we reduce C to 440 mmfd. It is obvious that many other combinations of B and C alone will also give proper results without touching a or b . Of course, when we change a and b then we can use still other combinations of B and C , or use the same values as used previously for another adjustment. For instance, compare the values in the 2nd, 5th and 10th rows which have been marked (*) for easy comparison. Notice that the difference in values of the trimmers $b-B$ equals 20 mmfd. in each of these cases, which requires a 544 mmfd. setting for condenser C . This use and adjustment of the trimmers b and B evidently requires careful consideration. It will be found from experience that the trimmer b in the preselector will generally have to be set at a higher capacity than B in order to track accurately at all other frequencies over the entire tuning range of the receiver.

The problem in the average realignment job resolves itself into selecting the proper adjustments for b , B and C because a and A generally are tied down with the markings on the dial. Of course, if the dial has slipped on the shaft then you have the added problem of also selecting the proper position of the dial. However, we should first proceed by assuming that the dial has not slipped. Corrections can be made later if it has.

I find that the practical procedure in a badly aligned receiver is first to align the intermediate frequency stages as specified by the manufacturer, then to get a point near the mid-point of the dial to track correctly. In the broadcast band I find it most convenient to make the reading track at 900 kc., which I do by using a signal generator which is accurately adjusted to produce a signal of preferably 300 kc. My reason for doing this will be clear when you realize that the harmonic signals of a fundamental frequency can be used for the same purpose as the fundamental and that when I use this 300 kc. signal then I can also check the responses

for the receiver at 600 kc. and at 1200 kc. and also at 1500 kc. (as well as 900 kc.) without changing the adjustment of the signal generator.

I set my signal generator to 300 kc. by first tuning in my shop receiver to a station which I know operates on a frequency of 900 kc. Then I adjust the signal generator to produce a modulated signal on the low frequency band which comes in at this same setting and also near 600 and 1200 kc. on my shop receiver dial. This tells me I have the required 300 kc. fundamental. If you cannot tune in a station which operates on 900 kc., then tune in a station which you know operates on 600, or 1200, or 1500 kc. and carry out the same procedure of setting the signal generator to produce the 300 kc. signal.

I now proceed to turn the dial of the badly aligned receiver near its 900 kc. mark and attempt to pick up the signal by adjusting its trimmers B and b and padder C , continuing to make any adjustments which I find necessary with them to make the signal track exactly with the loudest response at the 900 kc. mark. I now know that I have one of the many possible combinations similar to those listed in Table No. 1, no matter what value of $I. F.$ the receiver may use.

Next, I turn the receiver dial near its 600 mark on the dial. I will find that the signal again will come in but probably falling short or extending beyond the 600 mark. This shows me that I did not select the proper settings for the trimmer B and padder C during my first trial at the 900 kc. setting. Therefore, I carefully consider (but do not yet touch any adjustments) which way I will soon shift trimmers B and C to correct the reading at the 600 kc. mark. I have shown what I must do in Fig. 2 and Fig. 3, depending on how the signal comes in near the 600 kc. mark.

I also check the position where the signal comes in near the 1200 kc. mark and again only consider what must be done with trimmers B and C in this case. Now that I know what should

(Page 18, please)

TABLE NO. 1

(a+b)	b	a	A	B	(A+B)	C	(b-B)	$\frac{(A+B)C}{A+B+C}$
125	35	90	90	10	100	733	25	88
*125	35	90	90	15	105	544	20	88
125	35	90	90	20	110	440	15	88
125	35	90	90	25	115	375	10	88
*125	30	95	95	10	105	544	20	88
125	30	95	95	15	110	440	15	88
125	30	95	95	20	115	375	10	88
125	30	95	95	25	120	330	5	88
125	30	95	95	30	125	297	0	88
*125	25	100	100	5	105	544	20	88
125	25	100	100	15	115	375	10	88
125	25	100	100	20	120	330	5	88
125	25	100	100	25	125	297	0	88
125	15	110	110	15	125	297	0	88
125	5	120	120	5	125	297	0	88
125	0	125	125	0	125	297	0	88



RADIO-TRICIAN

REG. U. S. PAT. OFF.

Service Sheet

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

CROSLEY MODEL 1055

TUBE VOLTAGES—MODEL 1055									
Type	Where Used	H	F	S	Su	G	K	Go	Ga
6K7	R. F. Amp.	6.2	250	103	6	0	6	—	—
6A8	Mod.	6.2	250	103	—	0	6	-1 To -30	107
6C5	Osc.	6.2	75	—	—	—	0	—	—
6K7	I. F. Amp.	6.2	250	103	3	0	3	—	—
6H6	Det. & AVC.	6.2	—	—	—	—	0	—	—
6C5	1st A. F. Amp.	6.2	70	—	—	—	0	—	—
6F6	2nd A. F. Amp.	6.2	218	218	—	—	0	18	—
6F6	Push Pull	6.2	355	245	—	—	0	18	—
6F6	} Class A. B. Output	6.2	355	245	—	—	0	18	—
5Z4		Rect.	4.9	365	—	—	—	—	—

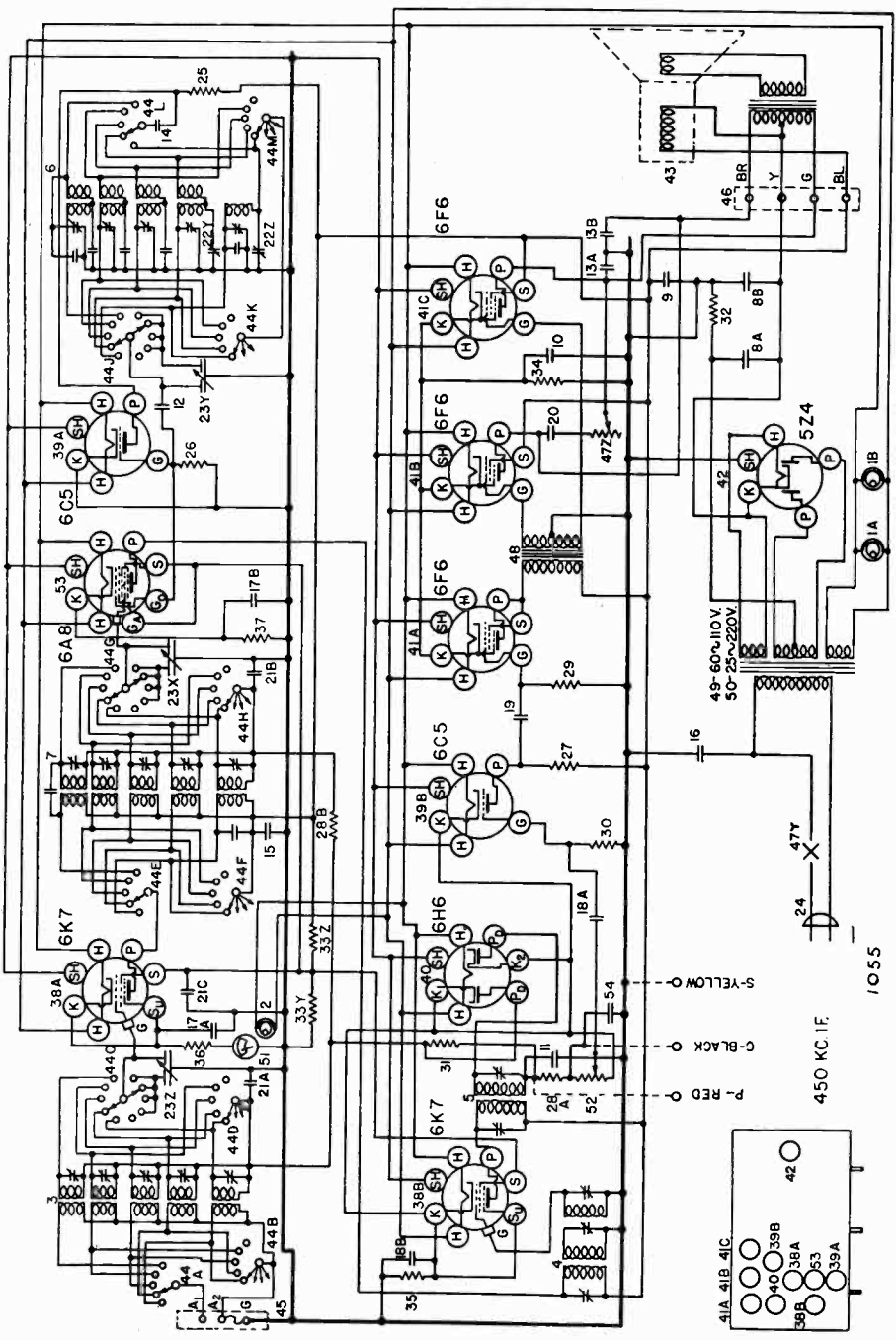
ALL D.C. VOLTAGES MEASURED TO CHASSIS WITH 500 VOLT, 1000 OHMS PER VOLT VOLTMEETER. ALL VOLTAGE PLUS OR MINUS 10% AT 117.5 LINE VOLTAGE.—POWER CONSUMPTION APPROXIMATELY 125 WATTS.

