National RADIO News

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IN THIS ISSUE

J. E. SMITH, President
National Radio Institute

Just around the corner

DAD is ready for the office. Little Billy is pulling on his last shoe. The table is set, breakfast is ready. Then Mother discovers that the sugar is very low—she forgot it yesterday while at the store. Nothing serious, though, breakfast isn't even delayed while someone goes for a couple of pounds. There is a little store *just around the corner* where it may be purchased.

Breakfast over, Dad climbs into his car and starts for the office. He glances at the gauge on the dashboard. "Gosh, my gas is low. Can't get down town on that." But there is no cause to worry. There's a filling station *just around the corner.* He'll fill up there. Won't even be late for work.

You run to catch the 8:05 trolley to town; it leaves the corner ten seconds before you arrive. You give way to a "blankety blank !*‡? street car," but then remember there's another one at 8:10. In fact, it's probably *just around the corner* and will be in sight in another few minutes.

Little Billy becomes ill in the night. Dad rushes to the phone—puts through a call. In thirty minutes Billy is "resting easily." The doctor has just been there and gone. The doctor lives *just around the corner.*

The grocer, the gasoline man—the butcher, baker and candlestick-maker all are within easy reach. They are ready to answer your beck and call. You can get them on short notice—when you need them most. This works out with most everything you require for your everyday life.

MOST EVERYTHING! But *not* EVERYTHING!

You hear of a fine job that is open—a job which would double your pay—has wonderful future possibilities. Just the kind of job you have always wanted. The requirements are that you have certain qualifications — you don't have them — then what?

Simply, you don't get the job—someone else does. You're still in the rut, hoping. There's someone else in the job, climbing to success.

WHY?

You can buy sugar and gasoline—you can even call the doctor on short notice. They are *just around the corner.* But Training—preparedness, those necessities for filling good jobs are NOT *just around the corner.* You cannot order them over the phone —you cannot run around the corner and buy them off of the shelf.

The good job will not wait for you to obtain your Training. It must go to the man *who is ready.* There are good jobs right now, TODAY, going to *men who are qualified to take them.* NOT, mind you, to men who decide today to train for them.

It is just a matter of being ready when opportunity presents itself. Your big opportunity may be *just around the corner,* but you can't go *just around the corner,* any old time the notion strikes you, and pick up the qualifications for getting and holding that job.

Think it over! Be ready for your job when it comes along.

A New Era in Public Address

by S. Ruttenberg, The Amperite Corp.

CARNEGIE HALL, New York — Burton Holmes, the premier traveloguest, was escorting his audience thru Sunny Spain. One of the more expensive carbon microphones was used in the sound reinforcing system—the voice emanating from the speakers was loud and clear. But after the audience toured Sunny Spain for about half an hour—they started to tire—became restless. They squirmed in their seats. The speech was clear—but the constant mechanical sounding peaks of the microphone diaphragm tired them.

During intermission several complaints were made against the "mechanical contraption." A P.A. man was called in. He substituted a velocity for the carbon. There were no peaks—the voice was natural—not mechanical. Like gravity—it was always working but you could not tell it was there. That is the way a system should sound.

The above incident is typical of the new era in public address work. Microphones with studio quality—capable of perfect reproduction without mechanical peaks are now available to the P. A. man. The whole P. A. field is wide open for replacement. And those who would not accept "mechanical sounding" contraptions are in the market for a natural sounding system.

A tremendous field which is wide open in every community is microphone installations in the footlights of theatre stages. Formerly, the microphone cost for the average stage installation was at least $600.00. Today equal fidelity can be obtained for $150.00 with the added advantage of the feedback trouble eliminated. Not only the larger theatres, but practically any theatre can afford such as installation. It is an excellent asset for amateur nights or similar special occasions.

Only the size of a match box and hanging from the shoulders. the new junior velocity microphone also opens a great many fields. It has practically the same output as a large velocity. Gives equal output with the head in any direction and is always the correct distance from the speaker. Walking after dinner speakers will find it mighty hard to walk away from the junior velocity. It gives the amusement park "barker" plenty of freedom and saves his lung power. Sport broadcasters can jump around as they please—the little microphones will always be right there. Lecturers can turn to explain their charts without any decrease in output. It can be sold to churches—and last but not least. the man in the corner drug store demonstrating corn cures will sound like himself and not like a very old and worn gramophone record.

And here is microphone news of importance—the little velocity will soon be available with a high impedance output. That means it can replace any condenser or crystal microphone without any circuit changes. You can feed it directly into the grid of a tube. Some more news—no pre-amplifier is necessary with high

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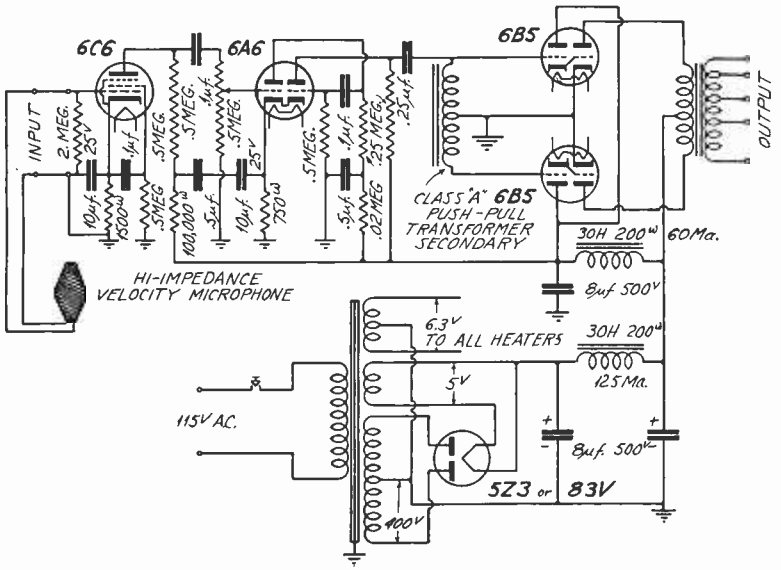

The high impedance velocity can be used directly into this three stage amplifier without the use of a pre-amplifier.

E. R. HAAS, Vice-President and Director

In this article "Spare Tire" Mr. Haas has a message for that large class of N. R. I. students and graduates who have not studied Radio with an idea of commercializing on it. They entered Radio without any idea of financial returns merely studying as a hobby—for the advancement of their personal knowledge of this fascinating science.

Spare Tire

THE height of optimism, they say, is a fellow who starts out on a long automobile trip with four worn out tires, and no spare.

Something is mighty likely to happen—and something unpleasant, at that.

There are any number of men in this country who are driving on badly worn tires. What I really mean, is worn out businesses—failing industries. It is well to have a spare.

Look what closed cars did to the automobile top business. Look what automobiles and tractors did to the wagon builders, wheelwrights, and blacksmiths. Look what sound pictures did to the silent films, and what Radio did to phonographs. Just about ruined them—in a few short years.

No one knows when a new invention—some discovery or other—will start an industry to skidding, throwing out of work men who have spent their lives in it. A deplorable condition, we must admit, but it is a part of the rapid-fire progress we've become accustomed to in this age.

Suppose such a thunderbolt hit your business—what would you do? WHAT COULD YOU DO?

If you have a family—wife, children, mother, dependent upon you, would you expect them to face hardships because you can't provide what they've been accustomed to?

Not if you're a real man you won't. You'll carry a spare.

N.R.I. Graduate George D. Honert, of Ligonier, Indiana, writing to the Institute, said, "I had a job as foreman in a factory. It looked fine—the future looked bright. But the factory closed, and I was out of a job. My wife and I often wonder what we would have done if I hadn't had my N.R.I. Training to fall back on. It pulled me through." When Honert needed it most he had a spare.

And R. S. Lewis, Pittsfield, Illinois, wrote, "I'd be unemployed or digging ditches now, if I didn't have my N.R.I. Training." Lewis carried a spare.

I could point out hundreds of such cases, taken from the files here at the National Radio Institute, cases of men who had the bottoms blasted out of their jobs—who would have had no place to turn for a livelihood—no means of supporting themselves, their families, had it not been for the spare tire they carried, their N.R.I. Training in reserve.

Cease looking upon your Radio studies as a hobby, a diversion. Look upon them as a safeguard to future happiness. Study—keep up-to-date—be prepared.

Even though you don't use your Radio Training right at the moment, carry it as a spare tire. Punctures and blow-outs seldom come when you expect them. They usually come when they are least convenient—when you are a long distance from any help.

Carry your Radio Training as your spare tire—and have it in good condition. Have it ready for any or all emergencies. You never know when you may need it—you never know when it may pull you out of a bad spot.

———*n r i*———

Did you ever take a jar of beans—big beans and little beans—shake it, and watch the big fellows work their way up to the top?

That is exactly what is happening in the Radio industry today. The *really big men*—those who study, prepare themselves, and are always ready for the job higher up, are pushing their way up to the top of the heap. The *little fellows*, the men who are trying to get by on insufficient knowledge, hit and miss methods, are being shoved out of the way, into the little crevices and ruts which are formed by the big fellows' progress.

It will be mighty tough, a few years from now, to sit on the side lines—in the same old job, at the same old pay, and watch the other fellow, who has worked his way up to the top, enjoying a fine income, and every one of the pleasures that goes along with it.

Effect to Cause

The Service Forum

Service Tips

PHILCO MODEL 15 — ADJUSTING THE SHADOW TUNING

When the Models 15 are shipped from the factory, the shadow tuning box is purposely set back from the bezel about ⅛ inch. This is done to avoid damage to the box during shipment through vibration of the meter against the back of the bezel.

When the set is placed in operation, first loosen the chassis hold down bolts enough to allow the chassis to float on its soft rubber support pads. See that all tubes are properly seated in their sockets. Connect the power cord to an electric outlet of the proper voltage and frequency, and turn on the power switch. Loosen the two mounting screws in the shadow tuning box, move the box forward to the bezel, and adjust the position of the box so that there is an equal amount of light on either end of the shadow.

In some cases it may be necessary to adjust the position of the light bracket in the rear by bending slightly to obtain a sharp-edge shadow and to center the shadow properly. It may also be necessary to adjust the position of the lamp in its socket. Ordinary pilot lights with inverted U-shaped filament will not be entirely satisfactory since they do not produce a sharply defined shadow. The new Philco pilot lights have been designed to produce greater concentration of the light at the desired point. For best results the filament supports should be parallel to the back of the meter.

———*n r i*———

PHILCO MODEL 200X — RATTLE

In rare cases on the Model 200X, a slight rattle, similar to a speaker rattle, may be experienced. This is caused by resonant vibration of the metal sound diffuser mounted in front of the speaker. The rattle can be eliminated by bending one or more of the blades slightly by experiment.

New facory production in the diffuser is now being covered with a special sound-deadening paint which completely eliminates any tendency to rattle.

———*n r i*———

CROSLEY MODEL 124 — MOTORBOATING

Check the secondary of the input push-pull transformer. A short due to temperature rise sometimes develops causing a motorboating effect.

RADIOLA RCA 33 — HUM

This condition can generally be remedied by connecting an 8 mfd. condenser rated at 450 volts across the 1900 ohm resistor, which furnishes the C bias of the 171A tube.

———*n r i*———

PHILCO 20, 20A — INTERMITTENT RECEPTION

This is most often caused by a defect in the coupling condenser connected between the plate of the detector 24 to the grid of the 27 1st A.F. The remedy is to replace that .01 mfd. condenser marked 19 with another one part No. 3903F.

———*n r i*———

PHILCO 70, 70A — EXCESSIVE HUM

This is generally caused by a 6 mfd. condenser No. 38 not making a good contact on the chassis. Disconnect this condenser. Clean the chassis and the condenser. Put it back; and everything will be fine.

———*n r i*———

PHILCO 90, 90A — INTERMITTENT RECEPTION

This condition can be cured by replacing the condenser marked 28 .01 mfd. with another one part No. 3903P which is located between the plate of the 27 1st amp. to the grid of the 47 A.F.

