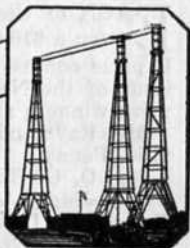


NATIONAL



RADIO



NEWS

FROM N.R.I. TRAINING HEADQUARTERS

Vol. 2—No. 1

WASHINGTON, D. C.

JULY, 1929

**“Radio in
Aviation”**

NUMBER



Read

in this issue—

**A. ATWATER KENT
WALTER C. HINTON**

and other writers on interesting Radio subjects

Contest Winners!

EACH of the following N. R. I. men won a \$10.00 cash prize in the N. R. I. prize contest announced in the March issue of the National Radio News. The prize winners are:

- Mr. Raymond D. Myers, Box 15, Idaville, Penna.;
- Mr. O. G. Baker, Lincoln, New York;
- Mr. Edgar A. Mathias, 1422 North Haugh St., Indianapolis, Ind.;
- Mr. E. G. Wolfe, 1327 Kenzie St., Elkhart, Indiana.

There were a considerable number of entries—a great many of them were very good, and it was a difficult task for the prize committee to select the winners.

The prize committee wants to thank each and every one of you N. R. I. men who submitted your ideas in this contest. You have shown some mighty fine interest and a good spirit, and we only wish that we could give every man a first prize.

"Letting well enough alone" is a foolish motto in the life of a man who wants to get ahead. In the first place, nothing is "well enough," if you can do better. No matter how well you are doing, do better. There is an old Spanish proverb which says, "Enjoy the little you have while the fool is hunting for more."

The energetic American ought to turn this proverb upside down and make it read, "While the fool is enjoying the little he has, I will hunt for more."

—Arthur Brisbane.

National Radio News Now in Libraries

N. R. I. students may be interested in knowing that the National Radio News has been placed in a number of the leading libraries throughout the country. That means that the News is being read by a larger number of people than ever before—the N. R. I. name is being advertised everywhere and that N. R. I. Radio-Tricians are getting a lot of valuable publicity. The comments of some of the librarians follow:

We are interested in receiving the current issues of the National Radio News—also we would like to have a complete file to bind for preservation in our reference collection.

—New York City Public Library.

Our Electrical Engineering Department and a great many others of the students and faculty here will be interested in the National Radio News.

—University of Missouri, School of Mines and Metallurgy Library.

We are very glad to add the National Radio News to our reading room periodical shelf.

—Hartford, Conn., Public Library.

The National Radio News will be of real help in our library. Thank you very much for it.

—Hancock, New Hampshire, Library.

We hope it will be possible for you to send us all the numbers of the National Radio News as we want to make them available to our readers.

—Birmingham, Alabama, Public Library.

Can You Answer These?

- How is Radio being applied to railroading? See page 10
- Who is N. R. I.'s oldest student? See page 8
- Who is often called the Henry Ford of Radio? See page 6
- How important is Radio to Aviation? See page 4
- How many workers does the world's largest Radio plant employ? See page 7
- Does it pay to size up your prospect? See page 13
- How important is self-confidence? See page 9
- What about the demand for battery operated sets? See page 13
- What new Radio development has been made by the Canadian National Railway? See page 14

National Radio News

Published in the interest of N. R. I. students and graduates, by the NATIONAL RADIO INSTITUTE
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NATIONAL RADIO INSTITUTE

Washington, D. C. July, 1929

Speaking of Radio progress—just 32 years ago this month, Marconi had developed his Radio apparatus so that communication was made between the shore and a ship 10 miles away! Comparisons between that and present day Radio are useless. We would just like to know what Radio will be like 32 years from now!!—Editor.

Radio Sweeps Onward in Big Expansion



I LIKE to look back about this time each year over the splendid progress Radio has made.

I look back and recall how crude—how small and insignificant Radio was just a few short years ago.

In making this comparison I can get some idea of how truly great and magnificent the Radio field of tomorrow will be.

When I first started in Radio, my friends tried to discourage me. They told me I could never get anywhere with that apparatus—apparatus that amounted to nothing more than a couple of old Ford spark coils and a bundle of wires. Thousands talked about my "foolish ideas" to my back, but I am mighty glad today that I stuck it out.

In fact, Radio has developed so rapidly and has made such a wonderful record and has been of such great influence that even some of us pioneers in Radio hardly dreamed 18 or 20 years ago that it would be like this.

Over 350,000 people are employed in Radio today. The annual turnover is approximately \$1,000,000,000.

But the Radio technique is not confined to the narrower field in which some people regard Radio today. It extends into a number of fields—solving problems in many lines of industry.

For instance, Radio is largely responsible for the development of the talking

picture. It has practically made the "movie business" over.

Then, it has given the phonograph industry a new and improved means of recording and reproducing—completely reviving the industry.

Then, there is wired wireless or the transmission of Radio signals over telephone, telegraph, electric light, and even trolley lines. It has opened up a new era in communication and remote control. This is also expected to do a lot in solving some of television's problems.

Also in medicine and surgery, Radio technique is playing an important role.

In prospecting for minerals and ore deposits, radio waves are being used to a good advantage. In fact—approximately one-half of the new oil wells discovered last year were brought in by the use of Radio prospecting.

Perhaps, one of the biggest "outside fields" in which Radio is being applied today is that of Aviation. The debt that Aviation owes to Radio is great. Without Radio, Aviation would be greatly hampered and progress would be slow, but Radio has provided Aviation with eyes and ears. Radio is a big factor in its present development, and will be a still bigger factor in the future.

With the aid of Radio beacons, directional finders, high-powered aircraft transmitters and receivers, and aircraft altimeters that tell the pilot exactly how far he is above the ground when he is making dangerous landings in foggy weather—these and many other big developments in Aviation are due to Radio.

