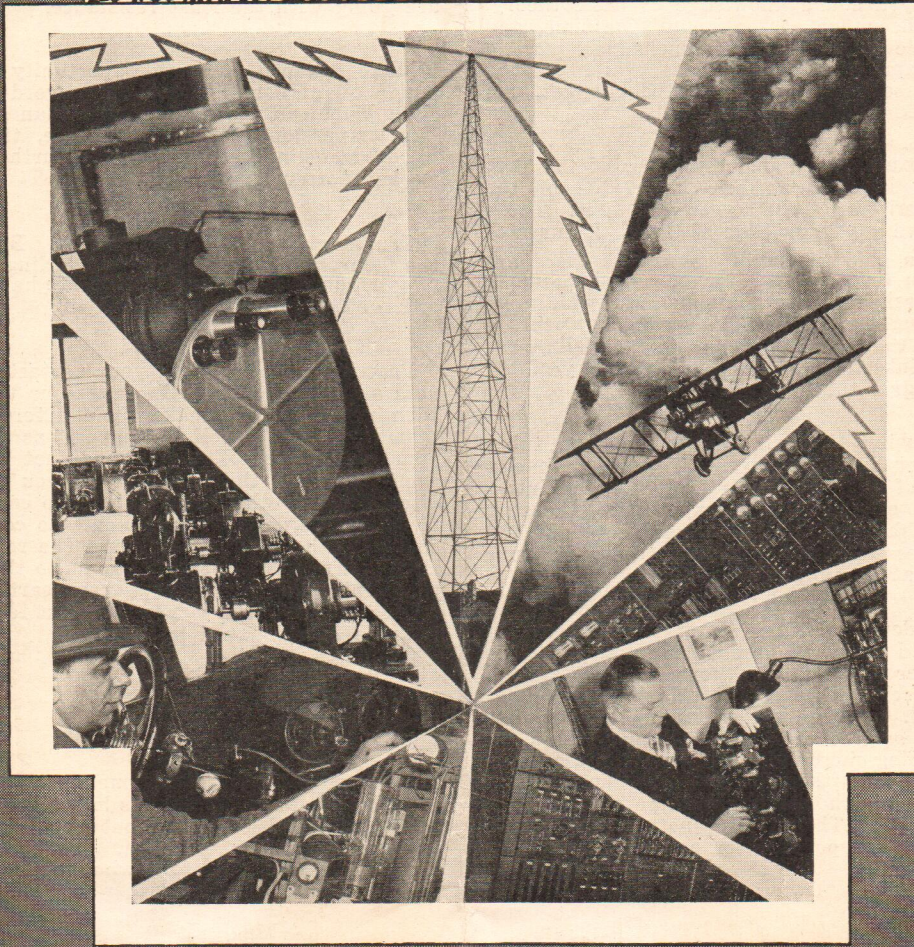


NATIONAL RADIO NEWS

VOL. 5—NO. 4

WASHINGTON, D. C.

NOVEMBER, 1932





from the
PRESIDENT'S PEN

J. E. SMITH, President, National Radio Institute

THE IMPORTANCE OF FUNDAMENTALS

N. R. I. has always insisted that a sound knowledge of practical Radio must be preceded by a sound knowledge of basic theory. It has been our contention all the time, and recent developments have conclusively proved, that improvements in Radio while on the surface seem to be complicated changes, can be traced back to fundamentals.

For example, an understanding of the R.F. pentode requires a basic knowledge of the characteristics of the screen grid tube. Those who have any knowledge of the E_p-I_p curve of a screen grid tube will know that there are kinks in its characteristic curve which make it impossible to use the tube over wide voltage ranges. The Radio frequency pentode merely uses a suppressor grid to eliminate these kinks to increase the total utility of the screen grid tube.

Reviewing the principles of vacuum tubes as power amplifiers, we realize that the efficiency of these tubes is limited. The introduction of modified Class A and Class B push-push amplification merely extended the usefulness of tubes, keeping the disastrous effects at a minimum.

The development of high powered output tubes did not make obsolete the orthodox type of power supply. The power supply system was merely altered. The principles were not changed. Designing engineers merely improved on the full-wave rectifier tubes by introducing mercury vapor into the glass envelope so that the wide variations in the tube resistance with change in current have been eliminated. They were not compelled to change the type of filter coils but to reduce its resistance.

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COURTESY

Courtesy is the oil which takes the friction out of your daily life. Friction means wear and tear. Friction creates heat and retards forward motion. You want to get where you are going with the least resistance.

Make full use at every opportunity of the magic oil of courtesy. A quiet word in the right place can accomplish more than a thousand impassioned ones. A simple, thoughtful deed of kindness will get you further than weeks of arduous striving.

Courtesy is a sign of strength. Big men are courteous. It is only underlings, employees, and "small timers" who are habitually rude or thoughtless.

Practice courtesy in all your contacts, business as well as social. Be courteous to those with whom it may make little difference so that you will establish courtesy as one of your life habits. You will find that it pays even in trivial things. Just as you despise discourtesy in others and respond to courteous treatment so does every person who comes in contact with you react to you. The real man is as courteous to the newsboy as to the bank president. Courtesy will warm hearts, melt opposition, and allow you to transform resistance into forward motion.

What might well be termed the "world's most lonely Radio Station" is located on Willis Island. This island is about 400 miles off the east coast of Australia. The station is manned by two operators who keep weather records and transmit weather reports.

SPRAYBERRY DESIGNS

A NEW SET ANALYZER

« Part II »

The last measurement described in the previous article told how to make rectifier plate voltage measurements.

Plate to grid voltage measurements may also be made as described for the A. C. rectifier plate voltages. However, in this case set S3 to the D. C. position. This measurement will indicate if both plate and grid circuits are complete. The voltage measured is the plate voltage plus the grid voltage.

To measure rectifier plate current, set S4 to the high position, and set S10 to neutral. Depress the push-button of S8 for one plate-current reading and the push-button of S9 for the other plate-current reading.

MUTUAL CONDUCTANCE TESTS FOR TUBES

After taking the plate-current reading of any tube, leave S4 set, and hold down the push-button of S6. A plate-current change will be noticed on the milliammeter. This indicates the tube's relative condition. Usually the greater the plate-current change, the better the tube.

If testing a screen-grid tube, depress the push-button of S5 instead of S6.

Jacks J1 and J2 may be used as the connections to the a.c. voltmeter for use as an output meter. Connect these across the voice-coil leads of the speaker by means of the regular test leads. Set S3 to the "on" or a.c. position. Adjust S1 for the proper range so as to get a satisfactory reading on the meter. Make the tuning adjustments in the usual manner.

RESISTOR MOUNTING

The resistance units are mounted by means of eleven 6-32 machine screws, $1\frac{3}{4}$ inches long.

The supporting strip is not attached to the panel until as much wiring as possible has been done to the other units. The mounting screws should be at least 2 inches long, in order that the supporting strip will clear the switch contacts underneath the panel. Two binding posts are provided for the connection of the C battery. These are mounted in a line with the jacks at the right-hand end of the panel.

The resistance units are mounted on three bakelite strips, specifications for which are shown in Figure 4. The 4950, 5000, 40,000 and 50,000-ohm resistances are shorter than the others, therefore two strips are required for the under side of the mounting.

Drilling specification for the panel are shown in Fig. 5. It is best to cut the large meter hole first.

