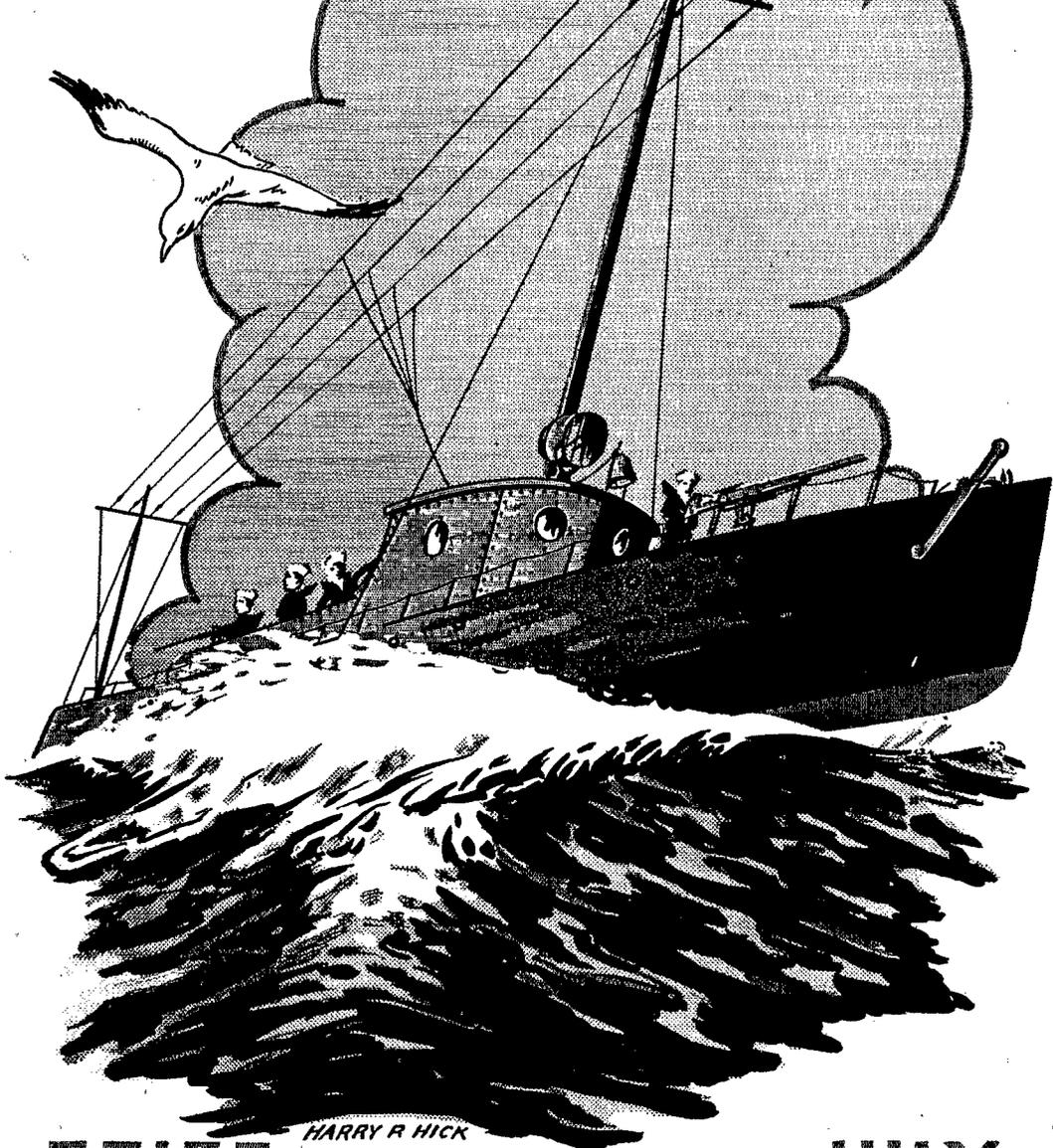


QST

A MAGAZINE DEVOTED EXCLUSIVELY TO THE WIRELESS AMATEUR



PRICE
15 CENTS

JULY
1917

War Results

Q S T -- Volume One

This temporary closing up has given the Editor a chance to look around. Result—he has found enough copies of Volume I to have ten copies bound in first class style. You all know how scarce these copies are.

In this volume will be found the audion articles by Paul F. Godley, four of the Old Man's "Rotten Stuff", and no end of interesting material.

Besides Volume One, we have 15 bound copies of Volume Two, First Half.

This is an opportunity to complete your file of QST, and at the same time possess yourself of something worth while. Covers and all are bound, making the year complete.

SOLD TO FIRST ORDERS

10 copies QST, Volume I, \$5.00 each

15 copies QST, Volume II, 1st Half. . . 2.00 each

The QST Publishing Company, Inc.

Care of Editor

HARTFORD, CONN.

QST

Volume II

JULY, 1917

No. VIII

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Hiram Percy Maxim, President

Clarence D. Tuska, Manager and Editor

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HARTFORD, CONN.

Commander Todd Has a Word For the Amateurs

N. S. E. 114

ADDRESS DIRECTOR NAVAL COMMUNICATIONS
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AND REFER TO NO.
21762-47 /S.

NAVY DEPARTMENT
NAVAL COMMUNICATION SERVICE
OFFICE OF THE DIRECTOR

ENCLOSURE

WASHINGTON, May 28, 1917.

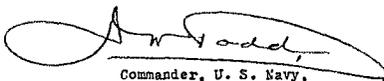
Mr. C. D. Tuska,
Manager and Editor,
"QST" Magazine,
Hartford, Conn.

My dear Sir:-

I have to thank you for the June number of your magazine, just received, and note your editorials on pages 21 and 25.

Your well worded advice to your readers is just what we want. The opportunities for real service are excellent. Not only should young men liable to be drafted for military service enroll, but your boys from 17 to 21 should take this opportunity to get a course in one of the naval schools, Boston (Harvard University), New York, or San Francisco, and see some service, either in the Fleet, in the Patrol Force, or on aircraft.

Very truly yours,



Commander, U. S. Navy,
Director Naval Communications.

Q — S — T

A Magazine Devoted Exclusively
to the Radio Amateur

Wanted: By Uncle Sam: 2,000 Amateur Wireless Operators

THE demand for Radio Operators is daily becoming greater. The call from our Country is one which no patriotic reader should overlook. The purpose of this article is two fold; first, we are starting a campaign for 2,000 operators; second, we are going to point out the wonderful opportunity which is offered to every amateur. Already large numbers of our members of the American Radio Relay League have answered the call. Many more will go into the service as a result of this article which is intended to make clear a few of the doubtful points.

At the outset all will probably agree that this is a call of humanity and before it is over every one of us will have to play his part. To play your part and do your bit, —does not mean you must shoulder a gun. Your part if you are a radio operator is to serve in that capacity. Your duty is to enroll today. Uncle Sam must have wireless operators. You must not fail him in this hour of need.

HOW TO SERVE YOUR COUNTRY

A division in the Navy has been created which is known as the Naval Reserve. The purpose is to provide a class which enables you to serve during times of national peril and war. In the Reserve you are free to ask for your discharge during times of peace. The Naval Reserve offers special

attractions to you as a radio operator. It gives you not only an opportunity to do your duty, but it also gives you one of the finest educational courses in the country.

THE SCHOOLS

Take a look at what is offered. In order that you should be informed, the Editor visited the proper authorities and came in contact with the actual conditions. The highest praise will only do justice.

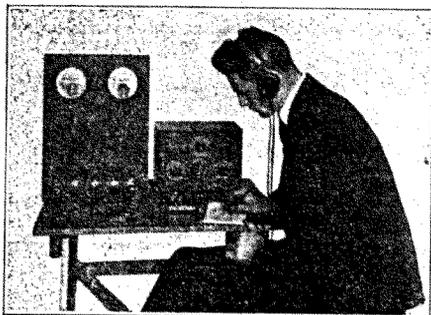
At Boston, Harvard University has turned over to the Navy Department one whole building. This is Pierce Hall. In this school at the present time one hundred and fifty Radio Electricians are being trained before being given their assignments. In this building the men sleep, eat and train. Code speed is worked up to thirty words per minute. Lectures on theory and apparatus are given. A small amount of drill work is taken up each day as a Radio operator is a Petty Officer and must know how to handle men. The operators are also put at secret code work as this plays an important part in Navy wireless. Nowhere will be found a better set of young men. They are a healthful, happy-looking lot preparing to take places on the mosquito boats, shore stations, and wherever needed.

In the Brooklyn Navy Yard it is the same way. Only there the school is not as large. The outline of the Radio Course is the finest substitute we have ever seen for a col-

lege course in engineering. Suppose you just look over the list to see what you are coming to:

SUBJECT

Machine Shop (bench work)
Magnetism and Electricity
Alternating Currents



APPARATUS FOR THE MOSQUITO BOATS

This gives a suggestion of the latest type of set which will be used on the boats

A. C. and D. C. Instruments
Batteries
Motors and Motor Control
Radio Power Circuits
Primary Circuits
Secondary Circuits
Condensers and Oscillating Currents
Radiating Currents
Transmitting Sets
Receiving Circuits
Receiving Sets
Service Radio Sets and Routine
Wave Meters and Measurements
Radio Regulations and Fleet Work
Radio License Booth
Review and Examination

The course in itself is a wonderful thing, but when you are told of the apparatus and demonstrations it becomes a thing to be sought after this very day. The best part of it all is, it's there for the asking only, and **THEY NEED YOU.**

PAY

Now in addition to all this you can hardly expect to be paid. But that's the way our Uncle Sam does things. He gives you unquestioned advantages and he pays you as follows:

Rank	Monthly Pay
Chief Electricians	\$72 00
Electricians Radio, First Class	61.00
Electricians Radio, Second Class	52 00
Electricians Radio, Third Class	41.00
Electricians Radio, Landsman	32 60

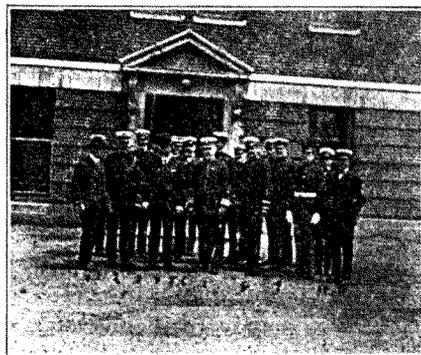
Besides this you receive uniforms, subsistence, and retainer fees. It really amounts to paying you each month and also looking after your expenses.

ENROLLMENT

An Enrollment Blank accompanies this article. Cut it out of QST. Fill it in properly. Go with it to the nearest Navy Recruiting Office. Have the Officer there certify as to your physical condition. Return the blank to us with the statement of your physical condition. We will get it to the proper headquarters. They will notify you when and where to report.

