nri journal

March-April 1967 35¢ Cents

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nri journal

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CONTENTS

COVER STORY

NRI Technical Editor Thomas Nolan, Jr. combines his love of flying and a knowledge of electronics in his story, "Electronics in Private Flying", which begins on Page 2. The article notes some of the practical aids available in small-plane piloting. Tom was formerly chief engineer of the Civil Defense Computer Facility at Olney, Md.

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'58 Whiskey, Roger . . .'

ELECTRONICS IN PRIVATE FLYING

BY TOM NOLAN

IT ALL STARTED more than a year ago, in October '65 . . . just a Sunday afternoon drive, passing a little airport in Maryland's Montgomery County, and one look at a little poster on the wall. I was ready for lessons . . . October does funny things.

The little two-place plane seemed just like a Boeing 707 the first time out. (Just read the manufacturers' ads, and you'll see what I mean. Good lord, all those buttons!)

After a few hours in the airport plane, I joined a club. It has one plane and about 15 members, so the plane really got a workout on the weekends. Then retiring (from government service) gave me extra time, so I was able to fly on weekdays. In fact, I used the three months after that until I joined NRI towards the end of February, 1966, to get in a little flying time towards my Private Flying License. Then there was the written exam to be studied for . . and passed.

My instructor was a young man who was a commercial pilot for a large motel chain. During the winter we used to get out and fly before his workday began, and after I soloed, I flew during the day by myself to build up flying time.

After I had been with NRI for a while, I took off one afternoon and passed the final exam with an FAA Flight Instructor. What a wonderful feeling! Now I was a Private Pilot and I could fly by myself any time.

So much for the license; now let's move on to electronics in private flying.

Among the requirements for that private license is a thorough knowledge of radio communications and radio navigation; the transmitter and receiver allow you to communicate with all flight service stations and emergency channels, and there are controlled airports where you are not allowed to land unless you have radio to communicate with the approach and control towers.

(And by the way, when it comes to takeoff, flying, and landing, these little planes have the same rights and privileges as

the big commercial airliners. After all, a big chunk of Uncle Sam's money - our money - pays for these traffic control and navigation safety features!)

The navigation receiver part of the NavCom (Navigation and Communication) unit gives you a choice for all VOR and VORTAC (Very-High Frequency Omni-Range and VHF Omni-Range Distance Measuring Equipment; Omni means all directions) radio navigation stations in the U. S. and all other countries. The little hypothetical trip that we're going to take will show you how the navigation section of the radio operates.

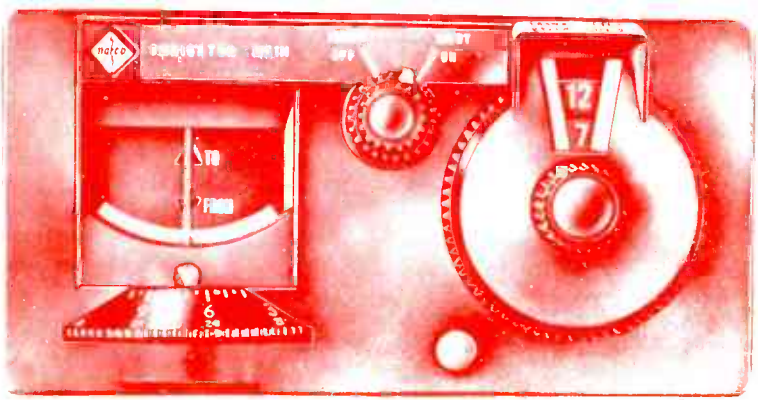
Let's look at one of the NavCom units we might find in the average small airplane. It's all contained in a little package about 3" × 7" and 12" deep. The part visible on the instrument panel is a 3"×7" face. There might even be a small box with some additional transistors or tubes located either behind the panel or in the rear of the aircraft to balance the plane more favorably.

All of the settings of channel frequencies and the navigation, or Omni information, are on the small front face of the NavCom unit. All channels of modern transmitters and receivers are crystal-controlled and the frequencies are selected by switches: an outer dial selects the basic frequency (such as 112 megacycles); an inner dial, additional frequencies (such as .7 megacycles). Our actual frequency in this example is 112.7 megacycles.

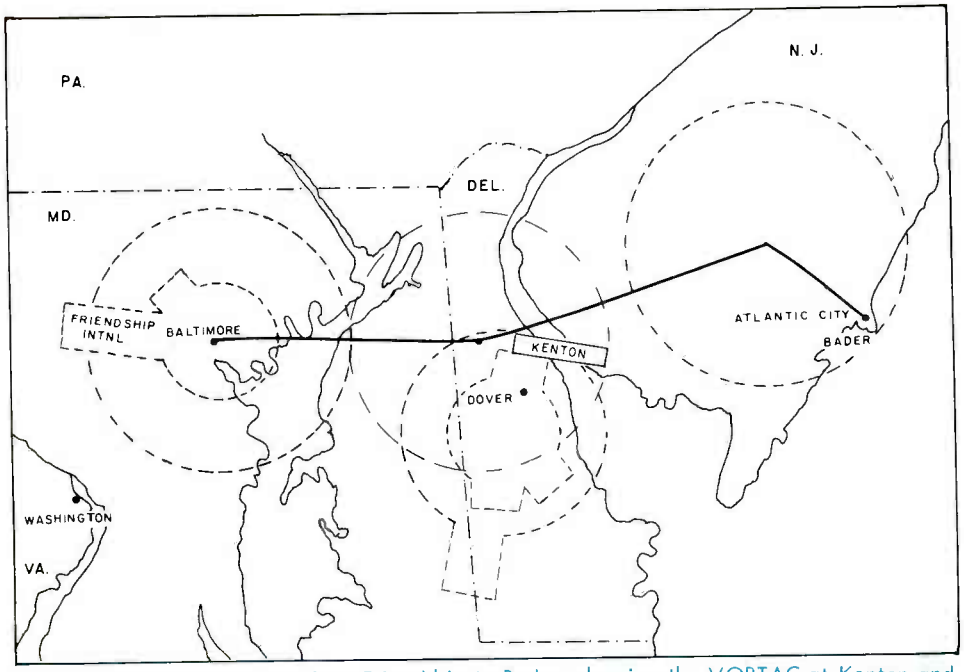
The receiver and transmitter dials are set in the same manner. The Omni frequencies (a group of frequencies ranging from 108 megacycles to 118 megacycles) are also found on this receiver dial. This is the part of the NavCom unit that's most interesting -- the part that will point a finger toward the predetermined destination that you have set.

Let's take our imaginary trip from Friendship Airport in Baltimore, Md. to Atlantic City, N. J., a trip which, incidentally, I have flown several times -- our club has two airplanes at Friendship. On our chart we can see Baltimore's Friendship and Atlantic City's Bader Field. A VORTAC, frequency 116.8 megacycles, code identification "ENO", is also visible at Kenton, Del. Another VORTAC, frequency 108.6 megacycles, code identification ACY, is located at the Atlantic City Airport.

Say we make a flight plan to use a compass heading of 95° to Kenton, 85° to Atlantic City Airport, and 145° to Bader Field. First, we call the local Flight Service Station (FSS) to obtain the latest weather details between Baltimore and Atlantic City. Everything is okay, so we then file a flight plan with FSS; we list the type of flight, VFR (visual flight rules), the type of airplane (a Cherokee



The NavCom Unit.



A map of our imaginary trip from Friendship to Bader, showing the VORTAC at Kenton and the VORTAC at Atlantic City.

180), our air speed (108 knots), fuel on board (four hours), number of people on board (two), and color of our aircraft (maroon and white). We give all this information, as well as our time in flight and the estimated time of takeoff, to the FSS.

Now we're ready! We get into the airplane, start the engine, turn on the radio, and set the transmitter and receiver frequencies to 121.9 megacycles, the Friendship ground control. Private airplanes have a series of numbers and a letter of identification (in our case, a Cherokee 7058W). For communication purposes, the first two digits are dropped, and the letter is given a phonetic code name. Our airplane, therefore, is referred to as "58 Whiskey". The following conversation takes place:

US: Friendship Ground, this is Cherokee 7058 Whiskey, located at South Ramp. Desire taxi instructions.

FRIENDSHIP GROUND: 58 Whiskey, runway 33, wind 15 at 270°, altimeter 30.20.

We taxi out to the end of runway 33 and set our brakes short of the takeoff point. We rev up the engine, check the magnetos, carburetor heat, and all the instruments, and then set the radio transmitter and receiver to 118.70 megacycles, the tower frequency . . .

US: Friendship Tower, this is 58 Whiskey at runway 33, ready for takeoff.