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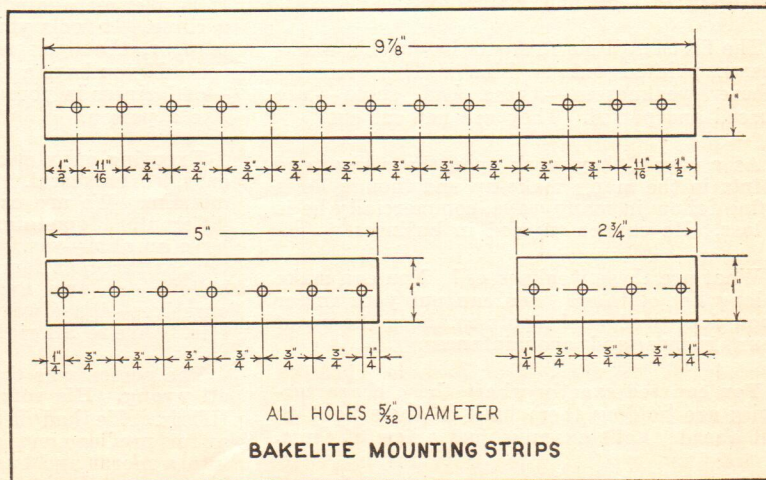


Figure 4

A FEW WORDS WITH THE N. R. I. DIRECTOR

E. R. HAAS, Vice President and Director, National Radio Institute



BEWARE THE DEADLY SOFT SPOT

How often have you seen beautiful fruit—a big apple, luscious peach, or fragrant melon—with a big soft spot on it? If the spot is not too big you can cut it out.

Such fruit is fit only for immediate eating or for cooking. You can't sell it. Commercially, fruit with soft spots in it is worthless.

The employer, looking for men to promote; to take over his work when he is ready to retire—looks for sound men—men without any spots in their character.

More personal careers are ruined by a man's own weaknesses—soft spots in his make-up—than by all other causes put together. The human weaknesses are endless, but you'll find two things true about every bad spot in the character of the men you know.

The first is, "a man resents having his weaknesses pointed out to him." The second—"these weaknesses—these bad spots—are nursed and petted. They are not cut out."

As a result, they work upon the many good points in the man's make-up and though he is a fine fellow in many ways, commercially he is a loss. He cannot succeed in business.

What are these weaknesses? You can make a long list of them. You can put your finger upon dozens of weak spots in the make-up of your friends and acquaintances.

You can see exactly where these characteristics are holding them back in their fight to get ahead. Let's examine just a few of them.

Maybe you have the very serious defect of believing that you are all right; you only see

these traits in other people. This is the most deadly of all soft spots in a MAN's make-up.

If you know how to be **honest with yourself** you will recognize that **SOME** of these apply to **YOU**. The **ONLY KNOWN CURE** for soft spots is to recognize them and **CUT THEM OUT**.

Feeling sorry for oneself (self-pity). If you ever **ALLOW** yourself to entertain a feeling of pity or sorrow about your condition, your start in life, your handicaps, real OR imagined—**stop**. You are what is known as a weak sister. That fatal soft spot will spread. Will rot your character and career.

Being suspicious of other people. This is a dangerous habit. If you can't trust other people, it will show in your attitude. People will not trust you. People like those who **TRUST THEM**.

Laziness. This is more than a weakness. It is a crime against a man's own life. It is a curse. It fools you. You think your health is poor, that you need this, you don't have that. If you have a single spot—even a **TAINT**—of laziness in your system—**GET RID OF IT** like a poison.

Excusing one's own mistakes. Nothing is so easy, so universal. Someone catches us in a mistake. We are careless, hasty, lazy, or indifferent. Something goes wrong. But we have an alibi—yes. We have a good excuse—two, or three, or four of them maybe. We even **believe our own excuses**. We can't criticize ourselves—it's always the fault of "somebody else." We're all right.

The person who thinks he is **ALL RIGHT** is **all wrong**. His soft spot is almost as big as **HE** is. He had better **GET ALIVE** to his awful predicament, stop **EXCUSING** himself into a moral and business bankruptcy, correct **his own** weaknesses, and make a man out of himself.