APPOINTMENT TO NAVAL ACADEMY

The law provides for the appointment each year of 100 enlisted men to the Naval Academy, the requirements being that the applicant must pass a competitive exami-

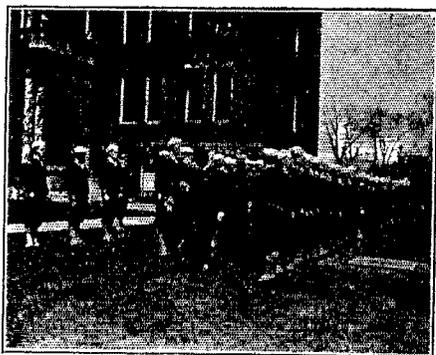


REVIEWING PARTY AT PIERCE HALL

1 Prof. Pierce	6 B. J. Leonard, Chief Electrician
2 Capt. Robertson	7 Capt. Rush
3 Lieut. Emmons	8 Lieut. Blakeslee
4 Pres. Lowell of Harvard	9 Gunner Dame
5 Lt. Col. Hall, U. S. M. C.	10 H. D. Kent, Chief Electrician in Charge
	11 Ch. Yeoman W. T. Coates

nation, must be under 20 years of age at the time of appointment, and must have been in the Navy at least one year at date of entrance to the Naval Academy. Examinations for entrance to the Naval Acad-

emy are conducted on board all ships and stations wherever there are applicants. In order to give young men a chance to prepare for this examination, classes are formed (with special instructors and the free use of all the training stations (and on board use of the necessary text-books. The can-



INSPECTING THE CLASS AT PIERCE HALL

didates who have the highest standing on the examination, and have successfully passed the physical examination, enter the Naval Academy on August 15th, and are admitted on exactly the same terms as midshipmen who are nominated by Members of Congress.

DOUBTFUL POINTS

If you don't wish to mutilate your QST, write us. We will send you another blank. If you don't know the nearest Navy Recruiting Office we will give you the address. The desirable age for operators is seventeen or over. If you have a question of any kind, ask us. Information will be sent promptly.

REMINDERS

You may enroll in the Naval Reserve for the period of the war or enlist in the Navy for four years. Uncle Sam expects every amateur to do his duty. So does the A. R. R. L. Try to see if you can't be number one or two of the two thousand operators who have been called for.

Personal Mention of Members in Service

See the report of Central District. We are indeed proud of the showing.

Jno. J. Fogarty—4DA, C. E. (R) U. S.

N. R. F. of Tampa, Fla., writes us an interesting letter at 4AM on watch in one of Uncle Sam's stations "Somewhere in America."

H. E. Rawson 7ZR of Kuna, Idaho, has placed his ranch in other hands and has come East to do his bit of war work with the General Radio Company, Cambridge, Mass.

John C. Cooper Jr., Manager of the Eastern Gulf Division has been sworn into the service as Ensign in the Reserve. He has temporary duties at the Charleston Navy Yard, Charleston, S. C.

Wm. D. Woodcock (formerly 8SK, then 8ZP) has been ordered to Cleveland.

Robert Leary of Buffalo, 80Q is now an instructor at one of the Naval Radio Schools.

M. H. Pancost, 80T has been stationed at Conneaut, Ohio in the U. S. Naval Reserve Force, Radio.

H. Peterson of Arlington Heights, Mass. has enrolled in the U. S. N. R. F. He is at Harvard University.

The apparatus owned by Paul Bauer of 1EMA has been commandeered by order of Lieut. Gawler, U. S. N. (former Radio Inspector). It will be used in one of the new Navy Stations.

Harold Bowen of Fall River, Mass., is Chief Electrician Radio on the U. S. S. Drysout. Mr. Bowen is formerly of 1ZF.

Lewis A. Gebhard, 8EA has received his assignment for Grand Haven.

Earl Voegeli of Bozeman, Mont., has joined the Navy.

John Garrett, 1SF has been assigned to Brooklyn.

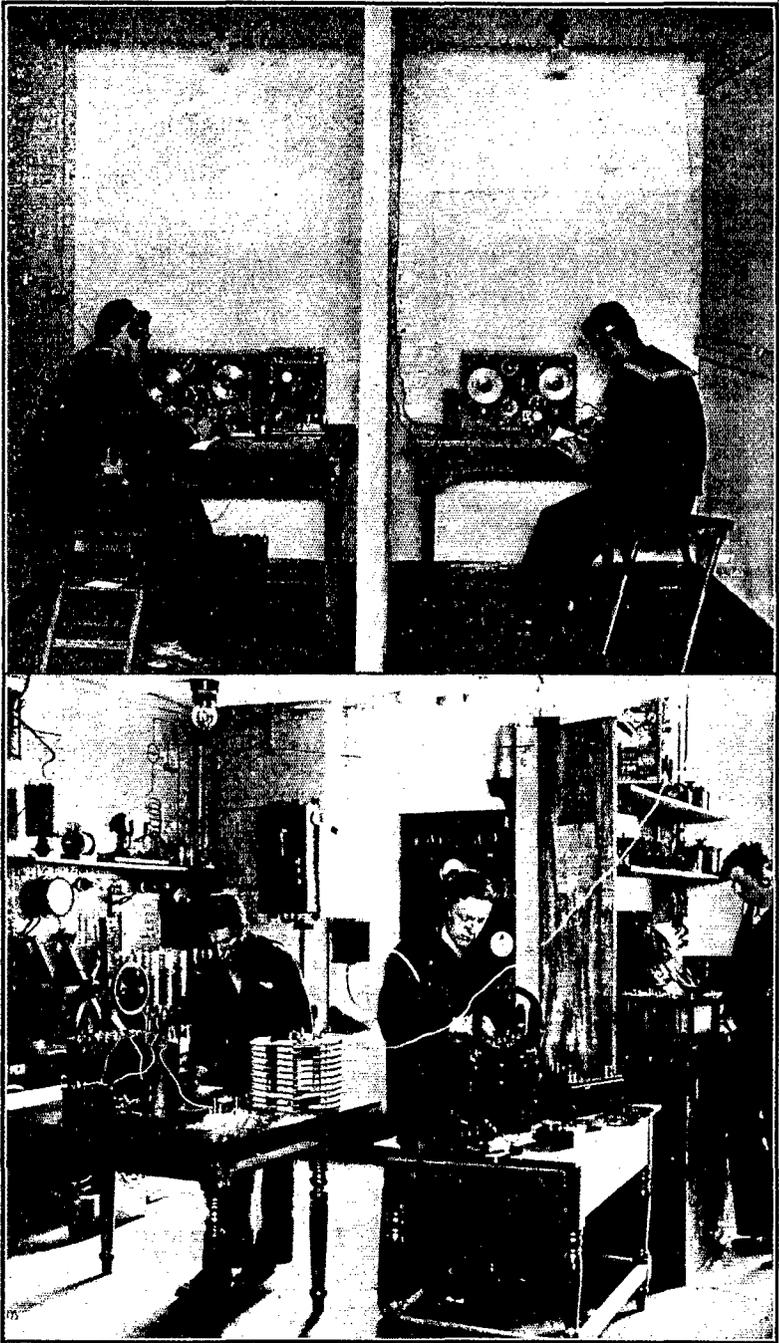
Owen Prothero, a Hartford amateur, is in the Radio School at Brooklyn.

M. B. West, 8AEZ has been promoted from Radio Censor to Asst. District Superintendent with Headquarters at Great Lakes.

H. A. Jackson of Nadiapolis, Iowa has joined the Navy and is at Charleston, S. C. on the U. S. S. Hartford.

Floyd L. Larson of Waterbury, Conn. is at the U. S. Radio Station in Porto Rico.

O. A. Poole, formerly of Wallowa, Oregon is now with the Signal Corps at Fort Leavenworth.



EXPERIMENTAL ROOM

You can get an idea of the opportunities from the apparatus shown

APPLICATION FOR ENROLLMENT IN THE UNITED STATES NAVAL RESERVE FORCE

(Chief Petty Officers and Lower Ratings)

Name : Age last birthday.....
Full name, surname to the left

Trade or occupation.....; Citizenship.....
U. S. or N. U. S.

State sea, small boat or any nautical experience; if any, to what extent.....

State what work or trade you are or have been engaged in, giving time so engaged.....

Place of birth.....; Date of birth.....
City or Town, and State

Home address.....
Street No., City or Town, and State

Name and address of next of kin.....
Name in Full

Street No., City or Town, and State

Locality in which duty is most desired.....

E d u c a t i o n
Give any degrees held

Have you ever served in the U. S. Navy, Marine Corps, Army, Naval Auxiliary or Coast Guard Service?.....

Yes or No.
 If any, what branch.....

I first enlisted in the.....;..... at.....
Date Place

as.....; and was last discharged.....
Rate Place

from the U. S. S.....with.....discharge
Station or Ship Character

as.....; Total service.....
Rate

Are you now or have you been a member of the Nat. Guard or Naval Militia?.....

.....
Signature, name in full

THIS PART TO BE FILLED IN BY THE ENROLLING OFFICER

Rate assigned.....; Class.....

Duty for which best qualified.....

R E M A R K S

Date

.....
 U. S. Navy
 ENROLLING OFFICER

(Descriptive list, other side, to be filled in by Examining Surgeon)

REPORT OF MEDICAL EXAMINATION

.....1917

To be filled in by the Examining Surgeon

Ageyears,months; Height in inches.....; Weight,.....pounds

Eyes.....; Hair.....; Complexion.....; Chest, mean circumference.....in.

Expansion.....inches; Color perception.....

Vision, R...../20; L...../20.

Hearing, R...../15; L...../15.

Permanent marks, scars, etc ,
.....
.....

TEETH

Right

Left

Upper: M M M B B C I I - I I C B B M M M

Lower: M M M B B C I I - I I C B B M M M

Accepted.....

Yes or No

Surgeon U. S. Navy

Examining Surgeon

Rotten Resonance

By The Old Man

WELL, we sure had a nutty Radio Club meeting here to-night. I blamed near cracked my condenser laughing over it and while I finish this pipeful preparatory to turning in for the night, I will jot down a few of the things which happened.

You know the club meets once a week now. The nervous energy the members expended in the air QRming each other before the war is now spent setting scientific traps and jawing each other about it afterward. We had to cut out the dope about what was lawful and what was unlawful as regards a wireless set because it threatened to end in murder, not to mention ruining a perfectly good desk. Our President's strong right arm and husky gavel held out allright, but the northeast corner of his desk got in such bad shape that the whole business threatened to come to pieces. The subject of discussion was changed by common consent.

Somehow or other we got going on the subject of phantom aeriels and developing transmitting apparatus during the period of the war. It seemed to offer an avenue of experimenting which would take the place of receiving. The phantom aerial does not radiate, and as such was considered as being outside the scope of the President's proclamation regarding radio. I do not know what Mr. Wilson would think about it himself if he happened to drop into one of our meetings out here. Sometimes I think he would order every radio bug in the country electrocuted, or else have Congress provide a bughouse for the accommodations of those whose reason had become unseated by the closing up order.

At tonight's meeting, old Final Authority came in late. He had not heard anything about the phantom aerial business. The first thing he bumped into was hearing somebody telling about how, just before he came to the meeting he had raised his "rad-

iation" from two amperes to five by taking half the studs out of his rotary and speeding the latter up to give the same spark frequency. There was a lot about superior quenching and less decrement and all, and going on right at the present time.

Final stared at all hands in a dazed way until his eyes popped. You could see he was having difficulty believing his ears. When the gink told about how he was getting ready to make his studs only one-thirty second inch wide at the points and expected to run a test before the next meeting, Final snorted, like a badly scared horse.