———*n r i*———

RCA MODELS 44, 46, 47 — LOW VOLUME

Incorrect number of turns in twisted portion of leads under shield to local-distant switch. The loading coil and condenser leads (green and black) should make two complete turns inside of the shield with the antenna lead making one turn.

———*n r i*———

ATWATER KENT MODEL 40 — LOW VOLUME

Check up on the grid leak. Oftentimes corrosion at the terminals of the original leak will cause trouble. Replace with a new grid leak employing pigtail connection, soldering the leak in place. Experiment with the value of the leak for best results. About 2 meghms should be right.

———*n r i*———

CLARION MODEL 320 — OSCILLATION

Check the by-pass condensers for opens by shunting them with others of about the same

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How One N.R.I. Graduate Worked his way to Success

DALE HOAG,
N. R. I. Graduate

FROM a high school youth to a successful Radioman in eight years—that's the record of Dale Hoag, N.R.I. graduate of Saginaw, Michigan.

While still a junior in high school, while most fellows in his class were devoting their spare time to athletics, social functions, etc., young Hoag became interested in Radio and decided to learn more about it. He became an N.R.I. student and studied Radio along with his high school subjects. He used his spare time profitably. He used it to get the Training he needed to put him ahead in the game of life.

Almost from the day he started taking the N.R.I. Course, he began working into the Radio profession. In fact, it was just a matter of about two weeks after he started his Training when he was engaged by a dealer, in his city, to help out with the Radio service work.

Hoag claims that he did not find the N.R.I. Course of Training the least bit hard. There were times, of course, when he did run into little snags which had to be ironed out, but with a natural ability to overcome obstacles, and a burning ambition to become a successful Radioman, he went ahead with his Training and graduated.

The boy's own ability and the value of N.R.I. Training were rapidly demonstrated. In his first year out of high school he obtained a position with a branch office of the Sparton Radio Company at $1,600 a year. That, we must admit, was a mighty good salary for a young fellow 18 years old. There were plenty fellows, two or three times his age, right in his locality who were not making that much.

From this position he advanced rapidly. He became Chief Tester for the United Reproducers Corp., at $2,000 a year. He reports that in the meantime he was receiving letters from all over the United States offering him Radio employment; this through the activities of the N.R.I. Employment Department.

One of the high spots in Dale Hoag's early Radio career was when he had the honor to be selected as a delegate to the N.R.I. Graduate Convention, in Washington, D. C., during the latter part of the year 1929. It was at this Convention that the N.R.I. Alumni Association was organized. Hoag was one of the originators of this movement—a Charter Member of the N.R.I. Alumni Association. His name stands engraved in silver, in the halls of N.R.I., a lasting tribute to those men who fearlessly pioneered a new idea, the first and only known Alumni Association of a home study school.

Hundreds of thousands of other young men have been idle during the period of depression through which our country passed, but Hoag due to his foresight, his training, his ability, has had steady employment throughout all the dark months of business adversity, as Chief Engineer of the Service Department of the Wilkes Distributing Company, distributors of Sparton products in the State of Michigan.

Some of the ideas which he has carried out, and which have been instrumental in his success are covered in an article written by Mr. Hoag for the Saginaw *News*, a newspaper of Saginaw, Michigan. We quote from Mr. Hoag's article:

"When a Radio is brought into an efficient establishment, it is first cleaned and the tubes checked. Then the actual trouble is diagnosed and repaired. From this point, the set is run through a series of tests, in which each part is checked for possible defects and, if necessary, replaced. Then it is connected to a sensitive oscillator, where it is adjusted to the manufacturer's original specifications as to tone, selectivity and sensitivity.

"The serviceman has to bear in mind that he must please the customer whenever possible. All small defects, no matter how trivial, which the customer reports, must be repaired. The customer is not usually a technically minded person, and he sees such defects in the same light as the more serious ones. Also, he must be shown how to operate the set correctly, and local reception conditions must be explained to him so he will not blame the set for conditions peculiar to his neighborhood."

In our opinion, Dale Hoag's success formula can be boiled down to ambition, plus training, plus good common sense, equals Success in Radio.

The Cathode Ray Oscillograph

and

Its Use in Radio Servicing

Part 2

Part I of this article appeared in the June-July Issue of National Radio News.

By Joseph Kaufman, N. R. I.
Supervisor of Education

SIMPLE APPLICATIONS

IN Part I of this series of articles on the cathode ray oscillograph, I explained how the tube functioned and how the assembled bench unit worked. We are now ready to learn some of the more simple uses.

Visualizing the Line Voltage with a Linear Sweep

Almost instinctively every new owner of a cathode ray oscillograph will screen the A.C. supply line voltage. By applying the line voltage to the vertical plates and through the controlled amplifier, the amount of deflection can be controlled from a negligible amount to a value sufficient to throw the line vertical above and below of the screen. The 110 volt, 60 c.p.s. supply line may be connected directly to the vertical input, but if you wish to use the amplifier I suggest that you apply the voltage through a step-down transformer. Now by shifting the controls on the oscillograph to self-synchronization, and regulating the linear sweep frequency control, you can make an adjustment which will place on the screen the steady, single sine wave pattern shown in Fig. 11A; you may also see other peculiar patterns. Let us reason out the possible patterns.

If the analyzed voltage has a frequency *f* and the linear sweep current has the same frequency *f*, the spot will move up and down once for each sweep wave and a single sine wave will be seen, as in Fig. 11A. Now suppose the sweep frequency is 30 c.p.s. while the analyzed wave is 60 c.p.s.; that is, the linear sweep frequency is *f/2*, where *f* is the frequency of the analyzed wave. When the spot has only moved across the screen one-half the horizontal distance, the vertical movement or excursion has been one cycle; thus in a single complete linear sweep two complete cycles of the sine wave voltage will be reviewed, as in Fig. 11B. And for a sweep frequency of *f/3*, *f/4*, *f/5*, etc., *3*, *4*, *5*, etc., complete waves will be viewed.

What will be seen if the linear sweep frequency is *2f;* that is, when analyzing a 60 c.p.s. voltage a 120 c.p.s. sweep voltage is used? Let us picture in our minds what would appear. The linear sweep voltage will move the electron beam horizontally across the screen twice for each cycle of the analyzed. Assume that on the first sweep the positive alternation of the analyzed voltage is screened; at the next sweep the spot in the vertical direction moves negatively but starts at the extreme left, giving us an alternation below the zero line. The pattern will appear as shown in Fig. 11C. The two "back traces" of the linear sweep are taking place on the same portion of the screen so that the one back trace covers up the other. A slight adjustment of the control for the linear sweep frequency will separate the two back traces so the pattern of Fig. 11C will change to the one

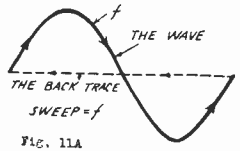

Fig. 11A

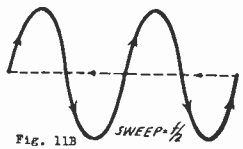

Fig. 11B

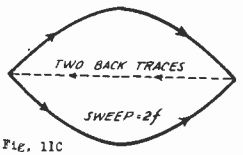

Fig. 11C

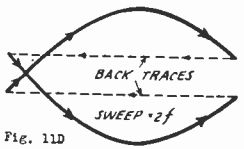

Fig. 11D

shown in Fig. 11D. Nevertheless, if you follow through the complete pattern you will observe that for two sweeps only one complete wave is shown. Hence the sweep frequency must be twice that of the analyzed voltage. These various patterns for a 2 to 1 frequency ratio, and there may be an infinite number, are due to phase relationship; or to put it in simpler form, due to the fact that zero analyzed voltage happens to come at different points of the sweep voltage.

In the N. R. I. laboratory, Mr. Rohrich has found it easiest to identify a frequency ratio which exists between the analyzed voltage and the linear sweep voltage by counting the number of loops at the top of the pattern for the analyzed voltage and counting the number of back traces for the linear sweep voltage. Thus in Fig. 11A there is one loop at the top and one back trace, showing that the ratio is 1 to 1. In Fig. 11B there are two loops at the top and one back trace, showing that the ratio is 2 to 1.

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The Cathode Ray Oscillograph (Continued from page 7)

In Figs. 11C and 11D you will find in each case that there is one loop at the top and two back traces, showing that the ratio of the analyzed sweep voltage frequencies is 1 to 2.

Patterns 11A, 11B, 11C and 11D portray the simple cases. What would you expect to see if the sweep is 3f? If the spot starts from *A* at the extreme left in Fig. 11E, at the end of the first sweep the spot will execute only one-third of the analyzed vertical voltage variation. The

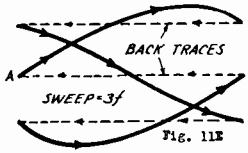

Fig. 11E

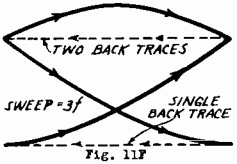

Fig. 11F

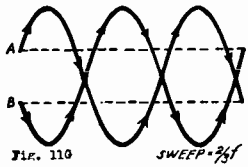

Fig. 11G SWEEP=2/1f

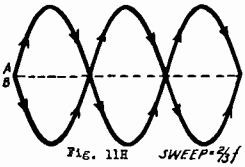

Fig. 11H SWEEP=2/3f

spot will be snapped back to left to continue on its vertical up or down movement, and will be snapped back three times before the cycle will repeat. Figure 11E is what you would see. The pattern will have three bright curved lines and three very faint horizontal lines, which I have been calling the "back trace." With a slight shift in the sweep frequency control the 1 to 3 pattern will shift to produce Fig. 11F. Obviously when the sweep is 4, 5, 6, etc., times the analyzed frequency, you will observe 4, 5, 6, etc., bright curved lines and the same number of back traces.

So far I have considered the conditions where the analyzed and sweep voltage bear a multiple (*1, 2, 3,* etc.) or sub-multiple relationship (*1/2, 1/3, 1/4,* etc.). Now what would you see if the analyzed frequency divided by the sweep frequency was 3 to 2, for example, if the analyzed *f is* 60 c.p.s., while the linear sweep frequency is 40 c.p.s.? In order to get the steady pattern, the spot must be traced from the extreme left and back to this starting point. That is what I did in drawing Fig. 11G, where I considered either *A* or *B* the starting point. Notice that there are three loops at the top and two back traces, showing that the ratio is 3 to 2. With a slight shift in the sweep frequency control the back trace *A* of Fig. 11G will coincide with the back trace *B* and this will form the pattern *11H.* In fact, you will notice that it is extremely difficult to hold the patterns stationary in all instances unless you use a maximum adjustment of the synchronizing control. Then the patterns will be distorted and will not appear as regular as that shown in Figs. 11G or 11H, but will look more like Fig. 11J. However, you will notice that again it is an easy matter to identify this 3 to 2 ratio pattern by counting the number of loops at the top and then counting the number of back traces to complete the identification.

It is sometimes difficult to see the complete back traces but this does not matter as the open ends on the left of the patterns, as at *A* and *B* in Figs. 11G and 11H, will readily allow you to determine where the back traces do exist.

Frequency Determination

With this information you will have no trouble at all in identifying frequency ratio patterns by visual inspection as they appear directly on the screen with 9 or 10 loops and 12 or 13 back traces. A greater number of loops and back traces can be determined if the pattern is photographed with a camera but for practical purposes this is seldom necessary because one of the simpler ratio patterns always can be formed by changing the vertical frequency of the linear sweep frequency for purposes of calibration.

You can now calibrate the sweep frequency generator by using known sources of vertical frequency and applying the formula:

$$\text{Linear sweep frequency} = \frac{\text{No. of back traces } \textit{times} \text{ vertical frequency}}{\text{No. of top loops.}}$$

To illustrate the formula let us say we have 60 c.p.s applied to the vertical plates. We get the pattern *11E* with one loop and three back traces. What is the sweep frequency? Substituting our known values in the right-hand side of the formula we find that the linear sweep frequency has a value of $\frac{3 \times 60}{1}$ or 180 c.p.s.

