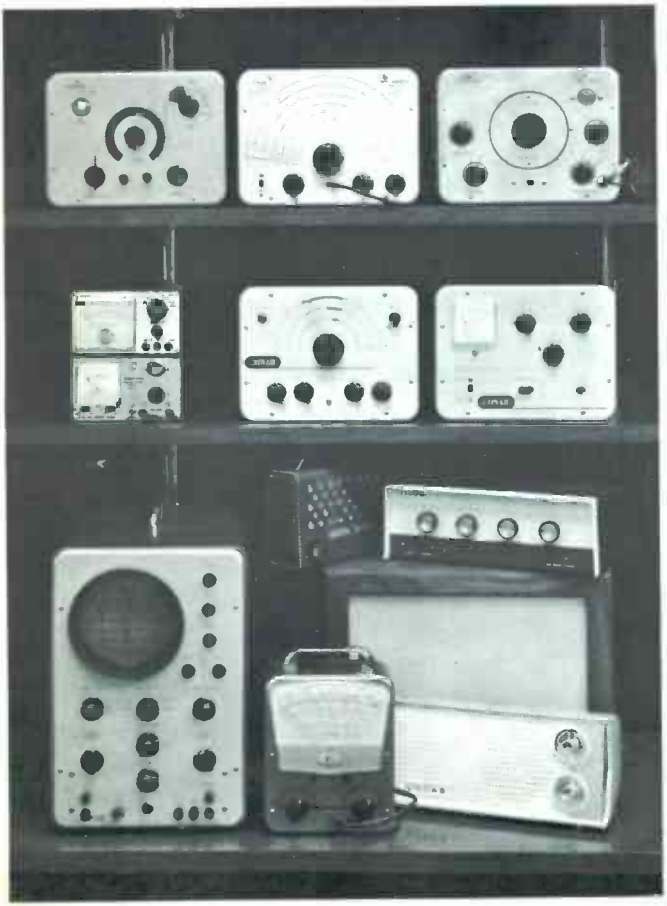
nri journal



Sept./Oct. 1966

in this issue:

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DIVISION OF NATIONAL RADIO INSTITUTE

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MODEL 400
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USE THE HANDY ORDER FORM ON PAGE 27—Cash or Terms

nri journal

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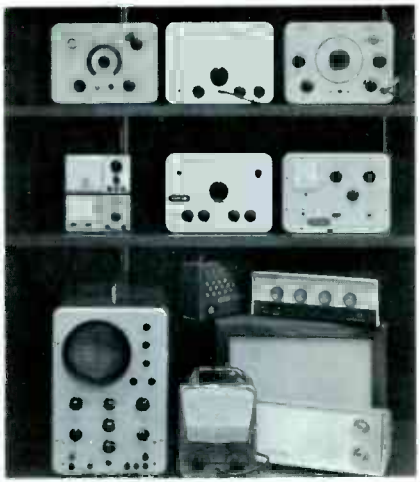


ON OUR COVER

Some of the family of CONAR (COmpany NAtional Radio) test equipment and electronics products in their handsome cabinets are shown: top row, from left, are the Model 311 RC Tester, the Model 280 Signal Generator, the Model 230 Signal Tracer; center, the Model 240 Volt Ohmmeter atop the Model 510 Transistor Power Supply, the Model 500 Novice Receiver and the Model 400 Novice Transmitter; bottom row, clockwise, the Model 250 Oscilloscope, the portable transistor radio, the amplifier for the Model 300 Stereo, the table model radio, the Model 103 Audiocolor, and the Model 211 VTVM, all available either in kit or assembled form. And remember, there are only a few shopping days left until Christmas!

J. E. SMITH RECEIVES NEW HONOR: 'DOCTOR OF SPACE EDUCATION'

By Collin B. Weschke

The man wore a broad grin and he stood tall with a youthful vigor that belied his 85 years. He had gray hair, but a proud twinkle in his eyes.

The man was J. E. Smith, Founder and Chairman of the Board of National Radio Institute. The date was June 15, 1966.

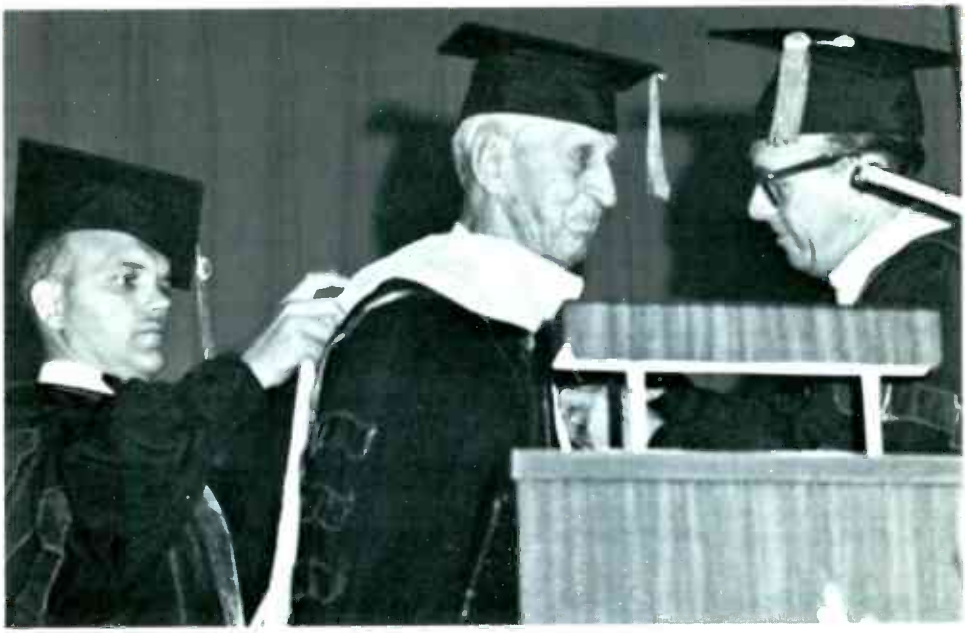
The occasion was one which saw him add another in a distinguished list of honors to a teaching career spanning the most remarkable 50 years in the history of his chosen field--electronics.

Mr. Smith was receiving an Honorary Degree, "Doctor of Space Education," from Brevard Engineering College in Melbourne, Fla.

And that same day he was to see the beginnings of construction of an electrical engineering laboratory bearing his name.

This is the way Dr. Jerome P. Keuper, President of Brevard College, put it when he awarded Mr. Smith the degree:

J. E. Smith, second from right, as he received his appointment as Honorary Colonel of the Gold Run Gulch Horse Guard. Others are, from left, Admiral Odale D. Waters, Jr., Oceanographer of the Navy, principal speaker at the Brevard Engineering College Commencement ceremonies; Fred Happ, founder of Gold Run Gulch; and Dr. Jerome P. Keuper, Commander-in-Chief of the Horse Guard, who is Brevard President.



J. E. Smith, NRI Founder, receives the mantle of "Doctor of Space Education" during exercises at Brevard Engineering College, Melbourne, Fla. At right is Dr. Jerome P. Keuper, President of Brevard. At left is Dr. Thomas E. Putnam.

"James Ernest Smith, in humble recognition of:

"A brilliant career in providing educational opportunities in Electronics to more than 3/4 million Americans over the past half century;

"The significant effect of your many years of teaching in laying the groundwork for the new field of Space Technology;

"Your constant encouragement and support of our own Brevard Engineering College;

"By the powers vested in me by the Board of Trustees of Brevard Engineering College and by the State of Florida, I do hereby confer upon you--with all of the rights, privileges, and responsibilities pertaining thereto--the Honorary Degree of Doctor of Space Education."

Along with his Honorary Degree, Mr. Smith also brought home a certificate naming him an "Honorary Colonel" of the "Gold Run Gulch Horse Guard," in recognition of "his outstanding accomplishments."

Gold Run Gulch is a mythical western town conceived by a group of business and professional men who are members of the Melbourne Shrine Club. It has as its counterpart an actual ghost town in the Colorado Rockies. The history, legends and folklore of the original town have been incorporated into the mythical village.

Gold Run Gulch grew in popularity with the passing years and today the "Town" has a complete contingent of officials and "characters," a mayor, a banker and an ol' opery company. Once each year the "citizens" gather for a "Night in Gold Run Gulch" and the spirit of the old town is revived with gusto.

As a means of honoring distinguished citizens of Gold Run Gulch, the Gold Run Gulch Horse Guard was formed and a commander-in-chief appointed.

The motto of the Guard is "desipere in Loco," which, freely translated, means "Relax in Levity," and expresses the spirit of the Guard.

Although originally intended as an honor for the citizens of Gold Run Gulch, the Guard soon received international recognition. It is now traditional for the Guard to confer each year commissions as Honorary Colonels. Usually no more than three persons of outstanding accomplishment are honored in any one year. The roster of Honorary Colonels now contains the names of some of the most outstanding and distinguished persons in America and Europe.

It was pointed out that more than 50 years ago--and six years before the world's first radio broadcast on Pittsburgh's station KDKA, Mr. Smith opened his school in "wireless radio," envisioning that radio would become a prime communications medium.

"I can train you in radio at home," was his familiar call, read by millions in men's, hobby and mechanical magazines over the years. His picture, prominently displayed on every advertisement, made him a familiar figure to millions who never saw him in person.

Today, at 85, Mr. Smith spends some time nearly every day at his office. He rises at 6 each morning and, weather permitting, swims in his pool at his home on the banks of the Potomac.

He operates with undiminished enthusiasm which has generated an intense loyalty among the more than 150 people who work in the modern NRI building on Washington's Wisconsin Ave. His business philosophy is untarnished by time. He believes that organizations, like individuals, stay young by tackling new projects and drawing inspiration from their vision of the future.

Mr. Smith's attitude toward NRI students--one of utmost dedication to their service and betterment--has spread among all who work in NRI. It is the secret--if it can be called a secret--of the school's success, which ranks it first in the nation in home-study Electronics.

A native of New Hampshire, Mr. Smith holds a Bachelor of Science degree in Electrical Engineering from Worcester (Mass.) Polytechnic Institute, and a Doctorate of Laws from Southeastern University.

He has two daughters and a son, Morrison, who carries on the NRI tradition as President.

EXECUTIVE VICE-PRESIDENT H. E. LUBER RETIRES

NRI's Executive Vice-President Harold E. Luber retired September 1, 1966, after completing thirty-eight years of service. Mr. Luber was employed as Sales Correspondent, and was successively Assistant to the Advertising Manager, in charge of Graduate Services, Director of Student Services, Executive Vice-President, Director and Secretary.

Mr. Luber and his wife Rhoda plan a European trip immediately. After they return they intend to spend much of their time with two favorite hobbies -- gardening and golf. The Lubers have two sons who have chosen careers in Electrical Engineering. The older son is a graduate of Worcester Polytechnic Institute, Worcester, Massachusetts; the younger son is presently completing his senior year there.

Mr. Luber's duties have been assumed by newly-appointed Vice-Presidents William F. Dunn, Director of Education, and John F. Thompson, Director of Advertising.

THE NATURE OF CURRENT FLOW

BY STEVE BAILEY

A knowledge of the nature and direction of current flow is basic to the understanding of the operation of any electronic circuit. It is the very nature of current that makes it possible for the flow to be the same at all points in a series circuit. This is a fact that many students accept, but few understand.