TOWER: 58 Whiskey, you are cleared for takeoff on runway 33.

US: 58 Whiskey, Roger.

After checking for traffic and making a last-minute instrument check, we make our turn on to runway 33, and we shove in the throttle. We start our roll down the runway, take off, and we're headed for Atlantic City. As soon as we're airborne, we set the transmitter and receiver to 122.1 megacycles . . .

US: Baltimore Radio, this is Cherokee 7058 Whiskey.

BALTIMORE RADIO: 58 Whiskey, this is Baltimore Radio.

US: Activate my flight plan at 1500 hours Greenwich-mean-time. 58 Whiskey.

BALTIMORE RADIO: 58 Whiskey, we will activate your flight plan at 1500 hours Greenwich-mean-time. Roger.

US: 58 Whiskey, Roger.

Now comes our navigating. As we climb, we reset our radio receiver to 116.8 megacycles and the OBS (omni bearing selector) to 95°. Nothing happens. As you know, vhf is a line-of-sight type of transmission and reception -- and it's about 62 miles to Kenton VORTAC, so we have to climb. Our altimeter shows 2500 feet and still climbing. As we circle the airport, we head the plane on a magnetic compass heading of 95°. Still nothing happens to the omni indicator on our little panel.

As we draw near 4500-5000 feet we hear a series of dots and dashes in the speaker: "dit-dah dit-dah dah dah" which is Morse Code for ENO. Now we know we have the right Omni Station. About this time the vertical needle moves to the right, and the little window, red in color, indicating no signal swings over and says "TO". This means that we are headed "to" the station. The needle to the right indicates that we must head the airplane a little to the right to be on a course of 95°.

Okay, so we head 105° by the compass and in about 3 to 5 minutes the needle drops toward center. Then we come back to a heading of 95° by the magnetic compass and look at the terrain: we can see that it matches perfectly the area where we drew the line on the chart. In other words, VFR flight depends on what we see as well as what electronics tells us.

We're now going about 130 miles per hour and in about one-half hour, if we have kept that little needle centered, the little window that says "TO" will suddenly flip over to a red color. When we look down on the ground, we can see a little round white building with a tower like a lighthouse sticking out of the top. This is the Kenton VORTAC and we have hit it right on the nose! After we pass over the top of it, the little red window says "FROM", which means that the Kenton VORTAC is now behind us. We could set it to continue on to Atlantic City on a "FROM" radial, but we won't.

Our next move is to reset the radio receiver frequency to 108.6 megacycles and the OBS to 85°, also turning the airplane to fly on a magnetic course of 85°. We can detect the identifying signal in the speaker: "dit dah - dah dit dah dit - dah dit dah dah" ACY. We know we have the right station. The little window reads "TO", the needle is almost centered, and we have before us a flight of about 52 miles, which will be about 20 minutes.

The needle stays centered and we check the ground. We're on course -- that terrain with all the creeks and inlets and that big Delaware River looks just like our chart. We're flying at 5500 feet . . .

As we near the Atlantic City Airport we shift to an OBS heading of 145° and turn the airplane to the same magnetic heading. The little window reads "FROM" -- we are 9 miles from Bader Field . . . There's Bader just ahead, and we begin our descent.

Bader is an uncontrolled airport (it has no FAA Control Tower, but has UniCom, which is a standard frequency of 122.8 mc). We can forget about Omni because we can see the airport ahead, so we set the transmitter and receiver and put in a call:

US: Bader Field, this is 7058 Whiskey. What is your active runway, please?

BADER: 58 Whiskey, runway 20, wind 10 at 140, no other aircraft in pattern.

US: 58 Whiskey, thank you. Roger.

We now turn into a normal landing pattern and make our landing on runway 20, which is 200° magnetic on the compass. 58 Whiskey has landed, our trip

to Atlantic City has been completed, and Radio Communication and Navigation have made it safer.

Air safety is aided by the emergency frequency 121.5 mc, which is monitored at all times by all airports and FAA stations. If you're in trouble, turn to that frequency and ask for help.

And if you're lost in the air, you won't be for long -- they'll find you on Radar. In fact, that might even be a good subject for a later trip at ATC (Air Traffic Control) to show how much electronics can do for the little pilot.

The equipment that we have described during the course of our trip is only a part of the total electronics possibilities. There's a lot more to it, such as the DME (Distance Measuring Equipment), Transponders (for Radar identification), ADF (Automatic Direction-Finding Equipment), and small plane Radar.

DME (Distance Measuring Equipment) is available for small aircraft. This is a small box mounted on the instrument panel with some additional electronics in the airplane. It works electronically in conjunction with the VORTAC stations. The signal is sent from the airplane to the VORTAC and a triggered signal is returned to the airplane. The DME in the aircraft measures the time of signal return and indicates the distance in miles from the aircraft to the VORTAC. Also the airplane's ground speed is shown on a dial by the same electronic equipment. Transponders may be obtained so that any radar interrogation from an approach control causes a signal to be transmitted by the plane and indicates on the radar screen a positive indication. When a great many aircraft are near a large airport, this is very reassuring both to ATC and the pilot.

ADF (automatic direction-finding equipment) allows the plane to fly to any radio station that it can receive which includes broadcast or low-frequency aircraft transmitters.

Small plane radar is available for twin-engine aircraft and is capable of letting the pilot have a preview of the weather ahead even though he may be on instruments and cannot see a thing outside the aircraft.

All of this equipment needs maintenance --and aircraft maintenance men are scarce. And all it takes is a little study to remedy this scarcity, because all Aircraft Electronics Technicians must have a Second-Class FCC Radio Operators' License, or have their work approved by a Licensed Technician. The FAA further requires some experience in the field before granting an FAA License, and experience comes from working . . .

Come on, fellows, we need help. As things are now, it may be a week, two weeks, even longer to get radios repaired in one of the shops at a local airport. We need good men to take care of those radios, so we can fly cross-country without worries, get into a controlled airport, or into any other situation where Radio Communication and Navigation are needed.

The forecast for the coming year in the field of marine electronics looks very bright. At the recent National Boat Show in New York City, many of the top electronics companies introduced new products and ideas in all areas of marine electronics and particularly some that should greatly advance close-range radio marine communications.

One problem in the past that has plagued both manufacturers and operators of marine radiotelephones is the static interference caused by other radios on the water. Now, manufacturers are attempting to overcome this static with new high-frequency vhf marine radiotelephones. This high frequency range is able to go above the interference and operate in static-free tones, while retaining a constant range. It offers the small boat operator the opportunity to speak with shore stations, Coast Guard, and other vessels.

One of the new marine radiotelephones using this high frequency vhf range was introduced at the boat show by the Raytheon Co. It is called the new Ray-40 and is a 12-channel, 35-watt output vhf-fm radio. The unit needs no ground plate attached to the boat's hull and will operate with an antenna of only 20 ". By employing the frequency modulation (fm) technique, it speaks in static-free tones up to 40 or 50 miles. All the new units of this type are built compactly and this one measures only 11 ".

The other areas of marine electronics were equally represented at the boat show. The range of new products covered everything from electrically powered megaphones to color TV's for the sailor who can't miss his favorite show.

New radar systems which are more compact and efficient headed the list of new products. These units are designed for the smaller boat so that its owner can enjoy the safety formerly reserved for larger craft. These will be a great help in extending safety to all parts of the water.

These new products with an emphasis on style, efficiency and safety and the prospect of cut rates and increased production signal a promising year for both manufacturers and operators of boats.

expo '67

It's 67 feet tall, 94 feet long, and weighs 46 tons . . . .
It's made of gleaming steel . . . . . .
It's called, simply, 'Man.'

The sculpture shown at the left was designed by noted American sculptor Alexander Calder who put the 'go' into sculpture by making it move -- by introducing the mobile.

'Man' is a stabile -- it will stand still . . . . . .
The creation has three heads, and viewers must move around it to see how different 'Man' looks from every angle.

The figure is sponsored by the International Nickel Company of Canada and will be located in the center of EXPO '67 on Ile Sainte Helene.

Canada's Birthday Blast

NEW YORK, N. Y. (ED)--A lot of Americans don't know it yet, but our Northern neighbor is about to have a birthday party the likes of which this hemisphere has never seen. Everyone's invited to this enormous celebration in Montreal, Canada, April 28 to October 27, 1967. The event is both to celebrate Canada's Centennial as a confederation and the 325th anniversary of the founding of Montreal. Canada, the City of Montreal, and the Province of Quebec are joint hosts.

And what is it? It's EXPO 67--the first officially recognized world exhibition of the "first category" ever to be held in the western half of the globe.