By getting various steady patterns and tabulating the position of the sweep frequency control, it is possible to calibrate the sweep control as to frequency.

Now that we know the c.p.s. of the sweep frequency, we can determine the c.p.s. of an unknown voltage which we will apply to the vertical plates. It is only necessary to rearrange the formula as follows:

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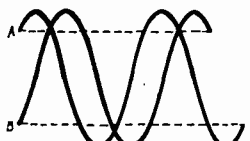


Fig. 11J SWEEP=3/2f

Studio "Don'ts"

by Earl Merryman

Control Engineer, Radio Station WJSV, Alexandria, Virginia. Secretary, N. R. I. Alumni Association

MOST every Radio man, at some time or another, will be called upon to speak over a microphone. This may be in a Radio station, as an announcer, or as a performer, or it may be in the use of a public address system. I have been asked, so many times, to give advice to fellows who are "going up against the microphone for the first time," that I have submitted the following list of "Don'ts" which I have compiled as the result of many years experience in the "Control Room."

Don't cough or sneeze into the microphone, as the engineer is not prepared for such a large increase in level. Some cases have been known where a sneeze or a cough kicked the transmitter entirely out of commission.

Don't permit any part of your body to touch the microphone. The body stores a quantity of static electricity. If the microphone is touched by the hands or face, there will be a discharge to ground, which will cause a spark. The microphone will pick this up, causing a hit on the program. Some of these discharges are strong enough to sound like the discharge of a pistol.

If you are in a large studio, don't stand or sit too far from the microphone. If you do, your voice will sound boomy, as if you were talking in a large hall.

Don't be late for a broadcast. Always allow yourself at least 15 minutes ahead of your scheduled appearance. This will save many grey hairs for the production department, announcers, and engineers.

Don't talk straight into the microphone if your "B's" or "T's" make a "putting" sound, or if your "S's" whistle, or your false teeth rattle. Always talk over, below, or across the microphone.

Don't turn the papers of your speech or your music. Allow each sheet to slide off and drop to the floor when you have finished with it.

Be careful that you do not kick or hit the microphone, or step on the microphone cables, as this causes hits and crashes on the program.

When you have finished your talk, do not move out of the chair, or make noises of any kind. Usually the announcer has to sign your program off, and any noises are picked up by the announcer's microphone. This results in room-noise, which is not appreciated by the production department.

Wait for the Control Engineer or announcer to give you the signal to start. When you are given the cue to stop, by the announcer, *stop* at the end of the next sentence.

Don't tap on the table with your pencil or your finger. Don't bang your fist on the table to emphasize your remarks. Don't set the water glass down hard—the microphone picks up these noises and amplifies them beyond your imagination.

Don't turn your head to look at the clock. The announcer will keep you posted on your time, and turning your head causes variations in level.

Time your talk before you go to the studio. Radio shows are run off to the exact second. On a fifteen minute talk you must make allowance for an opening and closing announcement, which gives you perhaps twelve or thirteen minutes. A show that runs over or short is considered poor production, and someone at the station gets blamed.

Don't talk too loud. Speak in your normal tones. Microphones are very sensitive, and will pick up and reproduce your voice in its natural tones.

Don't mistreat the studio pianos. These instruments are kept in perfect tune, and if you try to see how hard you can hit them, they will soon be out of tune.

Don't smoke in the studios. The ventilation systems in the average studios are poor. It takes quite sometime for the air to change, and the artist or speaker who follows you gets the smoke you leave.

———*n r i*———

American Radio Hardware

Attention of all readers of NATIONAL RADIO NEWS is called to the new catalog of the American Radio Hardware Company, Inc., 135 Grand Street, New York City. It contains a full line of Radio Hardware: screws, bolts, washers, prods, tips, lugs, jacks, etc. A letter to this company will bring you a copy of the catalog, free, which includes a list of their numerous sales offices, and their addresses, in the United States and Canada.

———*n r i*———

Iowa farm income was 43% higher in the first three months of 1935 than in those same months in 1934. Think this over, you Iowa Radiomen. There's a good market for sales, service, etc.

size known to be in good condition. If the plate or control grid leads have been disarranged, oscillation will probably result.

———n r i———

CROSLEY MODEL 30S — VOLUME CONTROL FAILURE

A common complaint is failure of replacement controls to reduce the volume sufficiently on strong stations. The remedy is to short the 3,500-ohm resistor in series with the control entirely out of the circuit.

———n r i———

ECHOPHONE MODEL 60 — DEFECTIVE FILTER CONDENSERS

Faulty operation of the volume control is usually caused by a defect in the filter condensers. These condensers are located directly under the power transformer.

———n r i———

EMERSON B ELIMINATOR

Many receivers using Emerson motor generators or dynamotor B eliminators for power supply have a tendency to have low volume after several months' use. This is caused by lowered B voltages in turn due to failure to oil the bearings of the generator. This of course results in reduced speed and lowered voltage.

———n r i———

GENERAL ELECTRIC MODEL K85 — DEAD SPOTS

Try several new 2A7 tubes in the oscillator stage. To cure a howl on strong signals, shield the grid lead of the 2B7 second detector tube.

———n r i———

GRUNOW MODEL 501 — MOTORBOATING AND NO SIGNAL

This is generally due to an open filter condenser. The installation of a new 8 microfarad condenser should clear up the trouble.

———n r i———

HOWARD HIGHWAYMAN — VIBRATOR DIFFICULTY

If the fuse in this receiver blows out frequently and the insulating sleeve has been properly placed over the fuse the trouble is probably in the vibrator. In such a case the vibrator should be replaced—never attempt to adjust the vibrator. In this set polarity is unimportant and therefore no changes are necessary whether the car battery has its positive or negative terminal grounded.

———n r i———

MAJESTIC TWIN SIX MODEL 66 — INTERMITTENT

Try a new G6A7-S tube regardless of the way in which the old one may test.

MAJESTIC MODEL 330 — INTERMITTENT

Check the 10,000-ohm screen resistor of the last I.F. tube, replacing if not normal. Also test the I.F. transformer for continuity as expansion sometimes breaks the leads and an intermittent contact results.

———n r i———

MAJESTIC MODELS 400, 411 and 413 — DEAD

This is generally due to failure of the oscillator tube to function. Try a new tube—you will probably find one which will work satisfactorily. To make a permanent repair however change the value of the oscillator bias resistor. This is done by replacing the 250-ohm section with one having a value of about 160-ohms and the 2,000-ohm resistor in series with it with one rated at 2500-ohms.

———n r i———

MAJESTIC MODEL 440 — BLOWS FUSES

Replace the 6Z5 rectifier tube with a 6Y5 type tube and install a .1 microfarad condenser rated at 300 volts across either side of the line. It is necessary to remove the chassis in order to replace the fuse.

———n r i———

MOTOROLA TWIN EIGHT AND DUAL SIX — NO SIGNALS AT HIGH FREQUENCY END OF THE DIAL

Try several tubes in the oscillator stage as not all tubes will function satisfactorily even though they check okay in a tube tester.

———n r i———

MOTOROLA TWIN EIGHT AND DUAL SIX — VIBRATOR NOISE

To clear up the buzzing noise coming from the vibrator pack tighten the self-tapping screw which holds the vibrator pack in the housing. This is located on the bottom of the set and also holds the cover on at the bottom.

———n r i———

MOTOROLA MODEL 44 — DEAD

If the power supply unit hums take the vibrator unit apart. You will find two small flat condensers on top of the reed unit. The reeds may be identified from the outside by tracing the red and green rubber covered wires. The original condensers should be removed and replaced with Mallory No. 16611-A oil condensers.

———n r i———

PHILCO SHADOWGRAPH MODELS — ALIGNING

When a shadowgraph is employed you can use it as an output meter when aligning the set. Make the adjustments for the narrowest shadow.

(Page 15, please)

The Cathode Ray Oscillograph (Continued from page 8)

$$\text{Vertical frequency} = \frac{\text{loops } \textit{times} \text{ sweep frequency}}{\text{back traces}}$$

Let us say we have an audio oscillator or a test record or test film which produces the pattern shown in Fig. 11G when the sweep frequency is 180 c.p.s., as determined previously. What is the frequency that is being produced and applied to the vertical plates of the oscillograph? We have three loops, two back traces and the 180 c.p.s. sweep frequency is known; we substitute in the formula and get $\frac{3 \times 180}{2} =$ 270 c.p.s. This shows us that the frequency produced by our test equipment is 270 c.p.s. We can now use this as a known source of frequency and extend the calibration of the linear sweep frequency oscillator by applying the first formula.

Voltage Analysis with Harmonic Sweeps

Quite often in analytical work it is wiser to apply a sine wave voltage to the horizontal or sweep plates. Entirely different patterns will be observed. We can quickly visualize what will appear by following the spot under the influence of the two voltages. Let us first consider equal and similar sine waves applied to the plates, as shown in Fig. 12. The spot is originally set in the center. Under the influence of the sweep and analyzed voltage the spot moves to points *1*, *2*, *3*, *4*, *5* and *6*. As both voltages are in time phase (equal at each instant) a straight line is obtained at an angle Θ, equal to 45 degrees. As long as the voltages are in phase a straight line will be observed: if the sweep voltage is larger than the analyzed voltage, Θ will be less than 45 degrees; if the sweep voltage is less than the analyzed voltage, Θ will be greater than 45 degrees.

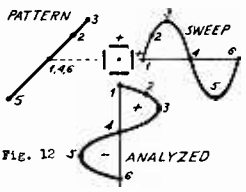


Fig. 12

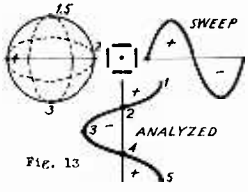


Fig. 13

Suppose the analyzed voltage leads the sweep voltage by 90 degrees as shown in Fig. 13. The spot will follow the circular pattern, *1*, *2*, *3*, *4*, *5*. Now when this phase difference is maintained and the voltage values are changed, the pattern instead of being a circle will be an ellipse, symmetrical with respect to the vertical and horizontal axis, shown by the dotted patterns in Fig. 13.

On the other hand, if the sweep voltage has a frequency twice the frequency of the analyzed voltage, a pattern as shown in Fig. 14 will be obtained. These patterns are called Lissajous' Curves, after the man who first analyzed them. These figures may also be used to determine frequency. The *ratio* of *side* contacts to *top* contacts is the ratio of *sweep* to *analyzed* frequencies. The patterns will change as the phase difference at point *1* is varied but the rule still holds good. The use of a linear sweep voltage to determine frequency is preferred by most technicians.

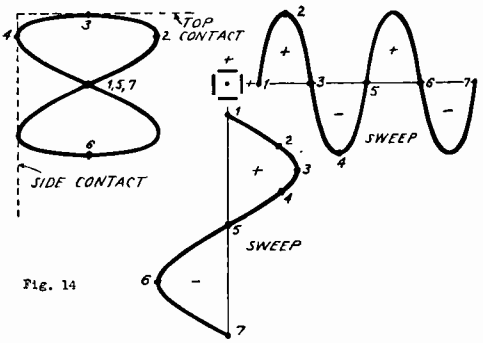


Fig. 14

Phase Determination

If we are given two voltages of equal frequency and were asked to determine their phase relationship, you may quickly determine this value by applying our voltage to the vertical and the other to the horizontal plates. The patterns observed are shown in Fig. 15. If the reference voltage is applied to the sweep plates, a line leaning to the right indicates "in phase," a line leaning to the left indicates 180 degrees "out of phase," with the intermediate loops having meanings as indicated.* This merely gives a rough idea as to phase.