Radical was there, of course. He had been quiet until he heard that snort and then I swear I believe he made up his mind to have some fun with Final regardless of whether the cause of science was advanced or not.

Radical usually waits until the end of every discussion when all the evidence has been put in, and then he proceeds to put his unerring finger on the vital spot and makes all other attempts partake of the appearance of thirty cents. This time he broke all precedents. He butted right in early in the game.

Said he, "You say that last Tuesday you were getting but two amperes into your aerial whereas tonight, just before coming to the meeting, you got five?" The whole question was a frame-up for Final's benefit and to emphasize the fact that the tests were going on right at the present time.

"Yes, an increase of just two hundred and fifty per cent in myradiation," promptly answered the young chap who had started the trouble.

Final stared. He was speechless. The President, not noticing and probably giving much thought to how much he could have improved his distance last winter if he had thought of this, indicated much interest. Radical, making believe to be considerably

impressed with this stupendous scientific achievement, and fearing if he did not keep the talk going, the phantom business would come to the surface, returned with,

"It would be very interesting to know the number of oscillations occurring in your closed circuit, so that it might be inferred how much you had freed your open circuit to oscillate unimpeded. Have you figured it out?"

The young man with the new idea was much puffed up by the interest he had aroused in Radical, and he was more than willing to give up his boots, or anything else asked of him. He replied:

"Yes, I have figured it out, on the basis of my wave length being 350 meters. I am not sure about this figure because the wave meter I used belonged to Mr. Smith, and I understand it is not closer than 25 per cent."

"How much," blurted out Final, now dead certain his ears were on the bum and forgetting for the moment the apparent serious infraction of the law.

"25 per cent. It does seem pretty bad, I acknowledge, but it was the best I could do."

Not wanting to have any more of this interrupting business, with the chance of the cat getting out of the bag, Radical, throwing a masterly touch of impatience into his tone said quickly,

"All right. 25 per cent. Maybe it is closer than you think. I dropped mine on the floor once and it was dead accurate afterward. Now go on with the figures and let's keep to the point. What did you say about the number of oscillations in your closed circuit before quenching occurred?"

Final looked stupefied.

"On the basis of 350 meters, it works out that the number of oscillations per second would be around 905,550. The time that my plugs are opposed to each other works out as around one and a half hundred thousandths of a second. In this time there would be something like thirteen oscillations."

"How many?" exploded Final, scaring Radical with his suddenness.

"Thirteen," responded the young scientist. "I feel pretty sure I am right because my father checked my figures."

Radical was ready. Final had backfired twice on him, so far, and it must not be permitted to happen again.

"Sure it's thirteen," said he, and you could see he was making a guess at it.

"All right. Now, the chances are your aerial, lead-in, oscillation transformer secondary, and—ground lead—" here he flashed a glance at the President, "have a pretty high resistance, so your aerial probably has a chance to oscillate forty or fifty times instead of ten or twelve and consequently you get a pretty good reading in your hot-wire ammeter." Here he paused. He could not think of what to talk about next, and any minute Final was likely to butt in. The best he could do in the emergency was to jump on the gap, which he did by hurriedly asking, "How did you figure the time the gap studs are opposed to each other." This created a splendid "dramatic interest" and it held Final and the whole gang. It was a master stroke.

"I took the width of the stud, about a sixteenth of an inch, and knowing the speed of my rotor I could figure how long the stud took to pass through a space equal to its width. I think this figured out something like point, naught, naught, naught, naught, fifteen. That's one and a half hundred thousandths of a second."

"How much", from Final, right on top of—"Well, how do you know—" from Radical. They QRMed so that you had to guess who said what. The President hitched forward, his glittering eye fixed on Radical and his strong, right fist ready to grab the war club. Radical was the quicker and repeated. "How do you know the spark played during that time? Does it jump to meet on your rotary?" He was excited and playing a fast game and his eyes snapped like the gap he was talking about.

"That's where I am in doubt", replied the young scientific gentleman. "I have watched my spark through smoked glasses and I should say it jumped to meet only a trifle. The best judgment I could form was that the duration of the spark was about the length of time necessary to pass through a sixteenth of an inch. Any way the spark does not seem to be any wider than a sixteenth."

"Well—" from Radical. He was stumped.

ed. He could not think of another question to save his life. He hesitated just a fraction of a second too long and Final got the floor.

"That is extremely interesting and bears upon a matter to which I have given much thought" said he, evidently entirely sidetracked. He had his calm and final-authority manner all back in full working order. But you could see the fatal ending was not far off.

"I am certain" he continued, "many amateurs would do well to carefully study this method of securing quenching because it is notorious that the back inductive effect of the secondary on the primary in the ordinary amateur oscillation transformer and spark gap is very much greater than is generally supposed and most serious losses must occur as a result". Then he did even better than Radical could have done himself and yours truly had a terrible time with a fake cough.

"Have you ever measured your decrement with a decremeter?" he asked.

"Not yet. I expect to tomorrow night. Mr. Blank," nodding toward Radical, "has borrowed the Radio Inspector's decremeter and we expect to have some tests tomorrow night. We shall try and have the figures to report at the next meeting".

This did the job. Final gazed long and hard at the speaker. He was marvelling that one so young and apparently sincere should in reality be so steeped in crime. The clever Radical saw that his victim had taken the bait, hook, sinker and some of the line, and he was smart enough to stand pat and let him hook himself good and plenty. Final did that same thing well and proper.

"The Radio Inspector!" he gasped after he could command his speech. He had his wires so badly crossed he was wondering if the radio inspector was a party to the crime.

"Sure, why not?" from Radical, who intended to superintend the hook setting business personally, if possible.

"Why not! Do you mean to tell me Mr.— (deleted by censor) is co-operating——". He paused as a brand new idea broke through. "Does Mr.—— know what use you intend making of his decremeter?"

"Mr.—— thinks he knows," and Radical so far unbent as to wink heavily at the membership in general.

He had told the truth, but the wink put a bad kink in it. Final took the interpretation it was intended he should take. After staring at Radical for what seemed a full half hour, he hove a deep sigh and turning to the President he said, his voice vibrant with emotion, "Mr. Chairman, I protest against this dangerous and illicit business. This is supposed to be a club composed of law abiding and honorable citizens. One of the foundation stones in our organization is to encourage the observance of the radio laws, and to discourage their breach. In times of peace we have invariably gone out of our way to adhere to this policy. But we are no longer at Peace. We are at war with a powerful and thoroughly prepared enemy. If there ever was a time when good American citizenship demanded that we more than ever stick to this policy it is now. But what do we find to be the case? Some of us are actually conducting tests with their transmitting apparatus. We are even so shameless as to promise at a future meeting to make known the results of these tests. Encouraging others to do likewise is unavoidable. And, as if to cap the climax, we are told here in open meeting of a damnable imposition which is being worked upon the Radio Inspector of this District."

Final had succeeded in working himself up into a fine frenzy. He never noticed the poorly concealed smiles of everybody in the room, including the President. And, Radical, the little fox, never turned a hair but looked the picture of unrelenting belligerency. Final went on, "It is unthinkable. I cannot bring myself to believe the majority of this club approve such tactics. Why, Good Gawd, sir, they stand men up against stone walls and shoot them for less than this."

"For WHAT?" interrupted Radical, leaning forward and sitting on the edge of his chair.

"For doing what you are doing."

"For doing what we are doing? Well, say, can't I use juice in any way at all?"

"You can use juice of course, but not——"

"All right, interrupted Radical, begin-

ning the regulation cross questioning, the object of which was painfully evident by this time. "Can I turn it on and off with a telegraph key?"

"You may of course use a key for a switch, but not——"

"All right Can I turn it on and off the primary coil of a transformer?"

"You may do that, but——"

"All right. Can I let the secondary of a transformer fill up a condenser?"

"Yes, but I——"

"All right. Can I permit that condenser to discharge through the primary of an oscillation transformer?"

We were getting close to it.

"You may, if——"

"All right. Can I pass the current in the secondary of the oscillation transformer through a resistance consisting of certain carbon rods and a capacity consisting of a Leyden jar, which happen to closely resemble a certain aerial in resistance and capacity, and which is otherwise known as a phantom aerial; and can I measure the current with a hot-wire meter; and can I change the number of plugs and the speed of my rotary gap; and can I use the Radio Inspector's decimeter to find out my decrement, or CAN'T I?"

He had him. Final saw it all and it bowled him over. He acted as though his key had stuck, all his fuses had gone out,

his motor generator was running the wrong way and pictures were coming in on his wire instead of signals. He went plumb dumb. I thought he was going to take the full count, until the chap with the wart on his nose and the hazy ideas regarding oscillation transformers, suffered a rush of brains to the head, caught on to the scheme of things and emitted a hoarse gurgle, originally intended for a horse laugh. This started the younger members and a general giggle went around the room. Everybody began to wonder what stunt would probably be pulled off next. Radical, who was still eyeing Final like a cat does a mouse just before she springs, asked, "CAN I OR CAN'T I?"

Final took off his eye glasses, and forgetting his scientific elegance for the first time since the development of radio communication, came down to earth and acknowledged the corn with a commonplace, "I reckon you can," upon which the entirely victorious Radical pronounced the final obsequies, "YOU BETCHER LIFE I CAN."

The President in sheer high spirits whacked the desk a mighty wallop, and closed the session by announcing that the last trolley to Smithsburg left in ten minutes and that the meeting was adjourned.

Say! But ain't that little Radical cuss the cutey?

Well, OM CUL GN SK.

Editorial in a Baltimore Paper Concerning Wireless

The average citizen has a rather vague idea about the necessary outfit for sending and receiving wireless messages. But, all the same, there are spotted about a good many people who not only possess some general knowledge of the ways and methods, but have in addition the expert skill requisite for setting up and equipping a wireless station. It is known that a good many wireless stations had been set up on house-tops, scattered over Baltimore, long before any question was raised concerning the possible unpatriotic use of a concealed wireless plant. This much the average citizen has

been made aware of — that a wireless message is a free ranger. That once flashed out it may be picked up by a thousand listening-in pole tops or mast tops or church spires.

That farm aero station that the STAR located over in Ann Arundel County yesterday may not have any connection with Germany's espionage activities, but all the same, the setting up of even a crude and effective apparatus at a point not far from the National Capitol has an impressive suggestiveness about it.

The Ideal Station

By James M. Sommer, 9JI

IN erecting a station, the amateur usually locates it in the most convenient place about the house, seldom considering the efficiency of such a location. The majority have their stations on the second or third floor. Stations placed in this manner have a very long ground lead, and for this reason they are often inefficient. The long ground lead causes a serious loss of radiation.

The basement has become a popular place for a station, an seemingly an efficient one, for the ground lead would be very short. This basement station, although apparently efficient, possesses an undesirable feature; for when a station is thus located, the lead-in from the aerial must come close to the ground to reach the apparatus. It is evident that a very serious brush discharge might occur, which would cause a great loss. The reader can see that the best place for a station would be on a level of the ground. A station in such a location would possess none of the undesirable features mentioned above.