The guest list alone merits the appellation "stupendous." Over 70 countries are participating, as well as several international organizations, including the United Nations Association and the European Economic Community. Three U. S. states--Maine, Vermont and New York--the Canadian provinces, and scores of Canadian industries--including the Canadian Bankers Association and the International Nickel Company of Canada, Ltd.--will also take part with impressive pavilions. The tallest structure at the exhibition is expected to be the United States pavilion, a gigantic 20-story bubble of steel and plastic, while Canada's 20 million dollar inverted pyramid will be the most expensive. The Communist bloc will be represented at the fair by the Soviet Union, Czechoslovakia, Yugoslavia, and even Cuba.

EXPO 67 will feature something for everyone, from art to amusement park, from science to "Soupe aux Pois." Located on one of the two man-made islands in the St. Lawrence, which will serve as exhibition site, "La Ronde" promises to be the most exciting new amusement park in North America. It should be, since Walt Disney himself served, gratis, as a special advisor in the planning of the fair. Highlight of La Ronde will be the "newest and most unusual thrill ride in the world" -- the Gyraton. Visitors will travel inside this tall, web-like structure as if on a trip through outer space. At the peak of the ride, the "space capsule" will drop vertically into a "live volcano" to be swallowed by a mechanical monster!

Want more? How about a cruise down the Volga on a river boat. . .or a lazy tour of Venice via gondola. . .or a sailing trip to Zanzibar in a dhow? Hungry? Try lunch at a Parisian sidewalk cafe, an English pub, or a Danish smorgasbord. And for visitors with elephantine appetites (that is, tastes that don't forget), here, once more, are those luscious Belgian waffles the New York World's Fair made famous.

In keeping with the tradition that world exhibitions reflect a theme of universal interest, EXPO 67's message is "Man and His World," with sub-themes depicting Man as Creator, Explorer, Producer, Provider, and Member of the Community. Man as Creator, for example, will be illustrated by selections of the world's greatest works of art, from primitive paintings to Space Age art. One of the most exciting sculptures is a giant structure of gleaming stainless steel, to be called, simply, "Man." Created by Alexander Calder, one of the world's leading sculptors, it will measure 67 feet high, 95 feet long, and will weigh about 46 tons. Its impressively flowing contours will seem liquidly moving to spectators, giving the form the name of "stabile," as opposed to mobiles, which actually do move. This sweeping, modernistic tribute to man will stand in Place International Nickel on the Ile Sainte-Helene.

And in conjunction with EXPO 67, Montreal's Place des Arts will be the center for the "World Festival of Performing Arts." Already booked are Britain's National Theater Company, the Comedie Francaise, Italy's La Scala, Moscow's Bolshoi Opera and Bolshoi

This steel and plastic geodesic dome, a space-age bubble, is devoted to displays of "Creative America." It will be the U. S. Pavilion at EXPO '67.

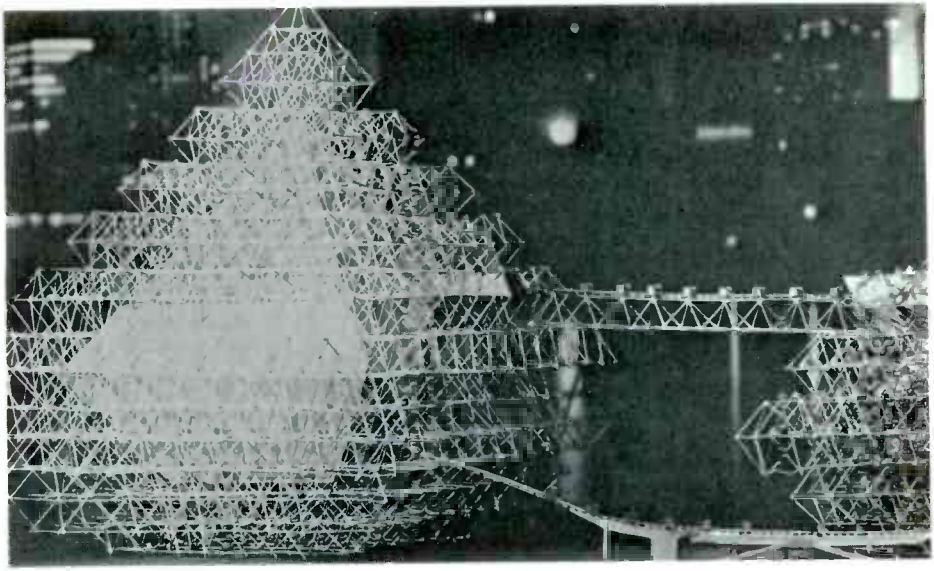
Ballet, and Austria 's Vienna State Opera, among many, many others.

The celebration's attractions go on and on. Nothing is being overlooked to make this party the biggest blast in a generation. Even standing in line, waiting for admittance to pavilions, will be an entertaining experience, with troubadour units of singers, dancers, skaters, clowns, musicians and magicians all devoted to diverting and amusing.

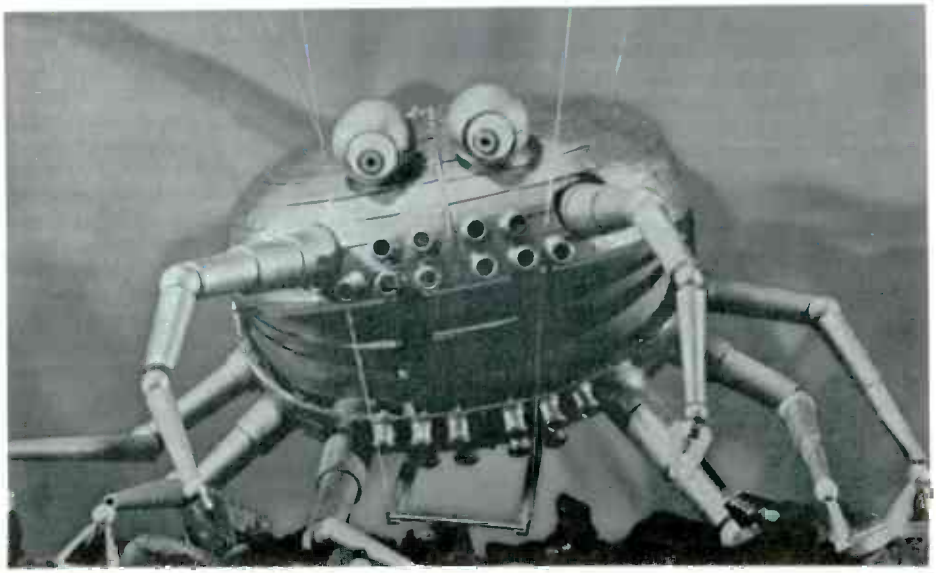
Can you come? Will you be one of the 30 million expected guests? Montreal will even help you find a place to stay, whether you want a luxury hotel or a trailer park. And your host will provide free transportation from EXPO 67's main gate to any part of the party.

Tickets, in the form of passports, are available in the United States through the American Express Company, the exclusive wholesale distributor of advance-sale passports. Gate admission prices are $2.50 for a one-day passport (half-price for children aged two to 12); $12 for a seven-day passport; and $35 for a season passport, good for all 183 days of the exhibition.

Mark it on your calendar now: April 28 to October 27, 1967. Canada 's EXPO 67 is one birthday blast you 'll never forget.



Newest concept in amusement park rides is the gyraton, whose purpose is to introduce riders to a series of human emotions — laughter, fear, adventure. Visitors will board "space cabins" and travel through a 215-foot high pyramid, then will be dropped into an adjacent live volcano where, in a pool of bubbling lava, a fearsome monster waits to swallow them.



BY
STEVE
BAILEY

DEAR STEVE:

What is an "effective" ac voltage?

B. L., Nebr.

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

Since ac is constantly changing, it is necessary to come up with an average value in order to measure it. So we measure it in terms of comparison. We compare the amount of heat developed across a resistance by a certain amount of current with the amount of heat developed across the same resistance when alternating current is applied.

Assume that we have a source of direct current connected across a resistor of a certain value and wattage. We would increase the direct current until we had exactly 1 ampere flowing in the circuit.

Then we would measure the amount of heat developed by this resistance at this current and voltage level. Next we would substitute the alternating current source for the direct current source; then we would increase the alternating current flowing in the circuit until the same amount of heat is developed that was developed by the resistor when 1 ampere of direct current was flowing through it.

We say that the amount of alternating current required to obtain this amount of heat is equal to 1 ampere. The ac voltage required to obtain this current flow and amount of heat dissipation is said to be equal to the amount of dc voltage that was required to obtain the same current flow and heat dissipation.