More exact values may be determined by measuring certain distances of the pattern. A scale should be mounted on the screen, the spot centered in the scale, and the two voltages applied. The width of the loop along *0x*, the horizontal line of the spot is measured; call it *d*. Next the greatest horizontal movement is measured, call it *D*. The value *d/D* (*d* divided by *D*)

*When the deflecting plate on the top (north) and the plate on the right (east) are originally biased +. In some oscillographs the west or left plate is +, and a line leaning to the left indicates "in phase."

(Page 12, please)

The Cathode Ray Oscillograph (Continued from page 11)

is the sine of the phase angle. Compute the value of d/D and refer to a trigonometry table, under sines. This will give you the angle. If the loop leans to the right the angle computed is the phase angle; if the loop leans to the left add 90 to get the true phase angle.

Voltage and Current Determination

As the deflection of the electron beam is proportional to the voltage applied, we have a means of measuring voltage. We may dispense with the sweep circuit and use the vertical plates. As the maximum deflection is dependent on the peak voltage (we are measuring A.C., A.F. or R.F. voltages) it is necessary to calibrate the deflection against root mean-square (effective) values. With the voltage amplifier at a definite gain setting (usually on full) or without the use of the amplifier, a known A.C. (low frequency may be used) voltage is applied. It is wise to apply a voltage of 1, 10, 100 volts. The spread from zero is measured and a scale made divided in ten equal parts. This scale may be clipped to the screen and used in measurements. If higher voltages or more accurate readings are desired, the beam originally placed in the center may be moved to a lower vertical position. Peak voltages may be measured by multiplying the scale reading by 1.41, assuming the device was calibrated on and is measuring sine waves. Before taking a measurement, be sure the spot is located at the zero scale position, and the brilliancy of the spot not enough to burn the screen.

Circuit currents may be determined by measuring the voltage across a known resistor in the circuit; or by inserting a resistance in the circuit whose current is to be determined, and which will not seriously alter circuit conditions.

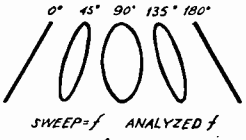


Fig. 15

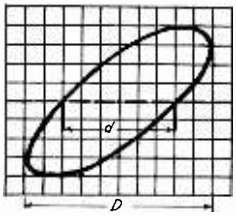


Fig. 16

As the cathode ray oscillograph requires negligible power to deflect the beam, it may be used as you would any high resistance voltmeter; and as its input impedance is infinitely large compared to most circuit components it may theoretically be used in R.F. measurements. The leads will contribute a large input capacity and for that reason the cathode ray oscillograph should be close to the circuit under test. The vacuum tube voltmeter is a preferred instrument, and is far more accurate and reliable, particularly the type with the tube in a unit which can be brought close to the tested circuit. With the advent of the "acorn" type tube, a vacuum tube voltmeter in which the tube may be actually brought to points of voltage and current measuring connections are possible. This voltmeter is a superior instrument for high R.F. voltage and current measurements.

Looking Forward

It was my intention, originally, to cover this subject of "The Cathode Ray Oscillograph" in three installments, of which this is the second. but new information obtained makes it seem impossible to do so. From all appearances will require four installments to cover the information now available, which means two more after this one.

In the next issue I will consider special service tests, using the cathode ray oscillograph.

Special Articles Planned

National Radio News, realizing that many of its readers have never had the opportunity to see what goes on in the big radio organizations, factories, laboratories, broadcast stations, etc., has decided to bring you a series of articles which we might well term "travelogues" in the Radio Industry.

We have already secured the cooperation of several large organizations, and in the next issue of National Radio News will take you for a word and picture trip through the Radio Tube Factory of the Hygrade Sylvania Corporation, at Emporium, Pennsylvania. Watch for these articles.

———*n r i*———

PHILCO MODEL 20 REWIRING

It is possible to obtain a greater output and some improvement in quality by using 45 type tubes in place of the 71A type tubes. Merely wire the filaments in series and install the new tubes. The present bias resistor need not changed unless you wish to experiment to see if slightly better results can be obtained.

The Service Forum (Continued from page 10)

PHILCO TRANSITONE — **TROUBLE IN 1934 CHEVROLET**

When installing this set do not mount on right side near the coil as it is practically impossible to remove ignition interference due to chassis pick-up. Lengthening the battery lead, shielding it and running it directly to the battery negative terminal and the shield to the positive terminal will often clear up trouble.

———*n r i*———

PHILCO TRANSITONE MODEL 5 — **OSCILLATION**

Move the 15,000-ohm resistor in the detector oscillator circuit towards the front of the set. Try a new 78 type tube.

———*n r i*———

PHILCO MODEL 10 — **HOWLS**

Check the tube shields making sure that they are in good contact with the chassis—if they are not a howl will result.

———*n r i*———

RCA VICTOR MODEL 32 — **HOWLS ON ALL STATIONS**

In most cases this is due to an open in the 500,000-ohm resistor connected across the interstage push-pull audio transformer—check and replace with a new one.

———*n r i*———

STROMBERG-CARLSON MODELS 38, 39 and 40 — **MODULATION HUM**

Try new 58 type tubes as a partial cathode to heater short will result in trouble of this type.

———*n r i*———

ZENITH MODEL 50 — **HUM**

If you are unable to discover any cause for this trouble, connect a 250,000-ohm resistor between the grids of the push-pull second audio tubes. In practically all cases this will eliminate hum not due to any discernible part failure.

———*n r i*———

SPARTON MODEL 333 — **HUM**

One side of the heater circuit of the 42 type tube is grounded to the chassis through a rivet. If a poor ground occurs at the rivet hum will result. Correct the trouble by grounding this side of the filament circuit at other points to the chassis. Also run a ground wire from the ground heater terminal of the 75 tube over to the resistor mounting plate which should be grounded.

SPARTON MODEL 36 — **VIBRATOR TROUBLE**

If the vibrators do not seem to last a normal length of time, add a .01 microfarad 1600 volt condenser (part A-5237) across the secondary winding of the power transformer in the eliminator unit. This installation should be made on every set of this model not so equipped.

———*n r i*———

RCA VICTOR MODEL R-37-P — **DEAD AND MOTORBOATS**

This trouble is caused by an open filter condenser. The 4 microfarad condenser is the usual offender. All of the filter condensers can be checked by shunting them with others of the same size.

———*n r i*———

PHILCO MODELS 89 and 19 — **INTERMITTENT OPERATION AND DEAD AT HIGH FREQUENCY**

Examine and clean the mica between the plates of the high frequency oscillator padding condenser. If the mica appears to be cracked, try a new piece.

———*n r i*———

PHILCO MODEL 19 — **INTERMITTENT**

If the shadowgraph widens when the set cuts out the trouble is immediately located to the R.F. portion of the receiver. Check the oscillator coil connection as heat and vibration sometimes causes the coil to snap near the lug and contact is intermittently made.

———*n r i*———

STEWART-WARNER MODEL R-117 — **EXCESSIVE ILLUMINATION OF THE DIAL**

Trouble of this sort sometimes interferes with night driving and it may be eliminated by removing the 15 ohm pilot light resistor and substituting a new 35 ohm resistor (Stewart-Warner part No. 84,197) in its place. The use of the higher resistor will, of course, reduce the voltage applied to the pilot light and the intensity of the illumination.

———*n r i*———

PHILCO MODEL 54-C — **HOWLS**

A howl intermittent in nature and seemingly varied by tuning the receiver to a station is caused by audio feed-back through the wiring. Lengthen and re-route the plate lead of the 43 type tube, keeping it away from the 75. This will remedy the trouble.

GEORGE ROHRICH

The Repair of Auton

EXPERIMENTS MADE IN TI

By George Rohrich, E

THE modern automobile receiver is a dependable machine but this dependability rests chiefly on the correct adjustment of the vibrator unit which is the most important part of the high-voltage power pack that supplies the receiver.

Careful checks have shown that the most frequent service calls on automobile receivers require replacement or adjustment of the vibrator unit. Most manufacturers of vibrators insist that best service will be obtained only when the old vibrator is replaced with a new one. This recommendation is well founded because many servicemen find difficulty in making adjustments on an old vibrator which will insure good performance over a period that compares with the performance of a new one. This difficulty has been traced to insufficient knowledge of the manner in which the adjustments should be made, even when suitable testing equipment is available.

In the laboratory of the National Radio Institute I have conducted extensive tests on many old and new vibrators, before and after adjustments were made with high grade testing equipment. I find that it is practical to repair and adjust a vibrator to give good service with the aid of an ammeter and voltmeter. At least, it is hardly worth while to attempt adjustments without these two meters connected at the same time. If you do not have them then don't attempt to adjust an old vibrator but replace with a new one.

If you have an 0—250 volt or higher range D.C. voltmeter and an 0—5 ampere or higher range D.C. ammeter then you can make satisfactory adjustments. However, I have always been able to improve my adjustments on the above with the additional use of an A.C. voltmeter or a cathode-ray oscillograph to give added life to the usefulness of the vibrator, especially if the vibrator is of the full-wave self-rectifying type as srown in Fig. 1.

Several different types of vibrators have been used by different manufacturers. However, all of them employ a vibrating spring set in motion by an electro-magnet, which interrupts a direct current obtained from a battery. This interrupted direct current is allowed to flow in the primary winding of a step-up transformer similar to that shown by contacts 1 and 2 in Figures 1, 2, and 3. This results in alternating voltage being produced in the secondary of the transformer, as across terminals 8 and 9 and across terminals 9 and 12 in the diagrams. This alternating voltage then is rectified by means of a rectifier tube or by additional contacts placed on the vibrating spring of the vibrator.

Figure 1 shows the fundamental circuit of the type which is used with a vibrator that rectifies the alternating voltage by means of the extra contacts 6 and 7, and 6 and 10. A clear understanding of the operation of this circuit is required to make proper adjustments and for this purpose only half of the circuit has been shown in Fig. 2 so the important circuits can be traced without confusion.

Refer to Fig. 2. Here you will notice that a storage battery is represented with the positive terminal of the battery connected to the chassis of the automobile, as indicated by the symbol for the ground connection. The negative ter-

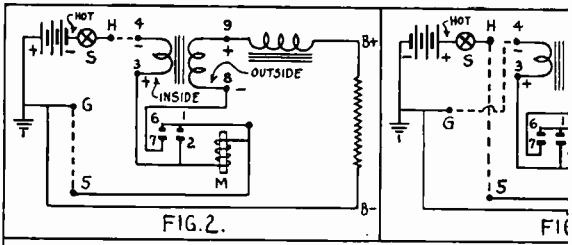


FIG. 2.

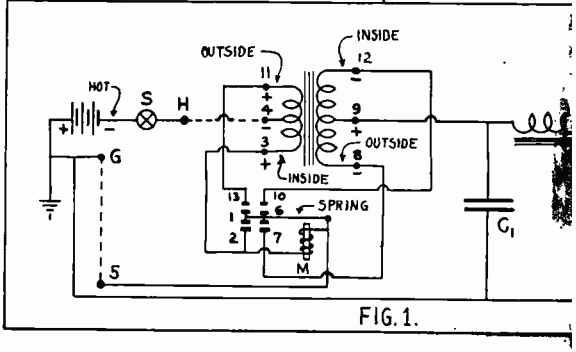


FIG. 1.

obile Radio Vibrators

E N. R. I. LABORATORY

gineer in Charge

minal of this battery is not grounded and for this reason it is called the "hot wire." This hot wire connects to one terminal of a switch S. The other terminal of the switch connects to a binding post H which is provided for the purpose of applying the proper polarity to the primary of the transformer across terminals 4 and 3, depending on whether the negative or the positive terminal of the battery is the "hot wire." You will notice in Fig. 3 that the positive terminal of the battery is the hot wire. However, in Figures 2 and 3 terminals 3 and 4 will have the same polarity across them during the time that the switch S is closed.