PARTS LIST—MODEL 1055

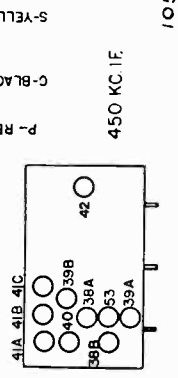
Figures in first column refer to parts in Diagram

Item No.	Part No.	Description	Item No.	Part No.	Description
1A	36504	Dial Light Socket Assm.	23 Z		
1B	36504	Dial Light Socket Assm.	23Y	G37 — 33002	Var. Tuning Condenser Gang.
2	W — 36557	Tuning Meter Bulb.	23X		
3	G83 — 32000	Ant. Coil Assm. Complete			
	G84 — 32000	Ant. Coil only 150-400 Kc. (W. B.)			
	G89 — 32000	Ant. Coil only 540-1500 Kc. (B. B.)			
	G65 — 32000	Ant. Coil only 1500-4000 Kc. (P.B.)			
	G87 — 32000	Ant. Coil only 4-10 Mc. (S. W. B.)			
	G66 — 32000	Ant. Coil only 10-22 Mc. (S. W. B.)			
	MG26 — 36542	Coil Support Base.	24	B — 33906A	A. C. Cord & Plug.
	W — 36028	5 Section Trimmer Cond. Assm.	25	W — 36545	Resistor 30,000 Ohm.
	MG9 — 36168	Shield.	26	W — 22196	Resistor 20,000 Ohm.
4	G66 — 32004	1st I. F. Trans. Assm.	27	W — 23403	Resistor 150,000 Ohm.
	G67 — 32004	2nd I. F. Trans. Assm.	28A	W — 21455	Resistor 300,000 Ohm.
5	G54 — 32002	Osc. Coil Assm. Complete	28B	W — 21455	Resistor 300,000 Ohm.
	G55 — 32002	Osc. Coil only 150-400 Kc.	29	W — 23785	Resistor 500,000 Ohm.
	G56 — 32002	Osc. Coil only 540-1500 Kc.	30	W — 35927	Resistor 2 Megohm.
	G57 — 32002	Osc. Coil only 1500-4000 Kc.	31	W — 36688	Resistor 3 Megohm.
	G59 — 32002	Osc. Coil only 4-10 Mc.	32	W — 36549	Resistor 200 Ohm 6 Watt.
	G58 — 32002	Osc. Coil only 10-22 Mc.	33Z	W — 32301	Resistor 10,000 Ohm.
	MG26 — 36542	Coil Support Base.	33Y		15,000 Ohm.
	W — 36028	5 Section Trimmer Cond. Assm.	34	W — 22873	Resistor 220 Ohm (Flex.)
	G7 — 34007	Condenser 1750 mmf.	35	W — 25937	Resistor 275 Ohm (Flex.)
	G8 — 34007	Condenser 4350 mmf. (2)	36	W — 21964	Resistor 165 Ohm (Flex.)
	G6 — 34002	Condenser 25 mmf. (2)	37	W — 22514	Resistor 750 Ohm (Flex.)
	MG9 — 36168	Shield.	38A	G151 — 36400	Socket, 6K7.
7	G39 — 32001	R. F. Coil Assm. Complete	38B	G151 — 36400	Socket, 6K7.
	G40 — 32001	R. F. Coil only 150-400 Kc.	39A	G152 — 36400	Socket, 6C5.
	G44 — 32001	R. F. Coil only 540-1500 Kc.	39B	G152 — 36400	Socket, 6C5.
	G41 — 32001	R. F. Coil only 1500-4000 Kc.	40	G155 — 36400	Socket, 6H6.
	G43 — 32001	R. F. Coil only 4-10 Mc.	41A	G153 — 36400	Socket, 6F6.
	G42 — 32001	R. F. Coil only 10-22 Mc.	41B	G153 — 36400	Socket, 6F6.
	MG27 — 36542	Coil Support Base.	41C	G153 — 36400	Socket, 6F6.
	W — 36028	5 Section Trimmer Cond. Assm.	42	G154 — 36400	Socket, 5Z4.
	MG9 — 36168	Shield.	43	427CL — 22	Speaker, Table Model.
8A	W — 36055	Condenser 35 mfd. 400 Volts.	44	W — 36547A	Band Change Switch.
8B	W — 36055	Condenser 35 mfd. 400 V.	45	G27 — 26719	Ant.-Grnd. Terminal.
9	W — 36057	Condenser 40 mfd. 300 V.	46	G5 — 31128	Speaker Terminal.
10	W — 36548	Condenser 25 mfd. 25 V.		W — 34627	Terminal Board Insulator.
11	G2 — 34002	Condenser 0.0001 mfd. 200 V.		W — 34628	Terminal Board Cover.
12	G1 — 34002	Condenser 0.00025 mfd. 200 V.	47Z	W — 32063	Tone Control.
13A	W — 35758	Condenser 0.008 mfd. 400 V.	47Y		On-Off Switch.
13B	W — 35758	Condenser 0.008 mfd. 400 V.	48	G22 — 24628	A. F. Transformer.
14	W — 35647	Condenser 0.006 mfd. 400 V.	49	G42 — 25669	Power Transformer 60 Cy. 110 V.
15	W — 32378	Condenser 0.01 mfd. 400 V.	50	B — 35007B	Universal Power Transformer.
16	W — 30805	Condenser 0.01 mfd. 400 V.	51	W — 36500	Tuning Meter.
17A	W — 36541	Condenser 0.02 mfd. 160 V.		W — 36501	Tuning Meter Bracket.
17B	W — 36541	Condenser 0.02 mfd. 160 V.	52	W — 32062	Volume Control.
18A	W — 28621	Condenser 0.02 mfd. 200 V.	53	G156 — 36400	Socket, 6A8.
18B	W — 28621	Condenser 0.02 mfd. 200 V.	54	G6 — 34402	Condenser 0.000025 mfd.
19	W — 32780	Condenser 0.05 mfd. 400 V.		B — 36515	Escutcheon.
20	W — 23615	Condenser 0.05 mfd. 400 V.		W — 36564	Escutcheon indicator
21A	W — 35936	Condenser 0.05 mfd. 200 V.		W — 36311	Band Change Escutcheon.
21B	W — 35936	Condenser 0.05 mfd. 200 V.		W — 36519	Knob, Tuning.
21C	W — 35936	Condenser 0.05 mfd. 200 V.		W — 36520A	Knob, Vernier.
22Z				W — 36518	Knob (Tail) Band Change.
22Y	G27 — 33006	Condenser-trimmer.		W — 36521	Knob (2)

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



WIRING DIAGRAM—MODEL 1055



Service Department

Lesson Grading Service

Mr. S. M. Armstrong, Service Director,
National Radio Institute,
Washington, D. C.

Dear Sir:

I would like to have some information on the schedule used in grading lessons, so I'll know definitely when to expect the return of my examinations.

Very truly yours,

S. J. PINKETT,
Chicago, Illinois.

Our system of grading lessons is very simple. It was designed with that object in mind, in order to avoid every possible confusion and save time.

Upon arrival lessons are sent immediately to the Instruction Department, where they are graded. They are then referred to the Lesson Recording Section, entered upon the students' records, and from there they are sent to the Mailing Department, which actually mails them back to the student, together with the proper advanced texts.

Usually this system is operated on a schedule of from 24 to 36 hours. Lessons that arrive before noon one day, are placed either in the noon or evening out-going mail the following day. I say usually, because there are some exceptions. For instance, lessons that arrive Saturday morning cannot possibly go out before the following Monday (and may not go out until Tuesday) because of the half-day Saturday (the Institute closes at noon Saturdays) and Sundays. Holidays sometimes interfere, also. Washington's birthday this year fell on a Saturday, which meant that lessons arriving Friday of that week, could not go out before Monday, or possibly Tuesday, or for a period of from three to four days.

Except in such unusual cases as this, however, the Institute succeeds in grading and mailing lessons within from 24 to 36 hours of receipt. Thus, if it takes two days for your lesson to reach the Institute, and two days for its return, your lessons should reach you within from five to six days after you submit them, providing they don't arrive in Washington on a Saturday, Sunday, or holiday. Just to play safe, though, I would advise you to set a definite period of seven days to allow for possible delays in mail service.—S. M. A.

S. M. Armstrong,
Student Service Director



Shipments from Outside Companies

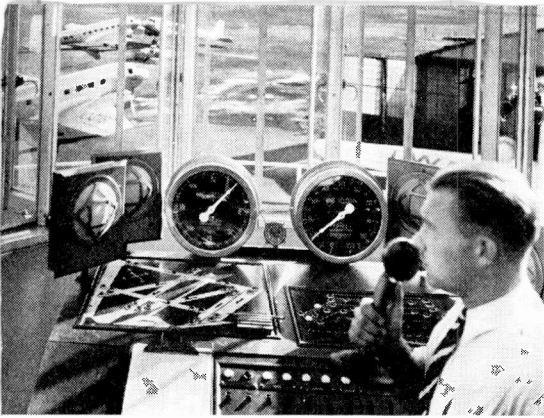
Please remember that the Institute does not maintain a supply department. Material ordered through the Institute—such as Batteries, Namometers, etc.—are sent from the manufacturers or a branch warehouse, on our order, not from the Institute.

For instance, a student who orders a set of Burgess Batteries cannot possibly receive them as quickly as his lessons. The lessons are sent him directly from the Institute, whereas his order for batteries must go through a longer procedure which cannot be eliminated. His order is received here at the Institute, is recorded, then forwarded to the Burgess Battery Company and there recorded before shipment is actually made. Sometimes the order is even forwarded from the Burgess Battery Company to one of their branches nearer the student, there to be finally filled.

All this takes time and it helps every party concerned when the student allows a reasonable period to elapse before writing us about it. Otherwise we will be sending out tracers and communicating with the manufacturers about non-delivery when in fact delivery was probably made within a day or two after the student wrote us or before we could possibly notify the manufacturer of his complaint.

— n r i —

By the way, I believe a lot of you fellows are overlooking the convenience and the time-saving feature of having a rubber stamp containing your name, address, and student number. These save a lot of time and bother. Instead of writing your name and address on lessons, letters, etc., you simply stamp it—and your name and address are far more easily read than if they were written. You can obtain these stamps (with self-inking pad) through the Institute for \$1.00—or you may purchase them locally.



Traffic Control Tower at Newark Airport

"Okey..."

How
Com

"Okay 404—runway's clear, the field's yours—come on in 404."

"22 calling WREE—calling WREE—do you get me—I'm five miles south of Newark."

"Okey-doke 22—what's your altitude?—I advise you to drop to 1,000—we have a TWA Ford flying blind—I'll send him up to 2,000. Stand by 22—I'll advise landing."

"Plane 407 to WREE Newark—plane 407 over Martin's Creek to Newark—arriving in 20 minutes—what are your ground conditions Newark?"

"Okay 407—I get you—ceiling 800 feet—visibility two miles—thickening haze—wind north-east—four miles. Got it 407?"

TRANSLATED from aviation lingo into plain language this conglomeration of figures and staccato phrases spells "Airport Traffic Control by Radio."

In a glass enclosed tower known as station WREE overlooking the Newark Airport this Radio traffic cop carries on 24 hours out of 24. There is scarcely a moment's silence, particularly on a rainy day like this when a thick gray haze blankets the field. The metallic voices booming forth from five loudspeakers drown out the steady downpour on the glass roof. The man on duty seems to have ten ears and as many hands. Four or five pilots or ground station operators may be calling in at one time, but he gets them all and answers them in rapid succession. He twists a dial, jots down some figures on his log pad with his left hand and then grabs the microphone.