Since the alternating current is having the same effect as the direct current, we say that the ac current flow is the effective ac current and the amount of voltage required to obtain this current flow is the effective ac voltage.

DEAR STEVE:

Would you please explain how a 90° phase difference is obtained in an inductive circuit?

G. J., Mich.

In an inductive circuit, a voltage will be induced into the coil when current first attempts to flow through it. This voltage will oppose the change in current through the coil. It will be at maximum the instant current is applied, so maximum voltage will be developed across the coil. The polarity of this voltage will be opposite to that of the current, so it will oppose it.

As the current continues through its first quarter-cycle, the rate of change will

gradually decrease, so the coil voltage will decrease. When the current reaches its positive peak, the rate of change will be zero, so the induced voltage will be zero, also.

After passing its positive peak, the current will rapidly decrease; thus the rate of change increases. The resulting induced voltage will have the opposite polarity, so it actually aids the current and tries to prevent it from decreasing. Maximum voltage will be developed as the current reaches the end of its second quarter-cycle, since its rate of change is greatest here.

As the current progresses from zero to its negative peak, the direction of change (and thus the polarity of the induced voltage) is still the same, but the rate of change decreases. When this negative peak is reached at the end of the third quarter-cycle, the rate of change of the current will be zero. Thus the induced voltage will also be at zero.

As the current starts into its fourth quarter-cycle, the rate of change increases, but the direction of change has reversed so that the induced voltage will have the opposite polarity, and thus will attempt to oppose the increasing current. The induced voltage will be at maximum at the end of the fourth quarter-cycle when the rate of change is greatest.

As you will see now, the change in voltage and current do not occur at the same time. Maximum voltage occurred when the current was first applied. As the current began to build up to its first peak, the voltage decreased to zero. Since the first peak occurs at the end of the first quarter-cycle of the 360° sine wave, we say that the voltage leads the current by 90°.

DEAR STEVE:

The audio output transformer of a radio is described as being a step-down transformer. If we want maximum sound from the speaker, why isn't a step-up transformer used?

B. W., Ark.

You have asked a very good question. In your later lessons, you will learn about a term called "impedance matching". Also, you will learn that the object of the output transformer is to transfer the maximum amount of power from the output circuit to the speaker. This can be done only when the impedance of the output circuit is matched to the impedance of the speaker.

In actual practice, however, distortion is introduced when the circuits are perfectly matched. It has been found that if the load impedance is made about twice as high as the tube impedance, almost as much power can be obtained from the tube and, at the same time, the distortion is considerably less than it is when the impedances are perfectly matched.

Therefore, it is general practice to use a transformer that will place a load about twice the output impedance of the tube in the circuit in order to reduce distortion.

The speaker is a current-operated device; therefore, by stepping down the signal voltage developed across the primary, the current step-up is obtained in the secondary. The higher the signal current developed in the secondary, the more output we will obtain from the speaker.

DEAR STEVE:

In Lesson 10, we are told that there is a 180° phase shift in a grounded cathode amplifier. How does this phase shift occur?

W. G., Canada

The first thing you should remember about a grounded cathode amplifier is that the input signal is applied between the grid and the cathode of the tube, whereas the output signal is taken from between the plate and ground. This is important in understanding the exact details of phase shift.

The output signal measured between the plate and ground in a grounded cathode amplifier is 180° out-of-phase with the input signal which is applied between the

Continued on Page 21.

ELECTRONIC "SCREWDRIVER" REPAIRS SHORT CIRCUIT IN SATELLITE

WORLD'S MOST DISTANT SATELLITE FIX SAVES EXPLORER XXXIII FROM POWER BLACKOUT

Project personnel of the Goddard Space Flight Center, Greenbelt, Md., have used an electronic "screwdriver" 252,900 miles away from Earth to restore power to a faltering satellite.

The emergency repair -- believed the most distant satellite fix ever accomplished -- was conducted by Goddard engineers via the tracking station at Rosman, N. C. It saved the Explorer XXXIII spacecraft from an almost certain power blackout.

The problem was first observed by engineers who noticed that power levels on the space science laboratory were only 13.5 volts, down from the normal 18.2 volts. Some of its electronic systems were beginning to operate erratically, and a short circuit was suspected somewhere in the miles of its electrical wiring.

Project officials decided to turn off the spacecraft transmitter in the hope that an increased power surge through the other electronic systems would eliminate the suspected short-circuit.

At 4:20 p.m., the turn-off signal was sent from Goddard to Rosman, thence to the satellite transmitter and the spacecraft obeyed. Goddard then waited 40 minutes, the time believed necessary to overcome the problem.

When the transmitter was again turned on, telemetry readings showed that the spacecraft power was back to the normal 18.2 volts.

Explorer XXXIII was launched July 1, 1966 from Cape Kennedy, Fla. Its orbit tops 270,000 miles at the farthest point away from Earth. This is beyond the Moon's high point of 240,000 miles.

Explorer XXXIII has returned much scientific information to Earth, including conclusive proof that the Earth's magnetosphere extends beyond the Moon. It has also recorded a shock front moving out from the Sun after a solar flare event.

James E. Smith, NRI founder, speaks at formal dedication ceremonies of the James E. Smith Laboratory of Electrical Engineering at the Florida Institute of Technology.

J. E. Smith Honored at Dedication Of Florida School's EE Laboratory

MELBOURNE, Fla.---The James E. Smith Laboratory of Electrical Engineering has been formally dedicated at the Florida Institute of Technology. The laboratory was named for James E. Smith, founder of National Radio Institute in 1914, which pioneered home-study courses in wireless radio.

Mr. Smith cut the ribbon at the dedication ceremonies, and made a brief address. Other speakers included State Rep. James Pruitt, who outlined the progress of education in Florida in recent years, and Dr. Jerome P. Keuper, president of the institute.

"The knowledge of electronics acquired by millions through Mr. Smith's efforts have made a significant contribution to laying the groundwork for the age of space technology," said Dr. Keuper.

The laboratory building houses two undergraduate laboratories and a graduate research laboratory, equipped primarily through donations of electronic equipment. The undergraduate portion is used for work on antennas, transmission lines, electronic circuits, servomechanisms, machinery, and digital systems. Many of the experiments at the laboratory, in use since last September, have been designed by the students.

The graduate research lab is used for experiments in digital systems, control systems, communications, oceanographic instrumentation, and physical electronics.

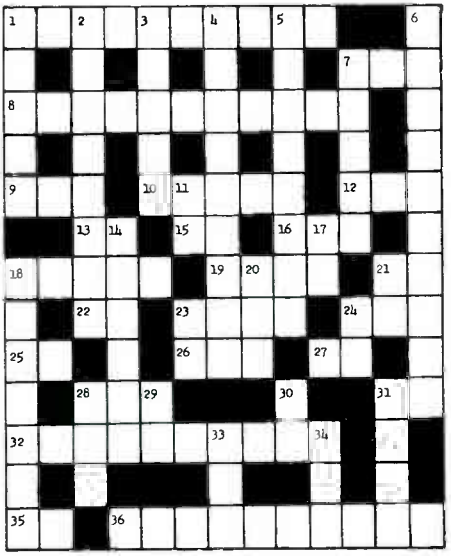
The labs also provide storage space for what eventually will be about $200,000 worth of electronics equipment to be used in research projects, as well as faculty offices.

"The laboratory building is the focal point of electrical engineering on the F.I.T. campus," according to Dr. Harry Weber, dean of the department.

Following the dedication ceremonies the building was opened for public inspection, and Mr. Smith was honored at a luncheon in the student cafeteria, hosted by Dr. Keuper, and attended by representatives of campus student groups.

A luncheon honoring Mr. Smith (standing) followed. At his right are Dr. Jerome P. Keuper, president of the institute, Smith's daughter, Mrs. Guilford Galbraith, and Fred Roberts, his long-time friend. The honor came as a surprise to Smith.

ELECTRONICS CROSSWORD PUZZLE



By James R. Kimsey

Solution on Page 32.

ACROSS

1. A negative-resistance oscillator similar to a dynatron.
7. Beat-frequency oscillator (abbr.).
8. A push-pull output circuit in which the screen grids are connected to taps on the primary winding of the output transformer.
9. Potentiometer (abbr.).
10. Precise.
12. In the past.
13. Direction of movement away from the center of the earth.
15. Lieutenant (abbr.).
16. Well-known manufacturer of switches.
18. TV circuits that handle picture signals.
19. Type of counter consisting of interconnected elements such that one and only one is in a specified state at any given time.
21. The objective case of "I".
22. Printer's measure.
23. The material or space about which a coil is wound.
24. Side of power not grounded.
25. Resistor-capacitor coupling between two circuits (abbr.).
26. A single unit.
27. Intermediate frequency (abbr.).
28. A microphone adapted for use in contact with the lip.
31. Pair (abbr.).
32. High-quality insulating material used in mounting radio parts.
35. Radio frequency (abbr.).
36. Erratic changes in voltage or current.