Returning to Fig. 2 you will notice that the spring of the vibrator normally holds the contacts 1 and 2, as well as 6 and 7 in the *open position*. However, current from the battery can flow through the electro-magnet M when the switch S is closed. The amount of current flowing through the primary and through the electro-magnet M is in the neighborhood of 100 milliamperes when contacts 1 and 2 are open. This current attracts the spring of the vibrator, *closing* contacts 1 and 2 and also closing contacts 6 and 7. The current in the primary winding then increases to approximately 3 amperes in the usual type of transformer that is normally loaded. The closing of contacts 6 and 7 *should take place at the same instant* as that when contacts 1 and 2 are closed. This allows the voltage across terminals 8 and 9 to be applied across the load at B+ and B—. The condensers C_1 and C_2 shown in Fig. 1 then become charged, continuing to supply power after contacts 6 and 7 are opened.

In Fig. 2 it can be readily seen that the closing of contacts 1 and 2 will short-circuit the magnet M. Current then ceases to flow in this magnet with the result that the tension in the vibrator spring opens the contacts. This reduces the current in the primary of the transformer and also results in reversing the polarity of the voltage which is induced across terminals 8 and 9. However, contacts 6 and 7 now are also open and this prevents current of opposite polarity from flowing through the load. In this way rectification is accomplished, resulting in the voltage across the load always being of one polarity.

We can now turn our attention to Fig. 1 and note that the circuit of Fig. 2 can be followed there in exactly the same manner. The tension in the spring now carries the contacts 1 and 6 past their normal positions so that contacts 1 and 13, and 6 and 10 are closed momentarily.

(Page 18, please)

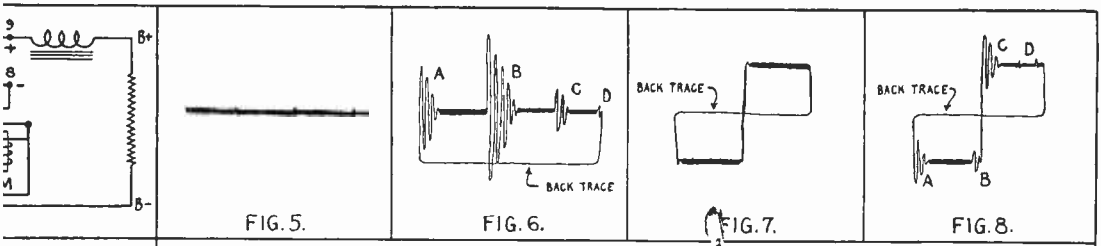


FIG. 5. FIG. 6. FIG. 7. FIG. 8.

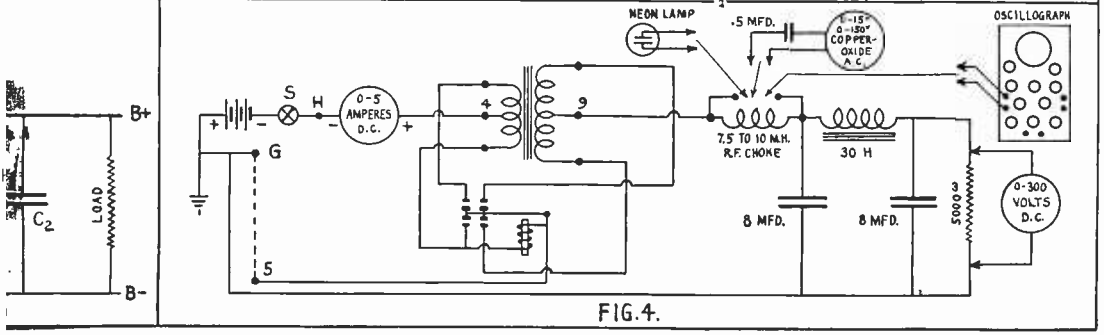


FIG. 4.

Automobile Radio Vibrators (Continued from page 17)

at the same instant. This allows current to flow through the upper section of the primary between terminals 4 and 11 and the induced voltage across terminals 9 and 12 again is applied across B+ and B— with the desired polarity.

Of course, as soon as contacts 1 and 2 have been opened, current again starts flowing in the magnet M but the inductance of this coil holds its current down for a moment allowing the other contacts to be closed before the spring is attracted toward the core of the magnet to repeat the closing of contacts 1 and 2.

The spring of the vibrator opens and closes the sets of contacts with a frequency which is about 120 cycles per second. It is evident that extremely careful adjustment of the contacts must be made so they will be opened and closed at the right instant and that the duration of contact must be correct. Otherwise, serious sparking will result at the contacts which will overheat and burn away the metal, further causing improper adjustment with a final result that the output voltage decreases and even stops.

A perfectly adjusted vibrator shows no sparking at the contacts even while interrupting a primary current of 3 amperes. Such an adjustment of the vibrator is essential for long life. Remove the vibrator and clean the contacts by filing them perfectly flat with a thin file that is inserted between the pairs of assembled contacts. In this way both contacting surfaces of each pair are filed at the same time which will insure their contacting each other over the entire surface when in use.

When all contacts are perfectly flat, regulate the spacing between contacts until *all are open* with a clearance between .003 and .006 inch. A page of your N. R. I. text book has a thickness of approximately .004 inch so if you can insert this between the contacts you will have a good initial adjustment. Final adjustment should be made while the vibrator is in use with an 0—300 D.C. voltmeter connected across the 5,000 ohm load shown in Fig. 1, while an 0—5 ampere D.C. meter is connected in series with terminals 4 and H. You should obtain a voltage of approximately 180 to 200 volts while the ammeter registers the least current, or near 3 amperes. (Manufacturers specifications should be used where available.)

For a complete check it is suggested you arrange the test circuit shown in Fig. 4 where you will notice that an R.F. choke has been added in series with terminal 9 and the input filter condenser. R.F. voltages will exist across this choke when the contacts are sparking excessively which can be detected with a neon lamp, sensitive A.C. copper-oxide rectifier type voltmeter or cathode-ray oscillograph. Adjustments should be made where little or no R.F. voltage exists across the choke. Under this condition the neon lamp will not light, or the A.C. voltmeter will register the least voltage, or the oscillograph will show patterns with ripples whose peaks have the least vertical amplitude, as in Fig. 5. With poorly adjusted contacts you will get a pattern on the oscillograph as shown in Fig. 6, indicating damped R.F. oscillation.

The oscillograph also can be connected across any pair of contact terminals of the vibrator shown in Fig. 1. Under this condition a vibrator with contacts well adjusted will show a pattern as in Fig. 7. Poorly adjusted contacts will result in a pattern as shown in Fig. 8.

The patterns shown in Figures 6 and 8 will show the faint back-trace and wavy traces at points A. B. C. and D. only when the intensity control on the oscillograph is turned up high. Some cathode-ray tubes which have a slowly acting screen will not show these wavy traces and in such cases there will be blank spaces at A, B, C and D in the patterns during the time that exessive sparking exists. In such cases adjust the contacts until the blank spaces disappear, resulting in closed patterns as shown in Figures 5 and 7.

———*n r i*———

"I understand and appreciate the usefulness of 'Easy Measurement Charts' published in the last several editions of the NATIONAL RADIO NEWS by Mr. J. A. Dowie.

"Here's hoping the 'NEWS' will expand its different sections into one of the best (if not the best) Radio Magazines."

J. LAURIE BELLIVEAU, Moncton, N. B., Can.

———*n r i*———

And now they are timing greyhound races with photo-electric cells preventing the possibility of human error.

Clean Condensers

In the condenser factory of the Aerovox Corporation, 70 Washington Street, Brooklyn, N. Y., the operators who work in the manufacture of Aerovox condensers are required to wear rubber gloves to prevent the possibility of perspiration or other impurities getting on the condenser foil.

RADIO-TRICIAN SERVICE SHEET
COMPILED SOLELY FOR STUDENTS & GRADUATES

Stromberg-Carlson No. 60 Type Radio Receivers

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Tuning Ranges	540—1570 k. c. and 5.5 to 15.5 mc.
Type and Number of Tubes	1 No. 6D6, 1 No. 6A7, 1 No. 6B7, 1 No. 37, 2 No. 41, 1 No. 80
Voltage Rating	105-125 Volts
Frequency Rating	50-60 Cycles
Power Consumption Rating	80 Watts

CIRCUIT DESCRIPTION

The No. 6D6 tube is used as the R. F. amplifier. The No. 6A7 tube is used for the oscillator-mixer. The No. 6B7 tube serves as the I. F. amplifier, A. V. C., and demodulator. The No. 37 tube is the first audio amplifier and the two No. 41 tubes function as the power output stage. The No. 80 is the rectifier in the power supply circuit.

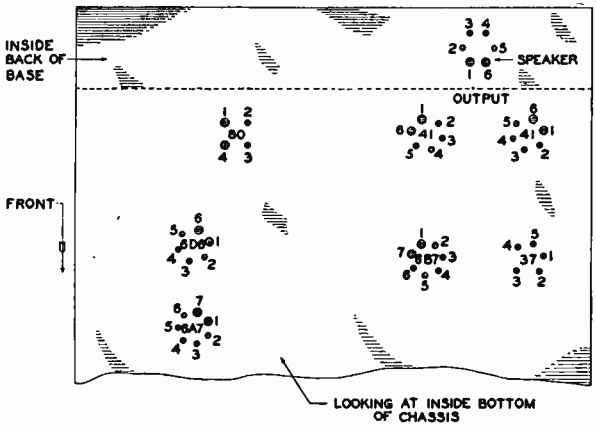


Fig. 2. Terminal Layout for Voltage Measurement Chart.

Tube	*Circuit*	*Cap.*	*Terminals of Sockets* 1	2	3	4	5	6	7	*Heater Voltages Between Terminal Nos.*
6D6	R. F. Amp.	G 0	H 0	P 145	S 85	Sup. 5.5	K 5.5	H 0	—	1–6—*6.5* volts
6A7	Mixer-Osc.	Mix. G 0	H 0	Mix. P 145	S 85	Osc. P. 175	Osc. G —20	K 5.5	H 0	1–7—*6.5* volts
6B7	I. F., Dem.	G 0	H 0	P 145	S 85	D 0	D 0	K 3	H 0	1–7—*6.5* volts
37	1st Audio	—	H 0	P 140	G 0	K 8	H 0	—	—	1–5—*6.5* volts
41's	Output	—	H 0	P 250	S 250	G 0	K 16	H 0	—	1–6—*6.5* volts
80	Rectifier	—	F 270	P *298*	P *298*	F 270	—	—	—	1–4—*4.9* volts
Speaker Socket			245	145	270	270	250	245		

A. C. voltages are indicated by italics

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

NORMAL VOLTAGE READINGS

These voltage readings are obtained by measuring between the various tube socket contacts and the bases with the tubes and speaker plug in place. The set is therefore in operation when the measurements are made. Fig. 2 shows the terminal layout of the sockets with the proper terminal numbers. The terminals of each socket are numbered, starting with one heater or filament pin and proceeding around the pin circle clockwise to the other heater or filament pin. This is done looking at the bottom of the socket. Tune Receiver to 1500 k. c.

Voltages are given for a line voltage of 120 volts and allowance should be made for differences when the line voltage is higher or lower. A meter with a resistance of 1,000 ohms per volt should be used for measuring the D. C. voltages. The Volume Control should be set all "On" (clockwise) before measuring voltages.