"Okey-doke 22—come in on east runway. 508—the way's clear to take-off."

"American Airline from Buffalo over Martin's Creek."

For perhaps three minutes the voices cease and the silence is startling. The operator glances over the field through the wet window panes and watches the graceful descent of plane 22 nearby. Like a great silver gull it circles, dips, glides to the ground and taxis up to a

passenger station. Five passengers step out and hurry into the building out of the storm.

A boy climbing the spiral staircase that leads to this dome of voices brings noonday coffee and the news that a famous movie star has just landed at the far end of the field.

"You should 'a' seen her," says the boy breathlessly. "She got away before the reporters could snap 'er—just ducked an'—." But the operator is not listening. He has guided so many celebrities to safety. He is much more interested in that TWA flying blind over the field. He must keep it out of the way of the American Airliner due now in 10 minutes and the U. S. Army plane preparing to take off at the north runway. For the haze is growing more dense and even the three silver ships being refueled nearby are becoming misty. His eyes rest on the funny little red fueling carts that are scurrying back and forth across the muddy ground.

"Plane 96 calling WREE—calling—"

The voices start again and he grabs the microphone.

It is a one man job for only one can have the complete picture of all air traffic movements. He must know just what planes are approaching the field, what planes are preparing to take off and those flying in the vicinity or over the airport for testing purposes. In fact, he must know what is happening on every part of the field and in every strata of air over the field.

The blue coated traffic cop at the corner of 42nd Street and Broadway waving his arms to cars, trucks and pedestrians has an easy time of it in comparison with the man at WREE. For he directs his traffic in air levels as well as on the ground. He must continually bear in mind the altitude of the flyers as they approach or leave the field, particularly in foggy or rainy weather when the visibility is poor. It is a kaleidoscopic picture which he shifts from one level to another. In the twinkling of an eye he builds his airways through the microphone. This plane leaving must fly at 2,000 feet. That transport approaching the port he directs to keep at 3,000. He lowers or raises the ships as the case may be to avoid the possibility of a collision.

"Duke 22, Come On In"

the "Radio Traffic Cop" Controls Planes
Coming and Going at Busy Newark Airport.

By M. M. BEARD

(Reprinted from "Pick-Ups.")

Weather conditions may be of little moment to the Broadway cop, but they are of vast importance to the operator in Newark's tower. Calls are continually coming in requesting information as to the velocity and direction of the wind and ground conditions at the port. The street traffic cop has only a few square yards to supervise. The air cop has 300 acres of field space and is in touch with planes 10 miles out from the field. Also he is advised of their scheduled arrival from even greater distances. He is likewise in constant touch with the ground stations of the four airlines that use the Newark port as a terminus. Added to these various duties he must keep a log of such traffic movements as arrivals and take-offs.

Station WREE is a beehive of activity, for Newark is one of the busiest airports in the country. During certain periods there is a plane arriving every 10 minutes. There are about 97 scheduled runs in and out of the port during the day and night and sometimes as many as 50 itinerant planes coming and going. On a clear day five or six planes can land and take-off at one time, but in overcast weather the tower takes care of one landing and take-off at a time.

A one man job! How does he do it all? The answer lies in the six black cabinets standing in the center of the tower room. Here are his co-workers that never rest—five Western Electric Radio receivers and one Western Electric transmitter. Four of the receivers take care of the incoming calls from the transports and ground stations of the airlines using the port. The fifth provides for reception from itinerant flyers. The sixth cabinet houses the transmitter. On the operator's desk forming a semi-circle are the five corresponding loudspeakers and a microphone. Back of them stand two wind indicators—one for velocity and the other for direction.

A simple layout of equipment, it occupies but a few square feet of space, yet it performs a tremendous job. For the lives of hundreds of pilots and passengers depend to a large extent upon this Radio traffic cop as air travel begins or ends at Newark.

Ship 22 is safe in port. But what happened on 22's long journey from the South? Let's hop over to the ground station of Eastern Airlines

nearly and follow the ship on the last lap from Washington to Newark. In the Radio room are two receivers—one for emergency use and one tuned to the control tower. Four more receivers are located at Linden, New Jersey, about 10 miles away, which are controlled over telephone lines. The operator at the airport simply twirls a telephone dial and can control his distant receivers as easily as you adjust your home Radio set. These remote receivers are used for picking up the planes and ground stations on Radiotelephone and for the line's point to point telegraph circuit. The transmitter combines two units and can transmit on Radiotelephone or Radiotelegraph. At other locations on the field Western Electric equipment is similarly at work on the ground stations of Transcontinental & Western Airlines, American Airlines and United Air Lines.

It is much quieter at the EAL station than at the tower. But intermittently the loudspeakers are working. The voices may be coming from pilots en route—from the ground stations of the three other airlines or from the control tower.

"Ship 22 to Newark—our position about 10 miles south of Wilmington on top at 5,800."

On top of 5,800 means the ship is flying above a bank of clouds or "overcast" at that altitude. There may be sunshine up there but it is still raining here and the haze is heavy. The operator at EAL repeats 22's call to verify it.

"Ship 22 to WEEP (the station's call letters)

(Page 21, please)

Ground Station of EAL at Newark Airport



The Three Point Oscillator-Preselector Adjustment (Continued from page 12)

be done to correct both cases, I return to the 900 kc. setting of the dial and proceed to select a second trial adjustment by moving *B* and *C* together, still making the signal come in accurately at this 900 kc. mark. I now have another combination of the capacities and I again check near the 600 and 1200 kc. setting, this time finding that I have improved my results, and I continue until my readings agree as closely as I choose

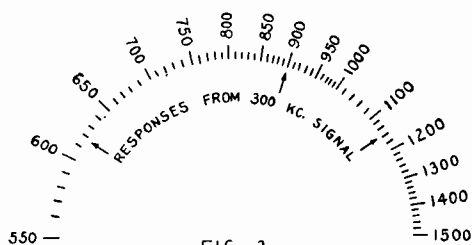


FIG. 2.

INDICATIONS FOR NEED TO REDUCE CAPACITY OF "C"
AND TO INCREASE CAPACITY OF "B"

with the dial markings.

You will find that adjusting padder *C* will have the greatest effect in moving the response point near the 600 kc. mark, while trimmer *B* will have the greatest effect in moving the response point near the 1200 kc. and 1500 kc. marks on the dial.

It will be evident after you try this method of tying down the tracking at three points (or more points) on the dial in the manner described that no trouble will be experienced in determining just what must be done to achieve good alignment. The method proves of greatest value in the higher frequency bands found in the all-wave type of receiver where trimmers *B* and *C* have a much greater controlling effect of varying the frequency responses than in the broadcast

band I have used as an example.

The thing to do is to select a frequency from your signal generator which will produce about three or four harmonic signals within the band which you will adjust. For instance in a band which covers frequencies between 1.5 and 6 megacycles I find it convenient to set my signal generator to a value of 2,000 kilocycles (or 1000 kc.) and tie down the 4 megacycle position ac-

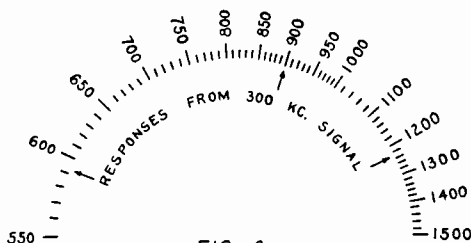


FIG. 3.

INDICATIONS FOR NEED TO INCREASE CAPACITY OF "C"
AND TO REDUCE CAPACITY OF "B"

curately with tests at the 2 and 6 mc. positions.

Having finished the alignment on the above band and identified the 4 megacycle position on the receiver, I then change the signal generator to produce a fundamental signal of 4 mc. and use it in checking the next highest scale which covers frequencies from 6 to 20 mc. I select the 12 mc. position as the midpoint and continue the two remaining trials until tied in at the 8 and 16 mc.

After the final alignments have been made I return to the broadcast band where I can now assume that I have the 1000 kc. position tied in accurately from which I can set the signal generator to 1000 kc. and give the entire receiver a final check at the harmonic positions which appear at intervals of 1 megacycle over the entire set of ranges of the all-wave receiver.

n r i

A complete line of paints, varnishes, and other finishes suitable for Radio receivers, studios, towers and poles, PA equipment and trucks, etc., is offered by the Campbell Radio Specialties Company, Ann Arbor, Mich. Detailed information and prices will be furnished by the company upon request.

n r i

A friend of an N. R. I. employee on his return from a trip to the Orient, told him about this ad he'd seen over there:

"FREE FOR FIX FAILED RADIOS"

You figure it out. We've long since given it up!

National Union Provides Steel Stock Cabinet

National Union Radio Corporation of N. Y. has just announced that they are making available to Radio service specialists, steel cabinets for storage of small Radio parts.

The cabinets are provided in three sizes, a 27 drawer style, a 100 drawer style and a 50 drawer style.

National Union believes these cabinets will fill a real need for dealers who are tired of playing "needle in the hay-stack" with their small parts stock and want to know what they have and where it is when they want it.



RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

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

CROSLEY MODEL 6625

TUBE SOCKET VOLTAGE READINGS

Tube	Function	H	P	P2	S	Su	G	K	Go	Ga
6A7	Osc.-Modulator	6.3	265	—	100	—	0	5.0	0	140
6D6	I-F Amplifier	6.3	265	—	120	6.2	0	6.2	—	—
6C6	Det. & A-F Amplifier	6.3	0	—	75	2.6	0	2.6	—	—
76	2nd. A-F Amplifier	6.3	140	—	—	—	0	10.0	—	—
6B5	Output	6.3	270	255	—	—	0	2.3	—	—
80	Rectifier	4.9	350	—	—	—	—	—	—	—

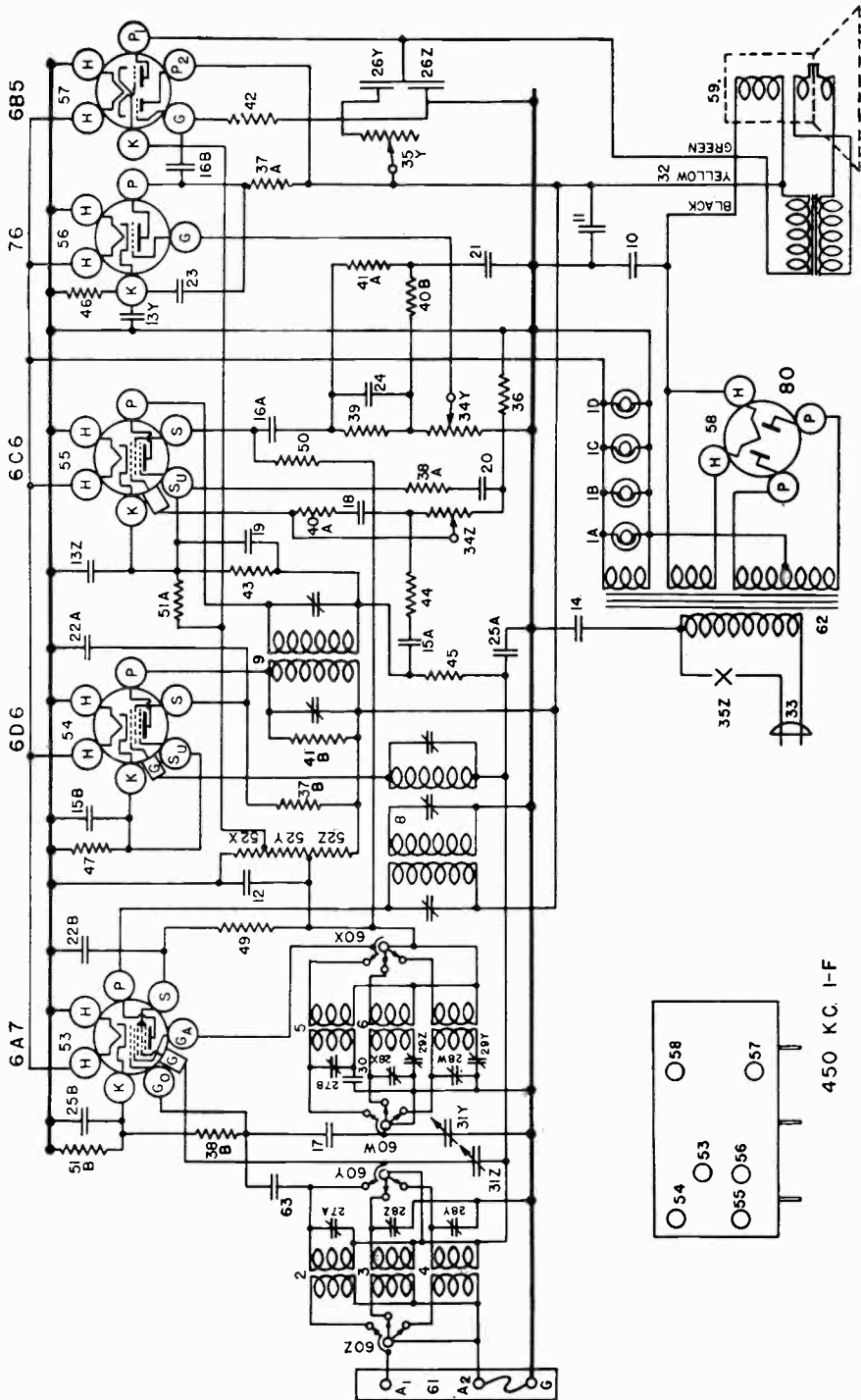
MEASURED ON 117.5 VOLT—60 CYCLE POWER SUPPLY.
 POWER CONSUMPTION APPROXIMATELY 80 WATTS.
 POWER OUTPUT APPROXIMATELY 3 WATTS.

PARTS LIST—MODEL 6625

Figures in first column refer to parts in Diagram

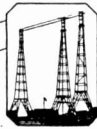
Item	Part No.	Name Description	Item	Part No.	Name Description
1A	W—37922	Bulb, Dial Light	38A	—36761	Resistor 40,000 Ohm, ¼ W., Insul.
1B	W—37922	Bulb, Dial Light	38B	—36761	Resistor 40,000 Ohm, ¼ W., Insul.
1C	W—37922	Bulb, Dial Light	39	—21454	Resistor, 1 Megohm, ¼ W.
1D	W—37922	Bulb, Indicator Light	40A	—34020	Resistor 250,000 Ohm, ¼ W.
2	G92—32000	Coil, Ant. 6000-18000 Kc.	40B	—34020	Resistor 250,000 Ohm, ¼ W.
3	G90—32000	Coil, Ant. 1800-6000 Kc.	41A	—37590	Resistor, 750,000 Ohm, ¼ W.
4	G91—32000	Coil, Ant. 540-1800 Kc.	41B	—37590	Resistor, 750,000 Ohm, ¼ W.
5	G84—32002	Coil, Osc. 6000-18000 Kc.	42	—36322	Resistor, 500,000 Ohm, ¼ W.
6	G83—32002	Coil, Osc. 1800-6000 Kc.	43	—33344	Resistor, 400,000 Ohm, ¼ W.
7	G82—32002	Coil, Osc. 540-1800 Kc.	44	—23403	Resistor, 150,000 Ohm, ¼ W.
8	G94—32004	Coil, 1st I-F Assm.	45	—37245	Resistor, 1.5 Megohm, ¼ W.
9	G93—32004	Coil, 2nd I-F Assm.	46	—21876	Resistor, 10,000 Ohm, ¼ W.
10	W—36055	Condenser, 35 mfd., 400 V.	47	W—22514	Resistor, 750 Ohm, ½ W., Flex.
11	W—36057	Condenser, 40 mfd., 300 V.	48	W—24537	Resistor, 60 Ohm, ½ W., Flex.
12	W—40325	Condenser, 50 mfd., 150 V.	49	—22831	Resistor, 15,000 Ohm, ¼ W.
13Z	W—37778	Condenser, 12 mfd., 25 V.	50	—21875	Resistor, 100,000 Ohm, ¼ W.
13Y	W—37778	Condenser, 12 mfd., 25 V.	51A	W—28106	Resistor, 500 Ohm, ½ W. Flex.
14	W—30805	Condenser, .01 mfd., 400 V.	51B	W—28106	Resistor, 500 Ohm, ½ W. Flex.
15A	W—36541	Condenser, .02 mfd., 160 V.	52Z	—37829	Resistor, 10,000 Ohm } Candohm
15B	W—36541	Condenser, .02 mfd., 160 V.	52Y	—37829	Resistor, 25,000 Ohm } Candohm
16A	W—32780B	Condenser, .05 mfd., 400 V.	52X	—37829	Resistor, 65 Ohm
16B	W—32780B	Condenser, .05 mfd., 400 V.	53	G47—28807	Socket, 6A7 Type
17	G1—34002	Condenser, .00025 mfd., (molded)	54	G75—28807	Socket, 6D6 Type
18	G6—34002	Condenser, .000025 mfd., (molded)	55	G74—28807	Socket, 6C6 Type
19	G2—34002	Condenser, .001 mfd., (molded)	56	G80—28807	Socket, 76 Type
20	W—30323	Condenser, .01 mfd., 200 V.	57	G90—28807	Socket, 6B5 Type
21	W—37988	Condenser, .017 mfd., 200 V.	58	G6—28807	Socket, 80 Type
22A	W—23142	Condenser, .02 mfd., 400 V.	59	—37916	Speaker, Spec. 532—BJ—3
22B	W—23142	Condenser, .02 mfd., 400 V.	60	B—37906	Switch, 2 Sec. Band Selector
23	W—27540	Condenser, .0005 mfd., 400 V.	61	G27—26719	Terminal Board, Ant. & Grnd.
24	G5—34002	Condenser, .00005 mfd., (molded)	62	G15—28500	Transformer, Power 110-60 Cy.
25A	W—35936	Condenser, .05 mfd., 200 V.	G16—28500	Transformer, Power 110-25 Cy.	
25B	W—35936	Condenser, .05 mfd., 200 V.	G17—28500	Transformer, Power 220-25 Cy.	
26Z	W—31052	Condenser, .004 mfd., 400 V.	W—35774	Base, Tube Shield	
26Y	W—31052	Condenser, .05 mfd., 400 V.	W—40531	Belt, Drive	
27A	W—37954	Condenser, H-F Ant Shunt Trim.	W—22334	Cable, Indicator Control	
27B	W—37954	Condenser, H-F Ant Shunt Trim.	W—35773	Cap. Tube Shield	
28Z	W—37954	Condenser, Pol. Ant. Shunt Trim.	W—40537	Coupling, Flexible Drive	
28Y	W—37954	Condenser, B-C Ant. Shunt Trim.	—37947	Dial Ass., Complete	
28X	W—37822A	Condenser, Pol. Osc. Shunt Trim.	W—40545	Diffuser, Light	
28W	W—37822A	Condenser, B-C Osc. Shunt Trim.	C—37894	Escutcheon, Cabinet	
29Z	G31—33006	Condenser, Pol. Osc. Series Trim.	C—37969	Face, Celluloid Dial	
29Y	G17—34000	Condenser, B-C Osc. Series Trim.	C—37968	Face, Glass Dial	
30	G17—34000	Condenser, .0053 mfd. H-F Osc.	C—37968	Face, Glass Dial	
31Z	G19—33001	Condenser, Var. Tuning Gang	W—40365	Gasket, Escutcheon Felt	
31Y	G4—35696	Cable, Speaker	W—49485	Hand, Long	
32	B—33906A	Cable, Plug, Power Supply	W—40484	Hand, Short	
34Z	37907	Vol. Cont., 1st A-F Control, 3 Meg	W—37339	Knob, 3 required	
34Y	37907	Vol. Cont., 2nd A-F Control, 1 Meg	W—40192	Knob, 1 required	
35Y	—37908	Control, Tone	B—37898	Lens, Dial	
35Z	—37908	Control, Tone	W—37909	Pullever, Indicator Cable	
36	—21455	Switch, On-Off	W—35772	Shield, Tube (Half)	
37A	—5469A	Resistor, 300,000 Ohm, ¼ W.	W—37914	Shield, Dial Light	
37B	—5469A	Resistor, 100,000 Ohm, 1 W.	G2—37965	Socket, Dial Light	
			G3—37965	Socket, Indicator Light	
			B—37896	Spring, Escutcheon Retaining	
			B—37897	Spring, Dial Lens Retaining	

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



WIRING DIAGRAM—MODEL 6625

NATIONAL RADIO NEWS



FROM N. R. I. TRAINING HEADQUARTERS

Vol. 7

June-July, 1936

No. 3

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P. J. MURRAY, MANAGING EDITOR

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Index

Article	Page
The President's Page	2
Mr. Smith Hears from an "Old Grad"....	3
The Crosley Auto Expressionator	4
Big Increase in Radio Activity this Summer	7
Funds for Police Radio System Raised by Popular Subscription	8
The Service Forum	9
The Three-Point Oscillator-Preselector Adjustment	11
Data Sheet—Crosley Model 1055	13
Service Department	15
Okey-Doke 22, Come On In	16
Data Sheet—Crosley Model 6625	19
Photo Contest Results	22
Ambulances to Be Equipped with Radio	24
Novel Radio Items	25
Alumni News	26-30
The Mailbag	31
Celebrate Anniversary of Transformer....	32

Okey-Doke 22, Come On In

(Continued from page 17)

—we are over Camden—are there any ships between Camden and Newark?"