The opportunities for the Radio man are not to be overlooked in this new field. Radio operators will be needed for big cabin planes. Some big planes are being made right now with specially equipped cabins for Radio operators. Then, there will be a need for Radio men to handle the beam stations and do the airport Radio work. All in all, it seems that Radio technique has just scratched the surface of the many possibilities ahead and in the near future Radio principles will be put to work in a number of new fields. The man with thorough Radio training will find an ever widening field of opportunity ahead of him.

N. R. I. men can well be proud of the fact that they are playing a part in this fascinating drama of Radio's progress. Let's carry on—let's tackle our work with a new courage for there are even bigger things ahead of us in Radio.

J. E. SMITH.

Radio Essential in Aviation

By LIEUT. WALTER C. HINTON
(Pilot of First Plane to Cross Atlantic.—Ed.)

LIKE other military airplane pilots, I was put through an extensive course in the fundamentals of radio-telegraphy.

I learned to send and receive code with sufficient speed and accuracy to qualify me for an aviator.

From that time on radio proved to be of ever increasing importance to me in my flying operations. Radio was an essential part of every important flight I ever made and it is going to be just as essential to every flight as time goes on.

After completing my training as a Naval Aviator I was assigned to duty as pilot and instructor of twin-motored planes. These planes were large enough to carry a full crew—in addition to an assistant-pilot and mechanic, there was a radio operator aboard.

In May, 1919, the U. S. Navy Seaplane NC-4 made the first successful crossing of the Atlantic Ocean. Ensign H. C. Rodd, U. S. N., was our radio man and Lieut. Elmer F. Stone of the Coast Guard my associate and co-pilot.

All during the flight from Rockaway Beach, New York, to Plymouth, England, we were in constant radio communication with the Navy Department in Washington, Naval vessels, ships at sea, and radio compass stations. This radio communication was of great value to us during this flight, and was a good check on our navigation. You must remember that this work was done ten years ago when the vacuum tube was still a new, experimental device, and the present day circuits and methods of shielding were unknown. The marvelous thing to me about the radio reception aboard the NC-4 was that the signals came through in good shape in spite of the high tension interference that was present. The NC-4 had four engines of 400 h.p. each—a total of 1600 horsepower. Each engine had twelve cylinders and each cylinder had two spark plugs. That means 96 high tension spark leads—eight induction coils, with their breakers and distribu-

tors, four low-voltage generators and a high-voltage generator for the radio. Each of these things was a healthy source of interference—and NOT ONE OF THEM was shielded.

When you stop to compare the equipment we used then with the equipment used today, you would no doubt wonder how any signals at all could have been received through this interference. Today each spark plug lead, the magnetos, the spark plugs themselves, and all other equipment aboard a plane is shielded so that interference is reduced to a minimum.

The plane I used on my trip from New York to Rio de Janeiro in August, 1922, was equipped with radio equipment that was a great improvement over what I had used previously.

I never really appreciated the value of radio communications until I went down to Brazil again in 1924 and 1925 as pilot for the Dr. A. Hamilton Rice Exploration Expedition. Here we proved by long tests in the field the value of short-wave radio transmission and reception over long wave. The short waves crashed through the continual equatorial static and kept us in daily radio communication with all parts of the United States and Canada. We transmitted scientific reports to Europe, and sent to and received from New Zealand and Australia. All this, mind you, was done with a little 100-watt transmitter weighing only 6½ pounds.

Thomas S. McCaleb, our radio man, built this set right there in the Amazon Jungle and operated it successfully and consistently every day, down there on the equator, where radio communications are extremely hard to effect.

"Mac knew his stuff." When a man makes a real success of a thing, as he did with our radio communication, and as he did later when he designed and installed the radio communication equipment for the Liberian Government in Africa, there are many who will say that the man was a genius.

Mac is no genius—he just loves his work and puts his mind on it.

After struggling up the Amazon River all day in a canoe, on the stern of which

(Continued on page 8)



"I am now connected with the Varney Airlines, and I am contemplating accepting a job as co-pilot and Radio operator for a salary around \$1000 a month. So I want to brush up on short-wave operating." William Pons, c/o Varney Airlines Airport, Salt Lake City, Utah.

"I have been up to my neck in servicing jobs for the past two weeks—mostly receivers. The electric sets seem to give the most trouble because of line voltage fluctuations thereby blowing tubes. In these two weeks I have increased my weekly salary about twenty dollars. My jobs have all been very successful." Clarence William Schohl, 37 Victoria Avenue, Buffalo, New York.

"I made about \$65 or \$70 in the last ten days here—not so bad for a small town." J. W. McColl, 607 Grant Street, Dennison, Ohio.

"I am doing all the Radio repair work for the Yale Battery and Electric Co. They wanted a man that could put out the work, so I showed the Manager my Radio-Trician card that you sent me and got the job. I am doing the repair work on a commission basis and clear about \$250 a month." N. A. Collins, 107 South D St., Yale, Oklahoma.

"Although I've finished only 7 lessons, I have made \$75.00 in my spare time doing Radio servicing." J. L. Rochon, Box 53, L'Original, Ont., Canada.

"I was a brakeman on the P.R.R. for nine years. I decided my future was slim as a railroader. Since enrolling I have made over \$400 and although I have not yet finished my course, I would not take \$10,000 for the knowledge I have gained. I secured a position as radio-trician for a local firm here after I was only half through my course. I have since been put in full charge of our Radio department with a nice increase in salary." Robert R. Myers, Altoona, Pa.

"In the last four months I have made \$500 in spare-time work here in my shop and I give all the credit to the N.R.I." C. L. Ravoira, Box 101, Weirton, W. Va.

"I would not take the price of your Course for the Work Sheets that I have already received from you. I don't see how you do it." G. E. Black, 321 East Oklahoma Ave., Knoxville, Tenn.

"I have averaged better than \$275 per month for the last eight months." M. Eckenbeck, Skamokawa, Wash.

