Suppose

Supposin' fish don't bite at first,
What are you goin' to do?
Throw down your pole, chuck out your bait
And say your fishin's through?

You bet you ain't; you're goin' to fish,
An' fish, an' fish an' wait
Until you've ketched a bucketful
Or used up all your bait.

Suppose success don't come at first,
What are you goin' to do?
Throw up the sponge and kick yourself
And growl, and fret, and stew?

You bet you ain't; you're goin' to fish,
An' bait, an' bait ag'in,
Until success will bite your hook,
For grit is sure to win.
In the old days crossing the ocean was quite an adventure. At the first sight of land mariners gave the order "Full Sail Ahead."

To see solid earth just ahead after the hazards of the journey produced a sense of security among the passengers and crew because a happy landing was close at hand.

The good ship "America" is nearing land after a hazardous journey. Adverse winds of reduced buying power; black nights of business indecision; high waves of unemployment made it discouraging—but solid land is sighted—Full Sail Ahead.

A new year is at hand in which to do the things that count. Business in general is headed upwards. Radio promises to exceed previous bounteous seasons. The solid shore of Radio opportunity is well in sight—Full Sail Ahead.

J. F. SMITH, President.
A Billion Dollar Year

1931

Present indications point to the American public spending more than a billion dollars for Radio sets and accessories during the year of 1931, as the estimate made by M. S. Burns, Vice-President of E. T. Cunningham, Inc., Radio tube manufacturers.

This huge amount, Mr. Burns adds, compares with a total sales of Radio sets of approximately $5,000,000 in 1922. Mr. Burns' belief that the new year will set a record for Radio and accessory sales is based on several factors, among these being: lower cost per unit; advanced mechanical features incorporated; better type and diversity of broadcast programs; new applications developed for Radio, such as use with automobiles, and the opening up, on a wholesale scale, of new markets both in the replacement field and in the farming areas of this country.

Radio to Eliminate Smoke

OPPORTUNITY knocks once at every door.

You've heard that line lots of times. Teachers preach it. It is quoted again and again in all sorts of successful literature.

Knocks

The only trouble with that line is that there is not one grain of truth in it. The truth is, that the more a days, opportunity knocks perpetually at everybody's door. It is one of the most persistent callers that we have. The trouble is not with the lack of opportunity but the lack of proper training, to take advantage of it when it calls.

Life is like a football game with each one of us as a player. The football itself represents opportunity. During the game, the ball will come within our reach quite frequently. When it does come do we make a score in the game of life or do we get thrown for a loss?

As soon as the air you may grasp it only when the ear and hand have been trained to make the catch. If you are inexperienced, you will fail—someone else will recover the ball and profit by your inability to take advantage of your opportunity. Then you are imperfect, you will be poor. If you are competent, you will recover the ball, and you will be successful. If you are perfect, you will recover the ball, and you will be successful. If you are perfect, you will recover the ball, and you will be successful.

Models 54 and 57

Model 54 differs from that shown in the diagram in the following particulars: The "P.H." terminals are between the R.F. transformer and the 0.1 microfarad condenser, instead of between this condenser and ground as shown. The condenser near the center of the diagram has values, from right to left, of 0.1, 0.1, 0.1 microfarad instead of those shown. There is no dial light on Model 54.

Model 57 differs in circuit from the above description in the following particulars: an additional condenser of 0.25 M.F. capacity is shunted across the filter choke. The primary of the output transformer is connected in the position in which the speaker field is shown in the diagram. Instead of being connected to the 1,050 ohm resistor through a condenser as shown, the bottom speaker terminal is connected to the ground. The speaker field is connected from this grounded terminal to the middle speaker terminal on the diagram, so that the positive B circuit flows through the speaker field to the ground. A fixed condenser is shunted across the 1,650 ohm output biasing resistor.

There are four secondaries on the power transformer. One of these supplies current for the heaters of the radio-frequency and detector tubes. This is the one farthest to the left on the circuit diagram. The next one toward the right is the high-voltage secondary, and it is connected to the plates of the rectifier tube. The third secondary supplies the current for the rectifier filament, and the fourth supplies current for the output tube filament.
The Inventor - an Industry Builder

By GEORGE ROHRICH
Engineer in Charge of N. R. I. Practical Training

It is interesting to recall that while Radio is a very modern industry, inventors of many centuries have contributed largely to its present state.