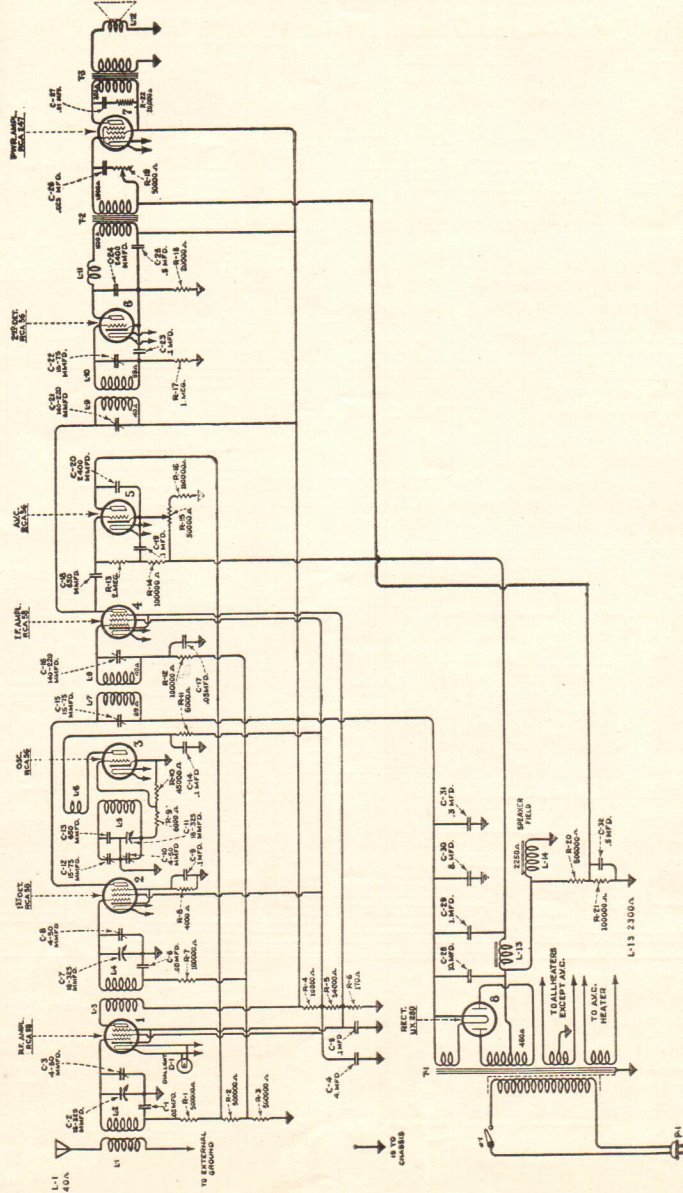
RADIO-TRICIAN SERVICE SHEET

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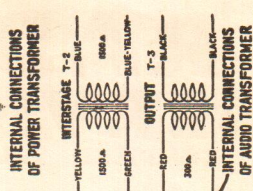
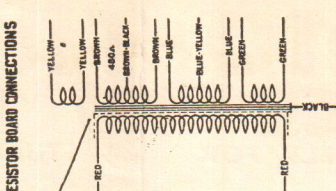
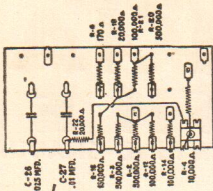
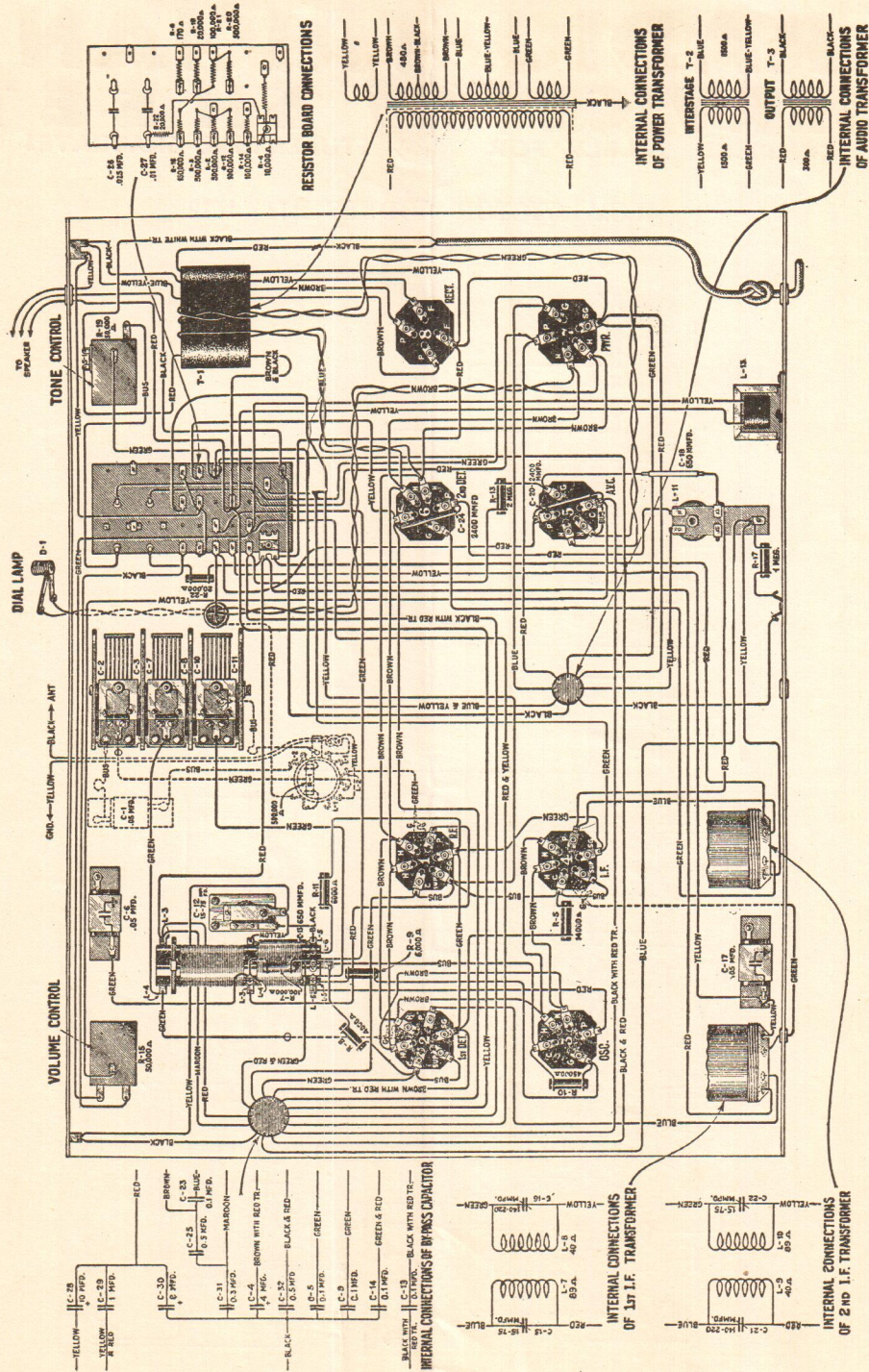
COMPILED SOLELY FOR STUDENTS & GRADUATES



R.C.A. VICTOR MODELS R71—R72



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Sprayberry Designs A New Set Analyzer

(Continued from Page 3)

CONTINUITY TESTER OHMMETER

Connect the test leads and the 4.5 battery in series with jacks J and J1. Set S3 to the "off" or d.c. position. Set S1 to the 5-volt position. When the two test leads are touched, 4.5 volts will be indicated on the voltmeter. When there is a resistance between the two leads, less than 4.5 volts will be indicated. Thus, to test circuit continuity, place the two leads across the circuit to be tested. If a reading is obtained, the circuit is closed. If open, there will be no reading.

If a resistance is being measured, read the scale directly in terms of current. If the scale shows .15 ma., the resistance will be equal to $\frac{4.5}{.00015} = 5,000 = 25,000$ ohms.

A chart may be made which shows the current versus the resistance, so that for any value of current you may readily determine the value of the resistance by referring to your chart, thus eliminating calculations.

To determine higher ranges of resistance, use a higher battery voltage. Each time a higher voltage is used, S1 will have to be set correspondingly. It is always necessary to subtract the resistance of the test circuit from the total value so as to get the actual value of the resistance under test. If the 5-volt range is used, the test circuit resistance will be 5,000 ohms, and for the 50-volt range it will be 50,000 ohms, and so on to the highest scale

of the meter, which has a resistance of 1,000,000 ohms.

The direction given may appear a bit complicated, but you will find that measurements are easily made and that the manipulation of the switches becomes natural after a few tests have been made.

The constructor will find that this analyzer can be constructed reasonably and will make measurements comparable to any type of tester in practical use by the service man. Below is a list of parts necessary for the construction of the analyzer.

LIST OF PARTS

- J, J1, J2, J3, J4—Yaxley insulated tip jacks, type 422.
- R1, R2, R3—I.R.C. .25 meg. resistances, type WW4.
- R4—I.R.C. .15 meg. resistance, type WW4.
- R5—I.R.C. 50,000-ohm resistance, type WW3.
- R6—I.R.C. 40,000-ohm resistance, type WW3.
- R7—I.R.C. 5,000-ohm resistance, type WW3.
- R8—I.R.C. 4,950-ohm resistance, type WW3.
- R9—I.R.C. .505-ohm resistance, type WW4.
- R10—I.R.C. 2.083-ohm resistance, type WW4.
- R11—I.R.C. 33.33-ohm resistance, type WW4.
- S1—Yaxley 8-point tap switch, type 1618.
- S2—Yaxley push-button switch, type 2006.
- S3—Yaxley jack switch, type 760.
- S4—Yaxley 4-point tap switch, type 1515.
- S5, S6—Yaxley push-button switches, type 2003.