"The practical six units you sent me are the

very foundation of set building and I don't believe can be equalled anywhere, because I searched papers, magazines and all sorts of advertisements before I took your course." Ernest Gray, 548 Orchard Street, Baltimore, Md.

"I am going to change Radio jobs this July for a better one with quite a raise in pay. I will be in charge of the Radio Department of the Alva Electric Supply Company. I give all the credit to N.R.I." G. B. Chick, Alva, Okla.

"To say that your course is fascinating would be to 'tag' it mildly. It is positively gripping. It is so interesting that one should experience no temptation to put aside the text for less profitable endeavors." Leon T. Clute, 800 Cogswell Ave., Solway, N. Y.

"I am now owner and operator of Station W9CNK on 40-meter band. Before I started this course I received \$1.00 a day for farm work. Now I am in Radio 'for keeps'." Paul Hampton, Jamesport, Mo.

"Gee, Mr. Smith, you take care of me just like a father and let me tell you, it sure makes me feel good to know that there is someone I can depend on for advice. Now about my work. I have on an average of 5 to 15 calls a day for service. I have charged \$2.00 for local calls. I have about \$500 worth of testing and repairing apparatus, a new Ford truck which cost \$795 and many other things which the course has paid for." Louis A. Defenari, Post Ave., Westbury, L. I., N. Y.

"In the past 6 months I have repaired nearly 1500 sets—both A.C. and D.C., netting me nearly \$5100." Glenn C. Sabin, 44 Maple Street, Northampton, Mass.

"I am working as a wireless operator on S. S. Jalavihar, getting a nice salary, besides having all my expenses paid, and rated as an officer." Major Dadi Sorabji, c/o The Scindia Steam Navigation Co., Central Bank Building, Calcutta, India.

"I have been very busy reaping profits. To date I have made \$184. This is spare time only and does not count the position I received through my Radio-Trician card." Wayne L. Perry, Jr., 1638 W. Lowden Street, Philadelphia, Pa.

"I have earned money enough to pay all our living expenses, also payments on a \$7,000 home besides paying for the course and now have more money in the bank than we had two years ago when I started the course. Have not found a radio service job that I could not fix." Geo. A. Weston, 715 Gettysburg Ave., Jackson, Michigan.

My Faith in Radio's Future

By A. ATWATER KENT

MY belief in the future of radio extends to every field of the industry, for improvement in one branch brings development in others. With better broadcasting, more people wish to hear programs; therefore, more radio receiving sets are sold.

With improved mechanical facilities for both broadcasting and reception, there is greater satisfaction all around.

There are great things ahead for radio. My belief that the future of radio is even greater than past or present has caused me to expand our present manufacturing area from fifteen and one-half to thirty-two acres. This was necessary in order to meet the steadily mounting public demand for Atwater Kent sets and speakers.

In these days of modern, high-speed business, it is a real privilege for any man or woman to have a part in this romance of radio. Any large undertaking is interesting and brings forth a thrilling response from every person connected with it in any role carrying responsibility.

Radio has all this thrill and, in addition, it has the appeal of adventure. Developments come so rapidly, new vistas open up so suddenly, the circle of activity widens so quickly, that every day brings a new opportunity for action.

There are never any dull days in radio. All groups—manufacturers, broadcasters, engineers studying the science of this new and mysterious means of communication, and the listeners at the loud speakers—all get a new thrill at almost every hour.

Those of us who are deeply immersed in the practical development of radio may perhaps fail to realize, at all times,

what a great adventure we are engaged in. Personally, I am deeply grateful that circumstances have cast my life in this intensely interesting field. I enjoy it thoroughly. Indeed, speaking with complete candor, it gives me a tremendous happiness. I get a "big kick" out of it and I'm sure that everybody else in radio gets the same thing. Nothing has ever taken hold of the imagination of the people as radio has, and I'm proud to be able to play the part I have in its development and wider use.

I could not be happy doing the same thing every day in the same way, cut and dried to order. I like a game which puts me on my mettle, which makes me keep my wits about me, which forces me to meet and beat new problems.

When you are engaged in such an activity your life is full, your hours fly quickly, the zest of achievement is in your work and the reward of success is waiting for you just around the corner. Such work, I think, keeps one young and happy.

It seems trite, perhaps, to endeavor to list the advantages of radio, its influence on our life and customs, the manner in which it has become a part of every-day things in which we are all interested, the great extent to which it has become a vital influence for good in the social, cultural and educational life of the nation.

It is easier to vision what radio now means by trying to imagine the void that would be left were radio suddenly abolished. Just a moment's thought shows us that, having seized this new instrument with such avidity, its absence now would actually be looked upon as a national calamity. We could not again live without radio.

Radio has added a new side to our lives, just as did the airplane and the automobile. It has passed through much the same stages of development which they encountered and it will become permanent just as they have become established.

There are now better facilities for broadcasting and better facilities for hearing the worth while programs on the air. There are millions more listeners and a greatly increased number of purposes for which radio is employed.

There is stabilization in every field of the industry.

During the last two years broadcast programs have become better and better, until now the millions of people constituting the great radio audience may hear the best in music at almost any hour. Of course, we shall have always trivial programs on the air, the same as we have varied entertainment on the screen, but there are better programs on the air now than ever before.

I have been delighted to note that there is a keen appreciation on the part of the public of the advantages and privileges it now enjoys from radio. The public realizes that this great growth has been made possible by the willingness of manufacturers, broadcasters and others to spend millions for development and promotion. Surveys of the industry indicate that the public is showing its appreciation in the most effective manner—by the purchase of radios in steadily increasing volume.

Buyers' demands greatly exceeded production capacity of our plant, in spite of the fact that we were turning out



Mr. Kent testing his two millionth set. This set was given to President Hoover.

construction of this acre addition.