It is the direction of current flow that lets you determine the polarity of a voltage drop. Also, by knowing how current flows through a circuit, we can determine whether the type of circuit we are working with is series, parallel, or series-parallel.

Fig. 1

Fig. 1 shows a simple series circuit. The wire and the resistor all contain atoms which have electrons that can easily be moved or displaced when an external force is applied. The external force is, of course, the voltage across the battery. It is capable of producing a pushing and a pulling force at the same time. An electron will be pushed out of the negative source terminal at the same time that one is pulled into the positive source terminal.

Now, let's take a closer look at the wire and the resistor. The free or movable electrons that were mentioned previously completely fill all available space in the wire and in the resistor. Another electron cannot be added unless one leaves the circuit at the same time.

Putting these factors together we have a situation where the battery is trying to force an electron into the wire at the same time that it is trying to pull one out. The result is that each time an electron enters the circuit, one leaves. Thus, all the free electrons in the wire are shifted or displaced from their original orbits to new ones.

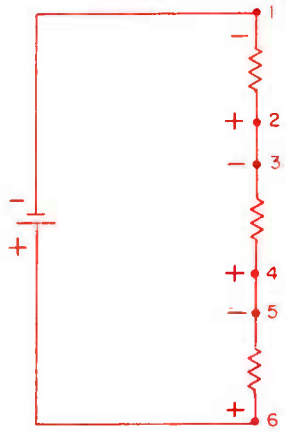
This can be compared to having a pipe that is completely filled with marbles. If we try to add an additional marble in one end, the last marble on the other end must be removed so all the marbles can shift over one space. Now, if we added and removed marbles fast enough, it is apparent that there would be a constant flow of marbles through the whole pipe.

What about the path of current flow? Current will always flow from negative to positive. The electrons that flow from the negative terminal of a source will set in motion all the electrons between this point and the positive terminal of the source . . . . so we can say that electrons always flow from negative to positive.

We can also use the direction of current flow to establish the polarity of the voltage drop across a resistor. The end of the resistor that the current enters is negative with respect to the end that the current leaves. This is true whether you have one resistor or several of them. For example, in Fig. 2, the voltage drops will have the polarities shown.

Point 1 will be negative with respect to point 2.
Point 3 will be negative with respect to point 4.
Point 5 will be negative with respect to point 6.
Point 2 is positive with respect to point 1.
Point 4 is positive with respect to point 3, and
Point 6 is positive with respect to point 5.

Fig. 2



By the way, if you are not entirely sure that you understand the meaning of the term "with respect to," you should clear it up now. The term means "compared to." When the term "with respect to" is used, we are establishing the polarity at one point by referring to another point for comparison purposes. You should remember this, since you will encounter the term in almost any discussion of electronic circuits.

So far you have seen how current flows in a series circuit. Now, refer to Fig. 3.

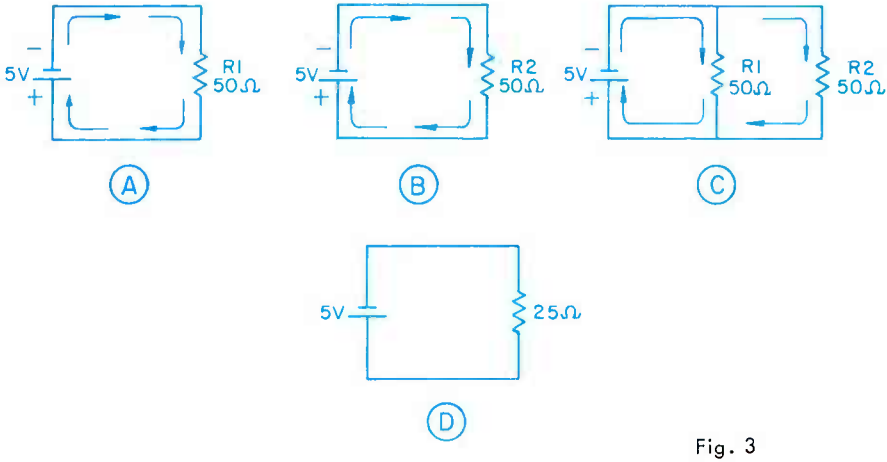


Fig. 3

Fig. 3A illustrates a series circuit consisting of a 5-volt source and a 50-ohm resistor. Using Ohm's Law, we can find that the current is equal to 100 ma.

Fig. 3B shows another series circuit using the same values. Again, we have 100 ma of current in the circuit.

In Fig. 3C we combined Fig. 3A and Fig. 3B. We now have a parallel circuit. Using the formula for parallel resistance,

$$\frac{R1 \times R2}{R1 + R2}$$

we find that the total resistance is 25 ohms. Using this resistance in the Ohm's Law formula for current, we find the source current is 200 ma. Notice that this is equal to the sum of the currents in Figs. 3A and 3B.

This points out a very important point to remember: The source current in a parallel circuit is equal to the sum of the branch currents.

Notice the path of current flow in Fig. 3C. Part of the source current will flow through R1 and part through R2. Since the resistance in each branch is equal, the current divides equally with half flowing through each branch.

When the total circuit current was determined, the total resistance of 25 ohms was used. Thus, it becomes apparent that the 50-ohm resistors connected in parallel are equivalent in resistance to a single 25-ohm resistor connected in series with the voltage source. This is shown in Fig. 3D. It is often useful to do this in order to simplify a circuit, as will be discussed later.

When we combine the circuits shown in Fig. 1 and Fig. 3C, we have a series-parallel circuit, as shown in Fig. 4.

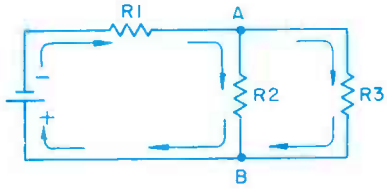


Fig. 4

The total circuit current will flow through R1. At point A, it divides with part flowing through R2 and part through R3. Therefore R1 is a series resistance. R2 and R3 are parallel resistors.

It is not often that you will encounter practical circuits that are either purely series or purely parallel. Instead, you will mainly see series-parallel circuits. Also, they will not normally appear as clear and simple as the one shown in Fig. 4. This means that you must have a method which will assist you in determining which resistors are connected in series and which are connected in parallel.

One circuit configuration that often causes

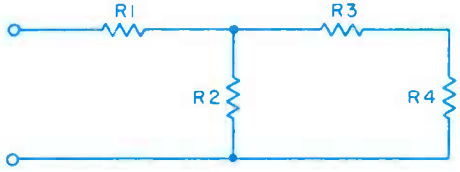


Fig. 5

confusion is the one shown in Fig. 5. Of course, before you can even begin to find the total resistance of a circuit such as this, you must determine which resistors are series-connected and which are parallel-connected. You can do this easily by keeping in mind what you have learned about the path of current flow.

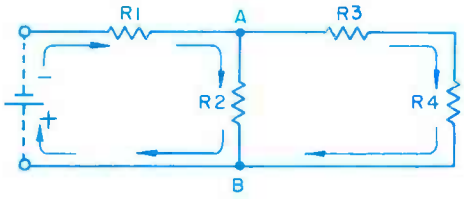


Fig. 6

Remember that it is the way you have resistors connected together that will determine the path of current flow. So, you can mentally connect a voltage source to the circuit in Fig. 5 and give the terminals of the circuit imaginary polarity signs. Then you can trace the probable paths of current flow through the circuit from the negative terminal to the positive terminal. This is shown in Fig. 6.

You see immediately that the full source current flows through R1. Therefore, this is a series resistance. At point A, the current divides. Part flows through R2 to reach point B. The rest must flow through R3 and R4 to reach point B. This tells you that R2 is a parallel resistance and that R3 and R4 are connected in series with each other and in parallel with R2. To find the total circuit resistance you would add R3 + R4. Then you would use their sum in the parallel formula with R2 which would give you the total parallel resistance. You would then add this to the value of R1 to find the total circuit resistance.

Let's try a more complex circuit now. The circuit shown in Fig. 7 contains several series and parallel circuits. It is possible to reduce this to a simple series circuit, using what we have discussed so far.

First examine the path of current flow. This shows us that R8 and R9 are in series with each other and in parallel with R10. If drawn separately, the circuit between C and D would appear as shown in Fig. 8A. R8 and R9 are connected in series with each other, so when they are added together, the circuit would appear as shown in Fig. 8B. Finally, when the combined resistance of R8, R9 and R10 is found, the circuit would appear as shown in Fig. 8C.

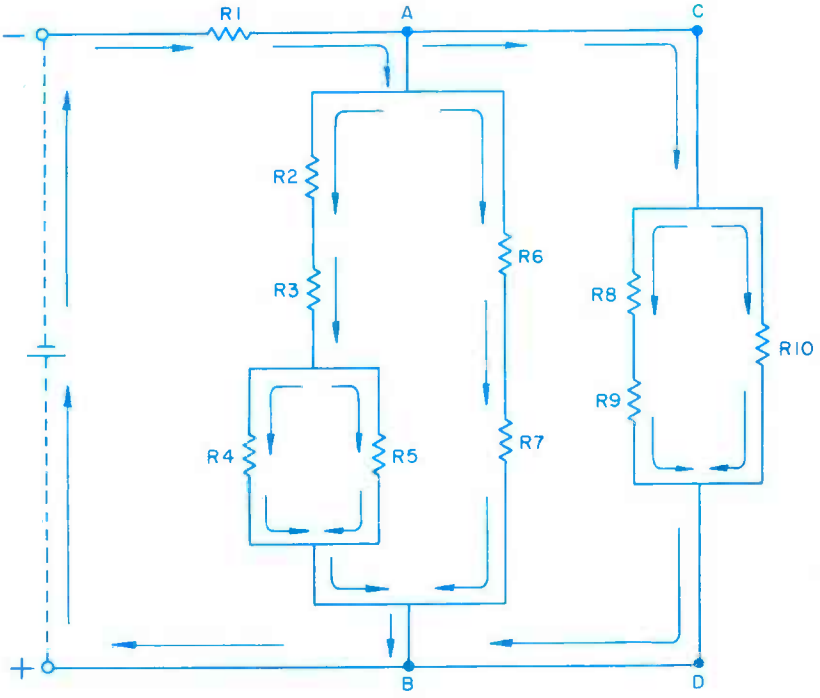


Fig. 7

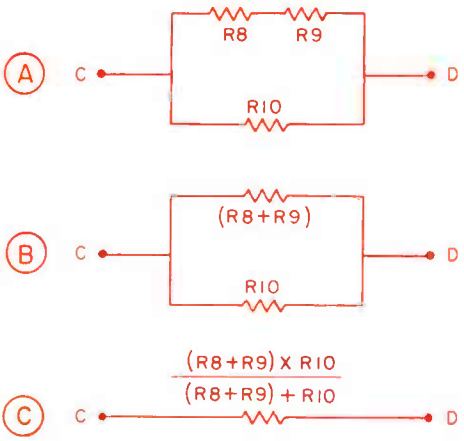


Fig. 8

Now examine the circuit between A and B. This would appear as in Fig. 9A when drawn

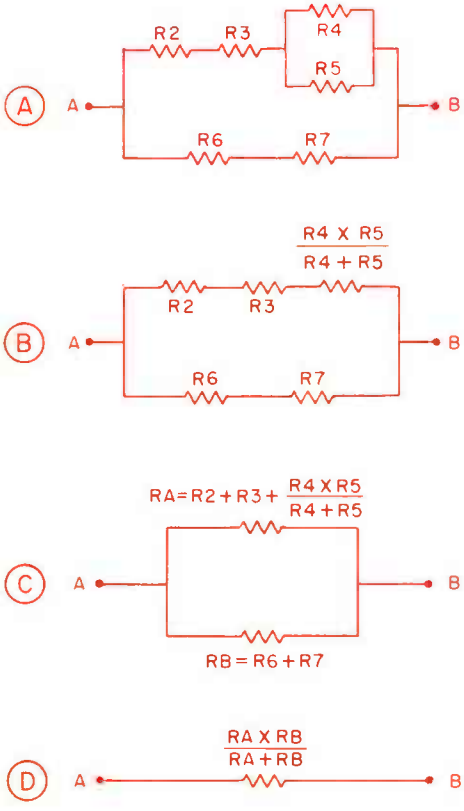


Fig. 9

separately. This shows that our first step would be to find the total parallel resistance of R4 and R5. When this is done, the circuit will appear as shown in Fig. 9B.