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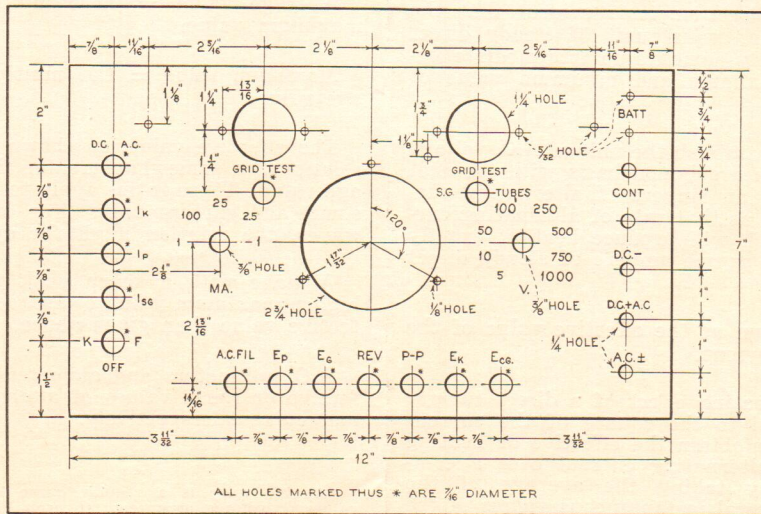
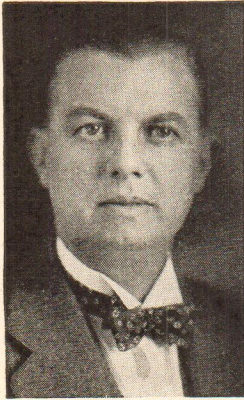


Fig. 5

[7]



THINGS TO REMEMBER

WHEN DEALING WITH DIRECT AND ALTERNATING CURRENT

by J. A. DOWIE
Chief Instructor

In dealing with alternating current circuits, there are many things not met with in direct current circuits.

Alternating current is one that is continually changing its value, as well as reversing its direction of flow. It passes through a certain set of current values in what is called a cycle, over and over again so many times per second. The current during each cycle passes through a large range of values from zero to maximum value, then decreases to zero again, then passes through a similar set of values in the opposite direction.

Since the voltage and current of an A.C. circuit are continually varying in value and reversing in direction, it is evident that the equivalent to an equal unit of steady direct current is really some value intermediate between the maximum and minimum value of the A.C.

In order to establish the unit of A.C. voltage and current on a common basis with those of direct current, an ampere of alternating current is defined as that rate of alternating current flow which will produce heat at exactly the same rate as one ampere of steady direct current.

This is known as the **effective value** of the alternating current.

Since the heating effect of a direct current is proportional to the square of the current (I^2R), we may obtain the effective or heating value of an alternating current over a complete cycle by taking the average of the squares of several instantaneous values of the A.C. current and extracting the square root of

the average or mean square of a number of values of current. This is abbreviated to root mean square or r.m.s. which is another term for effective value. In this expression mean and average have the same meaning.

The effective value of the current obtained in this manner is 0.707 times the maximum or peak value. Hence it is the square root of the average or mean square of several instant current values during one cycle.

Conversely, the maximum value of a sine* voltage or current is equal to 1 divided by 0.707 or 1.41, multiplied by the effective value of the voltage or current.

For convenience the foregoing relations are herewith given together.

Maximum value = 1.41 multiplied by the effective value.

Effective value = 0.707 multiplied by the maximum value.

Average value = 0.636 multiplied by the maximum value.

Maximum value = 1.57 multiplied by average value.

The effective value, as shown by the above relations, is somewhat greater than the average value. These ratios apply to sine curves of e.m.f. and current only. For other types of waves, the relation might be quite different.

A wave with a sharp peak would have a higher maximum value compared with the effective value than given above.

A.C. voltmeters and ammeters read the effective or r.m.s. values of alternating voltage and current respectively.

* A sine wave is a regular curve having the same values of voltage or current in each half cycle as time elapses above and below the zero value.

"FOLLOW THRU"

I have a friend, Jack Calloway, who is a salesman—just an ordinary automobile salesman.

He made out fairly well in the auto selling game—supported his wife and two youngsters—had a small car, but he just couldn't seem to get into the "big money."

He wanted a home of his own in the suburbs where his children could be out in the open—wanted to send them through good schools—in fact he wanted to give them some of the better things in life. He tried hard—worked hard—had plenty of prospects—closed some orders—but week after week he didn't seem to be getting further toward his ideals. He just couldn't close as many orders as he should. There was a goal he had set for himself—the "Star Salesmanship Class," and as the days went on it began to seem unattainable. He knew there was something wrong. But he couldn't figure out what it was.

Jack was a golf enthusiast and one day while on the course he had the club professional go around with him to give him some pointers on improving his drive. He wasn't getting the distance he wanted. They arrived at the fourth hole before the "pro" made any comments whatever.

"I've been studying your drive, Mr. Calloway," said Sam Dallas, the "pro," "and I see just what your trouble is. You're knocking that ball straight down the fairway and averaging about 175 yards on each drive. But you are stopping the club head short right after you hit the ball, which is all wrong—you've got to let that club swing free and swing thru. You'll never get any more distance until you learn to follow thru.

Calloway got more than a golf lesson from the "pro's" instruction—he got a lesson in salesmanship too.

He began thinking about a sale he had lost that very morning. Just because the customer had shown a little sales resistance Calloway figured it wasn't any use to bother with him.

And right then and there Jack Calloway found out what was keeping him out of the "Star Salesmanship Class." He didn't follow

by
MARK KEYS
National
Radio News
Staff



thru—didn't keep after his prospects—didn't break down their sales resistance and consequently didn't close the very orders that he should—the orders which would have done so much to give him the extra income he wanted.

But now Calloway is selling more automobiles than any other man on his firm's entire sales force. He follows thru.

Following thru doesn't only apply to selling automobiles. Following thru is one of the secrets of success in landing a good job—one of the secrets of success in owning the home you want—one of the secrets of success in building up a bank account—in obtaining financial independence.

Following thru is the secret of success in practically every walk of life. Plenty of fellows lose the sale of a Radio set to a competitor because they think the customer can't be sold when he says "No."

Plenty of fellows have failed in business just because in making their drives they didn't follow thru and work hard to put their business on a paying basis.

Your job is only half started when you have hit the ball. Any duffer can get a good drive once in a while but it is the man who has been trained to FOLLOW THRU who will have the longest drive and the best score in the long run.

CRAWL --- WALK --- Then RUN!

"Just when will I be a Radio man capable of making money in Radio?" A student just asked me that question. The answer will be of general interest.

In order to answer the question intelligently we must consider the setup of the N. R. I. Course. Our Course is arranged into four sections which may be classed as follows: Fundamental, Practical, Advanced, and Supplementary.

The Fundamental Course is in itself divided into two parts. The first twenty lessons cover the essential fundamentals of Radio; the next fifteen lessons cover special features of the modern Radio receivers.

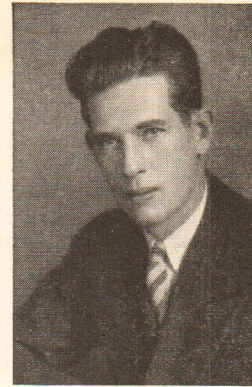
It has long been the contention of N. R. I. that practical training is an absolute necessity for success in the study of Radio. Therefore, along with the regular lessons of the Fundamental Course the student receives units of practical work which are the result of years of study and expenditure of thousands of dollars on the Institute's part.

Upon the completion of the Fundamental Theory the student is passed into his Advanced training which is a specializing Course—and which rounds out his knowledge of the advanced work on the subject he has chosen.

From the very beginning of the Fundamental training and at regular intervals thereafter the student receives Supplementary text books, designed to give him additional knowledge on subjects allied to his Radio training, such as ways to make money in Radio, how to do special jobs, a course in mathematics, etc. And in addition, along with these Supplementary books, the student receives about seventy service data sheets giving definite technical details and service information on the popular Radio receivers of today.