It is a matter of pride with me to realize that this is the largest radio plant in the world and one of the large industrial plants in the United States. We have been able to change fast enough, to do new things fast enough and to solve new problems fast enough to lead or keep abreast of radio development.

This should be a source of gratification to all of us because radio has become, in its short life, one of the major industries of the country. In view of the amazing things that have come from radio in the last few years, he would be bold indeed who would undertake to predict its future. But assuredly all of us in the radio game have many more years of thrilling adventure and satisfaction in accomplishment ahead of us.

The Atwater Kent Radio factory is the world's largest. Thirty-two acres of floor space. Provides employment for 15,000 persons. This huge plant demonstrates Mr. Kent's faith in Radio's future.



Student Keeler finds few things more fascinating than working with his Radio lessons and experimenting with his "high-power" set shown here.



Hi! Radio-Tricians- Meet Student Keeler

"DAD" KEELER at 83 claims to be N. R. I.'s oldest student. And, believe me, he has more down-right pep and genuine interest in Radio than a lot of younger men I have seen in my day.

Although student Keeler is old in years, he is young in spirit and in his Radio enthusiasm, and I call him one of "my boys" with the same feeling and interest as I do when speaking that way of any of my Radio students.

Student Keeler served in the Civil War—I wonder how many other N. R. I. men can say that.

He now lives at Deer Lodge, Montana. He has a big 10-tube Radio set, and from his knowledge of Radio stations all over the world it didn't take me long to recognize the fact that he is some DX hound when it comes to working his set. He keeps it in perfect repair and operation. He also has an amplifier unit and provides his neighbors with plenty of Radio entertainment. He says that he has done more to sell Radio sets in Deer Lodge, Montana, than anyone else he knows of.

Dad Keeler's son is a chip off the old block—he has a real interest in Radio too. His son is connected with one of the large Radio manufacturers in Oakland, California.

Just recently student Keeler paid his second visit to the Institute. He makes it a point to stop by and see us every time he comes to Washington, and, believe me, we are mighty glad to have him and show him around the place—the same as we are glad to have any N. R. I. man with us who stops over in Washington.

"Dad" claims that the older he gets the greater his interest in Radio becomes. He said "you know I get out of sorts when I see how so many young people pass up Radio opportunities. Many of

them don't realize just what is ahead in Radio. Why, if I were young again I would get into Radio 'right' with both feet and do the job up in a jiffy." One doesn't have to be around student Keeler long to know that he is all "sold" on Radio and Radio's future. He doesn't hesitate to advise any man today to dig in on his course harder than ever, get everything he possibly can out of his training because there is a real chance ahead to cash in on it.

Not only does student Keeler claim to be the oldest N. R. I. student, but the oldest Radio student in the world pursuing a regular course of instruction. We are mighty glad that we can have such an enthusiastic "young man" in our student body as "Dad" Keeler. J. E. S.

Radio Essential in Aviation

(Continued from page 4)

he had fastened an automobile generator driven off the fly wheel of an out-board motor to charge his storage batteries, anyone would think that he had put in a full day.

Soon as evening camp was made Mac's real work started. He would send an Indian up a tall tree to fasten his portable aerial, and radio communications would commence.

Sometimes Captain Stevens and I would fly into the main camp and after the business messages were finished we would sit around the campfire in the jungle and listen to jazz music from (KDKA, short wave) Broadway, New York, 4000 miles away.

The only way that any expedition can find its way in unmapped territory is to guide itself by navigation, just the same as a ship at sea, with sextants, chronometers, celestial sights, and correct time.

So, every noon Mac had to set up his

(Continued on page 15)

Self-Confidence Will Help You Crash Through

By E. R. HAAS, Director



SELF - confidence is something of which very few of us have too much. It is one of those rock-bottom essentials to a big success in any line. It will pay you to try yourself out—see how much self-confidence you have, how you can make it work for you, and how you can develop it more.

"I can and I will" is the basis of self-confidence. Some men go through life without knowing they possess POWER simply because they haven't had the self-confidence to test themselves out. They haven't called upon that POWER to work for them.

Take the boy who used to dive first from the shore at the old swimming hole. Then—step by step—gaining confidence each time he raises the height of his dive until finally he is cutting curves from the highest branches of the old elm on the bank.

But—if he had never taken the first dive off the shore, he still would be shuddering at the risk the fellows take who climb to the top of the elm tree.

Self-confidence comes the same way—step by step.

It comes from meeting each and every emergency and opportunity with "I can and I will."

A man can never do his best work unless he tackles the job with a feeling that he can do it—and do it well or find out the reason why.

Don't confuse self-confidence with egotism.

Egotism is blind conceit.

Self-confidence is merely recognizing your ability, and so conducting yourself that others will get the impression that you "know your stuff"—that you are willing to back your work up to the limit, and if you can't put the job over—then

you will step out and let someone in who can. That is the spirit that gets across—that is real self-confidence and it is a good idea to take stock and see just how much self-confidence one has, and cultivate and develop it. A "self-confidence" can be built up that will carry you over the rough spots and help you win out against big odds.

As you go along in your Radio course, study it hard, master all the details as well as the big basic facts. Then you'll have the knowledge that you need to do high class, expert Radio work.

Once you acquire that knowledge and power—that specialized Radio ability—USE it. Don't be afraid to tackle Radio jobs. Go into every one that you start thoroughly—master it—step by step—tackle it with a feeling that YOU CAN DO IT. That's how you develop self-confidence. It comes through experience—through tackling new jobs and doing them successfully.

Approach your prospect or customer with a confident air; walk, talk, and act as though you believe in yourself. Unless you do this—unless your actions are backed up by your own belief—how can you expect others to believe in you?

It doesn't matter how great one's ability is—how complete one's education is—his achievements can never rise higher than his own confidence. You can never go higher than you THINK you can.

So look ahead to your Radio work with confidence. Back it up with vigorous, never wavering self-faith. That's what counts. That is what the world expects, and that is what you will want to do to reach the top.