The operator immediately talks to the tower to report the approach of his plane and to learn what ships are nearing the field. He then relays the information to 22.

"WEEP" to 22—there is a TWA in the vicinity—ought to be out of your way by the time you arrive—come through the overcast so you can see where you're going—better fly at 1,800."

A different voice is heard. This time it is the operator at American Airlines talking to EAL over their common field interphone system. He gives a weather report from one of his ships just landed. The EAL operator relays it along.

"Hello 22—American Airlines just in report ceiling 1,700—visibility about three miles—wind 12 miles northeast. Have you broken through the overcast yet?"

Had the fog been extremely dense at Newark, 22 would be instructed to land at the Camden field for the ceiling must be at least 300 feet for landing. The trip might also be delayed if there were a number of other planes ahead en route to Newark. In that case 22 would be advised to circle over Princeton until the way is clear. Today it is "okay" for 22 to continue on her course. By now the pilot has broken through the overcast and is winging toward the field at 1,800 feet. Ten miles from the Newark port he is again in touch with the EAL operator.

"WEEP to 22—I am now turning you over to WREE."

The pilot then tunes his beacon receiver to 278 kilocycles and listens for WREE. From now on the control tower takes charge.

For outgoing planes the procedure is reversed. When the pilot is 10 miles out of Newark, he signs off from the tower and his own ground station takes control. From then on to Washington the EAL operator is on the job. He is in direct communication with his planes every half hour. But there are many "off schedule" calls when the pilot requests additional information or when the ground station gives further instructions. If the plane is making the trip through to Atlanta, Miami or New Orleans, other EAL stations along the line take over the ship in turn.

Thus Radio ceaselessly weaves an invisible network of communication to safeguard the traveler who sails the skies.

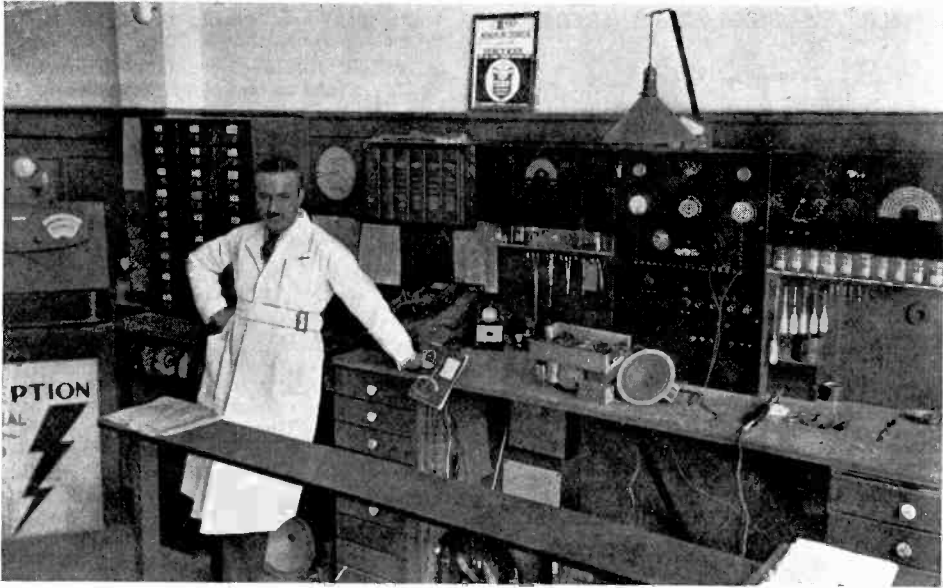
— n r i —

If a man cannot manage his own affairs how can he expect to be given the chance to manage the affairs of others—as in business for instance?

Photo Contest Results

The April-May issue of NATIONAL RADIO NEWS carried the announcement of a Photo Contest, in connection with which a first prize of \$10 was offered for the best photo of the best subject

(store, work bench, testing equipment, etc.). Second prize, \$5. We are pleased to award first prize for this issue to Student J. Alan Mohr, whose picture appears below.



In a letter accompanying his photograph, Student Mohr says:

"Business has been very good with me and I thank N. R. I. for helping me get started in the right field. Can always use \$10.00, so thought I'd take a crack at it with a picture of myself and service bench. The picture takes in only part of my store. The service bench is right up in front where people passing can see that I do my own repair work, which I find helps very much. I am proud of my service bench! I designed and built it myself.

J. ALAN MOHR,
San Francisco, Cal."

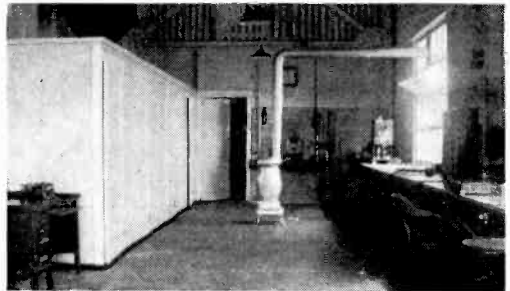
— n r i —

Second prize of \$5.00 for this issue goes to Student P. G. Baker, Pensacola, Florida, whose photo appears on the right. Student Baker remarked that if he got "in the running" in the Contest, by the time his photo appeared in the News, the stove shown in the picture would long since have been removed. Sorry, feller, but it had to stay in the picture; there's no way to get it out.

Both of these men are to be congratulated on the neat, workmanlike, well-equipped appearance of their shops. They *deserve* the business—and it is evident that they are getting it. More power to you, fellows!

How about the rest of you men?

Let's have some more pictures like those on this page. You know, Mr. Smith is going to continue this contest only as long as we continue to get good photographs. Hop to it—and get yourself an easy five or ten bucks!



The Service Forum (Continued from page 10)

PHILCO MODEL 65

NOISE

Replace the by-pass condenser between the plate supply lead of the 27 and the chassis. Carefully check the primary of the input push-pull transformer and clean the connections between the rotors of the tuning condensers and the chassis.

————— *n r i* —————

PHILCO MODEL 45

INTERMITTENT RECEPTION

Replace the cathode by-pass condensers with others having a value of .1 mfd. and rated at 200 volts.

————— *n r i* —————

PHILCO MODEL 90

HUM

Check and if necessary replace filter condensers Nos. 56 and 57.

————— *n r i* —————

SILVERTONE MODEL 100

NOISE

Check the input push-pull transformer and also the first A. F. transformer. Carefully check the values of the resistors in the power unit, replacing any which have changed in value.

————— *n r i* —————

RCA MODEL R12

HUM

Replacement of the condenser block is generally necessary. The large electrolytic condenser usually opens, causing hum and as the others will sooner or later become defective, an entire new replacement block is advisable.

————— *n r i* —————

PHILCO MODEL 19

DEAD

When this condition accompanied by proper voltages occurs, check the 15,000 ohm ½ watt detector-oscillator bias resistor. If it has changed in value, replace with a 1 watt unit.

————— *n r i* —————

MAJESTIC MODEL 25

DISTORTION AT LOW VOLUME

It is essential that good 27 type tubes be used in the second detector. Experiment with different 27 tubes for best results.

————— *n r i* —————

MAJESTIC MODEL 290

INABILITY TO REDUCE VOLUME

This is generally caused by a defective 10 microfarad condenser connected from the cathode of the 57 to the plate of the 58 noise suppressor tube. A substitution test will show up a fault at this point.

MAJESTIC MODEL 70B LACK OF CONTROL GRID VOLTAGE

No grid bias on the power tube is often caused by a short in the pilot light socket to the chassis, thus shorting out the bias resistor.

————— *n r i* —————

MAJESTIC MODELS 91 AND 92

MOTOR-BOATING

Replace the flexible lead which is soldered to the trimmer condenser cup sliding arm.

————— *n r i* —————

MAJESTIC MODEL 90B

INTERMITTENT RECEPTION

If the trouble is overcome by shorting out the R. F. Choke in the R. F. plate lead, the choke must be replaced.

————— *n r i* —————

KOLSTER MODELS K21-K28

DEAD

When this condition accompanied by lack of plate voltage occurs, check the 30,000 ohm resistor located under the power pack. This resistor is used to supply the detector with plate voltage.

————— *n r i* —————

JACKSON BELL MODEL 50

DEAD OR DISTORTED

Test the 2.5 meg. resistors connected across the speaker field winding. An open in either will result in this trouble.

————— *n r i* —————

GRAYBAR MODEL 100

WEAK OR DEAD

If the receiver works satisfactorily with the 27 type automatic volume control removed, try a new .5 microfarad cathode by-pass condenser.

————— *n r i* —————

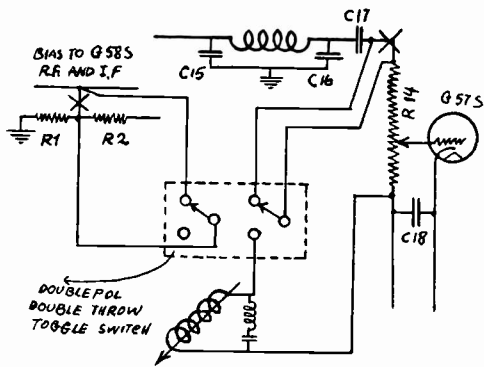
GREBE MODELS 6AC and 7AC

ELIMINATION OF FEED-BACK

The by-pass condensers between the intermediate and detector voltage supply points and ground, provide a resistance capacity filter, eliminating the feed-back generally termed "motor-boating" (the 750 ohm resistor and condenser in the A. C. Six performs the same function). The two small 1 mfd. condensers, between ground and the two filament bus-bars of 226 type tubes, prevent radio frequency feed-back which might cause the receiver to oscillate.