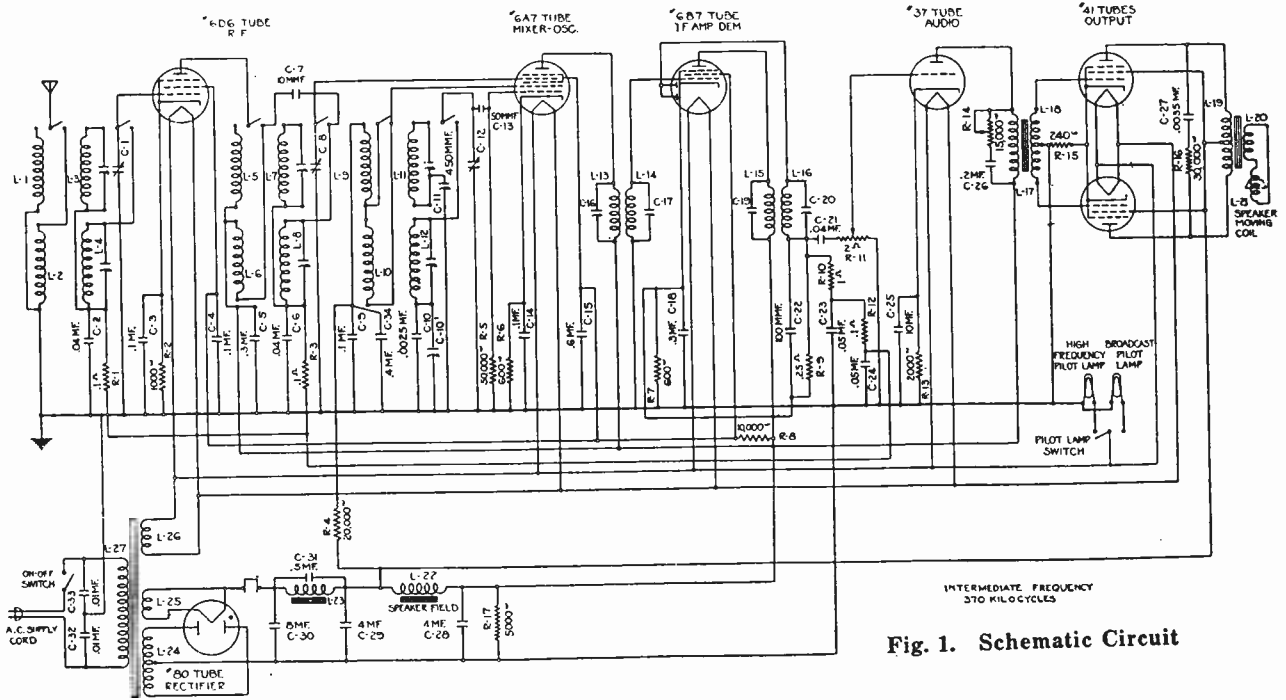


Fig. 1. Schematic Circuit

What Do You Like?

WE have told our readers, many times in the past, that NATIONAL RADIO NEWS is their paper. We want it to be just as valuable to them as possible—we want it to give them articles that will do them the most good—and which they like best.

Quite frequently we receive letters, from our readers, making suggestions for the improvement of NATIONAL RADIO NEWS—but these letters are entirely too few—entirely too far apart. We want more of them.

It is only by knowing what our readers like—what our readers consider most advantageous to themselves, that we can give them the type of article, the type of information that they most desire.

So now, we're making a special concentrated effort to get more information on this subject. We're giving every reader of NATIONAL RADIO NEWS this opportunity to air his views.

If there are certain things in NATIONAL RADIO NEWS that you like—we want to know about it—because if we find that enough fellows like those things we'll continue them—we'll add to them—we'll try to improve them—but at least, we'll have something to go on—something to start with.

On the other hand, if there are features about NATIONAL RADIO NEWS which you do not like—features you'd like to see changed—certain departments you'd like to see eliminated altogether, from this paper, then—we want to know about that also. Maybe there are other fellows who feel just the same way about it—and we're going to let the majority rule.

It may be that you like President Smith's page, and the page devoted to articles by Mr. Haas. Or—you may not like them. Or you may think that they should be combined on one page. You may or may not like the Service Forum, or the Easy Measurement Charts which Chief Instructor Dowie sends you in each issue. You may or may not like the small notices we publish telling you about new inventions and new developments in the industry, and who makes them—or the special articles written around such branches of the industry as Public Address Systems, Automobile Radio, Police Radio, the description of broadcasting stations and their equipment, Marine Radio, etc.

We want to know what you think of the Service Data Sheets, four of which appear in each issue—and the articles which we frequently publish regarding successful N. R. I. graduates.

We want you to tell us if you find the Alumni Association section interesting and what you think of the Mailbag.

This is one time you are going to get the opportunity to throw all of the brickbats and the bouquets you want. We are asking for them. We want them for your good, the good of our other readers, the good of NATIONAL RADIO NEWS.

Now we know you don't want to write long letters about this subject, and frankly we don't want to get them because they would be too hard to classify. So in order to prevent the necessity of you writing such letters, and to make it easier for us to do the classifying job on the replies, of which we will have thousands, a special form has been prepared on the back of this page. We are going to ask you, as a reader of NATIONAL RADIO NEWS, to take a little time, sit down and think this thing over. After due consideration, mark your selections, your criticisms, your praises, or any remarks you care to make.

Bear in mind that the selections you make—the remarks you send in, may have a big bearing on the future policy and content of NATIONAL RADIO NEWS, so do the job carefully.

After you have filled out this form, signed your name, address, and student number, tear the page from NATIONAL RADIO NEWS carefully, and mail it in. Arrangements have been made so that this page cane be torn out, on the dotted line, without injury to the rest of this issue of THE NEWS.

Mail your blank to "The Editor, NATIONAL RADIO NEWS, 16th and U Streets, N. W., Washington, D. C."

We'd like as many of these blanks as possible to be returned by August 21st, so we can tell you the results in the next issue.

Please read, very carefully, the article on the other side of this page. Then fill in the form below, tear out on the dotted line and mail to the EDITOR, NATIONAL RADIO NEWS, 16th & U STREETS, N. W., WASHINGTON, D. C.

Please check, in the columns below, whether or not you like the departments mentioned:

	Yes	No	Remarks
Editorials by J. E. Smith			
Editorials by E. R. Haas			
The Service Forum			
Easy Measurement Charts			
Data Sheets			
Articles on various Broadcast Stations, Police Radio Departments, Marine Radio, and branches of the Radio Industry.			
Stories about N. R. I. Graduates			
Notes about new inventions, and the manufacturers handling them.			
Alumni Association News			

Please state below the three departments you like best, in order of your preference:

First Choice

Second Choice

Third Choice

Please give titles of articles appearing in NATIONAL RADIO NEWS *(either this issue or previous ones), which you particularly liked.*

Title of Article	Issue in which published Month	Year

If you have any general remarks and recommendations not covered above, please give them here:

Your Name .....

Address .....Student No. .....

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

Easy Measurement Charts

by J. A. Dowie, N.R.I. Chief Instructor

Simple Formulas and a Chart for Calculating Values of Combined Resistors in Parallel and Condensers in Series.

J. A. DOWIE,
N. R. I. Chief
Instructor

WHEN there are only two unequal resistances connected in parallel, the resultant resistance can be calculated by the following formula:

$$(1) \qquad R = \frac{R_1 \times R_2}{R_1 + R_2}$$

Where R equals the resultant resistance and R_1 and R_2 the unequal resistances connected in parallel.

If more than two unequal resistances are connected in parallel, first find the total resistance of two resistances, combine it with a third resistance and so on.

When there are only two condensers connected in series, the resulting capacity can be calculated by the following formula.

$$(2) \qquad C = \frac{C_1 \times C_2}{C_1 + C_2}$$

Where C equals the resultant capacity and C_1 and C_2 the condensers connected in series.

To obtain the resultant capacity of more than two condensers connected in series, first find the resultant capacity of two of these in series, and considering this as a single condenser, combine it with a third condenser, and so on.

The similarity of these two formulas (1) and (2) makes chart Figure 1 suitable for the solution of either one of them permitting the solution of mathematical problems without mental effort.

All you have to do to use this chart is to place a ruler across the scales or draw a straight line across the scales for the solution of finding the resultant resistance of parallel resistances or resultant capacity of condensers in series.

For example, suppose there were two resistances in parallel of 100 and 150 ohms respectively. To find the resultant resistance of these two resistances, lay a ruler across or draw a straight line between 100 on scale A and 150 on scale C, and we find the resultant resistance to be 60 ohms on scale B.

Now suppose there were three resistances in parallel of 100, 150, and 90 ohms. From the above paragraph and chart Figure 1 we know the resultant resistance of the 100 and 150 ohm resistance is 60 ohms, therefore, to find the resultant resistance of these three resistances, we draw a straight line between 60 on scale C and 90 on scaleA, the resultant resistance being 36 ohms on scale B.

If there were two condensers connected in series of 60 and 40 micro-microfarads, a line drawn from 60 on scale A to 40 on scale C crosses scale B at 24 micro-microfarads. This is the resultant capacity of these two condensers connected in series.

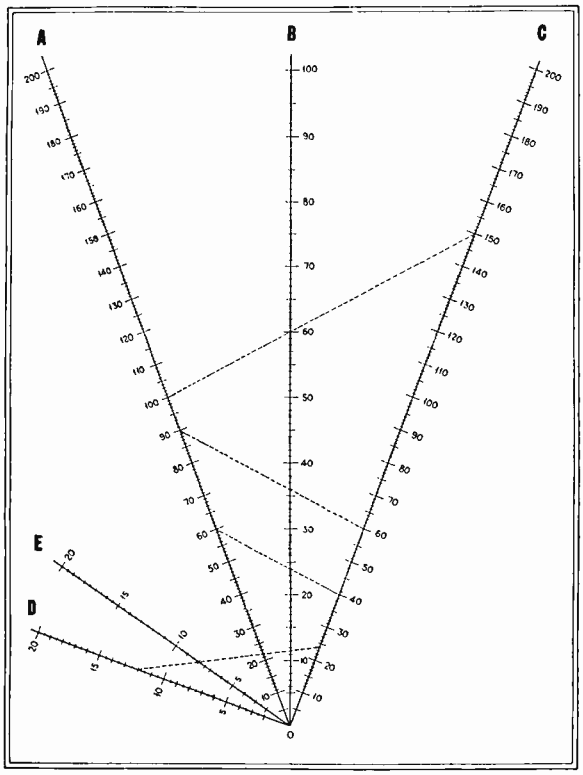
Now suppose there were three condensers connected in series of 60, 40 and 12 micro-microfarads. A line drawn from 24 on scale C to 12 on scale D crosses scale E at 8 micro-microfarads. This is the resultant capacity of the combinations.

The reason why we use scales D and E in this case is because the capacity is so small that it is easier to read on the chart.

It should be understood that it is necessary when using this chart to read the same units on all scales, that is, they should be in ohms, megohms, micro-microfarads or microfarads for any particular problem.

The range of this chart may be extended by considering the values on each scale as multiplied by some number. In extending the range of this chart, the student should be careful to use the same multiplier on all scales.

(*See chart on next page*)



Easy Measurement Chart

(Continued from page 23)

The chart to the left is Figure No. 1, as referred to in Mr. Dowie's article on the preceding page.

This chart, for calculating values of combined resistors in parallel and condensers in series, is sure to be popular with NATIONAL RADIO NEWS readers. It is mighty handy for any Radio serviceman.

Incidentally, this is one of a series of articles which Chief Instructor J. A. Dowie has been giving readers of NATIONAL RADIO NEWS, and which have become very popular. Letters from students and graduates all over the world have attested to the popularity of this series of articles.

Chief Dowie hopes that these charts will be as helpful and as interesting to you as they have to his students everywhere.—*Editor.*

What A Few N. R. I. Graduates Are Doing

John Gantt is Engineer at Radio Station WOL, Washington, D. C.

Earl Merryman is Control Engineer at Station WJSV, Alexandria, Virginia.

John E. Fetzer is President of Radio Station WKZO, Kalamazoo. Michigan.

Gerald Curtis is in the Radio service business for himself in Centerville, Iowa.

H. A. Logsdon is in full charge of the Major Appliance Department of Montgomery Ward Company store in Topeka, Kansas.

Norman R. Hood is in the Radio Engineering Department of the Firestone Tire & Rubber Company, Akron, Ohio.

Otis Wright is Chief Operator and Announcer at Station KUOA, Fayetteville, Ark.

Lyman T. Newell is Operator in charge of Airways Station, Elmira, N. Y.

Frank E. Timmons is with a firm in Richmond Ind., which wholesales Radio over a large territory.