Now that we have a general idea of the scope and layout of the Course, let us consider when a student can start making money. For the man with no previous training or experience in Radio, naturally the earning ability will not be immediate as otherwise. It is not suggested that any student without previous Radio training or experience advertise himself as a service man until he has passed the twentieth lesson of the Fundamental Course.

by
S. M. ARMSTRONG
N. R. I. Director
of Student
Service



By this I do not mean that this man should not attempt to do Radio work. On the contrary we have records which point to outstanding successes made by our students prior to this point. But unless they had previous training or unless they were very unusual students they did not derive their early success from servicing modern Radio receivers. Their work was of a different nature, constituting the installation of aerials for persons having inefficient antenna systems, installation of aerials for dealers and above all sales of receivers, tubes, service contracts and accessories for dealers on commission.

These men realized that their Radio knowledge was in the formative stage and that it was necessary first to CRAWL.

Arriving at the twentieth lesson in the Fundamental Course the average student of the Institute can then go into servicing on a broader scale and can in the majority of cases handle the ordinary servicing problems of today. I might say that he can handle all except the most complicated jobs, if he continues his study right along with his work, because he is then studying the very things with which he will have to contend in the field of servicing. He has passed his crawling period and is WALKING through what we might term the intermediate stage of his Radio servicing knowledge. His supplementary training which he has been receiving meanwhile has proved a great asset.

From this point he goes into the specialized branch of his training, the Advanced Course, the completion of which places him in a position to compete with any and all service men—he is then ready to RUN—travel forward rapidly to his goal—be it an independent service business of his own or a position in some organization dealing in Radio.

RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF. STUDENTS & GRADUATES

COMPILED SOLELY FOR



STROMBERG-CARLSON NO. 22 SUPERHETERODYNE

Designation	Value	Color Coding	Functions	Value	Color Coding	Functions
C ₁	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of Radio Amplifier	0.1 Mf.	Approx. 1 Mmf.	Main By-resonator Coupling Capacitor
C ₂	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of Mixer Tube	3 Mf.		Auxiliary By-resonator Coupling Capacitor
C ₃	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of First I. F. Amplifier	3 Mf.		Cathode By-pass Capacitor of R. F. Amplifier and First I. F. Amplifier
C ₄	600 Ohms	Blue Black Brown	Filter Resistor Screen Circuits of Screen Grid Tubes	3 Mf.		By-pass Capacitor for Screen Circuits of Radio Amplifier and Mixer Tube and Plate Circuit of Oscillator
C ₅	600 Ohms	Blue Black Brown	Filter Resistor Plate Circuits of Screen Grid Tubes	400 Mmf. Max.		By-pass Capacitor for Plate Circuits of Radio Amplifier and Mixer Tube
C ₆	600 Ohms	Blue Black Brown	Cathode Resistor of R. F. Amplifier and First I. F. Amplifier Tubes	40 Mf.		Unit of Variable Gang Capacitor
C ₇	450 Ohms	(Wire Wound)	Filter Resistor Plate Circuit Second I. F. Amplifier	400 Mmf. Max.		Grid Circuit By-pass Mixer Tube First I. F. Transformer
C ₈	600 Ohms	Blue Black Brown	Plate Resistor Plate Circuit Second I. F. Amplifier	40 Mf.		Series Capacitor for Oscillator Tuning Circuit
C ₉	10,000 Ohms	Brown Black Orange	Amplifier Grid Resistor	400 Mf.		Aligning Capacitor for Oscillator Tuning Circuit
C ₁₀	250,000 Ohms	Red Green Yellow	Demodulator Grid Circuit	3 Mf.		Aligning Variable Gang Capacitor
C ₁₁	100,000 Ohms	Brown Black Yellow	Filter Resistor of Demodulator	3 Mf.		Aligning Variable Gang Capacitor
C ₁₂	1 Megohm	Brown Black Green	Filter Resistor Plate Circuit of Demodulator	250 Mmf.		By-pass Capacitor for Cathode Circuit of Mixer Tube
C ₁₃	500,000 Ohms	Green Black Yellow	Filter Resistor Plate Circuit of Demodulator	3 Mf.		By-pass Capacitor for Cathode Circuit of Oscillator Tube
C ₁₄	100,000 Ohms	Brown Black Yellow	Volume Control Potentiometer	3 Mf.		Aligning Capacitor on Secondary First I. F. Transformer
C ₁₅	500,000 Ohms	(Wire Wound)	Hum Adjuster Potentiometer	3 Mf.		Grid Circuit By-pass First I. F. Amplifier
C ₁₆	400 Ohms	(Wire Wound)	Grid Biasing Resistor of Power Output Tubes	250 Mmf.		Scratch Filter Capacitor Phonograph Circuit
C ₁₇	750 Ohms	(Wire Wound)	Midtap Resistor Filament Circuit of Output Tubes	3 Mf.		By-pass for Screen Circuit of First and Second Intermediate Amplifiers
C ₁₈	10 Ohms	(Wire Wound)	Series Grid Resistor of Oscillator	3 Mf.		By-pass for Plate Circuit of First I. F. Amplifier
C ₁₉	500 Ohms	Green Black Brown	Cathode Resistor of Mixer Tube	3 Mf.		Aligning Capacitor for Tuned Link Circuit of Second I. F. Transformer
C ₂₀	6,500 Ohms	Blue Green Red	Section of Voltage Divider Resistor	100 Mmf.		Aligning Capacitor for Secondary of Second I. F. Transformer
C ₂₁	1,575 Ohms	(Wire Wound)	Section of Voltage Divider Resistor	100 Mmf.		Cathode By-pass for Second I. F. Amplifier
C ₂₂	1,220 Ohms	(Wire Wound)	Section of Voltage Divider Resistor	1 Mf.		Coupling Capacitor of Third I. F. Transformer
C ₂₃	144 Ohms	(Wire Wound)	Section of Voltage Divider Resistor	1 Mf.		By-pass for Plate Circuit of Second I. F. Amplifier
C ₂₄	520 Ohms	(Wire Wound)	Section of Voltage Divider Resistor	1 Mf.		Aligning Capacitor for Demodulator
C ₂₅	285 Ohms	(Wire Wound)	Section of Voltage Divider Resistor	1 Mf.		Grid Circuit Filter Capacitor of Demodulator
C ₂₆	3 Ohms	(Wire Wound)	Midtap Resistor Heater Circuit (at First I. F. Tube)	0.1 Mf.		Ripple Filter on Bias Lead C-2
C ₂₇				2 Mf.		Power Line Filter Capacitor
C ₂₈				3 Mf.		Ripple Filter Capacitor
C ₂₉				6 Mf. 25 cycle		Ripple Filter Capacitor
C ₃₀				2 Mf.		Ripple Filter Capacitor
C ₃₁				6 Mf. 25 cycle		Ripple Filter Capacitor
C ₃₂				5 Mf.		Ripple Filter Capacitor
C ₃₃				6 Mf. 25 cycle		Ripple Filter Capacitor
C ₃₄				4 Mf.		Ripple Balancer Capacitor First Audio Amplifier
C ₃₅				1 Mf.		Tuning Circuit By-pass of Demodulator
C ₃₆				1 Mf.		"Stopping" Capacitor Grid Circuit of Demodulator