DOWN

1. Low-frequency disturbance to a voice circuit caused by the operation of telegraph or signaling circuits.
2. The vertical elevation, measured by an altimeter, of an object above a given level.
3. The net electric charge within a given volume.
4. An electronic switch in which conduction is initiated by the breakdown of an auxiliary gap.
5. A physical component of a complex sound having a frequency higher than that of the basic frequency.
6. An rf transformer used with a direction finder.
7. _____ down. Runaway increase in an electrode current in a gas tube.
11. Roman numeral for forty.
14. A small tube designed especially for operation in the ultra-high frequency band.
17. Symbol for silver.
18. An auxiliary device used with a main device to obtain fine adjustment.
20. Former professional group (abbr.).
21. Master oscillator (abbr.).
23. Crystal oscillator (abbr.).
24. High frequency (abbr.).
28. A record of stations with which a radio transmitter has been in communication.
29. Power amplifier (abbr.).
30. Vacuum tube (abbr.).
31. A resistor, capacitor, coil, or any other _____ .
33. To cover with solder to permit or facilitate soldering.
34. A visual aid in tuning is known as the magic _____ .

EMPLOYMENT OPPORTUNITIES

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

WEINSCHEL ENGINEERING Co., Inc.
Gaithersburg, Maryland 20760 has immediate openings in Engineering, Repair, and Test Departments. Permanent positions and excellent chance for advancement. Evening and weekend interviews. Contact Mrs. Karen Syence at (301) 948-3434 or write Weinschel Engineering Co., Inc.

WESTERN UNION TELEGRAPH CO.
1405 G Street, NW, Washington, DC. Needs electronics technicians. Write or telephone B. L. Krise, Manager, Technical Services.

GENERAL TELEPHONE OF INDIANA, INC.
501 Tecumseh Street, P.O. Box 1201, Fort Wayne, Ind. 46801. Openings in exchange offices in Indiana.

ARFAX TELEVISION AND RADIO SALES AND SERVICE, 1420 Chain Bridge Road, McLean, Va. Needs TV serviceman for bench or outside work. Experience to include color if possible. Call 356-3600. Ask for Mr. Lake or Mr. Onfrychuk.

POLITO COMMUNICATIONS, INC.,
101 Walnut Street, Rochester, N.Y. has positions available for four or five technicians to service two-way radio equipment. Minimum requirement is a second class radio telephone license. Contact Mr. Joseph Carl Polito.

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

RADIO STATION WKRZ,
Oil City, Pennsylvania wishes to employ several first class engineers on its staff.

STATION WFMD,
Frederick, Md. Needs technicians with 1st class licenses.

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 the nearest RCA Branch or write W. R. Speck, RCA Service Co., Cherry Hill, N.J.

THE CHESAPEAKE CORP., West Point, Va. Needs a number of Electronics Technicians. No actual experience is needed, but a good Technical school education very desirable. Applicants should see or write Mr. J. W. Hockman, Personnel and Training Manager.

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

AUDIO FIDELITY CORPORATION
6521 West Broad, Richmond, Virginia
Needs two repairmen in Richmond office and possibly one in Roanoke.

UNITED AIRLINES
Wash. Nat'l. Airport, Washington, D. C.
Expects a continual need for radio technicians throughout their system in 1967. Would be interested in talking to any graduates interested in employment.

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 of District Product Service Manager nearest you.

COMMUNICATIONS ENGINEERING CO.
(Division of Sylan Electronics) 306 Kennedy St., NW, Washington, DC. Needs technicians with FCC licenses. Openings in TV, Audio, 2-way radio, etc. Call Mr. Brown, 451-5700.

30 Years Ago

As Recorded in The National Radio News

The final test which candidates for radio announcing positions had to pass was unfaltering recitation of the following statement: "The seething seas ceaseth and as the seething seas subsideth, many men munch much mush."

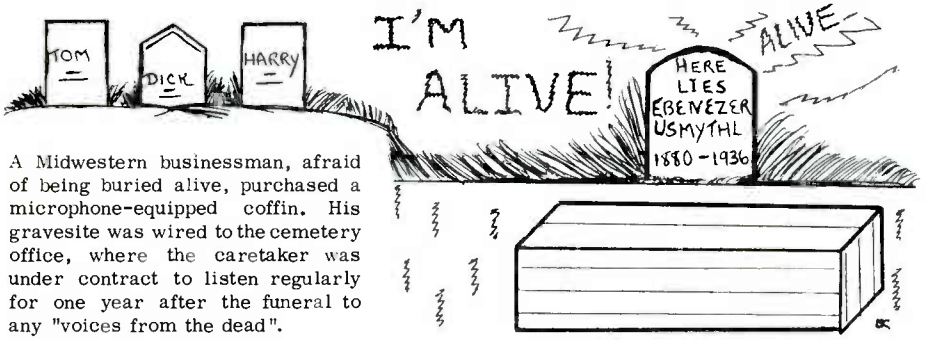
Convicts at the Joliet Prison conducted their own "amateur hour" every Monday and Wednesday night. The program was picked up by Station WCLS in Joliet and put on the air. The theme song, played by the prison's own band, was "The Prisoner's Song".

Radio was the alibi for a young robbery suspect sentenced to one to ten years in prison -- he maintained that he had been listening to "One Man's Family" when the robbery occurred. After he described the program, its author confirmed the description and the youth was released.

Powerful loudspeakers on British airplanes were replacing cavalry and guns in the deserts of Iraq. Voices from the sky seemed to be far more effective than force in quelling disturbances from desert renegades.

One of the latest uses for radio was in a new type of "detective" work. Employees of a large Mexican gold mine had to pass through a large coil of wire before leaving the mine. The coil was connected to a balanced high-frequency radio oscillator and even the smallest piece of precious metal could upset the balance of the apparatus, producing squeals in the headphones worn by the guards at the gate. Other applications for simple radio oscillators included an invisible control which could be placed near a safe, a door, or a bed. Changes in capacity between ground and the "feeler" antenna caused the relay in the plate circuit of the oscillator tube to turn on an alarm device. Gongs began to ring and bright lights began to flash as the intruder approached.

Rumors to the effect that the baseball umpire was on his way out were sweeping the country, and some sports fans felt that the ancient custom of disagreeing with the umpire (by way of pop bottles, seat cushions or what-have-you) would soon be defunct. A new gadget up for patent questioned the umpire's decision! When the system was installed, a pitched ball had to pass over the plate in order to interrupt a light ray and sound a gong to indicate a strike. Failure of the gong to sound would prove that the ball did not pass over the plate.



A Midwestern businessman, afraid of being buried alive, purchased a microphone-equipped coffin. His gravesite was wired to the cemetery office, where the caretaker was under contract to listen regularly for one year after the funeral to any "voices from the dead".

"Communications" Continued from Page 14.

grid and the cathode. The output signal will move in a negative direction when the input signal is moving in a positive direction.

When the input signal is moving in a negative direction, the output signal will move in a positive direction.

When you have a negative signal applied between the grid and the cathode of a tube, the flow of electrons through the tube will be restricted. Thus the current flowing through the tube will decrease. Of course, if there is less current, this means that the tube resistance has effectively increased.

The number of electrons flowing throughout the circuit will decrease; thus the voltage drop across the plate load resistance will decrease. This means that the voltage across the tube will be greater because of the higher resistance. Since the voltage is greater, we say that the output signal between the plate and ground is moving in a positive direction.

When a positive signal is applied to the input of the tube, the electron flow through the tube will increase. Since the current has increased the tube resistance has effectively decreased. The smaller tube resistance will mean a smaller voltage drop across the tube and a larger voltage drop across the plate load resistor. Since the voltage drop across the tube has decreased, we say that it is moving in a negative direction.

Since these changes in plate voltage are caused by a simultaneous change in the signal applied between the grid and cathode, we say that the output voltage is following the variations of the input signal. The signal has been transferred and amplified, but it is 180° out-of-phase with the input signal.

DEAR STEVE:

In all of my lessons, I have been told that current flows from negative to positive. However, recently, I read elsewhere that current flows from positive to negative. Now I am really confused! Please straighten me out.

E. E., S. C.

In order to fully understand how this situation developed, we must consider the early history of electricity.