Next, add together all the resistances in the top branch. Indicate this as RA. Then, add R6 and R7 together and let the sum equal RB. When you do this, the circuit will appear as shown in Fig. 9B. You then use the formula for parallel resistance to reduce the circuit to a single resistance as shown in Fig. 9D.

The only remaining resistance is R1, but the position of this resistor indicates that the full source current will flow through R1. Therefore, we show this as a series resistance. Also, when we insert the results of

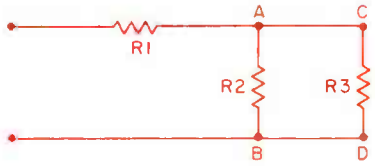


Fig. 10

Fig. 8C and Fig. 9D into the circuit, as shown in Fig. 10, we have a simple series-parallel circuit. We can now find the total resistance of the parallel circuit by using the formula

$$\frac{R3 \times R2}{R3 + R2}$$

When we insert the combined parallel resistance in the circuit, we have the simple series circuit shown in Fig. 11.

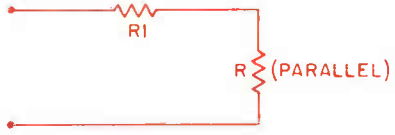
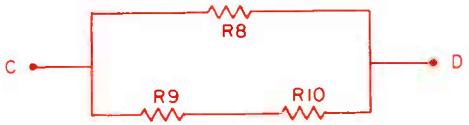


Fig. 11

Now, try to apply what you have learned here by solving for the total resistance of the circuit shown in Fig. 7. Assume that each resistor has a value of 10 ohms. The complete solution is shown on page 9 , so you can check your work and your final answer. If you did not obtain the correct answer, review this article and try the problem again. The facts you learn here will help you greatly now and in the future.

Solving for Total Resistance of Circuit Shown in Fig. 7.



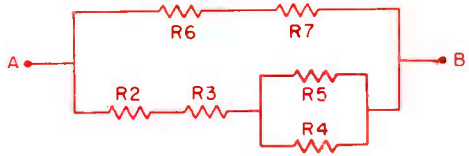
$$R_T = \frac{(R9 + R10) \times R8}{(R9 + R10) + R8}$$

$$\frac{(10 + 10) \times 10}{(10 + 10) + 10}$$

$$\frac{20 \times 10}{30}$$

$$\frac{200}{30} = 6.66\,\Omega$$

Step One



$$\frac{R5 \times R4}{R5 + R4}$$

$$\frac{10 \times 10}{10 + 10}$$

$$\frac{100}{20} = 5\,\Omega$$

Step Two

$$R2 + R3 + 5\,\Omega$$

$$10 + 10 + 5 = 25\,\Omega$$

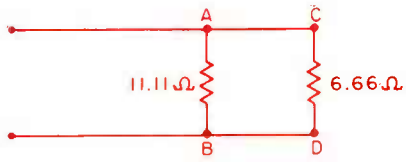
$$R6 + R7$$

$$10 + 10 = 20\,\Omega$$

$$\frac{25 \times 20}{25 + 20}$$

$$\frac{500}{45} = 11.11\,\Omega$$

Step Three



$$\frac{11.11 \times 6.66}{11.11 + 6.66} = \frac{73.9926}{17.77} \text{ OR } \frac{74}{18}$$

$$18\overline{)74.00} \quad 4.11$$

$$72$$

$$20$$

$$18$$

$$20$$

$$18$$

Step Four

$$R_T = R1 + 4.11\,\Omega$$

$$R_T = 10 + 4.11\,\Omega$$

$$R_T = 14.11\,\Omega$$

Step Five

J. B. Straughn and Ted Rose Plan Annual Visits to Alumni Chapters

J. B. Straughn, Chief, NRI Consultation Service, and Ted Rose, NRIAA Executive Secretary, will again visit the local Chapters of the NRI Alumni Association this year as usual. These NRI representatives always look forward to this annual contact with the members of the various local Chapters. The members do, also, chiefly because of the opportunity to attend Mr. Straughn's lectures and demonstrations on Radio-TV-Electronics and to get any help from Mr. Straughn on any problems they may have.

All students and graduates in the area of these local Chapters should grasp this opportunity to be present at Mr. Straughn's lectures. All are invited. You do not need to be a member of the Chapter. You will be cordially welcomed. For information about the Chapters and meetings, see "Directory of Local Chapters" on Page 32.

Here is the schedule of visits for the 1966-1967 season:

CHAPTER	DATE
Southeastern, Mass.	September 28
Detroit, Mich.	October 14
Hagerstown, Md.	November 10
Philadelphia-Camden	November 14
Springfield, Mass.	November 30
New York City	December 1
New Orleans	March 14
North Jersey	April 28
Pittsburgh	May 4

TUBE WITH CAVITY GOES TO DENTIST

Recently in North Africa, a dental patient was carried into the dentist's office in a wooden box for treatment. Captain W. S. Andrews, USN, Senior Dental Officer, was called upon to treat a radio tube with a "toothache." The operation took place at the U.S. Naval Communication Station, Morocco, Sadi Yahia.

The tube, a 100-pound klystron, had developed a major cavity as a result of "arcing" --burned-out spots on the tube's copper plates, stemming from the high frequency voltage necessary to operate the tube.

The operation was performed with the klystron tube resting in its packing crate in the Captain's dental chair. Captain Andrews drilled out the burned spots, then filled the cavity with silver amalgam at a cost of about 80 cents!

A klystron is a specialized vacuum tube which acts as a high frequency ultra short wave generator and amplifier. The tube with the cavity, nearly five feet in length and valued at about $3,500, is part of a troposcatter power amplifier that radiates 10,000 watts of power in the 755-985 megacycle frequency range. In the early fifties the klystron, developed just prior to World War II and used primarily in radar applications, was adapted for use in troposcatter communications as a power amplifier. Today, every tropo link throughout the world utilizes power klystrons.

Following a short recuperation period (which ended when the crate returned to the tropo site) the healthy klystron tube again became part of the terminal configuration at the tropo site in Morocco. The power amplifiers at the communication site are designed and manufactured by Radio Engineering Laboratories, Long Island City, New York and help provide a 215-mile tropo link from Morocco to San Pablo, Spain.

Courtesy The REL Communicator

THE NUN THAT SWINGS A SOLDERING IRON

Sister Rosa Mystica Uses Her NRI Training To Start Electronics Club for Teenage Boys

EVERYONE'S HEARD OF "The Singing Nun", but how about a swinging nun? That might be one way to describe Sister Rosa Mystica of Our Lady of Victory school in the Bedford-Stuyvesant area of Brooklyn, New York. Of course, what she "swings" is a soldering iron!

With a long-time interest in electronics, she enrolled in the NRI Radio-Television Servicing course in December, 1965, and at Lesson 20 in her studies, has repaired some thirty radios, several television receivers, and completed a considerable number of experiments using NRI training equipment, including the VTVM.

"Being a school teacher...is a side-line."

National Radio Institute
3939 WISCONSIN AVENUE · WASHINGTON, D. C. · 20016

B112-R56

April 29, 1966

Sister Rosa Mystica
Our Lady of Victory Convent
262 Macon St.
Brooklyn, N. Y. 11216

"How is Sister Rosa Mystica doing in her NRI course?"

This is the thought that occurred to me today. There was no special reason why this thought came to my mind except that I suddenly remembered our exchange of correspondence when you first inquired about NRI training.

Your plan to organize a club for boys in which boys can undertake projects in electronics, particularly learn Radio repair - and, I hope, TV too - appealed so much to all of us! Also, while we have heard of "singing" sisters none of us had heard too much about sisters who could swing a soldering iron.

But most of all, amid all the contraversy in the newspapers as to just what can be done for the poor, particularly those in depressed urban areas, your approach seemed so practical. If enough people like you can directly confront the underprivileged within their own environment with challenging, attainable goals, I definitely believe we can begin to make progress. That's why I am pleased to note that you have moved steadily ahead in your NRI course. We have excellent grades recorded for you for Lessons 1 through 14, and for Training Kits 1 and 2.

Sister Rosa Mystica, your project has been of such interest to us that I wonder if you would share it with our students and graduates? We would like to tell your story in the NRI Journal; a biography, several pictures, and your plans for your Boys' Club. And please don't be unnecessarily modest - I know your story would be very interesting.

Some good always seems to come about when you let people know about a dedicated individual; when you help others understand some of the social problems that persons like you are trying to alleviate; problems that most of us are so far removed from that we fail to realize ther are no easy and sudden solutions - mostly just dedicated individuals.

Cordially yours,

J. M. Smith

President

ec

accredited by the Accrediting Commission of the National Home Study Council

As she explains the procedures, the boys' faces begin to light up






"Basically I'm interested in all kinds of repair work," said Sister Rosa Mystica in an interview at the school, "I do plumbing, electrical repair, woodworking. I repair everything! But I was just doing it on my own until I started the NRI course. I didn't know how to repair anything until I got it...then I knew what was what."

She was always "just intrigued" with electronics, and some of her favorite reading material is electronics magazines. Hence she saw an NRI advertisement, wrote of her plans for an electronics club, and was awarded a scholarship. She enrolled for a course in electronics at night, but was unable to spare the time for such regular meetings, and thought home-study was the answer. Why couldn't she spare the time? Well, besides teaching at the school (third grade, all subjects), she is a history major at St. Francis College ("A boy's school," she giggles), going three days a week; she is conducting a class for housewives in consumer education.

"I have an in--our cook has a club. These people don't spend their money properly, and one of the main things is food---and buying on time. I'm helping them to get the most out of their money---and plan properly. We talk about everything...they live for the NOW."

Her major concern in the populous area is the young boys, to occupy their time, give them something to do. The school has a youth center, in which she participates, although it is conducted by another sister. "They have a meeting or a dance. Or they come to the gym for basketball. They plan something. The purpose is to keep them off the streets." Sister Rosa Mystica even hopes to get them a pooltable---"You know, just to keep them busy."

But long before she began studying electronics herself, she had a big dream that she is working very hard to make a reality: an "electronics club" for boys. "Almost everyone has a radio ---you see all kinds of discarded radios around here."