Graduate Eisinger Submits Diagram for Installation of Magnetic Pick-Up in Majestic 320

The diagram below was sent in by Graduate Hermann Eisinger, New York, N. Y., who writes: "I am enclosing a diagram showing the connections of a magnetic phono-pick-up to the Majestic Model 320 receiver. It is my own work and I believe it will be of help to other graduates and students."



Connection of magnetic pick-up for Majestic Model 320, using the volume control of the receiver. X indicates to break connection. Numbers correspond with those of diagram of receiver. Switch and twin jack may be mounted in back of receiver chassis. Turn suppressor knob all the way to the right.

Allied Radio's New Catalog Now Available

Allied Radio Corp., 833 W. Jackson Blvd., Chicago, has just issued their new spring and summer Radio catalog. It shows the latest lines of Receivers, Sound Equipment, Test Instruments, and Replacement Parts. Sent free on request to Radio Dealers, Servicemen, and Amateurs.

What's Wrong with the Picture?

(See page 3)

The words "Amplification" and "Occasion" are misspelled. Graduate Evans did this "to see whether the advertisement was ever read. It was surprising how many people asked, 'Who painted that sign; couldn't he spell?'"

Ambulances to be Equipped with Radio

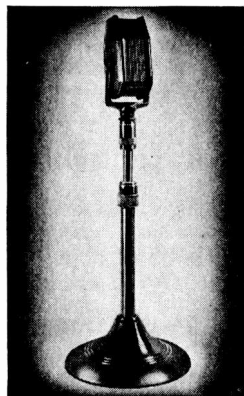
A new use for Radio will be inaugurated in Evanston, Illinois, when General Electric engineers equip one of the city's ambulances with short-wave transmitting and receiving apparatus, enabling doctors to keep in immediate touch with police and hospital officials. The ambulance equipment will be part of a two-way system also to be installed in 10 Evanston police patrol cars, and will add to the efficient means used to protect the citizens of that city, nationally known for its traffic safety and recent winner of the National Safety Council's grand prize.

During a police chase or in an emergency in which the ambulance is used, if the driver of the Radio car wants to get in touch with police headquarters or the hospital he merely lifts a telephone from a hook on the instrument panel, and a 15-watt transmitter mounted in the car goes on the air, putting him in immediate touch with headquarters.

Valuable time can be saved in relaying word ahead to the hospital regarding the condition of a patient, whether or not to have the operating room in readiness for quick use on arrival, or the summoning of special doctors, all of which now must await the arrival of the ambulance at the hospital.

Amperite Brings Out Improved Microphone Stand

A microphone stand especially designed for use at banquets, meetings, etc., has made its appearance. Called the "banquet stand," the smooth and positive action claimed for it is due to the incorporation of the Amperite ball bearing clutch. A $\frac{1}{8}$ turn with the fingertips is all that is necessary to tighten the stand securely. Once tightened, it will not "creep" yet the ball bearing permits the microphone to be rotated without loosening the clutch. Obtainable in gunmetal or chrome finish from the manufacturers, the Amperite Corp., 561 Broadway, New York City.



Amperite Banquet Stand

Novel Radio Items

-BY L. J. MARKUS-

P. A. System Sells Canaries!

A wide-awake Bloomfield, New Jersey, Radio man installed in a local pet shop a public address system which allows canaries to broadcast their own sales talks. Choice warblers can be heard a block away from the store.

— n r i —

Radio Is His Alibi!

Proving that he listened to "One Man's Family" kept Lloyd Bond, 19 year old Negro who was convicted of robbery, out of jail. He had been sentenced to from one to ten years in prison, but was released when the author of this Radio serial confirmed his description of the program.

— n r i —

Static Kills Itself in New Eliminator!

Newest of static eliminating devices is the Lamb silencer circuit, which actually turns off the Radio for the duration of the static. Since most static crashes last less than 1/1000th of a second, the interruptions are not noticed.

— n r i —

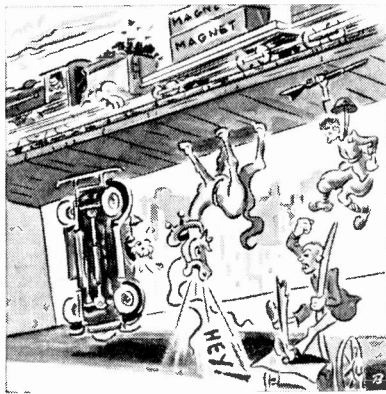
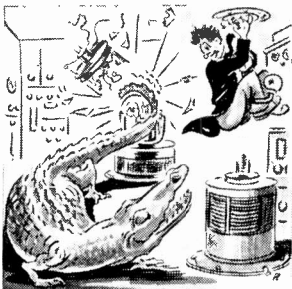
Staggering Statistics!

Nearly a thousand vacuum tubes, scattered all over the world, were needed to allow two men, stationed 50 feet apart, to talk to each other on a 'round-the-world telephone hook-up. About 85% of the distance was covered by Radiotelephone, the remainder by telephone wires.

— n r i —

An average of 10,000 applications are received each week from persons desiring to appear on one of Radio's most popular programs. Major Bowes' Amateur Hour; about 600 of these are granted auditions.

ALLIGATOR'S TAIL stops Radio station! A tame 'gator wandered into a radio transmitter building in South America and wagged his tail in friendly greeting, smashing a power tube!



PERMANENT MAGNETS used in the loudspeaker of a modern battery Radio receiver can lift 140 times their own weight!

and 20 acts are finally selected.

— n r i —

"Mike" Spies on Worms!

A sensitive Radio microphone was recently used to detect the presence of wood worms in an antique wooden plate. The microphone readily picked up the noises made by the parasites.

— n r i —

Radio Tower Makes Rain!

Rain falls more often within a radius of 30 feet of the new 360 ft. vertical radiator tower at WCKY than at any other point in the vicinity. Moisture in the air, hitting the cold steel structure, is condensed.

— n r i —

A "Fishy" Transmitter!

One hundred goldfish are official employees of a large British broadcasting station. These goldfish live in the water-cooling system used for the giant transmitter tubes, and remove the algae and other aqueous plants which might clog the pipes.

— n r i —

Have You Heard Ouchtube?

Commercial short-wave station RDB is located in the town of *Ouchtube*, Russia.

— n r i —

How To Be A Radio Announcer!

The final test which candidates for Radio announcing positions must pass is this "mush munching" line: "The seething seas cease and as the seething seas subside, many men must munch much mush."



"TALKING" PLANES make Arabs behave! Powerful loudspeakers on British airplanes are replacing cavalry and guns in desert regions of Iraq. Voices from the sky prove more effective than the use of force!



N.R.I. ALUMNI NEWS

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

The President Speaks

THE Radio servicing industry can reach its goal only through organization. Individually, the serviceman can accomplish little in bringing changes about for the betterment of conditions in our profession.

Many men operating in the field have been slow in realizing the importance of organization to give them the things they want. Others, while realizing that organizations are necessary, have let the other men carry on the battle. Stabilization in the Radio servicing industry will only come through *organized effort*, and it is the duty of every man who is a part of the industry to do his share.

Members of the National Radio Institute Alumni Association have the good fortune of being trained for this all important job of serving the Radio industry. Slowly, but surely, men who do not recognize the field is rapidly establishing itself on a sound basis, are losing out. The positions are being absorbed by men who, in short, do "know the answers."

It has been my pleasure and privilege to serve long as chairman of the Baltimore Chapter of our Association. While I have been in office as President, I have on numerous occasions had the good fortune to meet many N. R. I. men in other cities throughout the United States. I have never met a finer bunch of fellows anywhere. There is a common bond of friendship between N. R. I. men that can never be destroyed. I hardly believe there is an association in the country that has greater loyalty among its men than the N. R. I. Alumni Association.

We are all working toward a common goal, and I pledge to the members of the Alumni my sincerest efforts toward the advancement of the Radio servicing profession and our Alumni body.

P. J. DUNN, President,
 N. R. I. Alumni Association.

National Radio Servicemen's Week

IN the last issue of the NEWS, an announcement was made of the movement to set aside one week every year in the interest of Radio servicemen. So much comment was made by the public, servicemen, Radio associations, etc., that National Headquarters has had Sherlock Holmes on the job to bring you more information on this important subject.

We find our good friend, Wilmer B. Giese, Editor of the *Baltimore Bulletin* has presented some new facts so well, we are reproducing these excerpts from his popular magazine. Under the above caption the *Bulletin* says:

"Mayor Adein F. Levy, of Galveston, Texas, in a recent letter to the Governors of several states of the Union, urgently requested their cooperation, by proclaiming for their respective states, the fourth week of May in each year, as 'NATIONAL RADIO SERVICEMEN'S WEEK.'

"All Radio servicemen's organizations, manufacturers and others interested in the Radio industry are urged to cooperate in making 'NATIONAL RADIO SERVICEMEN'S WEEK' as popular as the various other proclaimed national weeks.

"Many of us fail to realize the greatness of the Radio service industry: it compares favorably with many of the largest industries in the United States today. The Radio service industry is a sixty million dollar industry. Thirty million dollars of this for labor charges alone. Within the next few years the Radio service industry will probably hit the one hundred million dollar mark. At the present time there are probably not over a few thousand Radio servicemen in the United States, that are capable of turning out a satisfactory repair job, and those having adequate knowledge number far less.

"Since the inception of national Radio service associations, many new local organizations have been formed; others are now in the formative stages. Inquiries from sections that heretofore have not considered organization, indicate greater activities. Many local organizations are going through periods of reorganization, culling

out the unscrupulous and those not qualified as Radio servicemen under the new standards, since NRA is out.

"Pledges of ethical and fair practices, adequate testing equipment, etc., are the order of the day. The era of the screwdriver artist and the tinkerer is past. The complicated advance and ever changing circuit designs, tubes, and so forth, of today leaves the old time serviceman gasping. It is only the man with at least a reasonable education and adequate experience, long and extensive studying, initiative and the proper testing equipment, that will survive, or be in a position to render satisfactory Radio repair service."