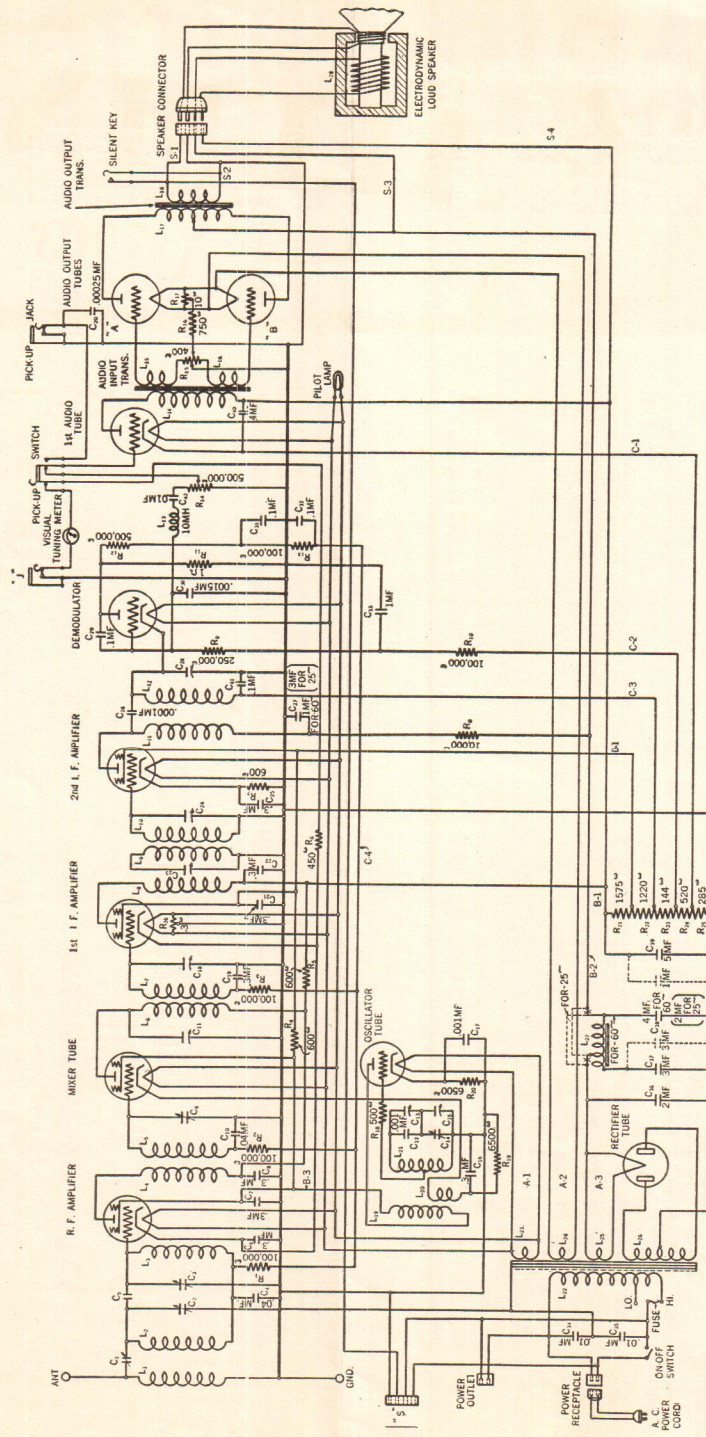
Table I. Resistor Identification

Designation	Value	Color Coding	Functions
R ₁	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of Radio Amplifier
R ₂	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of Mixer Tube
R ₃	100,000 Ohms	Brown Black Yellow	Grid Bias of Feeder of First I. F. Amplifier
R ₄	600 Ohms	Blue Black Brown	Filter Resistor Screen Circuits of Screen Grid Tubes
R ₅	600 Ohms	Blue Black Brown	Filter Resistor Plate Circuits of Screen Grid Tubes
R ₆	600 Ohms	Blue Black Brown	Cathode Resistor of R. F. Amplifier and First I. F. Amplifier Tubes
R ₇	450 Ohms	(Wire Wound)	Filter Resistor Plate Circuit Second I. F. Amplifier
R ₈	600 Ohms	Blue Black Brown	Plate Resistor Plate Circuit Second I. F. Amplifier
R ₉	10,000 Ohms	Brown Black Orange	Amplifier Grid Resistor
R ₁₀	250,000 Ohms	Red Green Yellow	Demodulator Grid Circuit
R ₁₁	100,000 Ohms	Brown Black Yellow	Filter Resistor of Demodulator
R ₁₂	1 Megohm	Brown Black Green	Filter Resistor Plate Circuit of Demodulator
R ₁₃	500,000 Ohms	Green Black Yellow	Filter Resistor Plate Circuit of Demodulator
R ₁₄	100,000 Ohms	Brown Black Yellow	Volume Control Potentiometer
R ₁₅	500,000 Ohms	(Wire Wound)	Hum Adjuster Potentiometer
R ₁₆	400 Ohms	(Wire Wound)	Grid Biasing Resistor of Power Output Tubes
R ₁₇	750 Ohms	(Wire Wound)	Midtap Resistor Filament Circuit of Output Tubes
R ₁₈	10 Ohms	(Wire Wound)	Series Grid Resistor of Oscillator
R ₁₉	500 Ohms	Green Black Brown	Cathode Resistor of Mixer Tube
R ₂₀	6,500 Ohms	Blue Green Red	Section of Voltage Divider Resistor
R ₂₁	1,575 Ohms	(Wire Wound)	Section of Voltage Divider Resistor
R ₂₂	1,220 Ohms	(Wire Wound)	Section of Voltage Divider Resistor
R ₂₃	144 Ohms	(Wire Wound)	Section of Voltage Divider Resistor
R ₂₄	520 Ohms	(Wire Wound)	Section of Voltage Divider Resistor
R ₂₅	285 Ohms	(Wire Wound)	Section of Voltage Divider Resistor
R ₂₆	3 Ohms	(Wire Wound)	Midtap Resistor Heater Circuit (at First I. F. Tube)