The invention of "drawing wire," for instance, is credited Rodolph, who conceived the idea in the year 1410. Prior to that time wire was "hammered" out. Can you imagine a present day receiver using hammered wire, when in an Atwater Kent speaker alone there are 11,000 feet of very fine wire?

Radio owes its origin to electricity and while the greater electrical experimenters have lived since the year 1800 the ancient philosopher Theophrastus mentions the power of amber to attract dry leaves and straws as early as 312 B.C. Pliny, in 70 A.D., writes about the same subject and it is from "electron," the Greek name for "amber" that "electricity" receives its name.

The progress of electrical development, so essential to Radio of today, must be traced through such inventors and experimenters as Michael Faraday, who discovered the principles of the dynamo in 1831; James Watt, Joule, Watson, Charles Coulomb, Andre M. Ampere, G. S. Ohm and Carl Gauss, in addition to the long list of American inventors and contributors to electrical research since the days of Benjamin Franklin.

Never in all those ages, however, has the inventive mind been offered such opportunities to commercialize. The industry is in a receptive mood for new ideas—new inventions. Manufacturers vie with each other in their attempts to secure new refinements for their sets, because with keen competition—with the buying public becoming more "Radio-wise" it is the set with something new—something different, which sells.

The field is therefore ripe for Radio inventions. The thoroughly trained man (Please turn to page 14)

"Results Contest" Carried Over

The big Results Contest was scheduled to close midnight, October 31st, the winners to be announced in this issue of National Radio News.

However, numerous suggestions have been made that the Results Contest be carried over so that the big winter months could be included, enabling more and bigger results to be reported.

The Contest Editor, after careful consideration and with the approval of the Contest Judges, has agreed to do this. The Contest will now be open for letters until midnight, February 28th, 1931, and the winners announced as soon after that time as possible.

Everybody has a good chance to win a cash prize. There are sixty of them, totaling $300, to be given away absolutely free to the writers of the sixty letters the Contest Judges think are best.

Get busy, you students and graduates, get your letters in to the Contest Editor and get lined up for those cash prizes.

You fellows who have already sent in letters and care to do so can make additions or changes in them by notifying the Contest Editor. In submitting new letters and changes where letters have already been written, be sure to state which Contest you are entering or in which Contest your letter is already entered.

Full details of the Contest rules were published in the August, 1930, National Radio News. Read the rules and get in the Contest.

Be sure to place the number of the Contest that you are entering on the top of your letter and send it in a separate envelope to the Contest Editor.

Letters written on the same sheet with lessons, requests for Consultation Service, or material of any other type will not be considered as eligible for the Contest.

There is $300 up here at N. R. I. waiting for sixty men to win it. All it takes to win a prize is a good letter stating facts. Your letter has as much chance as that of anyone else. Let's go! Flood the Contest Editor with result letters.

THIRTY-MILE GROUND

Thirty miles of copper wire make up the ground wire system of the fifty thousand-watt WLW Transmitter Station.
SOUND PROJECTION SYSTEMS for THEATRES

By J. A. DOWIE, Chief Instructor

It is estimated that 10,000,000 persons have been added to the weekly motion picture audience by Sound Pictures. They are directly a branch of radio because vacuum tubes, audio amplifiers, electrical phonograph pick-ups, photoelectric cells and loudspeakers are used in the systems.

Sound Projection Systems can be used for talking Motion Pictures, wherein speech or music is reproduced with motion pictures with an effect equivalent to the artists being present in person. Synchronized accompaniments, specially recorded musical accompaniments provided with feature pictures. In these two types, voice or music is synchronized with the picture, the sound heard at the same instant the action is seen on the screen.

Pictures with no special accompaniments can be provided with an orchestral accompaniment of commercial records. This non-synchronous reproduction requires special turntable apparatus.

When it is difficult in some parts of a theatre to properly hear the performers, an amplifier system functioning like a public address system can be used. This requires a special microphone pick-up and switching apparatus. Announcements and emergency calls are made from the manager's office by a small microphone pickup. This equipment is called an annoucing system.