Sister Rosa Mystica has the quiet gentleness you would expect of her profession, but her soft voice becomes intense when she talks of "her" boys and her plans for them. "I'm very fortunate. Quite a few are select children." It has been the custom for some years for several of them to accompany her on weekly grocery shopping trips for the school. "They are always reliable--I can count on them to bring the packages home for me."

Her own third-graders she feels are too young for much interest yet, so she sent around notices to the seventh and eighth grades at the school, and posted notices at the youth center

asking for a show of interest. So far about ten or twelve boys have expressed interest and attend her informal classes regularly, their ages around 12 to 14. "They're very intelligent boys. They have to be--they're all in the bright group at school."

Previously she had started an "electrical club", with the boys each donating 75 cents towards making lamps. "But I spent all the money on materials, and there wasn't any more, so when the materials were gone the club was, too."

She says she hasn't talked to any of the families about it yet, but knows they're interested because the boys keep appearing for her demonstrations and discussions. Through the long, hot summer "I know the families were happy, because it occupied their time. And one of my reasons is to give them something they LIKE to do."

During the summer meetings were on a somewhat irregular basis because of her own multiple activities, but she is impatient with the delay. "I want to plunge into a full program--and just go into it." After school starts again she plans to have the boys meet both after school and on Saturdays, and to enlist the aid of the Board of Education in planning procedures, as well as to "get someone to come over" from the nearby Pratt Institute's electronics school. Students from the institute's art school have been directing art classes for first and third graders at Our Lady of Victory for the past year on Saturdays, and she feels that she's going to need all the help she can get.

But basically she is following the NRI schedule, breaking it down for the youngsters. Her basic instrument is the CONAR VTVM. Did she have any trouble assembling that? "No, I didn't. It worked right away, no bugs. I was so happy."

As a student herself, she has mostly made all A's at NRI, with one B, and the same goes for her college classes, except for "one C on a surprise exam." She tries to keep up a regular schedule for submitting her lessons to NRI, but it's difficult. "We have so many activities here..."

None of the other sisters share her interest in electronics, although they help in many other areas. One has a basketball group for teenage girls, another has an art club, another "works with people on welfare, trying to see that they get their benefits....being a school teacher is a side-line for most of us."

And although none of the other sisters share her uncommon interest in electronics, they understand it, "they always smile at me" when she is repairing something or working on an NRI experiment. Her own delightful sense of humor admits that her choice of hobby is a little incongruous.

Sister Rosa Mystica is from the Bay Ridge section of Brooklyn, and attended public schools there. She entered the order of the Sisters of St. Joseph in September, 1951, spending the first two years at the Mother House in Brentwood, and was then assigned to St. James Cathedral in the Civic Center section of Brooklyn. After that, she spent a year and a half at St. Martha's, Uniondale, Long Island, before coming to Our Lady of Victory, where she has been nearly six years. In the early years of her training she also completed a four-year course in normal school (teacher's training in methods).

If Sister Rosa Mystica should be transferred again (sisters are frequently transferred), it won't diminish her interest or her studies in electronics, she promises. "I do that in my so-called spare time, anyway." Nor will it deter her in her ultimate goal, to pass on what she has learned in electronics to the youth of whatever area she's in---a useful, basic training to give them a start toward a vocation.

"If anyone has any suggestions" to forward the endeavor, she says, "Please let me know!"

"I study...in my so-called spare time..."

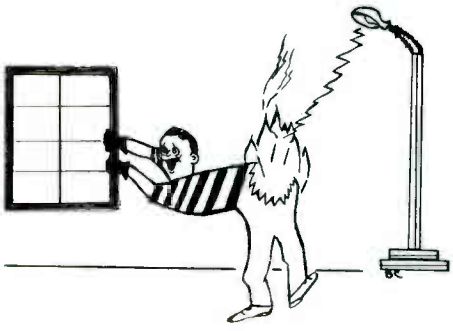
what's new ?

THE 'HEAT' IS ON FOR HOUSEBREAKERS

Hardly a day passes without some new development or product based on the laser, the coherent light principle. Among the latest are household applications.

Using a laser flyswatter, a housewife can merely sweep in the general direction of the offender to annihilate it. A laser igniter for stoves and oil furnaces will eliminate flames that go out. A laser oven will have a beam that can scan the food and bake it to a precise turn in minutes.

A laser alarm system is also anticipated. Besides "sensing" the intruder, it might even burn a hole in his pants to warn him not to intrude again!



STUDENTS PUSH BUTTONS, GET 'INSTANT ANSWERS'

Six high school students in Queens, New York recently participated in a joint experiment conducted by IBM and the Catholic Schools Diocese of Brooklyn. The experiment dealt with computerized homework.

The students punch out problems on push-buttons connected to an ordinary telephone, thus instructing an IBM 1710 computer fifty miles away to add, subtract, multiply, divide, or find a square root. The computer gives "instant answers" in a human voice.

Researchers maintain that this removes the drudgery -- not the teaching power -- from homework. Students have found the project a success because they can do more problems in a shorter time.

Other uses envisioned for the system include: "programmed" TV; automatic financial record keeping; checkbook balancing and reminders of financial obligations; recipe and household information files; instant almanacs and encyclopedias; appointment calendars to ring homeowners at the proper time; and finally, automatic charge service!

PIGSKIN PREVIEW HAS SOME NEW KICKS

Football season is well under way -- to the delight of sports fans. And several new devices just made the starting team -- to the delight of sportscasters as well as players!

A portable television disc recorder was used in commercial application at a Baltimore Colts intrasquad game broadcast by CBS. The recorder, built by the MVR Corporation, provided the network at the touch of a button with 20-second segments which could be relayed in regular motion or stopped to provide "freeze action" shots.

Everyone should have one of these portable recorders to review critical plays at home -- cost of the 40-pound unit is only $10,000. (The MVR Corporation says that the unit costs about one fifth of what comparable tape-equipment costs.)

Football players of the New York Jets now find themselves "far from the maddening crowds" right at the line of scrimmage. A specially-designed helmet drowns out crowd noise for the quarterback and a transistorized PA system boosts his voice. Small vents on the inside of the helmet allow him to broadcast from the helmet. The quarterback talks into a tiny microphone fastened to his faceguard for a call at the scrimmage line. A switch cuts off the loudspeaker while signals are being called in the huddle.

'TEL-LIPS' POSES NEW THREAT TO DOMESTIC SPIES

Litton Industries had developed a portable speech scrambler intended for people who believe their telephones are being tapped, for law enforcement uses (where it is necessary to keep information off regular police channels), and for businesses (in which secrecy is important).

The device is called Tel-Lips and is operated by dropping the telephone handset into a special cradle and using a handset which is part of the privacy unit. At the other end a similar device unscrambles the conversation.

An alphabetic keyboard also makes coded messages possible. The user states that an alphabetic word is to be sent and presses buttons in the correct order. The listener's buttons light up and when arranged in a different sequence make decriphering difficult. An unauthorized interceptor has about one chance in 100,000 of recognizing the entire message.

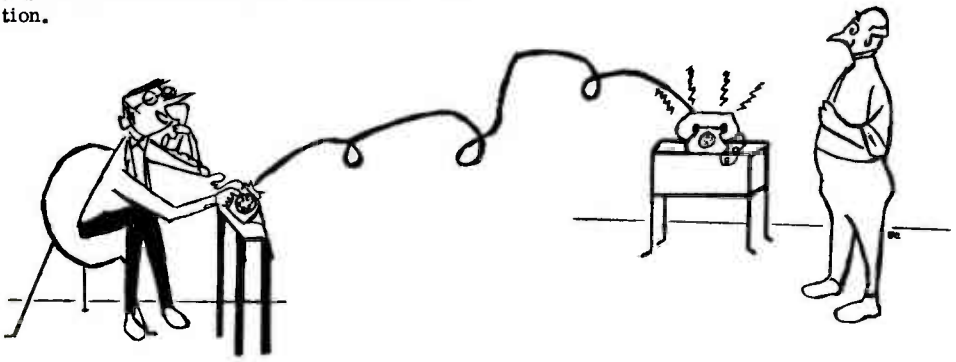
RANGEFINDER BECOMES LATEST HIGHWAY SLEUTH

Motorists beware -- The Bureau of Public Roads will soon have new electronic devices, now being developed by Raytheon, to study your driving habits.

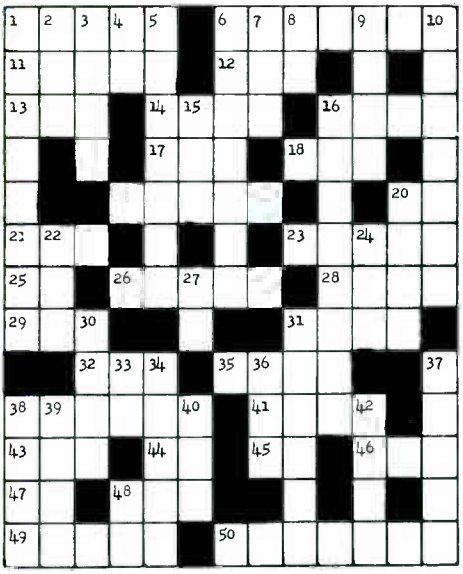
An optical rangefinder to measure the distance between cars will be installed on a test car which will follow and track another vehicle 20-80 feet away, at varied speeds. Using an optical radar technique which "locks on" the target vehicle and tracks it automatically, the rangefinder works equally well day or night. Raytheon emphasizes that the rangefinder will be used to study how the driver locates himself in time and space and what the processes are by which he controls his vehicle.

Although the equipment is not designed as a law-enforcement device or to trick or trap the motorist, the test car will be outfitted as inconspicuously as possible so that the driver will not become suspicious and alter his normal driving routine. The rangefinder will therefore be shaped as a headlight or other object commonly found on the car.

A data processor located inside the test vehicle will convert rangefinder results; up to twenty types of data can be processed in sequence, including distances, car speeds, brake and gas pedal use, traffic density, tailgating habits, and gas consumption.



ELECTRONICS CROSSWORD PUZZLE



Solution on Page 32.

By James R. Kimsey

ACROSS

1. A PN junction diode.
6. A relay operated by energizing an electromagnetic coil.
11. To destroy by degrees, or wear away.
12. A sharp blow or knock.
13. A resistor circuit to attenuate a signal without an impedance mismatch.
14. Sour or biting to the taste.
16. A metallic coating for iron and steel.
17. A rotating or sliding part that converts rotary motion to linear motion.
18. Egg factory.
19. Capacity between parts, wires, chassis and other objects.
20. Ratio of the circumference of a circle to its diameter.
21. Official record that must be kept by all stations.
23. Navigation system that measures time lapses between signals from fixed stations.
25. Voltage drop produced across a resistor by the flow of current through it.
26. Rays having frequencies between the higher ultraviolet frequencies and lower gamma rays.
28. A sudden loud noise.
29. Pole having more electrons than normal. (abbr.)
31. The waveform of a single-frequency ac.
32. Upper limb.
35. Greek letter used to indicate the base-to-collector amplification.
38. Variations in waveforms due to mechanical disturbances.
41. Low audio frequencies.
43. A sweet drink.
44. Chemical symbol for tellurium.
45. Most extensively used crystal in rf transmitters from 4500 to 10,000 kc.
46. Consume, as food.
47. Roman numeral for 150.
48. A sleeping or resting place.
49. A device that changes the amplitude of the output of a transmitter.
50. A coil for repeated amplifications.