To secure this location, the author built a small house, which measures about eight feet square. The lead-in was brought through a Marconi deck insulator in the roof, to one side of the oscillation transformer. The other side of the oscillation transformer connected to the aerial switch, and from there directly through the floor to the ground. In this station it will be noted that the aerial system is very direct which insures a maximum efficiency.

The Power

The power for the amateur station usually comes from the local light company's mains, which invariably carry a sixty cycle alternating current supply. There is not much chance to improve on the current supply for it is not made in varieties. It has been noted, though, that if a special transformer furnishes the power, the output to the aerial is somewhat increased.

When the power mains are run in, they should be as near right angles to the aerial as possible, for if they are parallel or nearly parallel they will absorb much of the radiated energy. This will not only cause a great decrease in the transmitting range, but may also cause a very serious kick-back. If the mains cannot be run at right angles to the aerial, the situation can be improved by running them in conduit, under the ground.

All the wiring in the station, or in the vicinity of the station, should be done in BX cable, for it is impossible to keep the house wiring from running parallel to the aerial in some places and, of course, parallel house wiring would be the same as parallel power mains. All wiring on the primary side of the transformer should be at least as big as the wire on the primary.

The Transformer

In choosing a transformer for your station you must secure one with the correct secondary voltage for 200 meters, and one with a very high efficiency. As far as I know there is not a transformer of this kind on the market, so it is plain that to secure the greatest efficiency you must construct your own transformer. To secure a design for such a transformer, the amateur usually relies upon a design which has proven efficient. This is the best method for much time and money must be spent in experimenting if you design your own transformer. For those who wish to secure data on a very efficient transformer I am submitting the following description and dimensions.

Core:—The core is of silicon steel which is cut in pieces, 7 1-2 inches x 2 inches and 4 1-2 inches x 2 inches. This core is laminated in the usual manner, and when completed weighs 30 pounds.

Secondary:—The secondary is wound in two pies, each containing 8000 turns of number 32 DSC wire. They are wound in layers, separated by onion skin paper.

Primary:—The primary contains 300 turns of number 14 DCC wire, being tapped at 200, 230, 260 and 300 turns. These taps draw respectively 700, 500, 350 and 150 watts.

The Choke Coils

Practise has shown that a choke coil between each side of the secondary of the transformer and the condenser is a big help. These coils prevent a backward flow of energy from the condenser which is important, as this backward flow of energy is liable to cause the secondary to break down. These coils also prevent a great deal of the kick-back.

The Condenser

The condenser (although one of the most important instruments in the station) is very often neglected by the amateur. To be efficient, a condenser should first be well insulated so as to cause a minimum brush discharge; second, it should be of the correct capacity for the wave-length used. To insure an efficient condenser, many amateurs construct one of glass plates and tinfoil. These plates are bound together and then submerged in a tank of oil. A condenser of this kind involves the right idea but it is not always carried out so that every detail is perfect. In the first place, the plates should always be vertical, for if placed horizontally, some air will always remain between the plates, which will cause the condenser to break down. The second thing to consider is that when the plates are bound together only a thin film of oil remains between each plate. This film is readily carbonized by the small brush, which is bound to occur. This builds up a better path for the brush which will continuously grow larger. It is well known, that this discharge will finally destroy the plate. Another undesirable feature about strapping the plates together, is that they are continuously breaking down, owing to the severe mechanical strain caused by their own weight.

To overcome these difficulties, the tinfoil should be stuck on both sides of every plate with beeswax, after which the plates should be mounted in a little wooden rack so that they will be spaced at least 1-8 inch. The author has found that a condenser of this kind is very near amateur perfection.

If the reader has a one-kilowatt transformer, it will be necessary to use either 3-16 inch or 1-4 inch plate glass in the condenser to avoid breakage. It has been found, however, that double strength AA selected window glass will hold anything under a one kilowatt transformer, and in some cases it has been known to be satisfactory on the larger power.

The Rotary

An efficient rotary must fulfill several conditions. In the first place, the rotary should make a very quick break, so that the damping in the closed circuit will be as great as possible. Another important item to consider is that the parts of the gap which carry current, should be as short and free from sharp angles as possible. A gap constructed after the following dimensions and description will fulfill the above conditions.

The disc is eight inches in diameter and of 1-4 inch Bakelite. This disc is mounted on the shaft of a 3600 R. P. M. induction motor. On a circumference with a radius of 3 1-2 inch bore twelve equally spaced holes. A lug, made of aluminum ribbon, should then be clamped on each side of every hole by means of a heavy brass bolt. To make the lugs, take some aluminum ribbon 1-2 inch wide by 1-32 inch thick, and cut 24 strips one inch long. Band these strips into small angle irons, making each shoulder 1-2 inch square. Bore a hole in the center of one shoulder of each lug, and fasten the lug to the disc through this hole. The stationary lugs, of which there are four, should be mounted on Bakelite standards. These lugs should also be of aluminum ribbon and should be mounted so that two lugs are on one side of the disc and two lugs are on the other side (see Figure 1 for hook-up). In this rotary it is seen that the break is very quick, owing to the thinness of the lugs and to the four gaps in series which reduces the drag. If the connections are taken off of the end of each stationary lug as they should be, the only sharp angles in the whole rotary are where the lugs go through this disc, which is not very serious. The leads are also very short, for they only have to go through the lugs and not clear around the disc, as in some rotaries.

The Oscillation Transformer

In the transmitting apparatus, there is just as much energy intended to go from the closed circuit to the aerial circuit, therefore it is seen that an oscillation transformer which would offer the least resistance to this energy would be preferred. The pancake type oscillation transformer fulfills this condition as well as any and it is much more convenient than other types.

The best kind of conductor to wind the Pancake type transformer with is copper strip, but as this strip is very expensive, it is seldom used. Brass ribbon is almost as good and, of course, is not near as expensive. The brass ribbon for the primary should not be smaller than one and one-half inches and the secondary should not be less than one inch. The thickness of the ribbon is not very important, for example, ribbon 1-16 inch thick has only 1-16 inch more surface per unit length than ribbon 1-32 inch thick. The coils should not be over 12 inches in diameter if the transformer is to be used on two hundred meters. The primary should contain about four turns and the secondary eight. In mounting the transformer use a fibre rod through the center instead of brass for the brass rod would absorb much of the energy. If the above details are carried out in the construction of the oscillation transformer, the efficiency of the same will be very high.

The Closed Circuit Leads

The leads in the closed circuit should be as heavy as possible so that they will possess a very small resistance. The best kind of connections are brass or copper ribbon. Leads of this kind have a very large surface. In some outfits it is not convenient to use ribbons for leads. In these cases it is necessary to use stranded cable. This cable should not contain less than 300 strands of No. 32 copper wire.

The Aerial

The aerial is one of the most important factors in making a long range station. To be efficient, the aerial should be high enough to clear all surrounding objects—well insulated and of low resistance. An aerial constructed after the following details has been found successful.

To clear all surrounding objects the aerial must usually be at least sixty feet high. Each wire in the aerial should have at least seven strands of number twenty-two copper wire in it and the lead-in should have as many stranded conductors as there are wires in the aerial. The number of wires can be varied at the will of the reader, but it is understood that the more wires the greater the capacity, thus the better. The spacing of the average antenna wires is at least four feet. Wide spacing also increases the capacity. Sufficient insulation may be acquired for the aerial by inserting a 10 1-2 inch insulator in each bridle and a ball insulator at the end of each wire. The lead-in should be bunched as soon as it leaves the aerial to avoid the absorbing of the current by tin-work, trees, wires, etc. As a final word I wish to caution the reader to insulate the lead-in very well where it

Galley 12

enters the station as this is generally a weak place in amateur construction work.

The Ground

A good ground is just as important as a good aerial and for that reason just as much pains should be taken in its construction. I have found that many amateurs use nothing but a water pipe for ground. A water pipe will do for a receiving station, but in a transmitting outfit where a high capacity is desirable some other sort of a ground must be provided. The best ground which produces a high capacity is one consisting of a number of radial wires laid about three inches under the ground. The conductors are brought together at the station, and they should be laid so that most of them are directly under the aerial. These wires may be of number 14 copper, but galvanized iron wire will do if copper is not available. A water pipe ground should be used in connection with this ground for it will add somewhat to the output of the station.

The Aerial Switch

The two things which tend to make a good aerial switch, are convenience and efficiency. A convenient switch would be one which you could change from transmitting to receiving by one quick and easy movement. To be efficient, the switch should have very good insulation and should

make excellent connection. The aerial switch manufactured by the Clapp-Eastham Co. fulfils these conditions. It is easy to operate and is unexcelled in insulation. The reader can construct one like it from the description in the catalog, if one cannot be purchased.

The Receiving Outfit

There being so many good receiving outfits on the market at the present time, it is very hard to make a choice and say that this one is absolutely the best. I have never had opportunity personally to compare all of them. From what experimenting I have done, I am satisfied that the following apparatus is well among the leaders if not the best.

The apparatus consists of the following

pieces:—A Paragon RJ-6 short wave receiver, an Audio Tron Bulb in connection with Ever-Ready flash-light cells and either a Willard or Prest-o-Light storage battery; and a pair of Mica Diaphragm receivers. If the reader does not wish to get Mica-Diaphragm receivers, I would recommend Brandes' Superiors.

A Final Word

As a final word, I wish to say that the main point to observe in constructing a station is to have every little detail perfect regardless of just how much of an ampere it will boost your meter or just how much louder it will make the incoming signals, for when the result of all these little details are added together, the sum makes us the ideal station.

Useful Ratios and Equations

The audibility of signals is inversely proportional to the cube of the number of visitors present.

The broadness of a station's wave is in inverse proportion to the owner's knowledge.

The velocity of muscular reaction may be expressed as: Speed in meters per second = VX ; where V is the transformer voltage and X the speed of greased lighting.

The wave length varied as the distance from the radio inspector.

The efficiency of a home made transformer varies as the number of times its cost exceeds that of a factory made one. Its life proportional to the time of bad QRN. The current drawn by a home made transformer cannot be expressed in a general equation, being dependant upon the capacity of the local lighting plant.

The antenna current drops as the wobble of the rotary rises.

The life of a high-voltage audion battery is proportional to the number of Charley Chaplin pictures down at the Aurora.

One charge of the lighting battery will last ten days in ordinary operation. A

correction factor must be used if visitors and small brothers are encountered.

The results secured from a transformer follow a cumulative law, increasing rapidly as the input is increased. Thus we have:

- 200 watts—Domestic unrest.
- 300 watts—Acute domestic situation.
- 500 watts—Civil warfare. Inter-household situation uncertain.
- 750 watts—Severance of relations with the lighting lines.
- 1000 watts—Precipitation of general engagement.

Attack opened by spark coil skirmishers and telephone scouts who gradually fall back on a strong line of light (company) infantry supported by insurance inspection artillery, and rapid fire navy yard guns. Attack breaks down before these and is crushed by a destructive cross charge of radio inspectors. An advertisement then appears saying—"For sale: Complete One kilowatt transmitter. Cause—am leaving town."



HURRY UP AND ENROLL

When the Navy Department sent a two hundred and fifty-four word telegram to the American Radio Relay League on the subject of enrolling in the Naval Reserve, it is a pretty safe guess that Radio Operators are wanted. The telegram appears on another page and it is printed just the way it was received. It is a record message all right, and the way the commas and periods are all spelled out is in itself a matter of considerable interest.