There are big things ahead in Radio for men who know Radio and know how to convince others that they know it. It's the men who have given a little thought to developing self-confidence who will make still more money in Radio.

So I say it will pay every one of us to stop once in a while—take stock of ourselves and see if we really believe in ourselves. The man who knows Radio and knows he does will go far.

Radio Communication on Trains

By J. A. DOWIE, Chief Instructor, Member I. R. E.



Recently, a large group of railroad officials and radio engineers witnessed a successful public test on radio communication using a 110 car freight train running from New York to Utica,

the train was 8 miles away. The communication is afforded by small, compact, low-power radio transmitters and receivers operating in the 109-130 meter band. At this wavelength, the equipment on the train demonstrated that its use set up no interference with outside broadcasting or public radio reception, and in turn it was noted that other broadcasting service in no way interfered with the train communication.

One of the principal features noted by the observers aboard the train was the simple and easy manner in which communication was interchanged. Pushing a button in the caboose caused a piercing whistle to issue from the powerful loud speaker located in the cab of the locomotive over the signalman's head.

The engine man had only to pick up a familiar type of hand telephone to establish the connection and the conversation between himself and the conductor in the caboose was carried on as easily and clearly as an everyday telephone conversation in the factory, office or home.

This easy method of talking between the extreme ends of a long freight train, if put into general use, will serve to reduce to a minimum hitherto unavoidable delays in the movement of this class of train. These delays arose because of the distance intervening between the locomotive and the caboose, which limited the carrying on of communication by hand and light signals or the dispatching of messages on foot by members of the

crew. All three of these methods were normally slow and have proved for years great consumers of time. In the case of radio conversation, a communication was instantly with all train movements promptly made and at a considerable saving of time as compared with present practices.

By the general use of this radio equipment, the railroad observers pointed out, there would be a material cutting down of delays to freight trains, that result from occasional incidents such as the parting of an air hose, the development of a hot box, or the necessity of setting up cars on side tracks between terminals.

Another feature of the simplicity in the use of this equipment is that it is adjusted and tuned to the particular wavelength desired, at terminal points. The entire apparatus is then locked up and no attention is required by the train crew during a trip.

The starting and stopping of the transmitter is all automatically performed by the simple action of picking up the telephone.

The equipment used on both locomotive and caboose set was designed by the General Electric Company of Schenectady, and it is comparatively of simple structure and compact. On the locomotive, a metal box holds the transmitter and receiver. It is made up of steel boiler plates, welded together, and is installed on the deck of the tender. It is completely weather-tight, being made to exclude water or other foreign material. The entire assembly is supported by eight springs, and in addition a system of snubbers is provided to prevent excessive oscillation.

The transmitting compartment contains three 50-watt tubes and one 7½-watt tube. Four of the latter size tubes are used in the receiver. The 7½-watt tubes are of the standard train controlled type, the reliability of which has already been proved by extensive use in Signal Department service. The 50-watt tube is a standard design used for aircraft and marine applications for a number of years.

The power unit for the equipment, which contains the necessary dynamotors, filter condensers, reactors, etc., is also housed in a metal container. Two dynamotors are utilized. The larger one



Photo showing engine man using a microphone of radio equipment used for radio communication on train. (Courtesy of General Electric Co.)

operates only when transmission is taking place and supplies plate voltage at 1000 volts, direct current, to the transmitter. The smaller machine runs at all times when the equipment is on the road and delivers plate voltage and bias voltage for the radio receiver. The use of this small machine permits the elimination of all batteries in the set.

Power on the locomotive is supplied from the headlight generator, no storage battery being required. On the caboose, a standard generator, driven by a belt from the axle, is used to charge a 32-volt storage battery. This battery supplies all the power required for transmitting and receiving. The total amount of power drawn by the equipment when transmitting is approximately 30 amperes at 32 volts, direct current, while in receiving, the current is approximately 5 amperes. This is the current required by the receiver dynamotor and the receiver filaments.

The loud speaker used in both engine and caboose is of a special type capable of producing a maximum amount of voice volume, and designed especially for these train sets. One loud speaker is bolted to the roof of the cab over the engine man's head. The other is mounted to the roof inside of the caboose. The opening for the sound is protected by means of a heavy wire screen so that an accidental blow will not damage the sound producing unit inside.

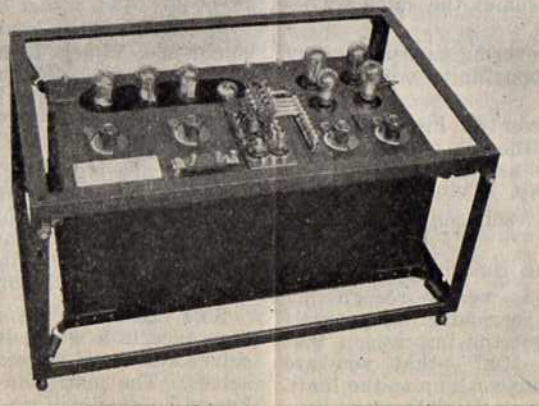
The antenna on the locomotive consists of a brass pipe mounted around the water tank of the tender. It is supported on insulators about 12 inches above the metal framework and is so low that it does not interfere with taking on water and coal. On the caboose, a simple wire antenna is provided.

Other routine communication intricate to the operation of the train which would have otherwise required considerable time to relay between the cab and the caboose, was speedily carried out on this trip with any delay completely eliminated by the use of the radio equipment.

Photo showing transmitter and receiver unit used for radio train communication.

Courtesy of General Electric Co.

Note: Details of exact circuits used in this transmitter and receiver is not available.



Radio Engineers See Big Future for Radio

By R. S. HUDIBURG, Assoc. I. R. E., Member N. R. I. Staff.