Early experimenters noticed from the results of their tests that by applying a voltage to a circuit, there was a movement of an unknown nature through a circuit. This "unknown" was designated as current. In addition, they noticed that by reversing the battery terminals they could reverse the direction of this current flow. They decided to mark one battery terminal positive and the other negative to tell them apart.

The direction of current flow was derived from observations made of a process used in electroplating. Here the material to be plated and a pure metal such as silver are suspended in a chemical solution. One terminal of the battery is connected to the pure metal and the other is connected to the object to be plated. It was noted that particles from the metal object connected to the positive terminal would flow through the solution to the object connected to the negative terminal. Thus it was assumed that current always would flow from plus to minus.

This theory remained in acceptance for some time until experiments with radio tubes showed that electrons flowed from negative to positive. However, by this time there were numerous texts on electricity written that all stated that current flowed from positive to negative, so the original theory remained in popular usage.

Since we now know that current flows from minus to plus in solid conductors, we have adopted this principle in your lessons. You will use this concept throughout your training period.

DEAR STEVE:

Lesson 8 explains about resonant current and voltage step-up in parallel and

series-resonant circuits. I don't quite see how this is possible. Would you explain?

C. D., Fla.

It is quite true that you will find 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 as a low impedance at resonance. Since the impedance is low, the current will be high and the current will be limited only by the resistance of the circuit. When we consider that $E = I \times X_C$ and $E = I \times X_L$, we can see that the voltage drops may be several times the source voltage.

In a parallel-resonant circuit, the conditions are just the opposite. The parallel-resonant circuit will represent a high impedance. Therefore, the voltage drop across the components will be high. Since the coil and capacitor in the resonant circuit are connected in parallel, the same potential will be across each branch. Thus there cannot be a voltage step-up.

However, the coil and capacitor will pass current back and forth. The ac source will provide only the current needed to make up for the losses in the resonant circuit, which will be relatively few. Since the resonant circuit current is greater than the generator current, there is what we call a resonant current step-up.

In this lesson, you are given many facts about resonant circuits. Try to concentrate on the main points which are covered by the test questions. In a later lesson you will study further about resonance and how it is used in practical circuits; you will construct and perform experiments on resonant circuits in one of your experimental kits.

DEAR STEVE:

I am presently studying Lesson 13 on transistors. The formulas for determining Alpha and Beta are given on Page 19. Would you show me exactly how these formulas are used?

P. A., N. Y.

In order to determine the value of either Alpha or Beta, you must know the value of one or the other. For example, you must know the value of Alpha in order to determine the value of Beta. In the same way, you must know the value for Beta in order to determine the value for Alpha.

Let's look at the problems shown on Page 19 of Lesson 13 with the explanations.

If you will remember, you must know the value of Alpha in order to determine the value of Beta. Since these are sample problems, we can assume a value for Alpha. In the first example, Alpha is equal to .95. Now we use the formula to determine Beta, and follow with the value of Alpha. The third step is to substitute whenever "A" appears in the formula; the fourth step is to subtract .95 from 1 to simplify the problem.

When you do this, as shown in Step 4, you receive a total of .05. This changes the

EXAMPLE A

1. $B = \frac{a}{1 - a}$

2. $a = .95$

3. $B = \frac{.95}{1 - .95}$

4. $\begin{array}{r} 1.00 \\ -\ .95 \\ \hline .05 \end{array}$

5. $B = \frac{.95}{.05}$

6. $.05 \overline{)\ .95}$ — 19; 5; 45; 45

7. B - 19

problem to the form shown in Step 5. You can now see that this is a simple division problem. The division is performed in Step 6. Notice that the decimal point has been moved two places to the right. This is to convert the decimals to whole numbers. Of course, since this is done in the divisor, it must also be done in the number to be divided. We are actually dividing 5 into 95. This gives us the value of Beta.

EXAMPLE B

1. $a = \frac{B}{1 + B}$

2. $B = 19$

3. $a = \frac{19}{1 + 19}$

4. $1 + 19 = 20$

5. $a = \frac{19}{20}$

6.
```
      .95
20 )19.00
   18 0
    1 00
    1 00
```

7. $a = .95$

The same method is used to determine Alpha when the value of Beta is known. The formula is only slightly different. Since we have already determined a value for Beta, we will use this same value in Example B. Again we start with the formula, and follow with the value of Beta. Since Beta is equal to 19, you put 19 wherever the symbol for Beta appears in the formula. Thus, our formula is now changed as shown in Step 3. To simplify the problem, we performed the addition indicated on the bottom portion of the formula. This simplifies the formula to the form shown in Step 5. You see that we have only simple division to perform. When we divide 20 into 19, we find that the value for Alpha is .95.

In summary, the steps to be used for these formulas are: First, put down the value for the known part down along with the formula to be used. Then substitute this value wherever its symbol appears in the formula. Simplify the problem by performing whatever the signs indicate. If it is a plus sign, you add. If it is a minus sign, you subtract. By doing this, you will reduce the formula to a simple division problem. After performing this simple division, you have the value you are looking for.

DEAR STEVE:

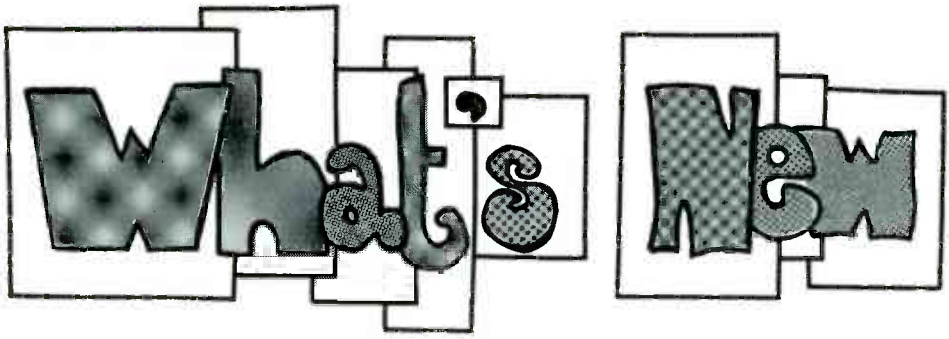
What is meant by the "plate resistance" of a vacuum tube?

D. R., Va.

The plate resistance is a measure of the influence that a change in plate voltage has on a change in plate current. It is equal to the change in plate voltage divided by the resulting change in plate current, with a constant value of grid voltage. The formula for this is:

$$R_p = \frac{\Delta E_p}{\Delta I_p \ (E_g \text{ constant})}$$

The value of plate resistance depends on the influence that a changing plate voltage has on the plate current. In a tube containing a screen grid, the plate current is not so dependent on the plate voltage as it is in a triode, so a change in plate voltage has less influence on the plate current. This means that the plate resistance of the screen grid tube is higher than that of a triode.



SPECIAL PLOTTER IS JACK OF ALL TRADES

Modern electronic devices are flourishing in every imaginable field ranging from oceanography to bioacoustics. Northrop Corporation's Nortronics Division perfected a single device which can be used in almost anyone of these fields. It's the Spectral Contour Plotter, a product which can spot tiny differences between virtually identical electronic signals. The plotter gives 3-D descriptions of the signal on charts similar to topographical maps of the earth's terrain. Some of the areas in which the plotter can provide clues are anti-submarine warfare, earthquakes, lightning bursts and other geophysical phenomena; electroencephalograms, respiratory and blood flow sounds, speech defects and synthesis and language studies.

DOCTOR'S HELPER TAKES A NEW SHAPE

To help doctors monitor a patient's progress, specially programmed hospital computers are being considered for use along with sensing and data-recording devices (already in the development stage) which can keep track of heartbeat, respiration, and blood pressure.

Any irregularities in the patient's condition will be monitored by the computer and instantly alert the hospital staff when quick attention is required. Other uses of the computer include tentative diagnosis of diseases in automated clinical laboratories and large-scale clinical data-retrieving systems, as well as record-storing and biomedical picture scanning.

GLASS PREVAILS WHERE METAL FAILS

It has been discovered that at depths of 20,000 feet below the surface of the ocean, where the pressure could crush the side of a submarine, glass will endure. Engineers have tested glass in pressure chambers at 12,000 pounds per square inch-equivalent to 27,000 feet in ocean depths. The testing is being done in connection with possible use of glass in electronic transmitting and receiving devices in underwater navigation and exploration.

Glass fiber rope used as guy wires on an antenna tower is claimed to be as strong as a steel cable of the same diameter. Because of its nonmetallic construction (the cable is made of glass filament impregnated with a plastic resin) it permits improved efficiency and range.