Dale Hoag is Service Manager for the Wilks Distributing Company, Saginaw, Michigan.

T. E. Johnston is operating a successful Radio Service Business in Shamrock, Texas.

Charles E. Steinhoff of Cleveland, Ohio, is a Radio Operator with the Airways Division of the United States Department of Commerce.

John M. Ticknor is Assistant Manager of a Radio store in Buffalo, New York.

T. L. Kidd is with Radio Station KTSA, San Antonio, Texas.

Noel W. Ray, Gadsden, Alabama, is operating a very successful Radio service business.

T. J. Telaak, has a fine Radio service business in Buffalo, New York.

Sylvanus J. Ebert is Radio Engineer at Station WSUI, Iowa City, Iowa.

Julius C. Vessels is Engineer at WJBY, Gadsden, Alabama.

A. R. Crane, is making good in his public address system business in San Diego, Calif.

George E. Bacchus of Brooklyn, New York, is operating a successful Radio service business.

Saul D. Gilles is an Authorized Philco Dealer in Philadelphia, Pa.

"Two Way" Police Radio

(Figure 1)

IN the space of a very few years, the police Radio telephone has become one of the most effective weapons ever used by the police in their never-ending war against crime. Today, no well-organized police system is considered fully equipped unless it possesses complete, efficient Radio telephone equipment for communication between headquarters and mobile police units.

The value of Radiofied police departments has been definitely demonstrated, and the next step in the direction of law and order, insofar as Radio equipped police units are concerned, seems to be the development of two-way communication.

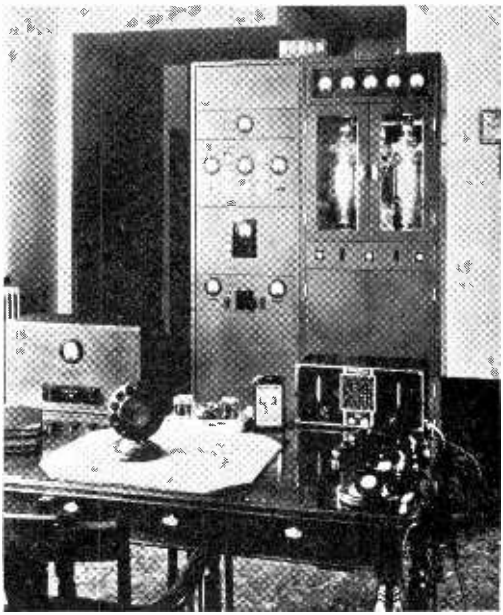
Police communication by Radio originally consisted in a broadcast from headquarters being picked up by the scout car in question; this car proceeding to the scene of crime, accident, or other disorder; then, the officer in the car concerned reporting back to headquarters by use of the nearest telephone.

The new order of things is to have a transmitter, not only at headquarters, but also in each of the cars. In this way, two-way communication can be maintained when and as often as desirable, while the car is en route, and without the necessity of the delay while one of the occupants of the scout car telephones back to headquarters.

The entire transmitting apparatus, as used in the individual cars, is sufficiently small to be installed in the trunk on the rear of the ordinary small sedan.

Figure 1 shows one of the "Two-Way" Police Radio communication systems of the Newark, New Jersey police force. The telephone through which the officer talks when transmitting back to headquarters is on the instrument board.

Now look at figure 2. The panel at the left is the 50 watt ultra-high frequency transmitter. The one on the right is the 500 watt amplifier. On the left hand corner of the dispatcher's desk is the control unit, and on the right hand corner is the receiver. Photographs, courtesy Western Electric Company.



(Figure 2)

Plans Ahead

by R. B. Murray, Asst. Executive Secretary

IN the few months that I have been associated with Alumni work, I have sensed the keen appreciation of students and graduates for the opportunity the N. R. I. has given them to get together and discuss Radio and business problems. This makes us, here at National Headquarters, want to work all the harder to justify the faith and confidence our Alumni members have in us as National Officers.

New ways and means of developing the Association including many new and worthwhile services have already been started. It is my desire to give here a few high-lights of what is being done to increase the value of the Association to members.

Recently a plan was developed to aid Local Chapters by giving them the opportunity to secure Radio speakers through National Headquarters. As the greatest source of supply is through Radio manufacturing interests we have centered our campaign on this group and the response has been unanimous. Such firms as Hygrade Sylvania Corporation, National Union Tubes, Weston Electrical Instrument Corporation, Arcturus Radio Tube Company, International Resistance Company, RCA-Victor, etc., have pledged their support of the movement.

An active campaign is under way at this time to increase the Alumni's membership. The more members we have, the more service we can render men who belong to this organization.

It is also the desire on the part of National Headquarters to increase its services to men who do not have the opportunity of attending regular Alumni Local Chapter Meetings. We feel they are deserving of every possible aid in their endeavor to reach their goal in the Radio profession. As the Alumni Association has not been organized for profit, National Headquarters can give additional services to these members. There are many other plans which I do not have space to outline here.

(Page 29, please)

To Resign

P. J. Murray, Executive Secretary, Not to be Candidate for Re-election

ONE of the oldest officers of the N. R. I. Alumni Association; Executive Secretary since 1931, and active in Alumni Association matters since the Association was formed in 1929, Mr. Murray has announced that he will not be a candidate for re-election this fall.

He made clear the reasons for his decision in the following statement:

"I'd like nothing better than to continue my work with the Alumni Association, but conditions make it necessary for me to devote my entire time to the business of the National Radio Institute.

"I've enjoyed every minute of the time I have spent serving our members. It was a real pleasure to correspond with thousands of them and meet, personally, hundreds on my frequent visits to the various Local Chapters.

"For some time I have foreseen the necessity of this move, and in order to have affairs at National Headquarters running smoothly, have instructed an assistant in the many duties of the Executive Secretary's office. He will care for practically all of the details until the next election of National Officers, nominations for which will be called in the next issue of NATIONAL RADIO NEWS.

"This gentleman, Mr. R. B. Murray, is already well known to many of our members, particularly those of the Baltimore, and Philadelphia-Camden areas. He will act under my direct supervision until our members have the opportunity to elect an Executive Secretary for the year 1936. R. B. (Bob) Murray states definitely that his hat is in the ring for that job. He wants it—but, of course, that is entirely up

(Page 30, please)

Detroit Chapter

Everything is going fine in Detroit. We are having meetings regularly, and there is more interest in the Chapter than ever before. I believe we have to congratulate C. H. Mills, Chairman, for doing a splendid job of keeping the Detroit Chapter in the limelight.

We are still following our past program of studying different apparatus that is useful for Radio service work; something that will give more distinction to our members as expert Radio-Tricians, also speed up individual service jobs.

At our next meeting we will have a very complete and thorough explanation of the cathode oscillograph and its application to Radio servicing. The Chairman has taken on this particular subject and has prepared several sketches in duplicate that the members may refer to as the discussion is being delivered, so saving the time required to put these sketches on the blackboard. This same kind of work has been in progress for some time, but as it takes some time to draw the sketches, it has detracted from the interest of the subject.

The cathode oscillograph is evidently soon to be the last word in Radio service, and the Local Chapter members are going to be at the top with the necessary technical knowledge to use this new method efficiently, and no doubt but that the Chapter will eventually secure this servicing instrument for the use of its members.

Several of the members are working on the Tefft Selective Analyzer which has been designed by one of our members, and is also manufactured by him and a partner. This is a reasonably priced test instrument and the obsolescence point is practically eliminated. The designer has given us a set of five drawings that divide the analyzer into separate parts, so that it can be built up without any complications. After the drawings have been placed on the blackboard each member can make his own sketch and do the work at leisure at his home, and then bring it into the meeting for comparison. This selective analyzer can be secured complete or in kit form, thus giving those who like to build their own test equipment something very useful and of great value.

Remember, the Detroit Local Chapter meetings, the second and fourth Friday in every month at 11305 Woodward Ave., Detroit, Mich. N. R. I. graduates and students welcome.

———*n r i*———

A smart fellow is one who takes the lemons that fate hands him and uses them to start a lemonade stand.

Chicago Chapter

"Even though the summer months are here, our Local Chapter activities have been moving at a fast pace," reports Earl Bennett, energetic Chairman of the Chicago Chapter. Real live meetings have been held—we simply *cannot* let the Baltimore crowd and the other Locals get ahead of us.

A splendid all-wave oscillator is going to be raffled off at our next meeting. There will be a second prize also, something useful for the up and growing Radio-Trician. Door prizes are real popular at our Chapter and any of the members staying home are missing a lot of fun. We understand Mr. Morehead got here at the last meeting in spite of a lot of handicap. He lives in one of those suburban spots where you have to use a derrick to get your car out of the rut. More power to him for getting here to the meeting.

The following officers have been elected to serve the Local Chapter until March 1, 1936: Earl R. Bennett, Chairman; Sam Juricek, Secretary; E. Sorg and J. A. Cordero, Financial Committee; R. Cordero, Librarian; E. Bauer, Editor; C. B. Morehead and E. Sorg, Entertainment Committee. Our Publicity Committee will be H. Dickton and E. Sorg.

The Chicago Chapter is also keenly interested in amateur short wave, as in the case of the Pittsburgh and Baltimore Chapters. Earl Bennett, our genial Chairman, is quite interested in a plan where all Chapters and National Headquarters could communicate with one another through short wave channels. It seems a splendid idea, and anyone interested can send their ideas to National Headquarters.

1936 Model Tube Checker

We have just received word that the Tefft Tube Checker has been improved to test all the new metal tubes, including over 150 other types. No adapters required. Our laboratory tested, thoroughly, the original model manufactured by an N. R. I. Graduate, Mr. A. R. Tefft, of Plymouth, Michigan, and his associates.

The price is low, to Radio dealers and servicemen, $12.50 net—which includes delivery charges in the United States. Full instructions for operation with each checker. For full details write direct to A. R. Tefft Co., Plymouth, Michigan.

Baltimore Chapter

P. J. Dunn, Local Chairman, and National President, has made plans to visit other Local Chapters of the Alumni Association in the next two or three months. This is the first time in the history of the Association that the National President has arranged to carry out such a program. National Headquarters extends best wishes for the trip.

New ideas continue to crop up in Baltimore, and bear fruit. Baltimore, like Pittsburgh, wants to learn all there is to know about "brass-pounding." So they are starting a class to learn Radio operating. Mr. W. Giese, a former Navy operator, was appointed instructor, and he will use the regulation N. R. I. Nacometer to teach the boys. As soon as the members get Amateur Licenses, the Baltimore Local expects to be on the air. A transmitter has already been donated by a company in Baltimore which admires the work the Chapter is doing.

On Tuesday, June 18, Mr. Joseph Kaufman, Director of Education at the N. R. I., gave a lecture on "How to Read Circuit Diagrams." Mr. Kaufman has had broad experience in the Radio profession, and has given interesting talks at other Local Chapters from time to time.

FLASH

The Baltimore Chapter desires to serve Alumni members living in other sections in the State of Maryland. A plan is underway to put on a campaign enrolling these members.

The Local membership will entitle them to receive regularly, the monthly issues of the *Baltimore Bulletin*, a standing invitation to attend meetings of the Local whenever they desire to come to Baltimore, put these members in touch with a number of Radio wholesale houses in this city where they may buy Radio supplies and receive regular dealer discounts. This represents a real service to Alumni members in outlying sections. Men interested in obtaining membership may do so by communicating with Mr. George C. Ruehl, Jr., Secretary, Charleston and Second Avenues, Lansdowne, Maryland.

Philadelphia-Camden Chapter

Mr. George C. Conner, commercial engineer with the Hygrade Sylvania Corporation, gave an exceptionally interesting talk on "Installing and Servicing Automobile Radios." He explained the various difficulties encountered in this work, and how to overcome them. The talk was then followed with a description of the characteristics of the new metal tubes, with advanced information on this development, which threatens to revolutionize the tube business. Mr. Connor's talk was then followed by a discussion of a consignment proposition by Mr. M. M. Sewell, manager of the Century Radio Company. This Chapter thanks both Mr. Connor and Mr. Sewell, and hope they will soon plan another visit.