I WISH every N. R. I. man could have attended the recent convention of the Institute of Radio Engineers held here in Washington in May. Those students and graduates who came went home with a new determination and a firmer belief in the great future for Radio

and the men in it. It looks good to see N. R. I. pins on the lapels of Radio engineers who are becoming famous. It was fine to have these fellows come out to the Institute and bring with them some of the leading figures in Radio. We hope nobody's lessons were delayed during this time as we were kept busy for three or four days showing these visitors, from all parts of the country, the big organization we have here to serve N. R. I. men.

The convention was a big success from the first day when we all went down to the White House to meet President Hoover to the final adjournment at the National Academy of Science. Since Washington is recognized as the center of Radio, everyone was busy going through laboratories, broadcast stations, and departments of the Government that are aiding the development of Radio.

An entire afternoon was spent at the Naval Research Laboratory where we saw some of Uncle Sam's experiments in precision measurements, Radio compasses, aircraft and submarine transmitters, chemistry and physics.

At the U. S. Bureau of Standards we saw some of the most delicate recording and measuring instruments in the world. Of great interest were the experiments in which three transmitters used the same aerial but operated on different wavelengths without interference. This new principle may greatly relieve the present congestion on the air.

At the National Academy of Science—one of the most interesting buildings in Washington—models of all types of electrical instruments were inspected. The unusual feature here was the privilege extended visitors to conduct their own experiments, from simple battery reactions up through the most complicated demonstrations of cathode and infra red rays.

The mornings were filled with the discussions of various papers submitted by some of the greatest

Radio authorities in the world. The three outstanding discussions of these meetings covered Television and telephotography, the use of Radio in Aviation, and the use of Radio in motion pictures.

These three fields are comparatively new but their future is beyond the imagination of the average man. Television, while in its infancy, is rapidly nearing commercial perfection. Its history and possibilities were discussed by Dr. Alfred Goldsmith, the foremost engineer of the Radio Corporation of America, and Mr. C. Francis Jenkins, the noted Washington inventor and pioneer Television experimenter. The latter freely predicted that Radio will soon bring into the home what he called "Radio-vision reception" of such events as inaugural ceremonies, baseball games, flower festivals and baby parades.

The discussions of the Radio principles that are being applied to the talking movies were very instructive. Experiments in Television and Radio indicate that in time we will have "talkies" right in our own homes. The day is not far distant, according to leading engineers, when the American stage can be brought into our very parlors.

The delegates felt that the future of Aviation depended upon the development of Radio. With the sky offering smoother highways than steel or concrete, commerce and industry are going to depend more and more upon aviation for transportation. Since Radio is the eyes and ears of the plane, there is hardly a doubt but that the next few years will see a great network of Radio beacon and compass stations throughout the country. It is thought that aviation's need for Radio may even gain precedence over the present amusement angle at least in the higher frequencies.

One of the features of the convention was the banquet held at the Mayflower Hotel, at which Dr. A. Hoyt Taylor, President of the I. R. E., awarded the 1929 medal of honor to Professor G. W. Pierce of Harvard University for his pioneer contributions to Radio engineering literature in the field of Piezo-electricity. The Morris M. Liebmann Memorial prize of \$500 was awarded to Professor E. B. Appleton, of Kings College, London, England, for his investigations in Radio transmitting phenomena. Dancing, novelty acts and a demonstration of Photo-Radio followed.

Following this program, the audience was held spellbound by the speeches of such great pioneers of Radio as Dr. Taylor, Mr. Lee De Forrest and Dr. Pierce. These men traced the progress of Radio from their own early experiments through the present great developments as well as predicted probabilities of the future.

These predictions of coming wonders would have stirred enthusiasm in stone images. That opportunities now existing as well as those thousands of new positions which are opening up right along, make the writer feel, that in the next few years an avalanche of men will storm the gates of this baby-giant industry. The fellows in Radio today are fortunate to have the lead on the tens of thousands of men who will be clamoring for admittance into this field when the great opportunities become generally known.

While unanimously agreed that the future of Radio offers possibilities beyond the imagination, the present contains big problems—the biggest being the need for men who know Radio, to fill the existing gaps. I heard this on all sides from engineers, manufacturers, jobbers and retailers—that the real need in Radio today is for trained men. It made me mighty glad to know that N. R. I. is training men who are capable of filling these positions.

Size Up Your Prospect

HERE'S a good tip on the importance of sizing up your prospect. You can't always tell whether a man who wants some service work done is a good prospect by just looking him over, but sometimes you will come out way ahead by giving this matter a little thought—unless, of course, you just want to go "on a lark."

Student Fred J. Robinson, who lives up in the mountains in New Mexico, wrote this about one of his prospects. You will get a "kick" out of it—read it:

"A Mexican came for me to fix his set. He said he could not make it work. I started out with him in my car and drove up into the mountains about six miles to a place where it was so rough we couldn't go any farther. Then we left the car and walked across the mountain three miles farther before reaching his home. You will laugh at what I found there—it was a little crystal set about four inches square and looked like one of those premiums that comes with a can of coffee. "The nearest station was 300 miles and this little crystal will do that—sometimes when it is working good. I went to work on it, fixed the ground wire up, and brought the aerial in and made it so he could get some sort of reception when conditions are favorable.

"Then he wanted to pay me, but he didn't have any money—so what do you think he did? Well, he went out and caught one of his little GOATS, and gave it to me for my pay!"

(Signed) FRED J. ROBINSON, Cleveland, New Mexico.

So size your prospect up carefully—unless you want to go on a lark.

J. E. S.

The other day a misinformed gentleman made the astounding assertion that the airplane would supplant the automobile in a few years. Absurd isn't it? But it is just as absurd to contend that the battery operated set will be replaced by the set operating from A.C. electric current. 12,000,000 homes in the United States alone without electric current are without the benefits of radio according to statistics compiled by the Federal Radio Commission. This means that there is still a tremendous market for the battery operated receiving set.