With the above facts in mind, all Local Chapters and Editors of local publications are invited to get behind this idea and push it for the betterment of all concerned. A week of this type of advertising will be wonderful publicity for all Radio servicemen, especially those possessing associational membership.

National Headquarters of the N. R. I. A. A. desires to align their forces with the National Radio Service Association to help insure a howling success for the proposed "NATIONAL RADIO SERVICEMEN'S WEEK."

Members who desire to express their views on the subject may write direct to P. J. Dunn, President, 713 N. Fulton Avenue, Baltimore, Maryland.

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A St. Louis Chapter Booster

The following letter was received by National Headquarters from Mr. Oscar Schleicher, 5406 Goethe Avenue, St. Louis, Missouri:

"An article in the last issue of NATIONAL RADIO NEWS states that Vice-President Edward J. Meyer of St. Louis, Missouri, wants to open an Alumni chapter here. In regard to this, I want to let 'Ed.' know that I feel the same as he does about a chapter in St. Louis, and if he can use my help I will cooperate with him 100% in bringing about a chapter in this city. St. Louis is certainly large enough and should have a chapter. I do not know 'Ed.' personally, but hope to get acquainted with him. So come on 'Ed.' I'm with you, let us show 'em St. Louis has the stuff and that we are from Missouri.

"Hoping that Ed Meyer hears about my letter and offer of help."

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No doubt there are other Alumni members living in St. Louis who feel the same way about the matter. So get in touch with Mr. Edward Meyer, by telephone—Riverside 0451-M, or write him at his home—4517 Alaska Avenue, St. Louis, Missouri.



New York Metropolitan Area Chapter

The first issue of our little magazine, "The Metropolitan Area Chapter Tattler," is just off the press and is already asserting itself as a worthy contender for Chapter bulletin honors. The Editor, Mr. R. Pettit, assures the boys he is going to do everything within his power to make it interesting, informative, and give the rest of the Chapter bulletins a run for their money.

At the next meeting we will consider the practical application of the 385 Automatic Supreme Instrument. This consists of checking coils R. F., I. F. audio transformers, power transformers and how to determine the windings by resistance measurements, checking condensers by leakage method, etc.

One of the men will attempt to light a 40 watt electric light bulb by his hand, without the use of a 110 volt supply. He will use nothing but the capacity of the body and a static electricity experiment to light this bulb. This is one for Mr. Ripley's "Believe It Or Not." Figure this one out!

Recently a gift was given by Dale Parts, Inc., New York City. Frank Maile was the lucky man to receive it. Frank declined the gift, inasmuch as he already owned one. It consisted of a Wirt Resistor Kit, which contained 50 assorted resistors with a cabinet of 6 drawers to keep them in, which will also hold 200 more resistors. Some lucky fellow will get this kit at our next meeting.

Social meetings will be the first Thursday of every month,—where we will have a get-together and have fun. For more details on the social meetings attend the business meetings. The business meetings will be held on the third Thursday of each month. The address is 12 St. Marks Place, New York City (near 3rd Avenue). The best way to get to the meeting headquarters is take the I. R. T. to Astor Place and walk a half block east, or take the B. M. T. to Eighth Street, and walk one and a half blocks east. Second Ave. "L" to Eighth Street, walk one block west. Third Ave. "L" to Ninth Street, walk one block south and half block east. It sounds very much like a crossword puzzle, but it will be well worth your while to attend. We have some mighty fine surprises in store for students and graduates in New York.

You can get full information about joining our ranks by writing M. L. J. Kunert, 66-11 74th St., Middle Village, L. I., N. Y.

(Alumni News continued on page 28)

Toronto Chapter

Any city member who was absent at the first social meeting of the Toronto Chapter, missed without a doubt, the most enjoyable gathering ever held by the Local since its inception. To say those in attendance enjoyed themselves would be putting it mildly. Enough is said in the decision to hold another such meeting in the very near future.



We guarantee 100% attendance.

We regret very much to hear that one of our charter members, R. Branscombe of Brampton, Ontario, Canada, has had serious trouble with his eyes, which makes it necessary for him to give up Radio work temporarily and come to Toronto for treatment. We all wish him a speedy recovery and an early return to the service business.

Members are urged to take advantage of much of the Radio sales for new receivers that have been slipping by because a lot of fellows just don't like to do selling. Do you men realize that there isn't a Radio salesman in the business today who has as good an opportunity to sell new sets as has the Radio-Trician. You talk to a customer at the very time his old machine is giving him trouble.

Many Radio-Tricians are content to make a few dollars on a repair job, when they could be making \$20 or \$30 on a sale, with a little extra effort. The thing to do is to get in touch with a store handling Radios—have them lend you one of the newer mantle models to carry whenever you go on a service call. Half the time such a set will sell itself, when comparison is made with the old machine, and many times, the small mantle set will pave the way for a larger console sale, if a demonstration is made while the customer still has the faults of his own machine fresh in mind. It is fatal to your sale, however, to repair the old machine and then return a week or so later to demonstrate a new one. You have to have a set on the spot while the customer is in the mood to consider buying, or you will not make much progress.

Try this out on the next ten calls you have—see if the jobs of salesman and Radio-Trician cannot be combined into one, to your own financial benefit. Others have done it, why not you?

A short time ago, arrangements were made to hold meetings at 1884 Yonge Street, on the premises of the Imperial Radio Service Co. Remember meetings are held the first Tuesday and third Thursday of every month at 8 P.M. All students and graduates of N. R. I. are cordially invited to attend.

Philadelphia-Camden Chapter

Clarence Stokes, well-known member of Philcam Alumni and manager of Philcam Radio Sales and Service, 2433 Kensington Ave., Philadelphia, has just purchased a new Supreme Fidelity 30-watt public address system. Mr. Stokes states that this system is available for any occasion at reasonable rates, to any member of the Local Chapter. For further information see him at Headquarters.

Philcam's cooperative service plan is progressing by leaps and bounds. The continued interest of graduates and students has made this possible. For the fellows who did not read the last issue of NATIONAL RADIO NEWS, we will repeat the highlights of Philcam's cooperative service plan.

Graduates and students of the N. R. I. are eligible to participate in our Alumni activities as well as the profits to be derived from *pooling* our resources and experience for the benefit of all men concerned. We repeat, "all profits will be equally divided among the members in proportion to the amount they have invested, similar to any corporation proposition."

Members can do their own service work here, as well as having service calls referred to them in their respective territories. We urge every N. R. I. man living in Philadelphia, Camden, N. J., and the surrounding communities to get in touch with Mr. Clarence Stokes regarding this proposition. You will be interested.

A card party is in the offing. We hold one of these affairs every year as it affords everyone the opportunity to meet each other on a social basis and get acquainted with their fellow Alumni members. The Entertainment Committee, along with the whole Alumni, wish to take this opportunity to thank Radio Electric Service Company, with stores in Philadelphia and Camden, for their donation of a set of Sylvia tubes. Some lucky fellow is going to get a "break."

A great deal of the credit goes to Mr. J. P. Hornbrook and Mr. William Trimble for the continued success of our Radio bulletin, *The Philcam Key*. These live wires are getting the news and material we need to put our bulletin over in a big way.

Four meetings are held every month—one business meeting and three service meetings. Every member is urged to attend as many meetings as possible. We cannot fail to note that the fellows we see here the most are the same boys who make the most money. Apparently these fellows are the ones who realize that it takes plenty of good hard study and an ever increasing desire to know more to go to the top.

Three Guesses

By Al Wysoczanski,
Philadelphia-Camden Chapter

Listed below are ten statements, which are either true or false. The answers to these questions are given on page 30.

1. There is a 60 cycle ripple in the output of a full-wave rectifier operating on 60 cycles A.C.
2. When the frequency of the A. C. applied to a condenser is decreased the capacitive reactance of the condenser increases.
3. In an electrical circuit, electrons move at a speed of 186,000 miles per second.
4. In an inductive circuit, the voltage lags behind the current.
5. The breakdown voltage of two condensers connected in series is twice as high as the breakdown voltage of one of the condensers.
6. Ohm's Law states, R is equal to E divided by I.
7. The suppressor grid in a pentode is used to suppress any oscillations due to feedback.
8. The grid leak type detector is more sensitive than the "C" bias type.
9. The amplification factor of a variable mu tube can be decreased by increasing the negative grid bias voltage.
10. Automatic bias and automatic volume control are the same.

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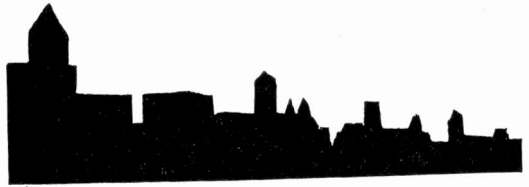
Baltimore Chapter

The *Baltimore Bulletin* continues to be a highly informative and interesting publication. Under the editorship of Mr. Wilmer B. Giese, whose prolific pen has captured the attention of large Radio manufacturers, a great deal of the credit goes to him. The last issue came out with a bright green cover—we imagine in celebration of St. Patrick's Day.

Honorable Howard W. Jackson, the Mayor of Baltimore City, has announced that he will proclaim the fourth week of May as "National Radio Servicemen's Week" to the citizens of Baltimore. We hope that the mayors of other cities will follow this progressive movement—it will be one of the best advertisements the serviceman has ever had to establish his business on a firm basis. Thanks, Mayor Jackson, for your interest in the Radio serviceman.

The next meeting of the Baltimore Chapter will take place in the New Howard Hotel, located at 8 N. Howard Street, Baltimore. Mr. Joseph Kaufman, Director of Education at the National Radio Institute, will conduct an open discussion on Radio receiver troubles. He will be assisted by Radio Consultants, Mr. Paul Thomsen, Mr. Straughn and Mr. Rohrich. All

(Page 30, please)



Chicago Chapter

Mr. P. W. Kidd, of the Supreme Radio Service Company, will continue his series of informative talks on the popular subject of Radio servicing. We can't give you his subjects, but we can promise you that they will be something you cannot afford to miss. Come on down and learn how another expert does it!

Members, here is your chance to do something for the Chapter and maybe have a little fun out of it, too. The raffle is definitely on, and at the last meeting twelve books were placed. We will need to put out that many more to make it the success it should be—so get yours. The proceeds are, of course, to be used for the benefit of the Chapter. If we make it good enough we'll shanghai the entertainment committee and throw a big party—or sumpin'.