There are two general methods of recording sound in making talking moving pictures:—the Vitaphone Method in which the sound is recorded on a disc like a phonograph record except considerably larger; the Movietone and Phonofilm systems where sound is photographed on motion picture film. Theatre equipment is available which can be used with either or both of these methods. The difference is in the pickup apparatus at the projector, amplifiers and loudspeakers being identical in both systems. A simple switching operation permits a change from one method to the other.

The sound to be recorded is picked up by a microphone which generates a small electric current whose variations correspond to sound waves. In disc recording, this current controls an electro-magnetic recording stylus, whose movements cut a record on a wax disc in the usual manner. In film recording, the amount of light falling on a moving film is made to vary according to the fluctuations of the microphone current, and so a photographic record corresponding to these fluctuations, and therefore, to the voice or music, is impressed on the film. The amount of light falling on the film can be varied by using the microphone current to control the brightness of the lamp furnishing the light ("flashing lamp" method), or to open and close an aperture through which light reaches the film ("light valve" method).

In the Movietone system, sound is recorded on the film as a track of constant width, but varying density. Sound recorded by the Photophone system is in form of a track of constant density but varying width. Which of the two methods is used, the current is obtained, either from an electrical reproducer playing on a disc record or from a film reproducing attachment through which the film passes on leaving the projector head.

The disc records employed are run at about half standard Phonograph speed; one record plays throughout an entire reel. The synchronized film used with the disc record is important, except that one frame at the beginning is marked to give the starting point. In the Movietone method, the sound record is a band of microscopic lines, about ¾" wide, called the sound track, running on one side of the film. The spacing of these lines, i.e., the contrast between light and dark, regulates the pitch sound. In the Photophone system, sound waves recorded form a single jagged heavy line. After leaving the lower sprocket of the projector head, the sound film enters the reproducing attachment where it passes over a sprocket that moves it along at constant speed. A narrow, bright beam of light from a high-intensity exciting lamp is focused on the sound track of the film through a fine and aperture plate. The light passing through the moving film will vary in intensity according to the variations of the lines on the sound track. This light falling on a photoelectric cell produces an electric current varying according to the light to the sound which was recorded.

The small current from the electrical reproducer or the photoelectric cell passes along to one or more vacuum tubes amplifiers which deliver a greatly magnified copy of this current.

The current from the amplifiers is converted into sound by receivers and loudspeakers located at the screen. The number and location, depend on the size and acoustic properties of the theatre. Usually a special type of screen is employed which reflects light well, enables a good picture to be obtained, yet permits a free passage of sound waves. Loudspeakers are placed immediately behind the screen which that a perfect illusion is obtained, that the voice or music is coming from the artists seen on the screen.

In the disc method, perfect synchronization is assured by driving the projector and the turntable with the same motor. If film and record are synchronized together, they must keep in step through the entire reel. In the film method, the fact that the sound record is on the film with the picture makes synchronization inherent.

By using two projectors alternately, a continuous program can be run as with ordinary pictures. A device called a fader is employed in making the transition from one machine to the other, causing no break in the music. The volume of sound heard in the theatre is also controlled by means of the fader.

Unlike ordinary moving picture projection, where film is run at a faster speed than it was taken, synchronized film must be run at the same speed as recorded, otherwise the sound would be distorted.

Non-synchronous reproduction is similar to synchronous disc reproduction, except that since their records are not synchronized with the film, it is not necessary to drive projector and turntable by the same motor.

In voice amplification systems sound is picked up by microphones, placed on the stage or in the orchestra pit. The microphone current goes to the same amplifiers which are used at other times for synchronous or non-synchronous reproduction. The output from the amplifiers is converted into sound by receivers and loudspeakers.

Announcing Systems may be installed in the manager's office or elsewhere. Speech is transmitted through the regular amplifiers and the loudspeakers at the screen or the voice amplification system loudspeakers.
Protect Your Credit You May Need It

By GORDON BIRREL
Merchandising Expert

Good credit is a necessary foundation for success.

Young men starting out in the world should have this impressed upon them as early as possible, before they make the mistake of damaging their credit.

Credit is like a frail flower. It flourishes in the sunlight of truthful dealing. It withers and fades when individuals make promises they are unable or unwilling to fulfill.

It is estimated that seventy per cent of all business today is conducted on credit. Everything from daily newspapers to international warfare is operated on the deferred payment plan.