BULLETIN

Student S. C. Milheim is asking the assistance of N.R.I. men in locating his daughter, Helen Claire, who disappeared April 27th, 1929, near Milton, Pa.

Helen is 14 years of age, has light brown bobbed hair, blue eyes, weighs about 106, is five feet two inches tall, and has a slight scar on the right side of the neck.

She was last seen with a bus driver named Samuel Sulouff. The latter is about 30 years old, weighs 175, height five feet nine inches, has black hair and brown eyes.

Anyone knowing the whereabouts of either of the above, please notify the father at R. D. No. 3, Milton, Pa., or the National Radio News.



Doubles Income Increase Each Year

Dear Mr. Smith: The first year after taking your Radio course I made enough extra money above my regular salary to buy a new automobile. Also, my increase in income has just about doubled each year since completing the course.

Furthermore, my present work as Manager of the Radio Department of the Murray Sales Company is much more congenial and not nearly as hazardous as my previous work as locomotive fireman. With the line-up ahead of me I feel that I'll earn at least \$4,000 in Radio this year.

You can see from the above that my investment in your course has paid me a very high rate of interest. To you and "Chief" Dowie goes the credit, and I'll always be glad to speak a good word for the N.R.I.

I would most certainly advise any man to study Radio either as a spare time or full time proposition. There's a future in Radio for the men who know Radio.

Yours truly,

(Graduate) HARRY LABORDE, 2010 First Ave., Perry, Iowa.



I admire Graduate LaBorde's spunk. The work he was in offered no future. He saw HIS future in Radio. He lost no time getting into it. He studied, worked—mastered it thoroughly. Today he is reaping his rich rewards. Watch him—a man of his ability and determination can go far in Radio.—J. E. S.



The Gunn Altimeter perfected by Professor Gunn of the Bellevue Naval Research Laboratories is heralded as one of the biggest Radio developments in the aid of Aviation yet produced. This Altimeter is so precise and accurate that the pilot can know at all times his exact height above the ground while landing under the most hazardous conditions in foggy weather. It is expected to render a big service and give a big impetus to commercial Aviation.

Stewart-Warner announces a new receiver with a special television hook-up. This new line of sets, according to Vice President Zucker are provided with terminals to make the amplifier stages applicable to television by connecting the outlet of the television receiver to the amplifier. So, when television "breaks" on a big scale, these sets can be used for both types of broadcasting.

The average Radio set is used 8 times more than it was in the early days of broadcasting. A recent survey shows that the average is from 2 to 8 hours a day. The higher quality programs offered now and the big improvements in tone reproduction are doubtless responsible for the increased use of sets.

Developments in the short-wave field have been remarkable. Marconi has perfected a transmitter by which he sends 4 messages on the same wavelength with the same antenna and transmitter at the same time.

According to reports recently gathered by the United States Department of Commerce, 1929 will be a record year in volume of Radio business done.

Over 6,500 dealers—or just one-fifth of all the Radio dealers in the country reported that in the first three months of 1929 they sold 154,970 Radio sets. The average retail price per Radio set was \$165.00. At this rate the total year's volume will reach a new high figure.

Great progress has been made in adapting Radio receiving apparatus for use in automobiles. At a recent show held in New York City the installation of Radio apparatus on automobiles was proven to be practical, feasible and offering exceptional opportunities for further development and use.

The new improvements that have been made on these special receivers have cut out noises and squeals caused by the high tension ignition

system on the car, and insures good reception while the motor is running and the car traveling at a rate of 50 or 60 miles an hour. The dials are mounted on the instrument board, and can be operated easily while the car is in motion. It seems certain that many of the finer cars in the next year or so will be equipped with specially designed Radio receivers.

The Radio Corporation of America has recently inaugurated a nation-wide communication service in competition with the land wire systems. Radiograms can now be transmitted from New York to San Francisco at the same price that telegrams are being sent. The intense activity and unusual developments in the Continental Radio communication field indicates that much development work is right ahead with an increasing demand for skilled Radio men.

A new Radio telephone system recently perfected by Radio Engineers of the Canadian National Railways is another triumph in Radio's onward march. While the train was traveling at a speed of 40 miles an hour west of Toronto, the vice-president of the railroad picked up an ordinary desk telephone at one end of the passenger car and got in touch with the general manager of the railroad back in Toronto.

The principle of this new apparatus throws the voice to the telegraph wires which lines the right-of-way of the railroad. It is then carried to the terminal point and there connected with the ordinary telephone line. All of the apparatus on the train has to do is to establish contact with the wire along the right-of-way while the train is speeding along at 50 miles an hour.

Here's a new one—gold is being used in the new 900 series Stewart-Warner sets. All connections in these sets are being plated with 22-karat gold. This, according to their Radio engineer, does away with loose connections. Also cracking, shriveling and corrosion are reduced to a minimum.

WGY's short-wave station, W2XAF, has inaugurated a special series of afternoon broadcasts for European listeners. Programs are daily except Saturday and Wednesday. They are expected to afford Radio engineers of the British Broadcasting Company an opportunity to carry on experiments in reception and rebroadcasting of trans-Atlantic programs. The time is not far distant when the famous concerts and festivals of European capitals can be brought into American homes by Radio.

Radio Essential in Aviation

(Continued from page 8)

receiving set, gather the engineers around him and receive the time signals from Washington, D. C., that were so important.

Mac made his first contacts with Aviation on this expedition, and has been getting air-wise and studying Aviation ever since.

Now he is one of the radio engineers who is designing and installing the radio communications systems for the Pan-American Airways—through Central America and the West Indies.

The Hamilton Rice Expedition was the first to use an airplane in exploration work and one of the first to make effective use of radio communications.

Our experience on this trip proved conclusively that there was two essentials for every exploration expedition, namely—airplanes and radio. That has been proved time and time again. And I often live over the Amazon trip again as I sit and listen to the radio, bringing me news from my friend and flying companion, Dick Byrd, way down there near the frozen South Pole.