DOWN

1. An antenna one-half wavelength long or a multiple thereof.
2. Period of time.
3. A terminal of any branch of a network.
4. Editor. (abbr.)
5. A device that introduces reactance into a circuit.
6. Streams of electrons or cathode rays released by a heated or illuminated cathode.
7. A young male person.
8. Elevator direction.
9. Acquire, as prestige.
10. Back and forth rotation of the main tuning gang in an oscillator padder.
15. Type of vehicle.
16. A condition in a vacuum tube in which the grid and cathode are at the same dc potential.
20. Window glass.
22. Raw metal.
24. Competed in a foot race.
27. Crystal cut at a 35° angle to the Z axis.
30. A square-wave voltage that switches a circuit on or off electronically.
31. Interfering noises in a receiver.
33. A direction. (abbr.)
34. Instrument used for electrical measurements.
36. Tide flowing back to the sea.
37. Movable plates of a variable capacitor.
38. A plug-in terminal.
39. Not working.
40. One of the guns in a color picture tube.
42. Vend.
48. Is.

BY STEVE BAILEY

DEAR STEVE,

Lesson 8BB explains about resonant current and voltage step-up in parallel and series-resonant circuits. I don't quite see how this is possible.

R. R., Calif.

First of all, you must understand what we mean by resonant voltage step-up and resonant current step-up. Resonant voltage step-up means that the voltage drops in the circuit may be greater than the source voltage. Resonant current step-up is when the current in the resonant circuit is greater than the current drawn from the power supply.

It is quite true that you will have a voltage step-up in a series-resonant circuit and a current step-up in a parallel-resonant circuit. This can be attributed to the characteristics of each type of circuit.

First of all, in a series-resonant circuit, the circuit will appear to be a low impedance at resonance. Since the impedance is low, the current will be high and will be limited only by the resistance of the circuit. The voltage across each component will be high since the current is high. For this reason, the sum of the voltage drops may be several times the source voltage. Keep in mind that the voltage across the coil is equal to the circuit current times the inductive reactance, and the voltage across the capacitor is equal to the circuit current times the capacitive reactance.

For a parallel resonant circuit the conditions are just the opposite. Since the coil and capacitor are in parallel, the voltage across them will be the same. Therefore, there will be no voltage step-up such as we encountered with the series-resonant circuit. Instead, there will be a resonant current step-up.

When voltage is applied to the resonant circuit, current will flow into the capacitive branch and the inductive branch. The current flowing in the capacitive branch will charge the capacitor. For the inductive branch, the coil will at first try to oppose the current flowing through it. When this opposition is overcome, the capacitor will discharge into the coil. This will cause a magnetic field to be developed around it. When the capacitor is fully discharged, the field around the coil will collapse, inducing a voltage in the coil, and current will flow from it to the capacitor. Again, the capacitor will charge. As soon as the energy from the coil is expended and the capacitor is fully charged, the capacitor will discharge into the coil starting the cycle over again.

The coil and capacitor will continue passing current back and forth in this manner. Since the inductive reactance and the capacitive reactance cancel at resonance, the current flow will be high. It will be limited only by the resistance of the coil and the wire in the circuit. Since these resistances are low, the losses in the circuit will also be low. The parallel-resonant circuit will draw from the power supply only enough current to make up for these losses. Thus, since the current in the resonant circuit is much higher than the current being supplied by the power supply at resonance, we say that there is a resonant current step-up in a parallel-resonant circuit.

DEAR STEVE,

What is meant by the Q factor of a coil? This is discussed in Lesson 8BB.

R. J., Va.

The Q factor of a coil is the designation used to indicate coil merit or efficiency. The greater the Q, the greater the efficiency.

In determining the Q factor of a coil, we must take the coil design, the dielectric, frequency, and losses into consideration. The loss due to "skin effect" is the most important. "Skin effect" is caused by the tendency of electrons to travel near the surface of a wire at high frequencies. This reduces the cross-sectional area in which the electrons are moving, thus increasing the resistance of the wire. As the frequency increases, the electrons tend to move closer together near the surface, so the resistance also increases. As you can now see, the resistance (and the losses in the wire) increases as the frequency increases.

Quite often special steps are taken to reduce this type of loss. For example, coils used in high-frequency equipment may be made of hollow tubing. Also, the tubing may be silver-plated to lower surface resistance.

DEAR STEVE,

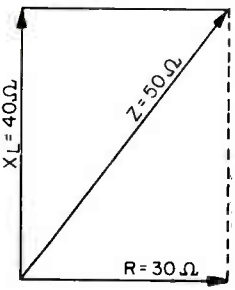
In Question 8 of Lesson 6BB, I am asked to find the total impedance of a given circuit. Can I add the reactance and the resistance together to do this?

B. C., Md.

No, you cannot simply add reactance and resistance together to find impedance. Remember that the voltage across the resistor will be in phase with the current flowing through it. At the same time, the voltage across the coil will lead the current flowing through it by 90°. Since out-of-phase values are contained in this problem, we cannot add them together.

There are two ways you can find the total impedance here. The first is to use vectors, which are explained on pages 23-26 of Lesson 6BB. Vectors provide a graphical means of showing out-of-phase values.

The second method is to use a formula. The formula is $Z^2 = R^2 + X^2$. This latter method is the most common. Here, you square the resistance, square the reactance, and then add



the two together. You then find the square root of the sum which will give you the total impedance.

To demonstrate this, let's assume that we have a circuit with a coil and a resistor connected in series. The reactance of the coil is 40 ohms and the resistance is 30 ohms. Diagram A shows the vector solution and diagram B shows the mathematical solution. We chose a scale of 1" = 20 Ω to solve the problem vectorially. Notice that the X_L line is 2 inches long, the R line is 1.5 inches long, and the Z line is 2.5 inches long. Since $2.5 \times 20 = 50$, the total impedance is 50 ohms.

$$Z = \sqrt{R^2 + X^2}$$
$$R^2 = 30 \times 30 = 900$$
$$X^2 = 40 \times 40 = 1600$$
$$R^2 + X^2 = 900 + 1600 = 2500$$
$$Z = \sqrt{2500} = 50\,\Omega$$

DEAR STEVE,

At this time I am studying Lesson 2BB. I don't understand the section on effective ac too well. Would you try and clear this up for me?

B. L., Neb.

An effective ac voltage is one that will have the same "effect" as an equivalent amount of dc voltage.

The above statement summarizes the information on page 15 of Lesson 2BB. To understand it better, consider a situation where we want to find a certain amount of ac voltage. Since ac is constantly changing, it is difficult to measure it. For this reason, we measure it by comparing it to dc. If we had a circuit

where we could measure the dc voltage and current, we could see how much ac voltage is necessary across a certain value of resistance in order to obtain a certain amount of current flow.

For example, if we found that we had to apply 100 volts dc to a circuit containing a 100-ohm resistor in order to obtain a current flow of 1 ampere, we would have a standard to compare ac voltage to. Then we could apply an ac voltage to this same 100-ohm resistor until a current flow of 1 ampere is measured. At this point we say we have the same amount of ac as dc. The ac is equal to 100 volts effective voltage since it has the same effect on the current as did 100 volts of dc.

Sometimes you will see the term "rms." This stands for "root-mean-square" and is exactly the same as effective voltage. The terms mean the same thing. For example, if you see an ac voltage expressed as "10 volts rms voltage," it is the same as "10 volts effective voltage."

Another point you should remember is that ac voltages measured by a service type voltmeter are always expressed in effective values. Thus, if you measure 120 volts ac, it is effectively the same as 120 volts dc. This is mentioned to be certain that you do not mistakenly interpret ac measurements you make as being peak or peak-to-peak values. AC meter readings are always expressed as effective or rms values.

DEAR STEVE,

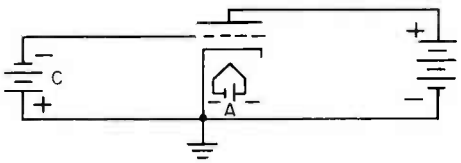
Several times in my lessons I have seen the terms "B+" and "B-" used. I am not certain as to exactly what they mean. Would you clarify this for me?

S. F., Fla.

The term "B+" is used to describe the plate and screen grid voltages in a receiver. "B-" is used to refer to the ground circuit of a receiver.

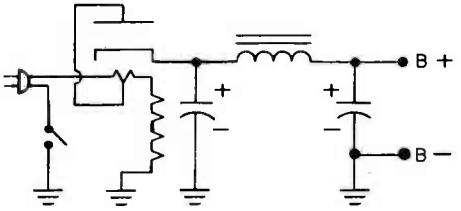
In the early days of radio, the filament, plate, and grid voltages were supplied by batteries. To distinguish between them, the different batteries were identified by letter designations. The filament voltage was supplied by the "A" battery, the plate voltage by the "B" battery, and the grid voltage by the "C" battery. Of these three, the only designation still in every-day usage is the "B" voltage.

Shown below is a diagram that is typical of those you have seen in your lessons. Notice that the plate voltage is supplied by the "B" battery. Also, notice that the positive terminal of the "B" battery is connected to the plate. Thus the plate voltage is known as the "B+" voltage.



The other end of the "B" battery is connected to ground. This is the common negative point in a receiver. So when a connection is made to the common negative point, we say it is connected to "B-" or ground. Ground is the point from which voltage measurements are taken.

In modern receivers, the "B" batteries have been replaced by power supplies. An example of one is shown below. Notice that the positive side is referred to as "B+" and the negative side as "B-." This is a typical ac-dc power supply.



DEAR STEVE,

I am having a great deal of trouble remembering formulas. Also, I find it necessary to constantly review. Is this to be expected, or is there something I can do about it?

C. J., Mo.

The trouble you are having is quite common. With each additional lesson you study, you learn new facts about theory, how components work, and how complete circuits work. If you consider only your first six lessons and each lesson to have an average length of 30 pages, you have studied 180 pages of information. Of course, we do not expect you to easily remember such a vast quantity of facts.

AUSTIN ANTENNA IS NEWEST ADDITION TO SOUTHWEST CIVIL DEFENSE OPERATION

Austin, Texas -- A telescoping radio antenna, buried 23 feet in the ground to resist nuclear blast effects, was installed recently at the Texas Department of Public Safety complex near the State's underground Emergency Operating Center.

Designed, built and installed by Collins, the antenna is capable of forcing itself through a ton of debris to the height of a 10-story building in three minutes.

Col. Homer Garrison, Jr., state coordinator of the Office of Defense and Disaster Relief and director of the Texas Department of Public Safety, said: "This additional facility is another step toward a guarantee of state government continuance during disaster. It will add to the state's emergency capability by allowing state-wide radio communications to continue from the Emergency Operating Center."

The antenna will also be used by the Texas Department of Public Safety in the event its other antenna systems fail.

Manufactured in building 430 in Dallas, the antenna is the first "hardened" antenna for a state civil defense operation in the Southwest.