Table II. Capacitor Identification

Designation	Value	Color Coding	Functions
C ₁	0.1 Mf.	Approx. 1 Mmf.	Main By-resonator Coupling Capacitor
C ₂	3 Mf.		Auxiliary By-resonator Coupling Capacitor
C ₃	3 Mf.		Cathode By-pass Capacitor of R. F. Amplifier and First I. F. Amplifier
C ₄	3 Mf.		By-pass Capacitor for Screen Circuits of Radio Amplifier and Mixer Tube and Plate Circuit of Oscillator
C ₅	400 Mmf. Max.		By-pass Capacitor for Plate Circuits of Radio Amplifier and Mixer Tube
C ₆	40 Mf.		Unit of Variable Gang Capacitor
C ₇	400 Mmf. Max.		Grid Circuit By-pass Mixer Tube First I. F. Transformer
C ₈	40 Mf.		Series Capacitor for Oscillator Tuning Circuit
C ₉	400 Mf.		Aligning Capacitor for Oscillator Tuning Circuit
C ₁₀	3 Mf.		Aligning Variable Gang Capacitor
C ₁₁	3 Mf.		Aligning Variable Gang Capacitor
C ₁₂	3 Mf.		By-pass Capacitor for Cathode Circuit of Mixer Tube
C ₁₃	3 Mf.		By-pass Capacitor for Cathode Circuit of Oscillator Tube
C ₁₄	250 Mmf.		Aligning Capacitor on Secondary First I. F. Transformer
C ₁₅	3 Mf.		Grid Circuit By-pass First I. F. Amplifier
C ₁₆	250 Mmf.		Scratch Filter Capacitor Phonograph Circuit
C ₁₇	3 Mf.		By-pass for Screen Circuit of First and Second Intermediate Amplifiers
C ₁₈	3 Mf.		By-pass for Plate Circuit of First I. F. Amplifier
C ₁₉	3 Mf.		Aligning Capacitor for Tuned Link Circuit of Second I. F. Transformer
C ₂₀	100 Mmf.		Aligning Capacitor for Secondary of Second I. F. Transformer
C ₂₁	1 Mf.		Cathode By-pass for Second I. F. Amplifier
C ₂₂	3 Mf. 25 cycle		By-pass for Plate Circuit of Second I. F. Amplifier
C ₂₃	1 Mf.		Aligning Capacitor for Demodulator
C ₂₄	0.0015 Mf.		Grid Circuit Filter Capacitor of Demodulator
C ₂₅	1 Mf.		Plate Circuit Filter Capacitor of Demodulator
C ₂₆	1 Mf.		Ripple Filter on Bias Lead C-2
C ₂₇	0.1 Mf.		Power Line Filter Capacitor
C ₂₈	2 Mf.		Ripple Filter Capacitor
C ₂₉	3 Mf.		Ripple Filter Capacitor
C ₃₀	6 Mf. 25 cycle		Ripple Filter Capacitor
C ₃₁	5 Mf.		Ripple Filter Capacitor
C ₃₂	6 Mf. 25 cycle		Ripple Filter Capacitor
C ₃₃	4 Mf.		Ripple Balancer Capacitor First Audio Amplifier
C ₃₄	1 Mf.		Tuning Circuit By-pass of Demodulator
C ₃₅	1 Mf.		"Stopping" Capacitor Grid Circuit of Demodulator

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





ALUMNI *News*

SPECIAL BULLETIN POPULAR

The Alumni Association Special Bulletin "H," on the subject of making money during the election campaign with portable public address systems, greatly exceeded our expectations for its popularity. Approximately 500 Alumni Association members availed themselves of the opportunity to secure this helpful money-making bulletin which was prepared by the Alumni Association in conjunction with the Instruction Staff of the National Radio Institute.

ALUMNI VOTING

From the far corners of the globe ballots are being received in the yearly Alumni Association nomination of officers. Members are casting their votes to nominate candidates for the offices of president, four vice presidents, secretary, and executive secretary. If returns justify we will be able to forward with the December News ballots for the final election. Great interest is evinced in this election as indicated by the number of ballots cast for nominations.

CALCATERRA CATALOG SERVICE

Your Editor desires your opinion of the value of the Calcaterra Catalog Service featured for the last several months on page 16 of National Radio News. Do you want this service or do you want us to discontinue it. This is your News—we want to make it as you want it. Indications point to the fact that the Calcaterra Catalog Service is popular as indicated by the number of inquiries they have received, but we want you to tell us what you think of it. Drop a line to the National Radio News, Attention the Alumni Editor and give us your reaction. In writing the Editor please do not discuss student matters in the same letter as one will delay the other.

POLICE RADIO OPERATOR

The efficient operation of the Police Radio of Akron, Ohio, is in the hands of N. R. Hood, N. R. I. graduate.

It is the job of Hood, as Chief Operator, and his two assistants to maintain the transmitter and operate it in the interests of Public Safety.

SPECIAL NOTICE

For a long time readers of National Radio News have wanted us to make plans whereby the News could carry longer and more meaty articles about the things which interest Radio men most. We have made such plans, and full details will be published in the December issue. Watch for it. You'll like this new plan.

Has it ever occurred to you that every Radio store manager or owner should be the best Radio man in the organization? That's something to think about.

NEW SET ANALYZER

(Continued from Page 7)

- S7, S8, S9—Yaxley push-button switches, type 2880 special.
S10—Yaxley jack switch, type 32.
S11, S12, S14, S15—Yaxley push-button switches, type 2001.
S13, S16—Yaxley push-button switches, type 2004.
1 control-grid clip.
1 Blan special carrying case, 12 inches by 9 inches by 5 $\frac{3}{4}$ inches, inside dimensions, covered with imitation leather.
1 roll No. 18 push-back wire.
Blan panel kit, consisting of 7-inch by 12-inch bakelite panel and three bakelite strips for mounting resistors, all cut and drilled according to specifications in Figure 4.
1 Weston model 301 universal meter.
1 UX type tube socket.
1 UY type tube socket.
1 six-hole socket.
1 Alden plug and cable, type 906WLC.
2 Alden adapter, type 964DS, 965DS.
2 Eby binding posts.
Miscellaneous screws and nuts.

(NOTE: Parts referred to can be purchased from any of the Radio Mail Order Houses.)

IMPORTANCE OF FUNDAMENTALS

(Continued from Page 2)

For years it was known that while the diode tube was a superior detector than any other known type, it lacked sensitivity and gave no amplification; consequently, it could only be used in elaborate circuits. Engineers merely combined the original diode and triode amplifier into a single envelope, giving a complicated arrangement in a simple form.

One realizes that all these improvements are simple, from a fundamental point of view. While imagination was necessary to develop them they are merely adaptations of fundamentals of Radio.

Recently John F. Rider introduced the resistance method of testing receivers, an important contribution to analyzing modern sets. Take it from me, without a knowledge of Ohm's Law, and the calculation of resistances in series, in parallel, and in combination, the method would be valueless. Always fundamentals are essential.

NATIONAL RADIO NEWS



Vol. 5—No. 4

Nov., 1932

Published monthly in the interest of the students and Alumni Association of the
NATIONAL RADIO INSTITUTE
Washington, D. C.

J. E. SMITH, President. E. R. HAAS, Director.
The Official Organ of the N. R. I. Alumni Association

So live that you can look any man in the eye and ask him to loan you a ten-spot.

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IN MEMORIAM

It is with sorrow that we learn of the death of graduate Harry H. Regennitter, of Davenport, Iowa. Harry was engaged in the Radio Service Business. He is survived by his widow and one daughter; his parents and a sister.



AMATEURS

The list of N. R. I. students and graduates who operate amateur stations is growing. Here are the names we have received since the last issue of the News.

Joseph E. Bird—W2DDW, Wappingers Fall, N. Y.
 Alvin L. Jones—W3CMJ, Hopewell, Va.
 R. T. Worthy—W4OL, Lagrange, Ga.
 E. LeRoy Deming—W8HHQ, Jackson, Mich.
 Isadore Lyman—W1FAK, Thorndike, Mass.
 I. R. Davis—W5CEE, Electra, Texas.
 Lio Lacourse—VE2EF, Trois Rivieres, P. Q., Canada.
 J. T. McCullough—W9BHG, Excelsior Springs, Mo.
 Paul K. Hudson—W8CXM, Athens, Ohio.
 Chas. Pilling—W4BKX, South Jacks, Fla.
 G. W. Fuller—W4BGG, Jacks, Fla.
 Lawrence E. Velin—W9AYT, Ishpeming, Mich.
 Oscar Smith—W7BZU, Wallace, Idaho.
 W. M. Yost—W9BXX, Greenville, Ky.
 Joseph Czyz—W1BTB, Suffield, Conn.
 Mike Zurich—W8FT, Detroit, Mich.
 Lawrence Keander—W1DJK, West Dennis, Mass.
 Otto L. Groff—W5II, Duncan, Okla.