We have already referred to the advantages of enrolling and the more we see of it the better it looks. The engineering course given is unquestionably one of the finest things offered in this country in the way of a practical training in electrical engineering. There are three schools where the training is done. One is no less a place than the Engineering Laboratory of Harvard University at Cambridge, Mass. The others are the Electrical Schools at the Brooklyn Navy Yard, Brooklyn, N. Y. and the Mare Island Navy Yard, San Francisco, Cal. The first mentioned is famous all over the world for its equipment and facilities. The other two are a close second.

When it is considered that every young

fellow who enrolls gets a good course of training in these engineering schools, and gets paid from \$30.00 to \$50.00 a month for taking it, and another \$60.00 for his uniform and outfit, and still another \$1.25 a day for his keep if no regular navy quarters are available, it is pretty fairly plain that any amateur radio operator who does not take advantage of it ought to have his head examined.

To all you fellows whose financial status is such that you cannot hope to take a regular college course, this enrollment proposition is nothing less than Heaven sent. Such a chance will never be offered again and any day you are likely to see it announced that no more will be taken.

The only thing the Navy asks is that you stay in for the duration of the war, and that if the war ends within four years you serve three weeks in each year for four years.

Think it over, you chaps who have not yet sent in your applications and make Mother and Father read this editorial. You can enroll at any Naval station in the country. Send your application to us if you want. We will help you get it properly located.

AMATEUR WIRELESS AFTER THE WAR

It takes some pretty husky optimism to talk about what we are going to do AFTER THE WAR. One sometimes wonders if there is going to be any such time as "after the war". There will, however, and in our humble opinion it will strike in very quickly when it starts. At this writing, early in June, when Liberty Loans and Selective Drafts are at their top notes, and preparations are going forward on a scale that the country has never dreamed of, the very last thing on the list to think of is "after the war". But, should anything untoward happen to our late friend Billy Hohenzollern, call letters unknown, it is our guess that things would come crumbling down in a way that would surprise everybody. The good old horse sense of the German common people would assert it-

self and it would not be many days before somebody would get hit in the head with an idea that maybe we better call a halt and talk the matter over. The war is over from the minute the fighters decide to talk it over.

When that glorious day arrives, amateur wireless will be unshackled. We will have the use of the air again, and old friendships will be resumed and new ones formed. We are not going to be kept shut up as some people think, but we will be encouraged to reopen and continue our experimenting. We have this in black and white from an authority in whom we all have the greatest confidence. It is a sure thing, and let everybody go ahead and plan accordingly and if you are thinking of buying any apparatus, go ahead and buy it. You will use it all right.

SOMETHING TO DO NOW

One of the big reasons most of us give when we have been asked why we don't get our radiation up into the double figures, is "we have not the time". Well, why not try it now? Certainly there is plenty of time and it is time well spent.

If we can provide a phantom aerial which will have the same oscillating characteristics as our regular antenna, but which will not radiate, there is no reason why we should not go ahead and try all the various combinations of transformer, condenser capacity, lead length and size, rotary gap, speed, number of studs, width of studs, diameter of rotor, quenching effect, oscillation transformer design, etc., etc.

There probably is not a single one of our stations who could not make a great

improvement in its antenna current if an attempt were made to do so. From our experience, we are not afraid to say that fully seventy-five per cent of the amateur transmitting stations could be improved a full one hundred percent, or their present antenna current doubled. It only needs the arousing of the necessary interest. We know a certain station which started off in November in 1916 radiating 2 3-4 amperes. By February 1917, the same station was radiating 7 amperes, and less power was being drawn from the city mains. The improvement was the result of a lot of little things and they all were brought about by experimenting and study.

Here is a fine field for those of us who cannot enroll. Let the stay-at-homes think about this.

LEND A HAND, FELLOWS

Sometimes we think the interest in amateur wireless has actually suffered a setback. Our subscriptions have fallen off, our renewals of old subscriptions have slowed up and even our newstand sales show the effect of something unfavorable. All this was to be expected the first few months after war was declared, because everybody was excited and upset thinking about enlisting, enrolling, planting potatoes, getting drafted, buying Liberty Bonds, etc., etc. But, after the first flush of excitement is over we ought to expect the radio bug to revert to his first and only real love. We do not want to be mistaken and therefore, please let every fellow who reads these lines remember he must do everything he can to get new subscribers to QST,

new members who will pay their annual dues, and to talk up amateur wireless. We need this help individually and collectively, and if anyone has not already done his share, let him begin right now.

Many a good plan has failed due to lack of precise direction; that cannot be said of this. What we want you to do today is: Decide what newstand in your town should sell QST, or what two or three, then write the name and address on a slip of paper, mail it to QST, Hartford, Conn. Could anything be clearer?

We repeat lest you forget. Sit down this minute and send in the name and address of a newstand in your town for QST.

ARMSTRONG OF THE ARMSTRONG CIRCUIT

A very pleasing bit of Radio History has been recently made which should not pass unnoticed by us amateurs. This is the award of the Medal of Honor of the Institute of Radio Engineers to Mr. Edwin H. Armstrong, for his work in connection with regenerative amplification and oscillation by means of the vacuum tube relay. We take pleasure in recording it in QST and saluting you, Mr. Armstrong.

The regenerative circuit was a brilliant

conception and it did more than any other one thing to make the season of 1916 and 1917 the banner year in amateur wireless.

Perhaps we should not overlook two other names who followed where Mr. Armstrong led and gave us practical working apparatus with which to regenerate and amplify signals which would never have been suspected two years ago. Mr. Godley and Mr. Grebe, accept our felicitations on this happy occasion.

THE IDEAL STATION

Don't overlook the article in this issue on **THE IDEAL STATION**. And also don't overlook the fact that if you are a specialist on any one thing that you are expected to come forward and tell us about it so that it will be a part of **THE IDEAL STATION**.

Every fellow, whether enrolled in the Navy or not, should feel at liberty to write on this subject. The military censor would probably not seriously object to an enrolled man telling what kind of an oscillation transformer he found gave the best results last winter. To those who are not in

the military service, we especially want to hear from, because they have the time to give the matter careful thought.

Just think what we can accomplish if we were to jump into this problem vigorously. We would have every detail up for critical examination and study from the standpoint of every conceivable angle of experience. The result would be something well worth while, and a matter of much interest to the manufacturers. Come forward, fellows, and pick out something you know you can improve and write us about it.

Reports of Division Managers

Monthly Report of Central District

R. H. G. Mathews, Radio Gunner
U. S. N. R. F.
Div. Manager

As our activities were cut rather short by our country's entry into the world war, and subsequent action, there is very little to report regarding the amateur work done during the past month. However, the amateur's work has not been done at his own station of late, but he has been using his abilities in the service of his country. We can all feel proud of the way our amateurs, particularly those of our League, have come forward when the call went out. I am especially proud of my Western Trunk lines, as nearly every operator on all three is either now in the service, or has been refused because of physical disability. The main thing is that all have tried to help. Mr. West, of 8AEZ, Mr. Graf, of 9RP, and the writer, of 9ZN, have been given appointments as Radio Gunners, and have been placed as Naval Radio Censors at various ports, Mr. West being at Buffalo, Mr. Graf at Manitowoc, Wis., and the writer in charge of Grand Haven and Benton Harbor, Mich.

More of our friends are to be found as operators at the various stations. I will name the following who have enrolled in the U. S. Naval Reserve, and have been assigned to this duty:-

L. E. Dutton of 9ALM, Chicago, at
 Grand Haven.
 G. D. Bauer, of 9VY, Ft. Wayne, at
 Grand Haven.
 E. F. Baldwin, of 9BT, Dixon, Ill., at
 Grand Haven.
 L. A. Gebhard, of 8EG, Buffalo, at
 Grand Haven.

R. L. Leary, of 8UQ, at Buffalo.
 W. D. Woodcock, of 8ZP, at Buffalo.
 W. C. Moore, of 8UG, at Buffalo.
 J. F. Miller, of 9KR, Chicago, at
 Benton Harbor.
 H. D. Stevers, of 9OX, Chicago, at
 Benton Harbor.
 R. F. Laidlaw, of 9PR, Chicago, at
 Benton Harbor.
 H. B. Deal, of 9NN, Cape Girardeau, Mo.,
 at Cleveland.
 L. A. Kern, of 9GY, Mattoon, Ill., at
 Detroit (WOK)
 K. Caldwell, of 9NW, Decatur, Ill., at
 Detroit, (WDR)
 C. Coultas, of 9LQ, St. Louis, at NAJ.
 W. P. Corwin, of 9ABD, Jefferson City,
 Mo., at NAJ.
 C. Bates, of 9ADL, Milwaukee, at
 Milwaukee.
 W. Perry, of 9NU, Racine, at Milwaukee.
 H. J. Burhop, of 9RW, Sheboygan, Wis.,
 at Manistique, Mich.
 D. Lewis, of 9XM, Madison, Wis., at
 Mackinac Island.
 O. Hansen, of 9XM, Madison, Wis., at
 Mackinac Island.
 D. O'Niell, of 9DK, St. Louis, at
 Manitowoc, Wis.
 Wm. E. Woods, of 9HS, St. Louis, at
 Manitowoc, Wis.

In addition the following have joined other branches of the service:
 Ross Parnin, of 9TA, Ft. Wayne,
 Kentucky Cavalry.
 C. Cornish, of 9KG, Ft. Wayne,
 Kentucky Cavalry.

Ed. Ericksen, of 9UM, Ft. Wayne,
Kentucky Cavalry.

G. H. Curtiss, of 8AOI, Mich. Naval Militia.

In addition, Prof. A. Hoyt Taylor, of 9XN, has been given the rank of Lieutenant and is located at Great Lakes, Ill., as District Communication Supt. of the 9th, 10th and 11th Naval Districts.

I think the foregoing list is sufficient to convince the most skeptical that the wireless amateur has proved his worth in time of war. Even our lady wireless wizard, Mrs. Candler, of 8NH, St. Mary's, O., has enlisted in the Naval Reserve, and is daily hoping that she be assigned as operator to one of the Great Lakes stations.

Several of my stations have sent in by request their records in transmitting in all four directions, during the past winter. I am giving them herewith.

9ALM, Chicago.

East—2PM, 2AGJ, 2AAZ, 800 miles.

West—6SI, 2050 miles.

South—5ED, 900 miles.

North—9XN, 750 miles.

Farthest distance heard—6SI, 2050 miles.

Farthest distance worked—9ZF, 1000 miles.

Messages handled—425.

9GY, Mattoon, Ill.

North—8OI, 700 miles.

East—2PM, 2AGJ, 2AAZ, 800 miles.

West—6SR, 1950 miles.

South—5ED, 700 miles.

9ZN, Chicago, Ill.

North—9XN, 750 miles.

West—6EA, 2000 miles.

South—5ED, 900 miles.

East—1ZF, 1ZL, 900 miles.

Northwest—7EG, LaGrande, Oregon, 1900 miles.

Actual communication was carried on with 7EG.

Farthest distance worked, 7EG, 1900 miles.