Mr. Fehn, our Chairman, gave a complete instructive analysis of the Philco Model 95 receiver. His diagnosis was complete in every detail, and we all profited from his vast experience in this line. We are looking forward to other interesting lectures of this type.

Members are attending meetings from a wide area in and around Philadelphia and Camden, some coming from as far as Chester, Holmesburg and Glenside. We must be doing them good!

Mr. Clarence Stokes, our Secretary, announces that the Radio Electric Co., in Philadelphia, has donated a permanent meeting place in the central section of the city that will seat 500 people. We are grateful for this cooperation. With a hall of this size and so centrally located, we will be able to invite every serviceman in this area to our meetings. We may be able o induce the mayor to attend, *as Mr. P. J. Dunn succeeded in doing in Baltimore.*

Another member was added to the staff of the *Phil-Cam Key;* Mr. James F. Hornbrook was appointed associate editor. He feels very much honored to be assigned this duty as he has only been with us a few weeks. The new editor is Mr. H. B. Willett, and he promises us some mighty fine issues of this splendid publication.

The card party recently held by the Chapter was enjoyed by all present and many winning prizes. Among the prizes were several presented by National Headquarters, President P. J. Dunn and his Baltimore Chapter. Many thanks.

During the summer we will have but one regular meeting a month, and graduates or students desiring further information are requested to write to Mr. Clarence Stokes, Secretary, at 2947 Rutledge St., or phone Mr. Charles Fehn, Chairman, at Nebraska 3557.

HAM LIST GROWS

The following new names are added to the growing list of N. R. I. students and graduates who are operating amateur Radio Stations:

Frank Photiades	W8NOA	Highland Pk., Mich.
Ralph Strawbridge	W8NMG	Williamsport, Pa.
Dean Bula	W5BDZ	Jet, Oklahoma
John Zilinsky	W1IUQ	So. Boston, Mass.
John Hallahan	W2EXY	Fords, New Jersey
Wm. H. Smith	W7ECY	Ellensburg, Wash.
Geo. H. Iwai	W6MDZ	Monrovia, Calif.

———————*n r i*———————

No one will get tired of NATIONAL RADIO NEWS. It is a treasure to N. R. I. men. It is the most interesting magazine I receive.

J. J. SAPIONE, Port Chester, N. Y.

———————*n r i*———————

I wish you would tell me what systems other readers are following to file the very valuable "service notes" which appear in the "Service Forum." I find them very useful and want to follow the best plan for filing them for ready reference.

F. X. CARTERET, Milwaukee, Wisc.

Let's hear from some of you fellows who are filing the "Service Forum" notes. Tell us your sug[illegible]ns so we can pass them al[illegible] "Cade"s.—Editor.

———————*n r i*———————

I thi[illegible]k NATIONAL

with aluminum paint and let it dry, and it is as good as a spray shield tube.

G. F. WATTON, Norfolk, Va.

It might be worth while to notch the tube base so the wire will fit below the surface thus preventing a short. The wire in the groove should be cemented in place. In many cases, an ordinary tube can be used without the shielding and with satisfactory results.—Editor.

———————*n r i*———————

DEWALD MODEL 724 AC

Here is another tip for the boys and I hope it will do them good. This time it is a Dewald Radio model 724 AC. The trouble is motor-boating. Motor-boating in this kind of set I found was caused by the screen grid bypass condenser which has a value of .5 microfarad—the one with the blue lead coming from the can. Here is how I found it.

I took the set to the shop, checked all bypass condensers. They all checked good. I then checked the push-pull input transformer and found it was open; replaced it with a new one and all was O.K. until two weeks later when the fellow walked in and said, "my set sounds worse than before." [illegible] back. I took [illegible]

THE second issue of our Chapter magazine, *The Canadian Radio-Trician*, has met with splendid success. We are now mailing this publication to N. R. I. men in all sections of Canada under our out-of-town membership plan. The response we are receiving from all over Canada with this arrangement is very encouraging, and we are doing our utmost to develop this publication. so that N. R. I. men living on this side of the border can obtain the latest and authentic information on Canadian receivers, service hints, and developments in Radio.

Out-of-town members are cordially invited to attend the meetings of the Toronto Chapter and hear lectures given by prominent Radio men. N. R. I. men living in Canada who desire a copy of the *Canadian Radio-Trician* and an outline of this membership plan. should write to Mr. E. Witherstone. 363 Nairn Ave.. Toronto, Ont.

Arrangements are being made for our members to inspect the studios and transmitter of broadcasting station CFRB. At the time of our visit to the studios. we are planning on using one of their studios for a brief business meeting.

Mr. Willis Forward, our Chairman, has been for a number of years in the service department of the theater equipment division of the Northern Electric Company. He was recently promoted to senior engineer with that organization. Congratulations!

Requests are continuing to come in from a number of Radio magazines offering to exchange their magazines each month for a copy of the *Canadian Radio-Trician*. The plan is working [illegible] ample reading [illegible]ry. Members [illegible]

Chapter Addresses

Any students or Alumni members desiring further information regarding Local Chapter activities may obtain it by writing to the Chapters direct, addressing their letters according to the following list:

Baltimore—George Ruehl, Secretary, Charleston and Second Avenues, Lansdowne, Md.

Philadelphia—Clarence Stokes, Secretary, 2947 Rutledge St., Philadelphia, Pa.

New York—Allen Arndt, Membership Secretary, 68 Suffolk, New York City.

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

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

Cleveland—Charles Jesse, Chairman, 3369 West 129th St., Cleveland, Ohio.

Chicago—Samuel Juricek, Secretary, 4223 North Oakley Ave., Chicago, Ill.

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

Detroit—William R. Sewell, Secretary, 16039 Curwood St., Detroit, Mich.

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Buffalo Chapter

A stag outing will be held shortly. Members of the various Radio sales and service houses in Buffalo will be invited to attend. We are anticipating a large crowd.

Louis Weber, past librarian of the Buffalo Chapter has recently opened his own service station in Buffalo and is off to a flying start. Mr. Weber is well qualified and deserving of success. All men of the Buffalo Chapter extend [illegible]es to friend Weber, whom we [illegible]good.

[illegible]und a new member a[illegible]d a[illegible] [illegible] Faulkner, 334 Third [illegible]y York. Geo[illegible]ge says [illegible]touch with[illegible]

Pittsburgh Chapter

Our membership has increased considerably due to the many fine lectures and additional aid we are giving N. R. I. men in this area. As time goes on, the general trend has been that Alumni men in and around Pittsburgh are turning more and more to our Local Chapter for assistance in keeping up-to-date with the forward pace of Radio. The ever-increasing changes in Radio circuits, vacuum tubes, etc., make the ambitious Radio-Trician realize he must *keep up* if he wishes to get his fair share of the profits to be made in Radio.

Mr. Joseph O'Shea, our technical advisor, has honored us again with three interesting lectures; "Electricity and Magnetism," "A.V.C. Circuits," and "New Metal Tubes." These lectures were well received.

George F. Weber, our Local Librarian, has secured two new Radio magazines for our members, *Short Wave Craft* and also *Radio Craft. Radio Merchandising* is to be added. It is suggested that members make full use of our library facilities.

At our last meeting the subject of Radio service charges was brought up, and it was unanimously decided to maintain our standard rate of $1.50 per hour. We also discussed news of the Radio and electrical industry, talks on better merchandising methods, practical testing procedure, and short cuts on testing receivers.

Thomas A. Deschantz, Chairman, extends a cordial welcome to all N. R. I. *students* and *graduates* to attend the meetings of the Pittsburgh Local Chapter. Chapter Headquarters are located at 1216 Coal Street, Wilkinsburg, Pittsburgh, Pa.

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Plans Ahead

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However, a few of the major plans are: A cooperative buying plan for all members; increasing service to Alumni men who are not in Local Chapter areas; serve other localities by organizing new Chapters; take steps to thwart local and national legislative plans injurious to our members; urge members to use our Consultation Service; give wider publicity to the Alumni Association in the Radio Industry; give more technical information to our members, etc.

Our whole idea in a nutshell is, "You Need Us and We Need You." With this in mind we feel that the Association will be one of the most powerful organizations of its kind in the world. Protect your educational investment. Back your Association.

New York Metropolitan Area Chapter

The annual election of officers was held at our regular meeting headquarters at the Hotel New Yorker on the night of Thursday, May 16. Mr. James L. Kearns was unanimously reelected as chairman for the coming year. Local Chapter members as well as those residing out of New York are well acquainted with the fine work Mr. Kearns has done in promoting the welfare of the Alumni Association.

Other officers elected were Mr. J. G. Holub, Vice-Chairman; Mr. L. Kershaw. Recording Secretary; Mr. J. H. Struble, Financial Secretary. Another group of officers were appointed to serve until April, 1936. Mr. A. Arndt, Membership Secretary; Mr. W. D. Foster, Sergeant-at-Arms; Mr. F. Jenkins, Assistant Sergeant-at-Arms; Mr. T. Cohan, Welfare; Mr. A. Bartlay, Service Forum; and Mr. E. Horvach, Librarian.

On the night of June 6, the first annual dinner was held and it turned out to be a great success. Everybody agreed they would all like to have many more dinners like this one in the future. All members present gave a short talk —everybody got along fine as though they were one great big family at home. Our Membership Secretary, Allen Arndt, after taking a course in public address speaking, has decided to go in for post graduate work.

"Jim" Kearns brought in a public address system and set it up giving the members a practical demonstration—showing the convenience and the simplicity of the apparatus. Jim is also something of an artist in his off moments from Radio. He played the piano while the whole group sang songs. (*Jim also played at Philadelphia one night and then went looking for a new tire. Remember?*) All the ladies present gave their whole-hearted approval of the boys going to the meetings. All members who didn't attend certainly missed something, so be on the lookout for the next dinner.

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"It is a pleasure to belong to the N.R.I. Alumni Association. Since I first enrolled as a student I have looked forward to being an alumni member. NATIONAL RADIO NEWS is a mighty fine magazine and gives just the information I need."

J. W. GLADDEN, Alexandria, Va.

The New Era in P. A.

(Continued from page 3)

gain amplifiers (100 db. gain). And since no input transformer is required with the high impedance velocity, the hum problem is entirely eliminated. The high impedance line, of course, should not be over 25′ or 30′ without compensation.

You can build a high fidelity 15 watt—4 stage amplifier for less than $30.00. It will be far superior to 90% of the jobs now in operation and which are replaceable.

The next point is how can I get them to buy a new installation? Shall I explain that the ribbon used is only 10015″ thick and, therefore, has no natural period of its own—therefore no peaks? Or, in spite of the fact that the ribbon is so thin the microphone itself is the most rugged type available and will stand the greatest amount of abuse? No—the method to use is the oldest—simplest—and most successful. "Listen to this one—now listen to this new one." Direct comparison is the only way to sell—it will close the sale for you. And after you make your first installation, the natural quality will get around. Others will then realize that their systems sound mechanical and poor. Remember, an untrained ear gets accustomed to his own sounding system—and only by direct comparison can he be shown the difference. Your job, therefore, is to demonstrate first—and then sell.

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Murray to Resign

(Continued from page 26)

to our members in the next election.

"I am glad to state that the Alumni Association is in very good condition. During the year 1935 it has made rapid advances under the leadership of P. J. Dunn, one of the finest Presidents that the Association has ever had, and a man who has the interest of the Association, and every one of its members, at heart. Under such leadership, the Association cannot help but go forward—to continue to serve its members as in the past, and even to increase its services.

"It is with a deep feeling of regret that I must sever my connections with this wonderful organization, and in so doing, it is my desire to wish the N. R. I. Alumni Association, its officers, and each and every one of its members, every possible success."

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"from the Pioneer Radio Home Study School"

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P. J. Murray, Managing Editor

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