MINIATURE GYROS FOR A GIGANTIC PLANE

Miniature gyroscopes small enough to fit inside a coffee mug will help navigate the gigantic Air Force C-5 fanjet cargo carrier. Northrop Corporation's gyroscope is based on the inertial ball concept but uses ceramic gas bearings instead of the

more conventional ball bearings. This increases the gyro's accuracy and lifetime usefulness.

CALCULATING COMPUTER TALKS BACK . . . . . .

General Dynamics has now made it possible to communicate with a computer over the phone and get a spoken answer. The push-button telephone which has two extra keys instead of the standard ten can be used not only for business calculating but for at home use in finding out anything from an airplane's arrival or departure time to the price of meat at the neighborhood market.

'ART' FOR ART'S SAKE? NO -- FOR PROTECTION!

The Alarm Reporting Telephone automatically transmits a prerecorded voice message to any pre-selected telephone number in the case of an emergency. When the party to be notified receives the emergency call from ART, a special button on the handset is depressed and the message is advanced, the call is acknowledged and the tape is reset. Taking into consideration a busy phone, ART will re-dial the number nine times within a 20-minute period. Not to miss a trick ART can also be called back to verify a previously reported alarm condition by simply dialing its number. If at any time during the conversation a true emergency condition should arise periodic bursts of tone are transmitted during the message, allowing the control party to hang up and receive the message.

ELECTRONIC BABY-SITTER: END TO PARENTAL WORRIES?

A new device designed to baby-sit the baby-sitter has recently hit the market. Called "Tele-Spy" the 7 × 5 × 3 inch minibox set-up turns your telephone into a detective. You connect the Tele-Spy to your telephone line. Whenever you call your number the phone will be answered electrically by the Tele-Spy before the telephone rings. Every sound in the room can be heard for an adjustable amount of time (30 seconds, a minute, etc.). At the end of the "spy" period the device disconnects itself from the phone line (hangs the phone up electrically) and is ready for another call. Worried about the baby-sitter throwing a party while you're out? Think you left the water running? Tele-Spy is the answer.

WANT YOUR CAR PARKED? PAY THE COMPUTER!

Now you can park your car by a special-purpose digital computer at New York's Speed-Park Garage. When you enter the world's first completely automatic garage you are directed by a lighted sign to drive your car in and nudge your wheels against a floor barrier. When the car touches the barrier the sign instructs you to turn off your motor, set the brake, and leave the car. Your car is then scanned by an electric beam for size, a parking slot is selected, and the parking cycle begins. Within 65.2 seconds your car is parked.

The U. S. Civil Service Commission, Alaska Interagency Board, 632 Sixth Ave., Anchorage, Alaska 99501, is looking for Electronics Technicians for positions in Federal agencies throughout the state, mostly with the Federal Aviation Agency and U. S. Air Force.

These positions require technical work involved in maintenance or installation which includes test, adjustment and other technical assistance on electronics systems and equipment. Applicant should have a background in commercial or military electronics and his experience, education or training must be of sufficient scope to perform the duties required at the grade for which he is applying. The positions are open at government grades GS-5 through GS-11.

Applications may be secured by writing to the above address, or for further information you should contact your local Civil Service Office.

NRI HONORS PROGRAM AWARDS

During the months of November and December, 1966, the following NRI graduates received, in addition to their NRI electronics diplomas, CERTIFICATES OF DISTINCTION UNDER THE NRI Honors Program for outstanding grades throughout their NRI training. This distinction is made part of their permanent NRI records and appears on all transcripts of records requested. NRI's worldwide leadership in electronics training is represented by these outstanding graduates from almost every area of the United States, from Mexico and Canada, and from other foreign countries. It's not surprising, either, to know that the Armed Forces, which place an emphasis on training and career planning, are also exceptionally well-represented.

WITH HIGHEST HONORS

James Von Bank
Albertville, Minn.

Frank F. Beard
Hill AFB, Utah

Victor P. Charmely
Alliance, Ohio

Tung H. Chow
Passaic, N. J.

Jerry Fallin
Madisonville, Ky.

C. M. Girard
New Orleans, La.

Clarence W. Haas
Roanoke, Va.

Howard E. McNeill
Baltimore, Md.

Sterle Reed Pierce
Salt Lake City, Utah

John D. Richards
Evergreen Park, Ill.

Peter T. Torrano
Balboa, Canal Zone

WITH HIGH HONORS

Robert Bircher
Florissant, Mo.

George F. Bowman
Canton, Ohio

Albert Brum
APO San Francisco

John Comelli
Santa Cruz, Calif.

George A. Davenport
Athens, Ala.

Albert N. DeBlois
Lewiston, Maine

Donald D. Florang
San Diego, Calif.

Edgar B. Gaines
Robins AFB, Ga.

George M. Gibson
Texarkana, Texas

Anthony W. Gonsalves
Boston, Mass.

Glen W. Green
Ionia, Mich.

Robert E. Hagenbuch
Baltimore, Md.

Karl L. Hildebrandt
North Vancouver, Canada

Coe Ishimoto
Vancouver, B. C., Canada

Marc Jaffe
Bronx, N. Y.

Ellsworth R. Klein
Baltimore, Md.

Russell C. Knepp
Cheyenne, Wyo.

Edward Kneuper, Jr.
Amarillo, Texas

Donald E. Knighten
FPO New York

William J. Krafick
Vandergrift, Pa.

Kenneth J. Krieb
Riverhead, N. Y.

Andrew S. Lampp
FPO New York

Perry W. Little
Beattyville, Ky.

John P. Maha
Batavia, N. Y.

John R. Matthews
Leonardo, N. J.

Jerry L. Meek
Austin, Texas

Leonard H. Mroczkowski
Rantoul, Ill.

Edward Nielsen
Chicago, Ill.

David C. O'Sada
Norfolk, Va.

Vivencio C. Pamintuan
Great Lakes, Ill.

Phillip R. Perry
Little Rock, Ark.

Richard O. Pickering
South Gate, Calif.

Reney Pinckney
Philadelphia, Pa.

John Robinson
New York, N. Y.

Alfred J. Rosensteel
Fort Bliss, Texas

Donald H. Rousey
Grapevine, Texas

Frank Schafron
Toronto, Ont., Canada

Roger T. Shigehara
Cincinnati, Ohio

Robert M. Strong, Jr.
APO New York

Frank G. Weatherly
Clinton, Miss.

Richard H. Wheaton
Washington, D. C.

Earl Williams
Chicago, Ill.

Kent L. Williams
Silver Spring, Md.

Benjamin F. Wise
FPO New York

Gerald O. Yocum
Vicksburg, Miss.

Wayne A. Younger
Champaign, Ill.

WITH HONORS

Vincent A. Amendola
Brooklyn, N. Y.

Stephen P. Bailey
Westwood, N. J.

Richard E. Barnard
Chester, N. J.

Robert S. Blanchard
Lockport, La.

George T. Boykin
Detroit, Mich.

Donald B. Curry
Seymour, Ind.

John Czerwienski
New Britain, Conn.

Mickey E. Davis
Dothan, Ala.

William H. Faulk
Hamilton, Ohio

Theodore Fien
Allentown, Pa.

Lawrence Glasser
Columbus, Ohio

George R. Green
Fair Haven, N. Y.

Tommie Goggans, Jr.
Seattle, Wash.

Ronald Lawrence Hall
Fort Knox, Ky.

F. P. Henry
Columbus, Ga.

Ignacio Heredia
Barcelona, Venezuela

Paul M. Kracher
Omaha, Nebr.

Richard Lamb
Aurora, Ind.

Fred H. Leidy
Altoona, Pa.

Frederick D. Lotze
Fitchburg, Mass.

Bernard J. Marshalek
Montoursville, Pa.

Hubbard W. Martin
Detroit, Mich.

Adam F. McDaniel
Newburg, W. Va.

E. J. Miskimens
Waynesburg, Ohio

Norman Morden
Wellington, Ont., Canada

Richard Piotrowski
New York, N. Y.

Eddie Joe Power
Shreveport, La.

Robert Pyznar
Hazlet, N. J.

Glenn Ragsdale
Florissant, Mo.

Ralph H. Seidel
Narragansett, R. I.

Peng Shao-Chu
Provo, Utah

Marvin A. Smith
Big Lake, Minn.

Leon K. Snow
Richland, Mich.

Warwick N. Snow
Bishops Falls, Nfld., Canada

Richard E. Solheim
Citrus Heights, Calif.

Robert Spadaro
Miami, Fla.

Richard W. Spellman
Washington, Pa.

Derek Stubbs
Port Credit, Ont., Canada

Urbin F. Sutfin
Alma, Mich.

David Swayer
Edmeston, N. Y.

Otis L. Walker
Salem, Va.