And speaking of Dick Byrd, reminds me of a letter I just received this morning from the Explorers Club in New York, asking me if I will speak to Dick over the short-wave radio on June 15th from 10:00 to 11:30 p. m. Eastern Standard time over Station WGY.

I have been getting a quantity of information from McCaleb on the new radio equipment that the Pan-American Airways is installing, and I've been getting more information for the same type from the Bureau of Standards here in Washington. The new aids to aerial navigation are nothing short of marvelous, and will make the operation of the aircraft by far the safest and best method of transportation in the world.

Just take the Radio Directional Beacon. This is a device that keeps an airplane pilot on his course. It does not make any difference whether it's day or night, rain, fog or snow that the pilot must fly through. It does not make any difference whether the pilot can see the ground. And more than that the pilot need not know how to navigate—when his plane and the airway are equipped with the radio directional beacon.

Most of us think that radio waves are radiated in all directions from the antenna, and that's true, but the radio engineers have rigged up a combination of aeriols so that they obtain a DIRECTIONAL RADIO BROADCAST BEAM that can be directed to any point on the compass that is desired.

There are two types of radio directional beacons, the visual type that operates a registering device on the pilot's instrument board and the audible type that sends the signal through a set of head phones the pilot must wear continually.

The beam is broadcast out over the airway, for instance, in a straight line from Cleveland to Chicago. The main characteristic of the beam is that it is in two parts, each of different wave length. Where these two wave bands come together in the center of the beam, is the region of least intensity. From the center out towards the right and left sides of the beam the intensity increases.

The new instrument on the pilot's dashboard

is made with two little reeds of steel that are sensitive to radio wave vibrations. One reed is tuned to the right side of the band and the other reed to the left. As soon as the plane enters the beam these reeds begin to vibrate, and can be clearly seen by a glance at the instrument. If the pilot steers a course in the center of the beam, the vibration of the reeds is equal. Should the pilot start to fly to the right of the center of the beam, the right hand reed vibrates more than the left, and vice versa, thus showing the pilot that he is getting off his course, and in which direction.

As can easily be seen, the pilot need not be an expert navigator, he need not see the ground, he need not even carry a map, so you see the science of radio, applied to an age-old problem, increases the usefulness of the world's newest means of transportation.

The radio beacon that sends an audible signal broadcasts two letters of the Morse code on the split beam. One letter on each side. If, for instance, the letters were A on the left and B on the right side of the beam, the pilot could easily tell whenever he was off the course by which letter he heard.

Of course, the radio directional beacon only tells the pilot whether or not he is headed in the correct direction.

But the Radio-Aviation specialists have gone farther than that. In the pilot's cockpit is a chart of the course, which, by the way, may not always be in a straight line.

Ever so often along the course will be a "Localizer Beacon" that sends "UPWARD" a radio signal, characteristic to each localizer beacon.

By checking each localizer beacon, with the chart of the course, the pilot can tell just where he is, without being able to see anything outside of his cockpit.

The General Electric Company and others are working on what is known as the Radio Capacity Altimeter, which, when perfected, will tell the pilot just how high he is above the land. This device, which is nearing perfection, will make it possible for an airplane pilot to make a safe, accurate landing without seeing the ground.

I could go on at length and describe the many uses for radio in connection with Aviation, but that would take more space than has been given me here.

But I want you to get clearly in mind that Air Transportation must be organized on a much more extensive and efficient basis of communications than any other means of transportation. The pilots should have continual weather reports while they are in the air. They should be informed of weather and field conditions at the field they left, the fields along the route and the field to which they are bound. Dispatching information, communications between planes in the air, and between the planes and the ground are all essential to good air transportation service and are being developed and installed on the established air routes as rapidly as possible.

The greatest difficulty being experienced by the air transportation companies is not to obtain good equipment but to obtain trained men who know radio and enough about aviation to apply radio to it. Just as there is a great deal more to radio than using a telegraph key, so is there a great deal more to Aviation than piloting a plane. The far-sighted, clear thinking, young man of today who wishes to advance himself with the advancement of world progress should get into either radio or Aviation, or a combination of the two.

In these two great new industries the field is wide and open, and your future is what you will make it. There is nothing to hold you back but lack of knowledge and training.

Now days you can hear old men who have not made a success of their lives, who are broken and bent by toil and disappointment say, "If I had only had a chance to learn something I could cash in on. I could live without worry today."

Twenty-five years from now any old man that says that will not deserve consideration and charity. He will have had his chance to get education and opportunity—and that old man may be YOU.



Broadcasting from the sky

Below: A jazz orchestra doing its best before the "mike" while soaring high in the air in a big cabin plane. The successful experiments in broadcasting from plane to ground have opened up a new field rich in opportunities for Radio men. Commercial aviation has been stimulated immensely by Radio's developments.

Plans Plane Driven by Radio Waves

A Los Angeles inventor, Maurice Poirier, predicts that in the future airplanes may be driven by power transmitted from land stations. His working model, the "Spirit of Night," shown above is equipped to receive Radio power and has a reserve rocket power system for quick take-off and to attain greater speed. From what Radio has done in the past 10 years it is not unreasonable to believe that transmission of power may be accomplished to a practical degree in the future. Only a few short years ago people ridiculed the idea of a man's voice being carried around the world in a fraction of a second and the other marvels that Radio has accomplished. The bigger things are still ahead of us in Radio.



A Radio Equipped Plane

Thousands of passengers are being carried in big cabin planes every year. New air lines are opening up right along. Notice the arrow in this picture. It points to a wind-driven generator just under the top wing. Under the new International Air Regulations a Radio operator is carried to attend and operate the Radio apparatus. Big airplanes are being built now with a separate cabin for the Radio equipment and the operator. Radio men will also be needed to install and operate the Radio apparatus at the airports.