No one should hesitate to buy on credit, but before buying, definite plans should be made for paying for the merchandise or services received. And there is no disgrace in taking a bank for a loan for business purposes—in fact, it is good business to do so.

Suppose a man has several hundred dollars due his creditors at a certain time and doesn't see his way clear to pay them. If his credit is good, he should be able to borrow the money at from six to ten per cent, pay off his bills, take advantage of discounts for prompt payment, and not only keep his credit in fine shape, but establish additional credit for taking care of his loan when it is due.

J. Pierpoint Morgan, the outstanding financier of the last generation says that the best security for a loan is character. And a big factor in any man's good character is his willingness and ability to meet his bills and obligations on time. Good credit is little more than a reputation for reliability.

The man who insists on your making your payments on time is doing you a big favor. He is helping you maintain a most valuable asset, your credit.

Modern business has established an elaborate system of individual credit rating. Every town of any size and consequence has its trade associations. These associations maintain Credit Information Bureaus, which supply credit information not only locally but maintain reporting services to other bureaus all over the country.

Apply for credit in a store or business house of any kind and your application is referred to the Credit Agency. If they have no unfavorable reports from merchants or other credit bureaus, you get what you want. Otherwise, you pay cash.

Excuses don't go with these fellows. They are not interested in a hard luck story. With them it is a case of "Do you pay, or don't you?" They feel that a man should analyze conditions far enough in advance to know when and how he can meet his credit obligations.

Employers frequently check up on the good character of a man before they hire him. A man who is conscientious in paying his bills is usually straightforward in his dealings with his employer.

To the man who expects to go into business for himself at some future date—good credit is his most valuable asset. He can get along on a small capital if he has good credit but if not—as soon as his capital is invested in equipment, etc., he has no place to turn for additional capital.

I have in mind the case of a man who made $75,000 in his business in three years. Then came a period of depression. He lost it all and $250,000 besides. That was a big hole to climb out of, but he didn't; he had a reputation for paying his bills promptly, consequently, very liberal credit. Right now he is well on his feet again, but he wouldn't be if his credit hadn't been good.

N. R. I. wants to help students build and maintain a good credit standing. A plan is operated here whereby credit certificates are issued, signed by both Mr. Smith and Mr. Haas, certifying the prompt payment of students' accounts.

The best rule for establishing a credit standing is never to buy anything you can't pay for and pay all bills promptly as they fall due.

The longer I live, the more deeply I am convinced that that which makes the difference between one man and another—between the weak and the powerful, the great and the insignificant—is energy, invincible determination, a purpose once formed and then death or victory.

—Foscell Buxton.
May Abandon Eiffel Broadcast

Broadcasting by long waves from Eiffel Tower, generally regarded as France's national station, is likely to be abandoned shortly in favor of a new station to be erected by the government. In order to reserve this power to maintain for official communications and experiments.

Telephone Service Between U. S. and Australia

Regular commercial telephone service is now available between North America and Australia, over the longest circuit ever established for commercial use. It consists principally of two Radio links, once across the Atlantic and another between England and Australia. With the wire lines involved in the connection the circuit between New York and Sydney is more than 14,000 miles long. Service is available to all points in the United States, Cuba and to the principal cities of Mexico. This service adds nearly 500,000 telephones to the network now within reach of the Bell System. In Australia, the service is now available to the states of Queensland, New South Wales, and Victoria, and the city of Adelaide. The cost of a call between New York and any Australian point is $4.50 for the first three minutes and $15 for each additional minute.

Stations in North America

There are approximately 1,100 broadcast stations in the world at this time. Over one-half of these are in the United States. To be exact—the number in this country is 628. To this, if we add Canada’s 77 stations and 7 for Mexico, we have a total of 701 stations on the North American continent.

Cost of Radio Power

Engineers estimate that it costs considerably less than one cent an hour to operate an A.C. Radio receiving set. The electric bill for powering a set having seven or eight tubes and in use four or five hours a day should not amount to more than $1.00 a month.

Radio Aids Train Crews

Use of short wave Radio in maintaining communication between the ends of freight trains, sometimes more than a mile in length, has been found practicable.

To replace the present system of hand signaling, the railroad has ascertained that the upper wave length can be employed in this communication.

By means of short wave Radio stations located in cabooses and cab of the locomotive, it is possible to keep the front and rear end of the train in constant communication, adding to the safety of the train and eliminating many delays.