The telescoping antenna will extend to its full height of 123 feet in three minutes from the hardened underground silo. The cone-shaped silo cover is capable of moving 2,000 pounds of debris as it swings open to let up the antenna's eight movable sections. Varying in diameter from two inches to 11-1/2 inches, these sections are stored vertically in a three-foot-diameter steel cylinder 23-1/2 feet long. To withstand blast effects, the antenna is shock-mounted within the silo, which forms a part of the electrical circuitry.

When extended to its full length, the antenna can withstand winds up to 80 miles per hour. It can be raised in a 60-mile-per-hour wind.

Sixty-two radial ground wires extend 120 feet horizontally from the silo top. These wires are buried a few inches in the ground.

From the underground communications center, the antenna can be remotely extended to any height, up to the maximum 123 feet, to operate best on the particular frequency being used at any given moment. The one-fourth wave monopole antenna, Collins Model 237Q-5, can handle 10 kw power in the HF frequency range of 2 to 20 megacycles.

"Communications," continued from Page 21.

In order for you to obtain as much as possible from your course, we suggest that after you finish your first six lessons, you begin making it a practice to review one lesson for each new one you finish. Pay particular attention to the chapter summaries and the Model Answers to the test questions.

As far as the formulas are concerned, make it a habit to keep a note pad handy while you study so you can copy the formulas down as they are given to you. Beside each formula, put down an example of how it is used. Then when you are asked to solve a math problem, you will have a complete list of formulas to which you can refer.

DEAR STEVE,

Please send me more extensive information on modulation and modulated signals. I am presently studying Lesson 2BB.

M. R., Fla.

Your request for information of this type is quite understandable, considering that you are only on your second lesson. In this lesson, you are given only a brief introduction to modulation. It is defined on page 19. Modulation is the process by which we combine an audio signal and an rf carrier.

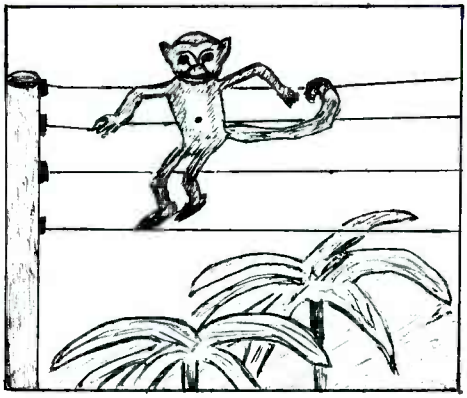
The audio signal is known as the modulation signal since it is used to change the characteristics of the rf carrier. Since the rf carrier is the signal being changed, it is the modulated signal.

In later lessons, you will study the processes we use to modulate a signal and will study modulation and demodulation (the process of removing the audio signal from the rf carrier) thoroughly. The main thing for you to know at this time is the definition of modulation.

The beginning of wisdom is the realization that the thing you are anxious about today won't seem important tomorrow.

30 Years Ago

As recorded in National Radio News



Monkeys in Central America had trouble walking over the telegraph wires. One bright ape finally conceived the idea of looping his tail over the wire above -- just like a trolley-pole arrangement.

Radio microphones began to be employed for uses other than entertainment. One sensitive microphone was used to detect the presence of wood worms in an antique wooden plate. (The microphone readily picked up noises made by the parasites.) On the other hand, broadcast systems often received help from unexpected sources. For instance, one hundred goldfish were official employees of a large British broadcasting station. These goldfish lived in the water-cooling system used for giant transmitter tubes, and removed algae and other aqueous plants which might clog the pipes.

A weird, whirring radio signal powerful enough to interfere with short-wave reception all over the world caused considerable speculation. The "Shadow", as it was called, was thought to be a scientific crank or a signal from another planet. A 60-cycle frequency which wandered aimlessly, the "Shadow" was finally pinpointed by the Navy Department: the signals were traced to experimental high-power diathermy machines.

Mysterious crashes of a sound effects box in the New York studios of Station WINS were traced to music played by a certain violinist. Shortening the legs of the cabinet took the resonant frequency out of the musical range and cured the trouble.

An industrious gentleman had a cast iron dog on his front lawn which he equipped with a buzzer and a photo-electric relay (or "electric eye"). When visitors approached, they passed through a beam of light focused on the electric eye, and this activated a magnetic bark.

Atop a 5,000 foot mountain in the Adirondacks of New York State, President Roosevelt dedicated the Whiteface Memorial Highway. A twenty-four inch searchlight, on which his voice was modulated, carried his words to a crowd at Lake Placid Airport, seven miles away. The night before, Governor Herbert H. Lehman of New York State spoke over the same distance. His voice faded once or twice when small clouds floated by the mountain top and partially covered the light beam.

Black and white pictures on television were an accomplished fact, although some engineers felt that better tensity and brilliancy could be obtained by using pictures with a greenish tint. Television in colors, many felt, would be very simple to develop, when the proper time came. As for television on the commercial market, some hopefuls predicted that it might be there by late 1936. Farnsworth Television, Inc. planned to produce home receivers giving six-inch pictures, although means were available to produce a much larger picture for auditorium and theater use. Under the Farnsworth system two receivers were necessary: one for television and one for sound. Officials of Farnsworth thought that television would have fewer and fewer "advertising plugs" and devote more time to entertainment -- in fact, such outdoor events as tennis, swimming, and track meets could one day be televised.

Viewers were often puzzled at the function of the "funny looking little glass enclosed tower" atop the main building of an airport. When asked what they thought the (control) tower was, some said it was a decoration, others a lunchroom or a recreation room for airport personnel, and still others a bedroom for aviators off duty.

ACTOR STUDYING FOR LICENSE AS 'HAM' OPERATOR

If you saw "King Rat", among the current crop of movies, this face MIGHT look familiar to you. It's Arthur Malet, who plays, he says, "the role of a most dishonest supply sergeant" in the film. Malet, a free-lance actor and licensed as an airframe and engine-mechanics specialist, is also an NRI student in the FCC Course, both because he wants to become a "ham" operator and "in case my present employment becomes unbearable". A native of England, he lives in Los Angeles. Actually, we misled you---in the photo he is made up for a test in "Mary Poppins". "Look young for my age, don't I?" quips Malet, who is in his mid-thirties, "and what a kindly, fatherly gaze I have!"

ALUMNI CHAPTER MEMBERSHIP OPEN TO STUDENTS, GRADUATES

There are local chapters of the NRIAA in fourteen cities in the U. S. These chapters were founded and are maintained by NRI graduates. Their purpose is to provide facilities for NRI men to hold meetings for the benefit of the members. The meetings are devoted primarily to talks, demonstrations, and discussions on the practical side of Radio-TV servicing. These programs are generally conducted by the senior members of the Chapter, who lead, guide, and otherwise help the more inexperienced members.

The members also enjoy the opportunity to associate with other fellows who have the same interests as they in Radio-TV-Electronics. They like to get together, swap experiences, hold "bull" sessions. Many Chapters serve refreshments such as cold drinks, coffee and doughnuts or snacks. This helps the members to relax and enjoy the good fellowship.

Membership in a local Chapter is NOT limited to graduates. Students are just as eligible as graduates. All local Chapters constantly strive to get as many new members as they can and extend a warm welcome to any NRI student or graduate who wants to join or visit the Chapter.

If there is a local Chapter in your area (see "Directory of Local Chapters" on page 32) we strongly suggest you drop in on some meeting night and get acquainted.

"Oh, cut out the melodrama and pay the bill!"

NRI GRADUATES: Where They Are, What They're Doing

Thousands of Graduates of the National Radio Institute are profitably employed in Electronics -- using their NRI-acquired knowledge and skills in Industry, the government, and their own businesses.

They are in practically every branch and every activity in the field of Electronics, as this partial list shows.

RADIO-TV REPAIRMAN SERVICE TECHNICIAN

Carl Werley	Repairman	Wyatt TV Shop Searcy, Ark.
Richard P. Whitacre	TV-Radio Technician	Sears Roebuck Winchester, Va.
Anthony C. Yurkus	Serviceman	Rose's Clothing and Furniture Co., Gardner, Mass.

IN INDUSTRIAL-GOVERNMENTAL ELECTRONICS

Roland Brodeur St. Boniface, Man., Canada	Chief Engineer	Radio Station CKSB
Harrell Brown Burlington, N. C.	Electrical Tester	Western Electric
Henry H. Bruemer, Jr. Normandy, Mo.	Engineer	Brasler Electric Co.
Russle L. Burns St. Scott, Kans.	Signal Test Foreman	Frisco Railroad
Edgar E. Buxton St. Albans, W. Va.	Metering Engineer	Union Carbide, Olefins Div.
Joseph J. Cadero San Francisco, Calif.	Traffic Signal Technician	State of California
Charles H. Calkins Hannibal, N. Y.	Electrician	Container Corp. of America
Hugh C. Canning Cap de la Madeleine, P.Q., Can	Foreman	Canadian Westinghouse Co. Ltd.
Waldemar A. Carlson San Jose, Calif.	Assistant Engineer	Pacific Telephone Co.
Chester B. Chadwick Tullahoma, Tenn.	Electrical Advisor	U. S. Army, Corps of Engineers
Robert V. Chadwick Toronto, Ohio	Research Technician	National Steel Corp.
P. O. Thomas Chapman Halifax, N. S., Canada	Electronic Technician	Royal Canadian Navy
Maynard E. Chappell Richmond, Va.	Staff Assistant, General Plant Supervisor's Group	C and P Telephone Co. of Va.
Russel L. Chard New Castle, Ind.	Tool Room Foreman	Perfect Circle Corp.
Alfred Christmann Chicago, Ill.	Communications Serviceman	Illinois Bell Telephone Co.
Robert H. Christoffers Hatfield, Pa.	Draftsman - Checker	Univac Div., Sperry Rand
H. A. Clark Endicott, N. Y.	Instructor	IBM Corporation
James M. Cobble Herndon, Va.	Electronic Technician	Naval Research Lab.
John Connor Munster, Ind.	Repairman - Vending Machines; Radar Ranges; TV Equipment	Automatic Retailers of America
Kenneth Conrad Oklahoma City, Okla.	Transmitter Engineer	KOCO-TV

EMPLOYMENT OPPORTUNITIES

The following firms have requested that they be listed as continuing prospective employers of NRI graduates in the designated capacities:

RCA SERVICE COMPANY, Camden, N. J.
Needs TV Servicemen at most RCA Service Factory Service Branches. Technical School training essential prefer B/W and Color Service experience. Apply at RCA Branch nearest you, consult Yellow Pages or write to D. A. Giordano, Mgr., Employment, RCA Service Co., Cherry Hill, N. J.

LEONHARDT APPLIANCE INC.
309 Guthrie, Louisville, Ky.
Needs experienced refrigerator man.

FOTO CHROME, INC.
5306 Baltimore Avenue
Hyattsville, Md.
Maintenance of electronically controlled photographic equipment. Foto Chrome offers a training program of 1 to 2 years duration on photography and electronics as applied to photographic equipment. NRI Graduates and students currently progressing through NRI courses are asked to contact Mr. Murray by mail, or personal visit for interview.

INDUSTRIAL AND MERCHANDISING SERVICES, S.A. 4201 Mass. Ave., N.W. Wash. D.C.
This is a large European organization which has just begun to establish appliance service shops throughout the U.S.A. It has openings for appliance servicemen, presently in Baltimore and Washington, later in other cities. Address inquiries to Mr. Carl Schleicher.