W. E. BLACKMAN, Lefors, Texas

Just the other day I was servicing an A.K. Radio. The tubes and set all checked O.K. but the set wasn't very selective, so after checking the set I decided to check the house wiring.

The house was plastered and had metal lathing. I found one of the power lines was grounded to this metal lathing and after insulating the wire from the lathing the Radio set worked just fine.

PAUL SHEAFFER, Harrisburg, Pa.

Here is a tip on the Majestic 90-91 and 92. A bad ground connection or a long ground lead will cause these models to oscillate from 1,000 kc. down to 550 kc. I had three of them recently, two with poor grounds and one, located on the 3rd floor of a building, with a 40-foot lead to ground. A steam system usually is a poor ground, but it solved this problem. It was the only ground available except the 40-foot lead.

CARL F. GEIGAND, Buffalo, New York.

You may be interested in knowing that I have installed an antenna system in an eight-family apartment building under construction, and was also entrusted with the installation of the vestibule-to-suite telephone system. Thanks to you, I was able to do this work like an expert, and I expect to accomplish much more.

VALENTINE OBEL, Omaha, Nebraska

An unusual trouble was encountered in a Philco 511. The complaint was a continuous noise resembling static. According to the customer this had been going on for about three years and said that I was the fifth man to work on the job.

After an inspection and a few tests the trouble was located in the first audio stage. The transformer was substituted for another and the noise was completely eliminated.

The funny part about this set was that three service men from an organization which claims to be the biggest of its kind in the state failed to fix the set. The total time in locating this trouble was about 15 minutes. So this just goes to show that it pays to be trained in Radio.

A. I. BORINSKY, Shenandoah, Pa.

I'm working in a theater with a Western Electric Sound System and I always try to locate any trouble without sending for the service man. This is good experience.

When I started the show the other day the sound was O.K. but in about twenty minutes it started to fade and by the time the reel ran through, went dead. I quickly switched my relay over to the other 3A Photoelectric amplifier. Still no sound. I inserted a new 3A Photoelectric cell and the sound was O.K. again. The time lost was only 3 minutes. The 3A Photoelectric cell is gas filled and in some way the gas escaped. We use a 49A amplifier per TA 4104. I have a 3 pole switch which I have hooked up to the 3A Photoelectric cells that if one amplifier does not function then I switch over to the other and then again it can be used to see if the cell or the amplifier is dead and saves lots of time.

Another time I had a cracking noise in my sound and after checking over I located that the sound lamp or exciter was causing this noise which was intermittent. A loose filament in the sound lamp caused the trouble.

Build Yourself a Valuable Radio Library with these Helpful FREE MANUFACTURERS' BOOKLETS AND CATALOGS

A FREE SERVICE DESIGNED TO SAVE YOU TIME AND MONEY

The cooperation of the manufacturers whose catalogs, literature and booklets are listed on this page, and the courtesy of the Calcaterra Catalog Service has made it possible for the N. R. I. Alumni Association to offer to readers of National Radio News a unique and money-saving service in obtaining Radio manufacturers' literature.

All that is necessary for you to obtain the catalogs or other literature listed on this page is to write the numbers of the items in which you are interested on the coupon, fill in the information

asked for and MAIL IT TO THE CALCATERRA CATALOG SERVICE. DO NOT MAIL COUPONS TO THE NATIONAL RADIO INSTITUTE, AS THAT WILL DELAY THE FILLING OF YOUR ORDER.

Stocks of the publications listed are kept on hand and they will be sent to you promptly, as long as the supply lasts.

To avoid waste and needless postage expense, PLEASE DO NOT SEND FOR ANY MATERIAL IN WHICH YOU ARE NOT ACTUALLY INTERESTED or of which you already have a copy.

2. HAMMARLUND 1933 PARTS CATALOG. An 8-page folder giving complete specifications and prices on the new Hammarlund line of broadcast and short-wave variable and adjustable condensers, sockets, coils, intermediate frequency transformers, shields, broadcast and transmitting chokes and flexible couplings.

4. HAMMARLUND-ROBERTS 15 to 200 METER COMET "PRO" SUPERHETERODYNE. Complete details on the outstanding features of a high frequency superheterodyne designed especially for commercial operators for use in laboratory, newspaper, police, airport and steamship work.

5. ELECTRAD 1932 CATALOG. 10 pages. Complete specifications and list prices, on the entire line of Electrad voltage dividers, fixed and adjustable resistors, public address systems, amplifiers, replacement resistors and valuable data on volume control circuits.

6. AMPERITE LINE VOLTAGE CONTROL. This folder gives complete characteristics and uses of the Ampelite Automatic Line Voltage Control and information on how its installation improves receiver operation

by eliminating troubles from fluctuating and excessive line voltage.

9. INTERNATIONAL 1932 RESISTOR CATALOG. A 16-page catalog containing complete specifications and valuable technical information on the entire line of International Metallized Precision wire wound, and enamelled wire wound resistors, motor radio noise suppressors and handy servicemen's resistor kits.

10. INFORMATION ON THE SUPPRESSION OF MOTOR RADIO NOISES. Circuits and data published by the International Resistance Co. on how to overcome troublesome motor radio noises in automobile radio installations.

11. FLECHTHEIM 1932 CONDENSER CATALOG. 4 pages. Descriptions and specifications of the Flechtheim line of high and low voltage paper condensers for receivers, transmitters and replacement work.

12. CERTIFIED TRIAD TUBE PLAN FOR SERVICEMEN AND DEALERS. A special plan which permits servicemen and dealers who maintain a service department to obtain Certified Triad Tubes direct from the factory at attractive discounts for profitable resale.

16. LYNCH RMA STANDARD RESISTOR COLOR CODE CHART. Post card size. Designed to simplify the job of identifying resistance values of resistors used in most of the standard receivers. Also contains a complete list of the most commonly used values with the corresponding color designations.

22. OHMITE STANDARD RESISTOR STOCK LIST NO. 8. A 6-page folder giving complete specifications and list prices of the complete line of Ohmite fixed, semi-variable, meter-multiplier, transmitting, voltage divider and power pack resistors, non-inductive resistors, slide-wire rheostat-potentiometers and power rheostats.

23. OHMITE REPLACEMENT RESISTOR BULLETIN NO. 10. Technical details, specifications, stock values and list prices of the Ohmite "Red Devil" replacement resistors which are designed to withstand excessive heat and are ideally suited for replacement use.

25. LYNCH NOISE-REDUCING ANTENNA SYSTEM. Technical data and specifications on a new transposition type antenna system which is effective in eliminating the great majority of noise interference on both broadcast and short-wave reception. It is especially suited for application on all-wave and short-wave receivers, can be applied to existing antenna installations, and offers a big field for profitable installation jobs for servicemen.

27. WIRE PRODUCTS AND ANTENNA SUPPLIES. 4 pages. Specifications of a wide variety of bare and variously insulated solid and stranded wires for aeriels, coils and transformers, aerial supplies, antenna kits, insulators, lead-in strips, lightning arresters and ground clamps.

28. HOW TO FIND YOUR PLACE IN BROADCASTING. 27 pages. A book which outlines the opportunities in radio broadcasting for singers, speakers, actors, writers, announcers, etc., and gives details of a course of the Floyd Gibbons School of Broadcasting which is designed to train and develop the talents of men and women for such opportunities.

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