Carl A. Vidnic
Long Beach, Calif.

Eugene Ward
Richmond, Ind.

James L. Williamson
Fort Bragg, N. C.

CONAR EASY PAYMENT PLAN

IM

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

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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

Eugene de Caussin	President
Edward Bednarz	Vice President
Isaiah Randolph	Vice President
Joseph Bradley	Vice President
Harvey Morris	Vice President
Theodore E. Rose	Executive Sec.

BUSY CHAPTERS PLAN TIMELY LECTURES AND DISCUSSIONS

PHILADELPHIA-CAMDEN CHAPTER is once again admitting new members. This time the new members are students Marvin A. Fulmer, Doylestown; Boyd Bingaman, Folcroft; Albert Roth, Aldan; and Associate Members Patrick McGettigan and Frank Trachtman, Philadelphia. Welcome to the Chapter, gentlemen!

At the meeting attended by Ted Rose and Joe Schek of the NRI staff, Chapter member Norman Roton demonstrated the proper way to converge a color TV receiver. This was an excellent presentation, but Norman was unable to finish due to lack of time. At the next meeting Norman went through this procedure again; on this second occasion he had time to make the demonstration more thorough and complete, covering all details. Secretary Jules Cohen also brought in his Lectotech V7 Color Bar Generator for a demonstration and it worked out well. Meetings like this are what maintains the members' enthusiasm and accounts for higher attendance.

A talk at an earlier meeting by Mr. Roy Gumm, Product Service Manager for Radios for the Philco Corp., was enjoyed so much that the members prevailed upon Mr. Gumm for a return engagement. He was accompanied by Mr. Lou Abrams for a lecture and demonstration on color TV using a Philco Color TV Receiver and informative literature to make the demonstration more meaningful. This program was just as fine as the previous one, and the members were glad to have been present.

Lou Abrams and Roy Gumm of the Philco Corporation, during a color-TV demonstration at a Philadelphia-Camden meeting.

The Chapter's 1967 slate of officers contains three men who have served their Chapter long and well: John Pirrung, Chairman; Jules Cohen, Recording Secretary; and Joe Burke, Financial Secretary and Treasurer. The other officers are Norman Roton, Vice-Chairman; Walter Wiacek, Librarian; and Pete Hutko, Sergeant-at-Arms. Our congratulations to these new officers.

DETROIT CONTINUES TRANSISTOR INVESTIGATION

DETROIT CHAPTER's John Nagy gave an exceptional and unusual talk and demonstration in which he compared the quality of old speakers with the more modern type and style speaker. This program was of particular interest to those who have undertaken the study of electronics in just the past few years.

The Chapter has for some time been planning a program, probably under way by now, devoted to informative discussions and demonstrations of the transistor.

FLINT MEMBERS STUDY SERVICING AIDS

FLINT (SAGINAW VALLEY) CHAPTER has now emerged from that period of the year when it is handicapped by the bad weather. Up until the time we went to press, the chapter had cancelled several meetings because of severe weather.

The Chapter has planned three different classes, including one on Servicing Transistors and Color TV, with the material supplied by Brother Bernard Frey of the Springfield Chapter, and one on the use of the oscilloscope in servicing.

NEW YORK CHAPTER WELCOMES VISITORS

NEW YORK CITY CHAPTER was pleased to welcome Lionel Williams as a member. He graduated several years ago but has been in the Army and has recently returned to the area.

On their annual visit to the Chapter, J. B. Straughn and Ted Rose were very pleased to find Sister Rosa Mystica and Sister Mary Amanda of Our Lady of Victory in Brooklyn. (A feature story about Sister Rosa Mystica was included in the September-October issue of the Journal.) The Sisters were indeed welcome, and we hope they can find time to visit the Chapter again in the near future.

The Chapter's officers for 1967 are: Samuel Antman, Chairman; Charles Vevo, First Vice-Chairman; Ontie Crowe, Second Vice-Chairman; and David Spitzer, Treasurer. Our congratulations to these gentlemen.

NORTH JERSEY ADOPTS A NEW FORMAT

NORTH JERSEY CHAPTER is delighted with the results of a new plan it has adopted for programs at the meetings. At each meeting two of the members present are selected to speak at the following meeting for at least 30 minutes. The first two members chosen were Walter Kwiczola and Secretary Franklin Lucas. Both spoke about transistors -- one talk concerned the trouble end, and the other was a detailed explanation of circuits. The many questions, asked and answered, were conclusive proof of the value of this plan. For the first time, a meeting had to be called to a halt at 11:00 P. M.

The Chapter reports that its officers for the current year are as follows: William Colton, Chairman; Franklin Lucas, Vice-Chairman; William Whitely, Treasurer; George Schalk, Program Chairman; Domenick Poerio, Chairman, Membership Committee. Our congratulations to these officers.

SPRINGFIELD PLANS ANNUAL BANQUET

SPRINGFIELD (MASS.) CHAPTER did not hold a meeting in December because the meeting night fell on New Year's Eve. The Chapter scheduled its annual banquet in place of the regular January meeting.

PITTSBURGH GETS TIPS FROM WESTINGHOUSE

PITTSBURGH CHAPTER was host to Mr. Bill Watters and Mr. Bill Mumper of Westinghouse. Mr. Watters gave a fine, informative talk on how to properly and effectively correct troubles, should they occur, in the new Westinghouse Color TV Sets.

The officers elected to serve the Chapter for the year are: Joseph Burnelis, Chairman; James L. Wheeler, Vice-Chairman; George McElwain, Recording Secretary; Howard Tate, Corresponding Secretary; William Sames, Treasurer; James L. Wheeler, Program Director; and William Lundy, David Benes and Charles Kelley, Directors. Our congratulations to these successful candidates!

SAN ANTONIO PINPOINTS DEFECTIVE PARTS

SAN ANTONIO ALAMO CHAPTER recently admitted Mr. M. W. Parker of San Antonio to the Chapter as a member. Welcome to the ranks, Mr. Parker.

Sam Stinebaugh introduced a novel program during the course of which he displayed the diagram of a TV vertical circuit, described a defect and then invited the members to ask questions aimed at locating the defective part. A variety of different troubles were discussed, and the members were well pleased with this new program.

The following officers were elected for this year: John C. Chaney, Jr., Chairman; C. W. A. Hoffman, Vice-Chairman; Robert Bonge, Secretary; and M. W. Parker, Treasurer. Our best wishes to these officers.

LOS ANGELES ENJOYS QUESTION-ANSWER SESSION

LOS ANGELES CHAPTER's officers this year are: Eugene DeCaussin, Chairman; Earl B. Allen, Jr., Secretary; Robert Belew, Vice-Chairman; and Ken Kellogg, Treasurer. Our best wishes to you, gentlemen!

At a question-and-answer session, a lively discussion developed around a TV service problem encountered by Gene DeCaussin. It seems that the low B supply voltage was too high; reasons for this were advanced by many members. After this problem was discussed, Bob Belew showed the members how to build a TV antenna with excellent gain for both Channels 5 and 10.

A TV schematic drawn in color to identify the various sections was used in another interesting talk given by Chairman Gene DeCaussin.

NRIAA EXTENDS THANKS TO A RESPECTED FRIEND

Before moving to Springfield, Mass. and becoming Secretary of the SPRINGFIELD CHAPTER, Brother Bernard Frey, O.F.M. Cap., lived in New York City and was a member of the Chapter. At two of the meetings there, he taped lecture-demonstrations conducted by a guest speaker, Mr. Larry Black of RCA. One lecture concerned the servicing of transistors, and the other was about color TV. Brother Bernard recently transcribed these lectures and offered copies to all the local chapters, asking only that they defray the cost of the stationery and postage.

National Headquarters joins with the local chapters in expressing our gratitude to Brother Bernard for his generosity and thoughtfulness and for the considerable labor spent in the preparation of this material.

J. B. Straughn, Chief, NRI Consultation Service, and Ted Rose, NRIAA Executive Secretary, have three local Alumni Chapters left to visit on their spring schedule. The dates are below:

New Orleans . . . . . March 14
North Jersey . . . . . April 28
Pittsburgh . . . . . May 4

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., 235-3074.

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 at Chairman Eugene DeCaussin's Radio-TV Shop, 4912 Fountain Ave., Hollywood, NO 4-3455.

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 Tschoupitoulas 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, Players Club, Washington Square (1/2 block west of Washington and Kearney Avenues), Kearney, 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: Isaiah Randolph, 523 Ivy St., San Francisco, Calif.

SOUTHERN 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 Dr., Springfield, Mass. Chairman: Joseph Gaze, 68 Worthen St., W. Springfield, Mass.

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