Farthest distance heard, 6EA, 2000 miles.

Messages handled—650.

It will be seen that the three stations above have been able to work both coasts direct. Others who have accomplished this

are 9ABD, 9JW, and 9EP, whose records are given elsewhere in the report of the Div. Supt. for that section.

Our new Div. Supts. are already planning new and more extensive relay routes which will become effective the moment we are reopened, and many new stations will be required. Owners of stations which might be able to do relaying, but who have been backward in offering their services are urged to apply to the proper Div. Supt. for a place on one of these new routes, which are being run to every important town in the country. Applications for Trunk Line appointments, or suggestions as to new routes should be sent to the Div. Mgr. at Chicago, direct, but applications for Branch Route appointments will be handled by the various Dist. Supts.

In closing, we wish to heartily thank all those who have so kindly cooperated with their Div. Manager during the past season, and have helped make the Central District Routes such a success, and we wish them all the good luck in the world when they embark on the next radio season's work.

DISTRICT OF MISSOURI AND KANSAS

A. I. Graham 9ZK, and G. E. Wilson 9EP
Superintendents

As monthly reports from this district have not been made during the winter, this report will state briefly what has been done during the past season. Some very good records have been made and a great deal of traffic handled as two of the transcontinental lines pass through this district. For Trunk Line E, the Southern Route, 9ABD acts as official station, connecting Dallas and the Southwest with the various Eastern Cities. Trunk Line G, the most successful of the transcontinental lines, is represented by three stations, 9ABD, 9EP, and 9ZK, who act as relay stations between Denver and the several points in Illinois and Ohio. Stations 9LO and 9JW have also handled a large amount of the transcontinental traffic. All of the Denver traffic is handled by 9ZF and 9AMT while the Eastern end is taken care of by 9ZN, 9GY and 8NH. Denver works direct with the Pacific Coast and the Illinois and

Ohio stations relay direct to the Atlantic coast, thereby making three relays necessary to cover the distance of 2700 miles.

This line has handled a tremendous amount of business and was in first class working order until the very minute that all stations were ordered closed. So when we open again, we urge everyone to take advantage of this line as it is beyond the experimental stage and has proven itself quite capable of relaying any messages entrusted to it.

Although the number of messages handled in this district is not as large as in the East, it is rapidly increasing due to the opening of the Western territory. A great increase in the number of messages was noticed after March, when the Transcontinental Route "G" was announced, and approximately 300 messages have passed over this line since then. In all, during the season, 9ABD handled about 300 messages, 9JW 175, 9EP 200, 9ZK 160, and 9LO 60 since February 1st. As there is such a large number of stations in St. Louis doing relay work, the individual number of messages handled is rather small, which would indicate that there is no "hog" there who monopolizes the air. It would be much better if this condition were a little more universal.

Several of the stations have made enviable records, 9ABD, 9JW and 9EP having been heard on all four sides of the United States. Several of the others have nearly tied this record, having been heard on three sides and as far West as Phoenix, Arizona. Those in this district who have been heard by 6DM (now 6ZQ) at Phoenix are 9NN, 9LO, 9LQ, 9DM, 9QJ, 9IO, 9HX and 9ZK. While the S. S. El Norte was off Key West, signing N. V, the steamer successfully worked with 9ABD, 9LO, 9JW and 9EP. 9ZK has worked with PC, the S. S. El Sol, who was also off Key West and about 1200 miles distant. No difficulty was experienced and signals were reported very strong. A few of the best transmitting records for several of the stations are as follows:

For 9ABD:—2AGJ, 2ABG, 2PM, 3CV, 4AA, 4CY, 6ZQ, 6UP, NV.

For 9ZK:—2ALI, 3AFA, 3MR, 4AA, 4AW, 4CL, 6ZQ, LDX, PC.

For 9EP:—3RO, 4CL, 4DG, 4DM, 6ZQ, 6UP, NV, Schnectady and Binghamton, N. Y.

For 9JW:—3CV, 6SR, 6TD, 6ZQ, NV.

For 9PF:—2AGJ, 2PM, 4CY.

For 9HX:—2AGJ, 2CE, 2FH, 2IB, 2IT, 2PM, 3SV, 4AW, 6ZQ.

For 9GJ:—2ABG, 2ZL, 2AGJ, 2PM, 4CL.

Some very good receiving has also been done. Most of the stations have heard amateurs on the Atlantic Coast, and on good nights the Pacific amateurs are occasionally picked up. As we are able to hear the amateurs on both coasts and they are also able to hear us, we believe it is only a matter of time before we will be able to handle transcontinental traffic with only one relay. The use of supersensitive receiving sets and well tuned transmitters have made many things possible that we dared not even hope for in the early days. We are anxiously awaiting the time when we will be permitted to open again and continue with the good work. Following is a list of the most distant stations heard in this district, the 5, 8 and 9 stations being omitted as they are too numerous.

Heard at 9GY:—1ZL, 1VN, 2QQ, 3ZS, 3PC, 4AA, 4AC, 4AD, 4CY.

At 9JW:—2AGJ, 2ZI, 3PC, 4AA, 4AC, 4AM, 4CL, 6FD, 6ZQ, 6WZ, 7CE, 7MI.

At 9ABD:—2ABG, 2AGJ, 2SZ, 2PM, 2ZK, 3PC, 4AA, 4BD, 4BY, 4CK, 4CL, 4CY, 4KG, 4YV.

At 9UK:—1ZM, 2AGJ, 2ZL, 2PM, 4AA, 4BE, 4BY, 4CL, 6ZQ.

At 9PF:—2AGJ, 2PM, 4CY.

At 9ZK:—2AGJ, 2PM, 2PC, 3PC, 6ZQ.

At 9HN:—2AGJ, 2PM, 3PC, 4BY, 4CL, 4CY.

At 9ABM:—1AG, 1ZM, 2ZL, 2PM, 2AGJ 2AAQ, 3PC, 4AA, 4BY, 4CL, 4CY.

At 9HX:—1ZL, 2AGJ, 2IT, 4AA, 4AT, 4CL.

At 9HU:—1ZL, 2AGJ, 7ZM.

At 9EP:—2AGJ, 2PM, 2ZS, 3PC, 4BE, 4BY, 4CL, 4DG, 6EA, 6VK, 6ZQ, 6ZV, 7ZN, 7ZC, 7ZR.

REPORT OF DISTRICT OF WISCONSIN AND MINNESOTA.

H. J. Burhop, Dist. Supt.

The following routes were in working order at the close of the radio season, and will be maintained during the next season.

9ZN:—Chicago, Illinois.
 9NU:—Racine, Wis.
 9ADL:—Milwaukee, Wis.
 9RW:—Sheboygan, Wis.
 HB:—Neenah, Wis.
 9KY:—Waupaca, Wis.
 9WT:—Wausau, Wis.
 9ZN—Chicago, Illinois.
 9NU—Racine, Wis.
 9ADL—Milwaukee, Wis.
 9RW—Sheboygan, Wis.
 9ADI—Marinette, Wis.

It is the purpose of the Dist. Supt. to push these routes through to Duluth, and to Minneapolis and St. Paul, but the amateurs in this territory do not seem to be awake, and so far it has been impossible to reach either of these places. Amateurs who are located at points where they would be of assistance in reaching any of the important towns of Wisconsin or Minnesota are asked to communicate with the Dist.

Supt. at 9RW, Sheboygan, Wis., at once as it is desired that these routes should be ready for operation when we are reopened.

H. J. Burhop, Dist. Supt.

DIST. OF ILLINOIS AND MICHIGAN

L. E. Dutton, Asst. Dist. Mgr., Dist. Supt.

It has been impossible to construct any branch lines under the existing conditions, as there is no telling just what stations will reopen, and the efficiency of those which do. In Michigan, branch lines will be constructed taking in the most important cities, such as Detroit, Lansing, Battle Creek, Ann Arbor, Traverse City, Saginaw and Bay City.

In Illinois, branch lines will be constructed from Chicago, covering the northern half of the state, and from Mattoon, covering the southern half.

Stations intending to reopen after the war and wishing appointments on the various branch lines, are requested to communicate with me, at 9ALM, Chicago.

L. E. DUTTON, Asst. Dist. Mgr.
 1340-N Homan Ave.
 Chicago, Ill.

In the Service

At the time of writing, I am "on watch" on—at the—and have just listened to, and copied most of the "Navy press" formerly sent out by NAA at 8:30, now sent at 10:00 after the customary time and weather reports.

You may be surprised to learn that at the present time there are very few radio messages sent, and these are entirely between ship and shore. The land wires are used entirely for communication from one land station to another, I understand. Everything is changed now. The attention signal, ship and shore station call letters and the usual QRA to QTA are also different. Practically everything is in code.

I have sometimes listened for three hours without hearing anything to disturb the absolute silence of the "ether". Just think what a blessing this would have been in normal times.

The set on board is a 1-2 k. w. 500 cycle set, made by the Wireless Improvement Co.

of New York, and is complete, in two panels, placed together on a frame about 24 x 36 inches. Automatic starting of the motor generator, and a "break in" system, together with a continuous wave changing apparatus, which indicates the standard positions, together with a coupling scale are some of the refinements. The receiving set is the Wireless Specialty Co. "I. P. 76" and with the Mica Diaphragm receivers, and our 110 foot antenna, NAA comes in very much like it used to at home.

There is a nice hot wire ammeter, like the one I have, on the panel, and the antenna switch is quite complicated. I mean to get one if I can when I quit the service.

As it is nearly midnight and I have already taken up considerable of your time, will QRT, trusting that you may find time to pardon this hasty letter. There is an Underwood Typewriter within easy reach, but I think it too noisy for this time of the night. "P".

Baltimore Radio Association

What It Has Done Since Closing Orders

THE Baltimore Radio Association has proved of considerable assistance to the Government Radio officials in the past few weeks when orders were received from Lieut. P. L. Wilson and Inspector R. Y. Cadmus. A detailed account of the work done by this body of energetic Radio operators to help the Government may be interesting to the readers of QST.

When the newspapers reported that the President would undoubtedly order all the wireless stations in the United States closed during the war, a meeting of the Board of Governors was immediately called and several resolutions were passed by its members. The secretary was called upon to write letters to the local Radio Inspector, Lieut. Cadmus, Secretary Redfield and Lieut. B. V. McCandlish, District Radio Superintendent offering the assistance of the Club.

Local newspaper clippings were submitted to the members of the Board by Mr. Bernhart and Mr. Duvall, the Vice-President, with the request that some action be taken by the Association to contradict some of the erroneous statements which they felt would make a bad impression on the public.

Mr. Cadmus called on the Association the day he received orders from Washington to take down the aerials and prepare the apparatus, ready for his seal. He advised that the members would greatly assist his office by reporting any station that had apparatus for receiving only, or had apparatus and was not licensed and not on his records.