New Aero-Radio Services

Radio stations have been established at Newark, Camden, Harrisburg and Pittsburgh to keep pilots in constant communication with the ground during the Allegheny hop of the newly contracted Transcontinental Air Mail and Passengers route of Transcontinental Air Transport and Western Air Express. All planes of the service will be equipped for two-way Radio.

The addition of 15 more stations to the fast expanding Radio net-work of Aeronautical Radio, Inc., cooperative communication system of the leading air transport lines, has been authorized by the Federal Radio Commission. They will be located at Dallas, El Paso, Big Springs and Abilene, in Texas; Phoenix, Douglas and Tucson, in Arizona; Hopeville, Ga.; Jackson, Miss.; Shreveport, La.; Birmingham, Ala.; Alameda, Calif.; Omaha, Neb.; Cresson, Pa., and Newark, N. J.

Irish to Have High Power Station

Word has been received from London of a super-power station to be owned and operated by the Government of the Irish Free State.

This station will be capable of a power output of 150,000 watts. Contracts for the erection have been awarded the British Marconi Company.

New Zealand-Australia Radio Telephone Link

Testing of the Radio telephone link between New Zealand and Australia has commenced. Initial tests have proved very satisfactory and telephone conversation can now be exchanged without difficulty between two Radio stations. In addition to communication between the Radio stations, a great deal of work has to be done in connection with the linking up of the wireless section with the toll lines of the country.
EUROPEAN RADIO CONDITIONS
(Continued from page 3)

conditions with man-made interference.

The result of my investigations proved that the great majority of the noises came from faulty switches, motors and electrical appliances in the hotel where the set was installed. I corrected some of these and my set operates perfectly. I can help but realize how lucky we are in America, where a fortune for education is not necessary. In fact, finances are of least importance—willpower and energy being the prime factors.

Radio on both sides of the ocean needs trained—well-trained men. I might point out that I conceived the idea of enrolling with R. N. I. Lucerne, Switzerland, September 9, 1930.

Radio Manufacturing Aids Other Industries

The strikingly large quantity and variety of materials which is annually consumed by the American Radio industry in the manufacture of receiving sets grows in great ways in aiding the various industries supplying these materials.

A statistical report compiled by the Electrical Equipment Division, Department of Commerce, from information furnished by manufacturers, shows that 158,365 tons of material are used in the manufacture of 3,000,000 receiving sets.

Steel leads the metals in quantity, totaling 110,000 tons per year. Copper and copper alloys follow with 16,000 tons. Aluminum is placed at 4,000 tons. Tin, 8,000 tons. Nickel, 5,000 tons. Zinc, 1,000 tons. By-products, 9,000 tons.

The invention of the midgets and super-heterodynes, the tube business is becoming exceedingly active again. Sales of new sets and replacements of tubes in presently owned sets have caused sales to mount above expectations.

The Inventor—An Industry Builder
(Continued from page 7)

is in the ground floor because he has a definite, thorough understanding of the underlying principles, which enables him to work directly towards his goal, once he has the idea of an invention in mind. It is in the minds of Radio inventors. Good money. When a Radio manufacturer makes up his mind that a certain improvement is necessary to make his set sell to the public, he will not hesitate to pay and pay well to the patent of the patent.

Navy Radio Engineers Study Round The World Signals
(Since Front Cover.)

The mysterious high frequency Radio signals which encircle the earth and return to the receiving station in the form of wierd echoes, are being studied by engineers of the Naval Research Laboratories in Washington.

These round the world signals sometimes cause quite a bit of interference on high frequency recording equipment on certain frequencies.

The Government, in its interest in Radio, is conducting quite a bit of research along these lines. Photograph on the front cover of this issue of the News shows Dr. A. Hoyt Taylor, noted high frequency expert, adjusting the transmitter which is used in the tests.

Tube Manufacturer Optimistic

Ernest Kauer and E. T. Mahurin, president and vice-president, respectively, of the CECo Manufacturing Co., passing through New York on the way home Providence after a business trip to Eastern and Middle West cities, sounded an optimistic note for Radio.

"There is considerable activity in the trade," Mr. Kauer stated. "In sets, this is particularly noticeable in the case of midgets and super-heterodynes. The tube business is becoming exceedingly active again. Sales of new sets and replacements of tubes in presently owned sets have caused sales to mount above expectations."