DECCA NAVIGATOR SYSTEMS, INC.
1706 L Street, N. W., Washington, D. C.
A London-based world-wide organization needs radio technicians with 1st and 2nd class operator's license for jobs in U. S. A. and overseas. Contact Mr. Lederer at the Washington office of Mr. Riley, Decca Navigator Systems, Inc., 386 Park Avenue, S., New York, N. Y.

WESTERN UNION TELEGRAPH CO.
1405 G. Street, N. W., Washington, D. C.
Needs electronics technicians. Write or telephone Mr. B. L. Krise, Manager, Technical Services.

COMMUNICATIONS ENGINEERING CO.
(Division of Sylvan Electronics)
6610 Blacklick Rd., Springfield, Va.
Needs technician with FCC license. Call Mr. Brown, 451-5700.

GENERAL TELEPHONE OF INDIANA, INC.
501 Tecumseh St., P. O. Box 1201, Fort Wayne, Ind. 46801
Openings in exchange offices in Indiana. No experience needed for: PBX MAN-To install and maintain mobile telephone systems of electronic relay and electro-mechanical types. SWITCHMAN-To install and maintain mobile telephone systems throughout state.

SIMPSON ELECTRIC COMPANY
5200 Kinzie St., Chicago, Ill. 60644
Openings for technicians, design and development engineers, electro-mechanical and production engineers. Write: W. F. Jones.

SYLVAN STEREO AND TV SERVICE CO.
306 Kennedy St., N. W., Washington, D. C.
Opening for radio-TV serviceman. Call Mr. Lee, 726-5800.

LEPPERT, ELECTRICAL APPLIANCES
623 H St., N. W., Washington, D. C.
836 Leesburg Pike, Falls Church, Va.
Occasional need for appliance servicemen.

AERO TV AND APPLIANCE COMPANY
7314 Little River Turnpike, Annandale, Va.
Needs appliance servicemen. Write: A. Berry.

ALL-TRONICS, INC.
560 Portage St., Kalamazoo, Mich., 49006
Needs electronics technician.

UNITED AIRLINES
Wash. Nat'l. Airport, Washington, D. C.
Openings for radio technician.

AMERICAN TEL. AND TEL.
1130 17th St., N. W., Washington, D. C.
Needs electronics technician.

SACRAMENTO ARMY DEPOT
Sacramento, California
At moment needs 120 radio technicians.

AUDIO FIDELITY CORPORATION
6521 West Broad, Richmond, Virginia
Needs audio-visual repairmen and electronics technician.

STATION WFMD, Frederick, Md.
Needs technician with 1st class license.

VANITY FAIR
P. O. Box 111 Monroe Mills
Monroeville, Alabama 36460
Challenging, long-term opportunity in expanding Research and Development Dept. for two or three electronics technicians who can adapt technical training to business-industry needs. Vanity Fair is a nylon lingerie and foundation garment industry with a growth equal to a plant a year for the past 10 years. Seven plants located within 100-mile radius of Monroeville, clean, wide-awake town of 5,000, which is 90 miles north of Pensacola, Fla., and 100 miles southwest of Montgomery. Adhere to policy of promotion from within. Write George Heard, Director of Industrial Relations.

CHESAPEAKE AND OHIO RAILROAD CO.
409 11th St., Huntington, West Virginia
Needs technicians for electronics maintenance on railroad. Must have 2nd class license or better. Openings in Ill., Mich., Ky., and Va.

RADIATION SERVICE COMPANY
9342 Fraser St., Silver Spring, Md.
Needs Communications Technician with 1st class FCC license to train in Baltimore. No experience necessary. Pays $80 - $125 wkly. Car furnished.

GENERAL ELECTRIC COMPANY, Appliance Park 6-221, Louisville, Ky. 40225 has openings available throughout U.S.A. with good pay, excellent working conditions, full benefit package. Specialized on-the-job training provided. Consult local telephone directory for factory service operations, or write to above address for location to District Product Service Manager nearest you.

NEPTUNE BROADCASTING COMPANY, 300 North 7th St., Steubenville, Ohio, is seeking men with radio training and/or experience for jobs in Ohio, Pennsylvania, and West Virginia.

RCA DET Division has openings for electronics technicians. Contact Mr. Townsend, RCA DET Div., Front and Cooper Sts., Camden, N. J.

SUN ELECTRIC CORP., 5708B Frederick Ave., Rockville, Md., is looking for electronics technicians.

> We are all ready to be savage in some cause. The difference between a good man and a bad one is the choice of the cause.
>
> Wm. James

ALUMNI ELECTION BALLOT

FOR PRESIDENT (VOTE FOR ONE MAN):

- ☐ Eugene de Caussin, Los Angeles, Calif.
- ☐ F. Earl Oliver, Detroit, Mich.

FOR VICE-PRESIDENT (VOTE FOR FOUR MEN):

- ☐ Joseph G. Bradley, Jr., New York, N. Y.
- ☐ George Vogel, Baltimore, Md.
- ☐ Harvey Morris, Philadelphia, Pa.
- ☐ James L. Wheeler, Verona, Pa.
- ☐ George Stoll, Kearney, N. J.
- ☐ Isaiah Randolph, San Francisco, Calif.
- ☐ Edward Bednarz, Fall River, Mass.
- ☐ John T. Parks, Ware, Mass.

POLLS CLOSE SEPTEMBER 25, 1966.

SIGN HERE:

Your Name .....

Your Address .....

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

MAIL YOUR COMPLETE BALLOT TO:

T. E. Rose, Executive Secretary

NRI ALUMNI ASSOCIATION

3939 Wisconsin Ave.

WASHINGTON, D. C. 20016

CONAR EASY PAYMENT PLAN

SO

Note: Easy payment contracts cannot be accepted from persons under 21 years of age. If you are under 21, have this sheet filled in by a person of legal age and regularly employed.

Enclosed is a down payment of $_____ on the equipment I have listed on the reverse side. Beginning 30 days from the date of shipment I will pay you $_____ each month until the total payment price is paid. You will retain title of this equipment until this amount is fully paid. If I do not make the payments as agreed, you may declare the entire unpaid balance immediately due and payable, or at your option, repossess the equipment. Your acceptance of this will be effected by your shipment to me of the equipment I have listed.

Date _____ Your written signature _____

CREDIT APPLICATION

Print Full Name _____ Age _____

Home Address _____

City & State _____ How long at this address? _____

Previous Address _____

City & State _____ How long at this address? _____

Present Employer _____ Position _____ Monthly Income _____

Business Address _____ How Long Employed? _____

If in business for self, what business? _____ How Long? _____

Bank Account with _____ Savings ☐ Checking ☐

CREDIT REFERENCE (Give 2 Merchants, Firms or Finance Companies with whom you have or have had accounts.

Credit Acct. with _____ Highest Credit _____
(Name) (Address)

Credit Acct. with _____ Highest Credit _____
(Name) (Address)

Alumni News

Howard Tate	President
Joseph Bradley	Vice President
Edward Bednarz	Vice President
Isaiah Randolph	Vice President
F. Earl Oliver	Vice President
Theodore E. Rose	Executive Sec.

DE CAUSSIN AHEAD AS PRESIDENTIAL NOMINEE, OLIVER TAKES SECOND PLACE IN PRIMARIES

Eugene DeCaussin is far and away the favorite nominee to serve the NRI Alumni Association as President in 1967.

DeCaussin has long been the Chairman of the Los Angeles Chapter, which he has served wholeheartedly and generously. He is also a former National Vice-President, having been elected to this office in 1963 and 1964. He now has a good chance at the highest honor, the Presidency.

This primary election brought about a very surprising and completely unlooked for situation in the man chosen by the members to run against DeCaussin. He is F. Earl Oliver of the Detroit Chapter. Oliver is a real old-timer in the NRI Alumni Association, was President in 1943 and was many times elected to a Vice-Presidency thereafter, in addition to serving in the various offices of the Detroit Chapter over the years.

Of the Vice-Presidents currently serving, three of them were nominated for a second term. They are Joseph Bradley, New York City; Edward Bednarz, Fall River, Mass; and Isaiah Randolph, Los Angeles, Calif. The other candidates for a Vice-Presidency are George Stoll, Kearny, N. J.; James L. Wheeler (who was a Vice-President in 1965), Verona, Pa.; Harvey Morris (another old-timer and former President and Vice-President), Philadelphia, Pa.; and John T. Parks, Ware, Mass., a member of the Springfield Chapter who has not previously been a candidate for National Office.

One thing you can be sure about: all of these are good men; you could not make a mistake in choosing any of them.

Mail your ballot to reach Washington not later than September 25 - the earlier the better. The winning candidates will be announced in the November-December issue.

Industrious Chapters Plan Heavy Autumn Schedule

FLINT (SAGINAW VALLEY) CHAPTER at its meetings this spring concentrated mostly on the problems involved in Color TV Servicing. It concluded this program this summer. But because of the importance of the subject and the need for the members to learn all they can about Color TV Servicing, this program will be resumed in the fall. In November the Chapter will show a Sylvania Color TV movie that includes sound.

Clyde Morrissett and Andy Jobbagy paid a visit to the Detroit Chapter, where Andy delivered a lecture on the use of a Radio Analyst. He and Earl Oliver also exchanged ideas on how to align a table model radio.

The Chapter is planning a Thirteenth Anniversary Celebration to be held in October.

LOS ANGELES INVESTIGATES COLOR-TV SERVICING

LOS ANGELES CHAPTER, in holding its meetings on the second and last Saturday of the month, has used the latter as a work session on Color TV and the first meeting as a business meeting followed by servicing problems of the members. The Chapter has found that this works out very well. During these sessions, the members discuss various problems they have run across in servicing; if students encounter rough spots in their lessons, the senior members help them.

Work on the Chapter's Color TV set has progressed very satisfactorily. The members have disconnected and checked all condensers in the set, replacing all that were defective, then tested all potentiometers, replacing several of these. The next move will be to check the circuits for resistance and voltage. During this testing, the students are given the opportunity to take part and are given practical experience in soldering and testing parts.

The newest member to join the Chapter is George Lautenschlager of Long Beach, a student. Our congratulations to you, George!

The Chapter was saddened at the loss of Floyd Cox, who passed away a short time ago. He was a very successful Radio-TV Serviceman, owned his own well-established shop in Hollywood and was a highly respected member of the Chapter.

NEW YORK USES SLIDE-TAPE LECTURES AS SERVICING GUIDE

NEW YORK CITY CHAPTER'S Jim Eaddy, who has served well and faithfully for so long, resigned from office due to the press of his business. Ontie Crowe was elected first Vice-Chairman to fill Jim's term. Ontie has done much for the Chapter in the past, and the members are glad to tender him this honor. Sam Antman and David Spitzer gave an excellent demonstration of radio receiver alignment, using a Signal Generator, Signal Tracer, VTVM, and the Chapter's Demonstration Board. After this had been completed and many questions answered, Sam ran through the set with a Scope, showing the waveforms to be found at grid and plate of each stage, using first an injected signal and then a regular station broadcast.