Although the newspapers stated there were only 80 stations in the city—over 235 stations have been closed up to the present time. The scattered few that are left are soon to be rounded up and this shows that the Association helped to some extent. Stations that were never known to exist were soon discovered by the quick and watchful eyes of the members. In many places apparatus was sealed that had not been used

for years, and even where the aerials were not in evidence, instruments were found, stored away in attics and cellars and reported by the members. As the inspectors were somewhat handicapped in covering the city quickly, the officers of the Association came forward with motor cars and their personal services and the districts that had been assigned to each party was soon gone over thoroughly. The President, Mr. Primrose, Vice-President, Mr. Duvall, Secretary, Mr. King with the assistance of Mr. Falconer and Mr. Smith, made the rounds with Chief Electrician Hubbard. The work was carried on continuously, day and night and even on Sundays. As Mr. Falconer enrolled in the Naval Reserves and left Baltimore on the "Fish Hawk", as Second Class Electrician, we were compelled to get a car to take the place of his and Lieut. Wilson kindly loaned his for the work in the afternoons. Considering the bad weather and the inability to secure cars at all times, we believe that the closing and sealing of the stations about Baltimore in such short time could be called a record. Some days we could close as many as a dozen stations, while on others and especially at night only two or three could be sealed. In many instances, due to the absence of the owners, aerials had to be lowered, sets dismantled, boxed and sealed, and this kind of work took considerable time, especially when the stations were in a scattered section of the city.

Many humorous incidents were related by the members of the sealing parties at the regular meeting of the Association on April 21, but of all the stations that were sealed, was there one that showed any opposition to the work. Almost all knew that it had to be done and almost all were ready for the inspector's seal, those that had not dismantled their sets, had neglected it for lack of time or absence from the city. While this work was going on, it was learned that stations in and near Philadelphia were still

in actual operation and none of the Washington stations had been sealed. It should go to show that the Government officials had not been prepared to do this work quickly and an organization such as the one in Baltimore seemed to be greatly needed at this time in the other two cities. The Association has received words of praise from both the Radio Inspectors office and from Lieut. Wilson for the work that the members and officers had done and it is hoped that assistance had been given to the Government officials in other cities by Associations or Clubs such as the one in Baltimore.

At the meeting of the Association on April 14th, the President announced that the Board of Governors had voted that the meetings would be held once a month during the period the stations were closed up, instead of every two weeks as before, and that the activities of the Association would by no means cease. In fact, the work of the Association would go on as before, except for the work done by the relay committee and it is hoped that some very interesting lectures will be brought before the members. Mr. Falconer suggested that on each meeting night a certain instrument or part of the equipment could be discussed or lectured upon, and to this end, each member would have the chance to contribute the results of his experiments or to suggest improvements on the various instruments. Mr. Duvall promised to present a paper on the insulation of the station at the next meeting, which will contain some novel experiments he has made along this line. The paper will be open for discussion and suggestions by the members and undoubtedly some very interesting points will be brought up.

Although the stations are closed and sealed for any radio operation, many of the members obtained permission to hold out certain parts of their apparatus, such as transformers, which will be used for experiments in High Frequency work. Telephone receivers, keys and buzzers for practice, etc. Many of the members were delighted to learn that QST was to be published throughout the war and as a contribution to the future of the magazine and

the American Radio Relay League, a great many promised to join the League and subscribe to the magazine. Application blanks to the League will be distributed among the members at the next meeting.

A good many of the members of the Association who have not been interested in actual Radio Relaying in the past and who are more of the experimenting type of amateur have a suggestion to make to the editor of QST. It is believed that throughout the period that the stations of the League are closed, due to the present war situation, and as there is no telling how long this period will be, interesting material, such as that as supplied before by the relayers, will be found scarce and as a suggestion, it was thought that a new department could be started in QST. The main idea of this new department is to have a number of pages open to the readers of the magazine which they could use as an experimental department. By this it is not meant to have a so-called "How to Make it" or "construction" department, but a department for discussion, ideas and suggestions by the readers. Many of us have thought out in our minds or on paper some scheme or idea to improve on the various instruments used today, some perhaps, have some idea of a new tuning or interference preventing system, or maybe some have thought out a system for transmitting undamped waves, that seemed probable, but they have never been thought seriously about. He can therefore write his idea to the new department in QST and ask for improvements or suggestions from other readers.

For instance, suppose you had thought up an idea some time ago that was a combination transformer, rotary gap and generator. You had worked it out yourself on paper, but had never had the time or funds to actually carry out your scheme. You were also not entirely sure of some things, as you had not studied generators and transformers. Suppose you described your idea briefly to QST readers, and you were not sure of this and that point and you wondered if this and that would work, etc. Well, those who read your idea or scheme might have had some such idea

themselves or could suggest something here and there for improvements, or others could point out why it would not work or just what could be done to make it work. No attempt would be made to give any detail or working plans or would any of the schemes be expected to be actually worked out at this time, unless they were remote from active wireless apparatus. After all these ideas, suggestions and discussions have been published in QST and operation of our stations is again resumed, we will have enough data, ideas and suggestions for experiments that will keep us busy for some time to come. What do you say? Is it a good suggestion or not?

A Brief Account of what happened at Buffalo when Orders were Received to Disconnect all Radio Apparatus and Dismantle all Aerial Wires, and the Means Used to Enforce the Orders.

By SARB

Orders to disconnect all radio apparatus came from M. B. West, radio censor for the United States Government for this district, on April 9th, and the sheriff of Erie County was notified on the same date in a telegram from Governor Whitman to dismantle all wireless stations in this county. He at once got his sixty deputies together and gave them written orders to search for all radio apparatus and report their findings to him.

On April 16th, a wireless station was installed in the Federal Building to be used for the purpose of detecting amateurs who had not obeyed the Government's orders to dismantle their stations. It's installation was directed by Radio Engineer Leary of this city. The local commercial station that had been taken over by the naval authorities was re-opened for commercial business. It is being operated as a naval station and will be subject to censorship at all times.

April 17th showed that three hundred radio stations in Buffalo and vicinity had been dismantled since word came from Washington and it was especially pleasing to Radio Gunner M. B. West. The Police Department joined forces with the sheriff and the radio department, and the reports

from captains of several stations (police) showed that up to the morning of the 17th, twenty-one additional outfits had been dismantled. Also one station in Williamsville, near Buffalo, was closed. Radio Gunner West has been meeting with success in his recruiting campaign. On the morning of the 18th, six Buffalo amateurs were sworn into the Federal service and sent to the naval training station at Great Lakes, Ill. As soon as they complete their course of training they will be assigned to the radio stations in the Great Lakes region. The powerful call of a British warship somewhere off the Atlantic Coast was heard on the following night by Mr. West on the audion, sounding code signals. This is the receiving apparatus that has been installed for the main purpose of detecting wireless plants which have not complied with the order of the war department. Three operators have been using their plants during this week, but as no questions were asked and no call signals given, it was impossible to tell their location. The operators try various letters of the code each night and inquire as to their spark. It is expected they will be located soon, or either shut down their sets themselves.

We are all anxiously awaiting the word that will give us permission to again reopen our stations, and we hope that it will be soon. Meanwhile, let us fly old glory at the top of our masts in place of the aerial and patiently await the outcome of Uncle Sam's entry into this great war.

THIS MONTH'S COVER

This month's cover is extraordinary, and it is worth special mention. It shows in poster effect one of the submarine chasers which we hear so much about, and where many of us amateurs are to be detailed as radio operators. Unlike most magazine covers which are mainly ingenious, eye attracting devices to sell the magazine, this cover shows the actual construction as far as details have been made public by the Navy Department. It is the real stuff, and many of you fellows take a good look because many of you are destined to live several months aboard a boat that looks just like this.

The cover is by Mr. Hick 1ESS.

For Sale and Exchange

FOR SALE: 9RW selling entire set—1 Kw. T-2 Thordarson, cost \$25.; plate glass condenser; A-Z rotary; Murdock aerial switch, cost \$3.; fibre base extra; three coils Clapp-Eastham edgewise wound copper strip, heavy $7 \times \frac{3}{4}$ in. diameter, excellent for O. T., one coil four turns, one five turns, one eleven turns, cost \$22 $\frac{1}{4}$ per turn; Blitzen 48 plate glass case variable, cost \$4.; other apparatus, instruments sold separate or together. All communications answered. Write H. J. Burhop, 1945 No. 7th St., Sheboygan, Wis.

FOR SALE: Complete $1 \frac{1}{2}$ spark coil sending set and 8,000 meter receiving set. Also two storage batteries. Walter J. Schneider, R. R. No. 2, Mason Rd., Hamilton, Ohio.

FOR EXCHANGE: Volt-Amp motor, cost \$6.50 and is just as good as amp; telephone transmitter, receiver, condenser, and induction coil, 1,000 ohm bell-ringing coils, J. & B. Master vibrators, $\frac{1}{2}$ in. and $\frac{3}{4}$ in. spark coils without vibrators, but the J. & B. Master vibrator will work on either one of them. I want 1 in. spark coil with good vibrator, loose coupler, pair of good 2,000 ohm phones, variable condenser, and good detector. Jerome W. Bastien, 114 Fourth St., N. E., Little Falls, Minn.

FOR SALE: Electro professional loose coupler, \$5.00; will exchange Multi-Audi-Fone in A1 condition for a good three or four inch spark coil and loading coil for a variable condenser. J. R. Smith, Box No. 481, Osborne, Kans.

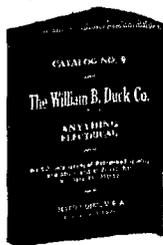
FOR SALE: Multi-Audi-Fone single step three-year written guarantee, complete directions, blue print of connections, new \$15.00 prepaid. H. E. Williams, Eureka, Cal.

EXCHANGE: Have a quarter Kw. Gnome flexible transformer to exchange for an audion detector set of reliable manufacture. All letters answered. Lester Reiss, 580 West 161st St., New York, N. Y.

FOR SALE: Will sell for \$3.50 a \$600 meter loading coil with switch variations in good condition. It is a \$4.00 coil, only had it a short time. I will also sell a \$1.50 detector for \$1.00; will furnish with detector a piece of N. A. A. tested galena and silicon and a piece of Radiocite. It works fine, for \$4.00. Harold Ackerman, 405 Park Avenue, H. Cloquet, Minn.

Additional For Sale and Exchange Notices
on Page 28

ATTENTION WIRELESS AMATEURS



We anticipate that very shortly all of the amateur wireless stations will be re-opened. Our stock of wireless instruments was never more complete than it is at this time. We have large quantities of every instrument listed in our big 300 page catalog and in the few cases where our stock was low it has been replenished. Our wireless business is one out of five big departments of our business and our patrons can always rest assured of prompt service for anything in the electrical line at any time in the future.

If you are without our big 300 page No. 11 electrical and wireless catalog, would suggest that you send 8c for it at once.

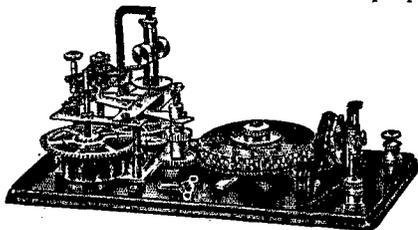
There will be no special sale on wireless instruments by this company during the continuance of the war.

THE WM. B. DUCK COMPANY

236-238 Superior Street, TOLEDO, OHIO

YOU NEED AN OMNIGRAPH NOW!