SHORTER HOURS—MORE PAY

"I am proud to say that, without asking for it, my salary has been increased from $125.00 to $150.00 a month. I had to quit playing in radio work for a while and I was then that I realized how the lessons, the help of your staff and your personal help made it impossible to go wrong. I get along fine on my new job and I'm going right along for the future." Clayton Price, Ashland, Virginia.

GOOD WORK, McCASKILL

"I wish to say a few words complimenting you on your splendid Radio training, which course I recently completed. As a result of your training I have not been blemished by any job as yet."

"In my 6 months with the company I have made about $500 in spare time, and expect my earnings to increase now that I have graduated and the water gets the credits. If I have as much as I have had so far. It is certainly impossible to estimate the time of my training in dollars and cents; the value of my training is too high."


MADE FOREIGN EMBRACE

I am now a member of the American Radio Manufacturers Association. I am attending my first meeting, which took place in San Francisco. I was able to attend the meeting of the American Radio Manufacturers Association, which was held in San Francisco. I was able to attend the meeting of the American Radio Manufacturers Association, which was held in San Francisco.

LEAR WINS PROMOTION

"As you know, I am a job as repair man with the R. A. A. Victor Company in Camden, New Jersey. I have been working for the company for about 1 month and have just been made the head of the repair department." Donald W. Lear, Camden, New Jersey.

CLOTHIER TELLS HOW

"About a year ago I went to a bank and borrowed $25,000 on the security of my radio sets and my radio equipment, along with a little money of my own, to start my regular trade in Radio work as a radio line. The money made from Radio has been re-invested in this little business and I have now been able to accumulate quite a stock of equipment.

"I tell someone at first, but soon found that my best advertising was my satisfied customers. They stay with me and each one tells a friend or two, etc.

"My list of customers increases all the time and my little shop is getting entirely too small to handle my work and just as soon as I can spare the time, I intend to enlarge it.

"I am getting plenty of service work on A.G. receivers, too, for a long time I did not get as much because the sales guarantee took care of A.C. sets all right now, as the guarantee runs out. I get the work.

"From present indications, it looks as though it will take me a long time to get as much work as I can. I have long paid back the money that I borrowed and don't have to worry about red tape. Everything that comes in now is a bonus. Whenever I try to make my earnings have made my business successful." J. G. Clothier, Santa Maria, Calif.

MANENY LANDS JOB

"I am earning $80 a week and working for one of the largest and most up-to-date Radio dealers in this city. The company is the Consolidated Gas, Electric Light and Power Company of Baltimore, Maryland.

"I find out that I can do everything expected of a service man of Radio receiving sets—why I say I am earning $80 a week in Baltimore. I started out with the Consolidated Gas, Electric Light and Power Company of Baltimore, Maryland.

"$200 THIS WEEK?

"I'm taking an hour off for lunch today and if I don't have to cut it short and deliver another $200 this week, I'll have sold six Orazkas this week already. Don't ever advise a fellow to sell until he has had enough time to count his bankroll later.

"My sales and installations keep me so busy that I don't get much time for service work through the week.

"A fellow called me up the other night, said his set wouldn't work properly. He asked how it acted, and I told him to put it on the table and I would look at it. I went over and checked the receiver and found him a new tube, and another one.

"I had to go over and convince him and then sold him eight tubes—profit for one hour, $6.30."

"I have just sold six Orazkas this week—profit for one hour, $6.30."

LEAR WINS PROMOTION

"As you know, I am a job as repair man with the R. A. A. Victor Company in Camden, New Jersey. I have been working for the company for about 1 month and have just been made the head of the repair department." Donald W. Lear, Camden, New Jersey.

A GOOD INVESTMENT

"At first I thought that what you had written me about you fellows making nice money was impossible, but now I've opened my eyes and changed my mind.

"The money that I have put in the National Radio industry is turned to a profit in a few weeks on repair work alone," E. Wehber, Union, N. J.

The "Mailbag" wants to tell other students your ideas. What are you doing in the Radio direction, what is your radio work like? Tell us about special jobs that N. R. I. training has helped you handle. Send your ideas in—we want to publish them. Watch the Mailbag for helpful ideas from other students.