The Chapter enjoyed watching Howard Sams' Slide-Tape Lectures: Color Receiver Circuit Analysis and Installation and Maintenance, thanks to the kindness of Joe Mikulski, who lent his slide projector for the occasion, and Roy Da Silva, whose Tape Recorder is a most essential part of such occasions. The members were most pleased to welcome Joe back. He is one of several who put in appearances after a long absence.

NORTH JERSEY CHAPTER ANTICIPATES TOURS, FILMS

NORTH JERSEY CHAPTER was entertained with a "dog set" brought in by Vice-Chairman George Stoll. Trouble was injected into the set after it had been repaired to demonstrate additional troubleshooting methods.

Due to the recent change in meeting places, a blackboard is needed, which one of the members has promised to donate.

Two films from the telephone company were shown by Program Chairman George Schalk. George has also been trying to make arrangements for a tour of the Admiral Company.

PHILADELPHIA-CAMDEN GREETS NEW MEMBER

PHILADELPHIA - CAMDEN CHAPTER'S dynamic and industrious leader, Secretary Jules Cohen, has been having a rough time with his right hand ever since spring, to such an extent that it seriously incapacitated him for much of his work and other activities. He ended up in a hospital for tests and X-Rays but this did not help. Fortunately, the ailment was cleared up by a former football trainer with whom Jules took a fishing vacation in Quebec. It's good to report that Jules is on deck again with his usual full head of steam.

One new member has recently been accepted into the Chapter. He is Student Robert J. Knoblauch, Bristol, Pa. Welcome to the chapter, Bob!

In Memoriam

Since the last issue of the Journal we have received word that the following members of the Alumni Association have passed away. We extend the sympathy of the Alumni Association to their families.

Mr. Steven A. Stova, Boonton, N. J.

Mr. Nils W. Clark, Salamanca, N. Y.

Mr. Theo. I. Hogan, Memphis, Tenn.

Mr. S. Chiaramonte, Brooklyn, N. Y.

Mr. A. F. Melin, Ft. McCoy, Fla.

Mr. A. A. McKinnis, Burkburnet, Texas

Bill Davis was a feature speaker at the last spring meeting. His subject was the B and K TV Analyzer. Bill knows his subject well and gave his usual fine talk.

VARIOUS FILMS HIGHLIGHT SAN ANTONIO ALAMO MEETINGS

SAN ANTONIO (ALAMO) CHAPTER exhibited a slide-tape presentation from Howard Sams called, "Pricing Your Services For A Profit." The members found this subject to be so interesting and important that a regular "bull session" was held later. Another slide-tape presentation to be shown is "This is Photofact." Continued use of films is in store for future programs.

The Chapter also has plans under way for a Scope demonstration with an operating TV set.

SAN FRANCISCO INTRODUCES TELEVISION QUIZ

SAN FRANCISCO CHAPTER'S Arnold Hopkins conducted a lecture on how to reduce flicker on the TV screen. An unusual feature of this lecture was that he distributed a television quiz to the members to use in following his discussion. This device made the lecture much more interesting and meaningful. According to schedule, Percy Ellis was to bring in his picture tube rejuvenator and demonstrate it on a weak picture tube and Art Ragsdale was to supply his tube tester to check the other tubes in the TV set, at the following meeting.

SPRINGFIELD PAUSES FOR 'REFLECTIONS' ON TV

SPRINGFIELD (MASS.) CHAPTER'S Joe Rufo conducted an unusual and excellent lecture and demonstration. He brought in a Color TV Portable and his B and K Color Generator. The back of the TV set faced the audience and by use of a large mirror everyone could observe what was taking place on the face of the tube. Brother Bernard ran the tapes of a talk by Larry Black on Color TV servicing. Brother Bernard stopped the tapes at various times while Joe demonstrated such details as the placement of parts, exactly how to get purity, center convergence, dynamic convergence, and tracking. This program proved that a picture is worth a thousand words.

Being a full-time serviceman, Joe gave the members many useful pointers that he has acquired from experience. As an example, he showed the members three ways to eliminate snow by removing the signal while making purity adjustments. Although the tapes suggested disconnecting the tuner from the i-f section, Joe said that if this is too difficult to just short out the signal from the tuner.

This was truly a fine lecture and demonstration. The members agreed unanimously that they derived a great deal of benefit from it.

Logic and common sense are not synonymous, and it is in this area that computers can lead you astray. Perhaps you've heard about the man who had two watches. One of them didn't work at all; the other gained two seconds a day. He programmed a computer to find which of the watches was the better of the two, and the electronic contraption answered that the non-operative watch was much to be preferred. Why? Well, even though it was stopped, that watch would tell the correct time twice a day. The other watch--the one that lost two seconds a day--would indicate the correct time only once in every 120 years.

DIRECTORY OF ALUMNI CHAPTERS

DETROIT CHAPTER meets 8:00 P. M., 2nd Friday of each month, St. Andrews Hall, 431 E. Congress St., Detroit. Chairman: James Kelley, 1140 Livernois, Detroit, Mich., VI-14972.

FLINT (SAGINAW VALLEY) CHAPTER meets 8:00 P. M., 2nd Wednesday of each month at Andrew Jobbagy's Shop, G-5507 S. Saginaw Rd., Flint. Chairman: Clyde Morrissett, 514 Gorton Ct., Flint, Michigan., OW. 4-6867.

HAGERSTOWN (CUMBERLAND VALLEY) CHAPTER meets 7:30 P. M., 2nd Thursday of each month at George Fulk's Radio-TV Service Shop, Boonsboro, Md. Chairman: Robert McHenry, RR2, Kearneysville, W. Va. 25430.

LOS ANGELES CHAPTER meets 8:00 P. M., 2nd and last Saturday of each month, 4912 Fountain Ave., L. A. Chairman: Eugene DeCaussin, 4912 Fountain Ave., L. A., NO 4-3455.

MINNEAPOLIS-ST PAUL (TWIN CITIES) CHAPTER meets 8:00 P. M., 2nd Thursday of each month, at the homes of its members. Chairman: Edwin Rolf, Grasston, Minn.

NEW ORLEANS CHAPTER meets 8:00 P.M., 2nd Tuesday of each month at Galjour's TV, 809 N. Broad St., New Orleans, La. Chairman: Herman Blackford, 5301 Tchoupitoulas St., New Orleans, La.

NEW YORK CITY CHAPTER meets 8:30 P. M., 1st and 3rd Thursday of each month, St. Marks Community Center, 12 St. Marks Pl., New York City. Chairman: John Schumott, 1778 Madison Ave., NYC. 722-4748.

NORTH JERSEY CHAPTER meets 8:00 P.M., last Friday of each month, Washington and Kearny Ave., Kearny, N. J. Chairman: George Schopmeier, 935-C River Rd., New Milford, N. J.

PHILADELPHIA-CAMDEN CHAPTER meets 8:00 P. M., 2nd and 4th Monday of each month, K of C Hall, Tulip and Tyson Sts., Philadelphia. Chairman: John Pirrung, 2923 Longshore Ave., Philadelphia, Pa.

PITTSBURGH CHAPTER meets 8:00 P. M., 1st Thursday of each month, 436 Forbes Ave., Pittsburgh. Chairman: Joseph Burnelis, 2268 Whited St., Pittsburgh, Pa.

SAN ANTONIO ALAMO CHAPTER meets 7:00 P. M., 4th Friday of each month, Beethoven Home, 422 Pereida, San Antonio. Chairman: Sam Stinebaugh, 318 Early Trail, San Antonio, Texas.

SAN FRANCISCO CHAPTER meets 8:00 P.M., 2nd Wednesday of each month, 1259 Evans Ave., San Francisco. Chairman: Isiah Randolph, 523 Ivy St., San Francisco, Calif.

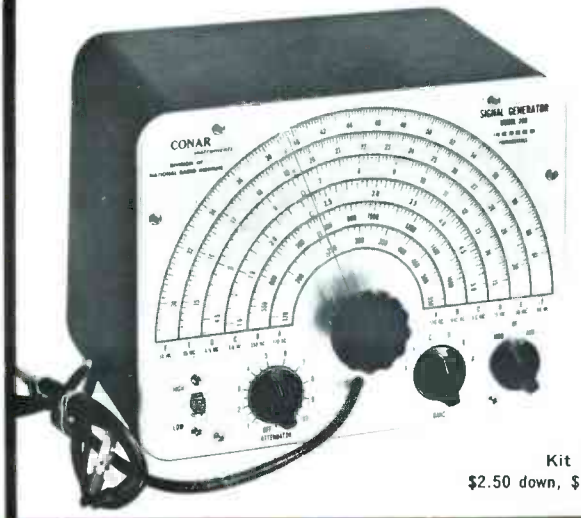
SOUTHEASTERN MASSACHUSETTS CHAPTER meets 8:00 P. M., last Wednesday of each month at home of John Alves, 57 Allen Blvd, Swansea, Mass. Chairman: Daniel DeJesus, 125 Bluefield St., New Bedford, Mass.

SPRINGFIELD (MASS.) CHAPTER meets 7:00 P. M., last Saturday of each month at shop of Norman Charest, 74 Redfern St., Springfield, Mass. Chairman: Joseph Gaze, 68 Worthen St., W. Springfield, Mass.

SAVE BY BUYING FROM

CONAR

DIVISION OF NATIONAL RADIO INSTITUTE



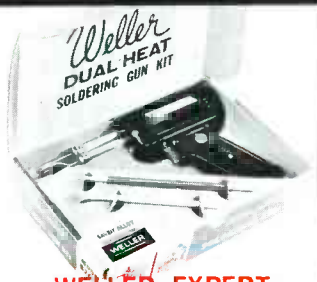
CONAR SIGNAL GENERATOR

easy calibration—accurate within 1%

Uses Hartley-type oscillator circuit with six separate coils and capacitors. All coils are carefully pre-aligned and double-checked before shipment. High output simplifies signal injection for rapid alignment and trouble shooting on transistor and tube receivers. Covers 170kc to 60mc in six ranges, with harmonic frequency coverage over 120mc. Ideal as marker for TV alignment. Single cable for all outputs—no need to change leads when switching from 400-cycle audio to modulated or unmodulated RF. Tuning dial features planetary drive with 6:1 ratio for greater accuracy and elimination of backlash.

Kit (280UK) $24.95 Assembled (280WT) $35.95
$2.50 down, $5.00/mo. $3.60 down, $5.00/mo.

CONAR "BEST BUYS" TO HANDLE EVERY SOLDERING JOB



WELLER EXPERT SOLDERING GUN KIT

Dual-heat gun, aid tool, cleaning brush, solder. "Triggermatic" control for 125-watt or 90-watt heat. Spotlight illumination. Easy-to-replace tip heats in five seconds.

CONAR PRICE: $6.48 (8200AC)

UNGAR SOLDERING PENCIL KITS

Low heat, light in weight, small tips. Perfect for circuit board and transistor work. Senior Kit has 47½, 37½, and 23½ watt elements. Junior Kit has 37½ watt element only. *Ten* ⅛" tips included.

CONAR PRICES: $7.40 Senior Kit (S776TO) $3.98 Junior Kit (J776TO)

AMERICAN BEAUTY SOLDERING IRON

Perfect for kit assembly, radio-TV wiring. Nickel-plated, copper tip resists corrosion, easily replaceable. Stainless steel casing with 30 watt element. Insulated stand, ⅛" and 3/16" tips.

CONAR PRICE: $5.47 (3120TO)

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