Now that your wireless sets are discontinued, temporarily, it goes without saying that you MUST keep up your code practice



THE OMNIGRAPH AUTOMATIC TRANSMITTER, connected with sounder, or Buzzer, will send you unlimited Continental or Morse Code messages, at any speed you desire.

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Unexcelled, also, for learning the Morse Code or for practice with the Morse Light. Send for Catalog—it's free—describing four different models—\$2.50 to \$18.00—or purchase direct through your Electrical Dealer. We sell the OMNIGRAPH under the guarantee—if not as represented, your money back for the asking.

THE OMNIGRAPH MFG. CO.,

35-39 Cortlandt St., N. Y.

WANTED: All numbers of 1916 QST, also Jan., Feb., Mar., 1917. Let me know how many you can supply and price of same. K. F. Gray, 718 Milton Ave., Easton, Pa.

FOR SALE: 1½ in. spark coil, \$1.00; 1 Murdock spark gap, 0.50; 1 key, \$0.75; all in good condition, also 1 Lionel electric with four cars and 80 lengths of track, perfectly new, guaranteed to run perfectly. **WANTED:** January February, March QST in good condition. All letters answered. Address: Paul R. Ferhend, 915 Latrobe Ave., Chicago, Ill.

FOR SALE: Large aerial switch. United Wireless change-over type, fibre base, copper parts all in A1 condition. Write for details. Harry S. Siegel, 709 Walnut St., Erie, Pa.

WANTED: A one inch coil—state make—also a one Pint Leyden jar. John Miller, 33 Windsor Place, Brooklyn, N. Y.

FOR SALE: One Master Vibrator, Model "T", \$5.00; four 1-2 inch spark coils same as used in Ford machines, 1.50. Each or set for \$5.00. All letters answered as received. Henry W. Breiden, Jr., 1304 Myrtle Ave., Jacksonville, Fla.

FOR SALE: One E. I. Company 3,000 meter loose coupler, \$5.50; one complete Murdock head-set, 2,000 ohms, \$8.25; one 1 inch wireless spark coil, \$3.00; one Western Electric 110 volt, direct current, 1-12 hore power motor. Runs good on A. C.; \$4.00. All goods in A- condition. Photos of motor sent on request. Address: Albert L. Branom, 208 Giddings Ave., Jerseyville, Ill.

AMATEURS

Now is the time during the lull to make your station what you would like it to be. Buy the apparatus you need, make repairs to the apparatus you have, or experiment making apparatus to your own design or along new lines.

I have a surplus of wireless apparatus to sell; No. 5 Model Loose Coupler, also the Parts, Plain and Wound tubes for Primary and Secondary Switch Points, Switches, Knobs, Polished Cabinets, Rubber Panels, etc.

I am preparing a list of bargains which will be sure to interest you for the prices will be extremely attractive. Now is the time to give your initiative full rein and show the next awakening of the Wireless Art the forced vacation was a benefit.

Send 2c stamp for list

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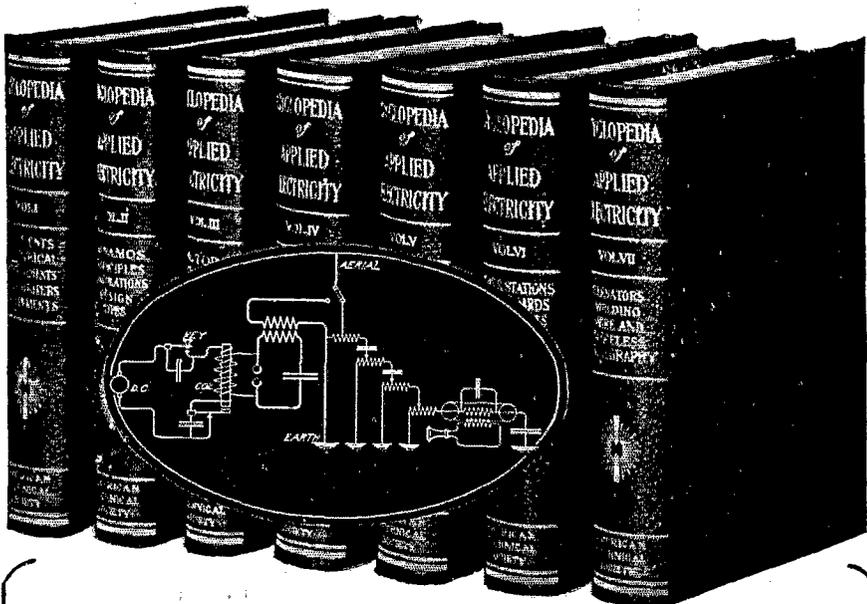
Gentlemen:—

Enclosed please find \$1.00. Send me Lieut. Mauborgne's book on Wave Meters by return mail.

Address

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THE latest in inventions in Wireless Telegraph and Telephony are all explained in the new Cyclopedia of Applied Electricity. The up-to-the minute discoveries that are revolutionizing the business are all treated in detail. Here is a new Electrical Library that no one interested in Wireless Telegraph and Electricity can afford to be without. It is the latest work of its kind—and written in simple, easily understood language. You can get it on a remarkable offer.

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American Technical Society,
Dept. E— Chicago, U.S.A.

Please send me the complete set of the Cyclopedia of Applied Electricity for 7 days free examination. If I decide I do not want them I will return them at your expense, otherwise I will send you \$2.00 after 7 days and \$2.00 a month until \$19.80 has been paid. Then you will send me a receipt showing that the \$35.00 set and Consulting Membership are mine.

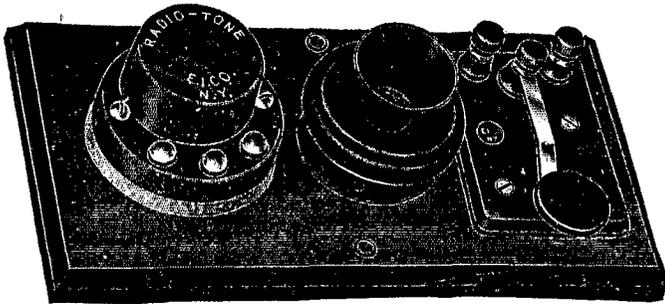
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AMATEURS, ATTENTION!



Radiotone Codegraph

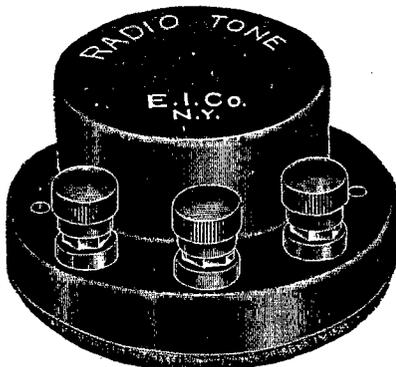
ceive at the required speed, when your country calls you?

The Radiotone Codegraph is positively the only instrument made that will send such an unbelievably close imitation of a high pitch Radio Station, that it has baffled experts. The outfit replaces the old-fashioned learner's outfit, consisting of key and sounder. The Radiotone Codegraph comprises our famous Radiotone High Frequency Silent Buzzer, a special loud talking receiver with horn, and a key all mounted on a base. Operated on one or two dry cells, the phone will emit the characteristic high pitch sound, which while not harsh, is heard all over the room. With little trouble you can learn the code correctly in 30 days—

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Connect two of these outfits together for intercommunication work and you and your friend five or fifteen blocks distant can converse over a NO. 36 WIRE, so fine that no one will see it. Or you can use instead of the wire, a metallic fence and the ground. Or you can communicate over your 110 lighting line, using no extra wire, only the ground. Full directions how to do this are furnished with the instrument. DEALERS: This is the 20th Century instrument that sells like WILDFIRE. 600 sold in New York in 10 days. Get our proposition today.

Radiotone Codegraph complete as described, each \$1.95
Shipping weight, 3 pounds. Enclose sufficient postage for mailing
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No 1800

The "Electro" Radiotone HIGH FREQUENCY SILENT TEST BUZZER

of pleasure for intercommunication work. Particularly now that we cannot use our Wireless sets, the Radiotone is already in wonderful demand. All the interesting things as described with our Radiotone Codegraph, elsewhere on this page, can be performed with the Radiotone, a key, a dry cell and a phone. Shipping weight, one pound. Enclose sufficient postage for mailing

Radiotone as described.....each **\$0.90**

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Yes, the RADIOTONE is SILENT. In fact, it is so silent that you must place your ear on top of it to hear its beautiful musical note.

You will be astounded at the wonderfully clear, 500 cycle note, sounding sharply in your receivers, when operated on one dry cell. To learn the codes, there is absolutely nothing like it. With the RADIOTONE, a key and one dry cell and ANY telephone, a fine learner's set is had. Two or more such sets in series will afford no end

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Expert instruction—Modernly equipped Laboratory, lowest tuition—Dormitories—Employment Bureau.

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Correspondence courses, special 8 weeks (5 hours per day for instruction and 3 hours of home study) residence course. Next class starts June 15th. Regular 6 months evening course, open year round. Advance course in Zenneck opens June. Enroll now.

All residence students are under the direct instruction of former Chief Operator of Marconi Stations at Savannah, Ga., and Cape Hatteras. Over 100 students taught by mail. Our automatic sender is unsurpassed.

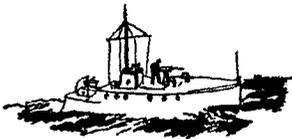
Marconi Company accept our students. Positions now open.

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SUBMARINE CHASERS

and other Navy Vessels are being equipped and manned with wireless. Students from this school have recently been accepted by the Navy Radio School and enrolled in the Naval

Reserve. Positions in the Merchant Service and in the Enlisted Signal Reserve Corps of the Army await trained wireless operators.

Your bit, Mr. Amateur, is clearly defined. Write for folder "Q" which tells of afternoon and evening training classes, dormitory accommodations and temporary employment while studying.

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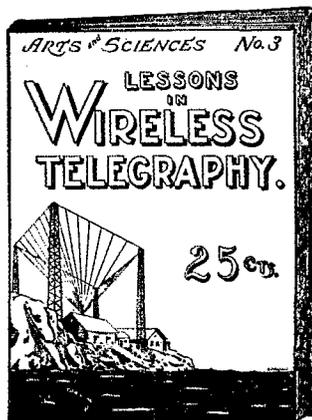
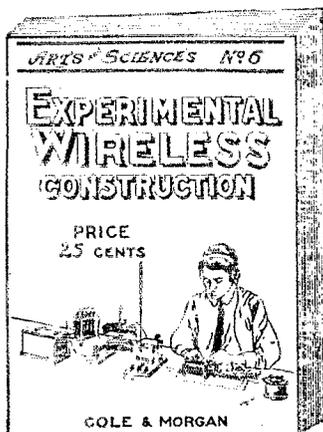
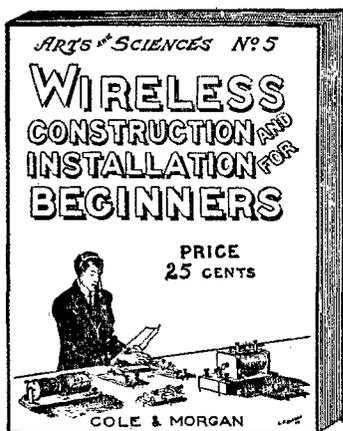
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