Here are the members who have not missed a meeting for the first three months of the year:

Samuel Juricek
Leo Lewandowski
C. B. Morehead
Frank Pesek
E. J. Skrzyniarz

Several others merit honorable mention, having missed but one meeting, and in at least one instance this was due to illness. Eddie Sorg missed two, but these were also due to illness, and there may have been more absence for the same cause, but it was not reported to us. The honorable mention roll follows:

Joseph Balsamello
Earl R. Bennett
Lester Lee
J. Sowa

Chairman Bennett missed the last meeting because of illness.

So come on down fellows, the bigger our attendance, the more we can accomplish. We will be looking for you at all of the meetings for the next three months, so don't strain our eyes.

In the "Chatter" last month we ran a column of questions with a challenge to you fellows to see what you could average on them. On another page we also mentioned that the library could use some more material. "Bob" Murray, Executive Secretary of the National Association in Washington, noticed these items and immediately fired your editor a big package of library

(Page 30, please)

Detroit Chapter

Our library has recently added to its collection of books, a complete set of John F. Rider's manuals and two new Radio magazines. Here is your opportunity, fellows, to get the very latest schematic drawings on any of those sets that have been troubling you. There is a wide variety of Radio books and magazines for lending—see the librarian, Mr. C. H. Mills, at the next meeting—he'll be glad to help you with your Radio problems.

The Detroit Chapter is planning to show regular feature films as a part of their entertainment program. If the plan works out successfully—three or four of these shows will be given every year. Specially selected films—the ones most all of us like—will be shown.

The regular round table discussion of Radio receiver troubles is being continued with great success. It is surprising how much a fellow can learn by attending these meetings and taking part in these discussions. So any of you members who have some technical problem, or a particular receiver, giving you difficulty, let us know what it is. We will all take a hand in trying to "iron" it out.

Our meetings are continuing to be held at 11305 Woodward Avenue, Detroit, Michigan. Let us hear from you N. R. I. men who would like to join this fast moving Alumni Chapter.

You can receive full information about the Detroit Chapter by writing to Mr. F. E. Oliver, Secretary, 218 Alter Road, Detroit.

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Baltimore Chapter

(Continued from page 29)

of these gentlemen are well-known members of the N. R. I. Technical Staff. These men have frequently made their appearance in Baltimore City and we have always enjoyed hearing them.

We urgently request all N. R. I. students living in this area, to get in touch with Mr. I. A. Willett, Secretary, 2411 Arunah Ave., Baltimore, Maryland. Mr. Willett will gladly tell you how you can become a member of our Local Chapter and take part in our activities.

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Wanted!

Photographs of Chapter activities . . . meeting headquarters or rooms, members, dances, parties, meeting groups, etc. National Headquarters needs the cooperation of EVERY Chapter. Send material by June 15th, at the latest. Come on, fellows, let the rest of the membership know what you are doing.

R. B. MURRAY,
Executive Secretary.

Directory of Chapters and National Officers

Baltimore—I. A. Willett, Secretary, 2411 Arunah Ave., Baltimore, Md.
Philadelphia-Camden—Clarence Stokes, Secretary, 2947 Rutledge St., Philadelphia, Pa.
New York—L. J. Kunert, 66-11 74th St., Middle Village, L. I., N. Y.
Buffalo—T. J. Telaak, Chairman, 657 Broadway, Buffalo, N. Y.
Toronto—Ed. Witherstone, Secretary, 363 Nairn Ave., Toronto, Ont., Canada.
Chicago—Samuel Juricek, Secretary, 4223 N. Oakley Ave., Chicago, Illinois.
Pittsburgh—Albert Maas, Secretary, 9 S. Howard Ave., Bellevue, Pa.
Detroit—F. E. Oliver, Secretary, 218 Alter Rd., Detroit, Mich.

NATIONAL OFFICERS FOR 1936

President—P. J. Dunn, 713 N. Fulton, Baltimore, Maryland.
Vice-President—Ed. Witherstone, 363 Nairn Ave., Toronto, Ont., Canada.
Vice-President—Clarence Stokes, 2947 Rutledge St., Philadelphia, Pa.
Vice-President—Earl Bennett, 931 Wesley Ave., Evanston, Ill.
Vice-President—Edward Meyer, 4517 Alaska Ave., St. Louis, Mo.
Secretary—Earl Merryman, National Headquarters, Washington, D. C.
Executive Secretary—R. B. Murray, National Headquarters, Washington, D. C.

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Chicago Chapter

(Continued from page 29)

books and a letter in which he says, among other things, that he still cherishes the hope of seeing all the fellows in Chicago one of these fine days. We take this opportunity to thank "Bob" for the new books, and to assure him a royal welcome any time he can make the "Windy City." The first and third Fridays of every month are the dates—Sherman Hotel, the place, 8:30, the time—and we want to see all of you fellows here.

Students and graduates may receive full information about our activities by writing Mr. Samuel Juricek, Secretary, 4223 N. Oakley Ave., Chicago, Illinois.

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Answers to Three Guesses

- | | |
|----------|-----------|
| 1. False | 6. True |
| 2. True | 7. False |
| 3. False | 8. True |
| 4. False | 9. True |
| 5. True | 10. False |



More Advice for Graduate Hayworth

I do not think the Radio serviceman should compete with the appliance repairman in his community. If there is none, then I believe he might handle what he could without slighting his Radio work. Of course, minor adjustments and repairs would be in order mostly as a means of creating good will.

As to selling Radios, I most certainly would encourage all servicemen to do so. A serviceman should not use much pressure as that will eventually have a bad effect on his stock in trade "Servicing." He will get plenty of openings. For instance, on a service job we often hear, "Maybe it's not worth fixing." That's your opening to ask if the customer would be interested in trading it in on a new Radio, etc.

H. E. BECKER,
Grand Lodge, Mich.

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I would like to submit my opinion on the question of side lines for the Radio servicemen. Previous to enrolling with N. R. I., I had several years experience in Radio servicing with prominent firms (two and one-half years as Service and Claim Adjustment Manager for one of Sears Roebuck & Company's leading stores of southwest Texas), and I have also maintained a service shop of my own.

There are several factors to be considered in answering Mr. Hayworth's question—mainly, the type of the firm, whether it is a sales-service or solely a service organization. If the former, I'd say sell all the merchandise you can along with your service work, especially such merchandise as will require your services in repair work later. By so doing, as long as it doesn't interfere with your service work, you are making yourself immediately more valuable to your employer, building a steadily increasing demand for your services in repair work. Thereby you promote both your own and your employer's interests at the same time.

On the other hand, if you are conducting or are employed by a purely service organization, I'd say stick strictly to servicing. In this case,

the more you impress upon the public that you are a service specialist, the more confidence your customers will place in you. This often leads to connections with sales organizations who, knowing that you are not a competitor, will value your advice as being impartial.

Above all, sell yourself and service *first!* You thereby gain the confidence of your customers and, if desirable, can arrange for them to purchase merchandise *through* you at a profit to yourself without their feeling you are selling them something. But never let sales interfere with your service, nor undertake competitive selling of merchandise with another customer whom you are serving.

Primarily, sales and service do not mix well, as one must be sacrificed to the other to a certain extent. Specializing in service—and sticking to it—I find, will eventually pay bigger dividends.

FRANK MILLS,
Bynum, Montana.

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Additions to List of N. R. I. Hams

—who own and operate their own stations:
J. R. Villalon—CM2BD—Habana, Cuba.
Jesse F. Beeler—W3FTC—Louisa, Va.
W. J. Barr—W5EFM—Fort Sam Houston, Tex.
Ronald F. Watts—VE4MR—Edmonton, Alta., Can.
Kenneth Hughes—VE4XS—Calgary, Alta., Can.
Raoul Santos—W1BET—New Bedford, Mass.
R. N. Halliburton—W4DLK—Nashville, Tenn.
William Sneed—W4DZZ—Winston-Salem, N. C.

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Compliments

I like the NATIONAL RADIO NEWS very much and enjoy reading every page of it. It has more useful information than any other magazine I have read. I find the service notes to be very helpful, too.

GRADUATE LLOYD EVELAND,
Tonkawa, Okla.

Celebrate Anniversary of Transformer

THE feat performed on March 20, 1886, in Great Barrington, Mass., by William Stanley, inventor of the transformer, was duplicated on the evening of March 20th at Pittsfield, Mass. The meeting was one of many throughout the country celebrating the 50th Anniversary of the transformer and the alternating-current system of electrical transmission and distribution.

Cummings C. Chesney, now an honorary vice-president of the General Electric Company, was the principal figure at the celebration, when a portrait of Stanley was unveiled and the original Great Barrington experiment repeated in miniature. Mr. Chesney, the only remaining member of the Stanley-Kelly-Chesney trio which perfected and built the alternating-current system of generation and distribution, lighted a replica of Edison's original incandescent lamp with a replica of the original Stanley transformer in the presence of Mrs. Stanley.

The alternating-current transformer, keystone of modern electrical distribution systems, was designed by William Stanley in 1885. A year later he set up and placed in operation the first

system employing this then unconventional method. Five years later he established the Stanley Electric & Manufacturing Company in Pittsfield, and with John F. Kelly and Cummings C. Chesney brought out the famous S-K-C system of alternating-current generation and transmission. In 1901 the Stanley company was acquired by the General Electric Company and since that



C. C. Chesney with replica of the original Stanley transformer and incandescent lamp.



William G. Stanley

time the plant has grown to be one of the largest in the world devoted exclusively to the manufacture of alternating-current transformers.

Stanley's first transformer was a tiny device easily held in one hand. Since then, transformers weighing hundreds of tons and with electrical capacities up to 287,500 volts have been made in the plant to which his genius gave birth.

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Zenith Gets Share of Increase in Radio Business

That 1935 was a big year in Radio—and that 1936 promises to be even bigger—is shown by the earnings of one Radio manufacturer just made public.

As compared with a loss of over \$90,000 for the same period of the preceding fiscal year, the Zenith Radio Corporation reports a profit of over \$1,000,000 for the nine-month term ending January 31st. With the exception of 1929, this is the biggest profit ever earned by Zenith in a similar period, and the volume of business continues to grow, said an official of the company.