

AUGUST 1925

CENTS

Wireless Age

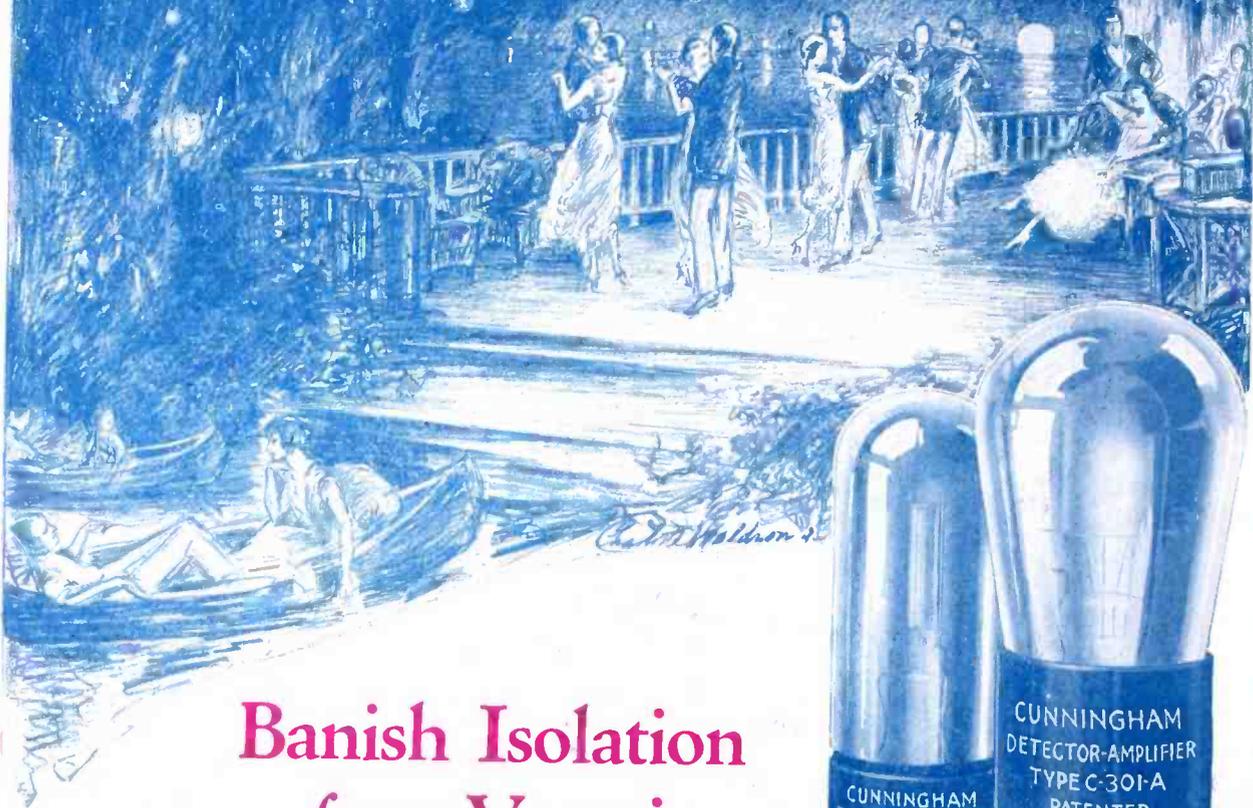
The Radio Magazine

50



REVERE F. WISTENHUFF

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"Quality Goods for Quality Readers"

Wireless Age

The Radio Magazine

Vol. XII

No. 11

August, 1925—Contents

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Your Authors

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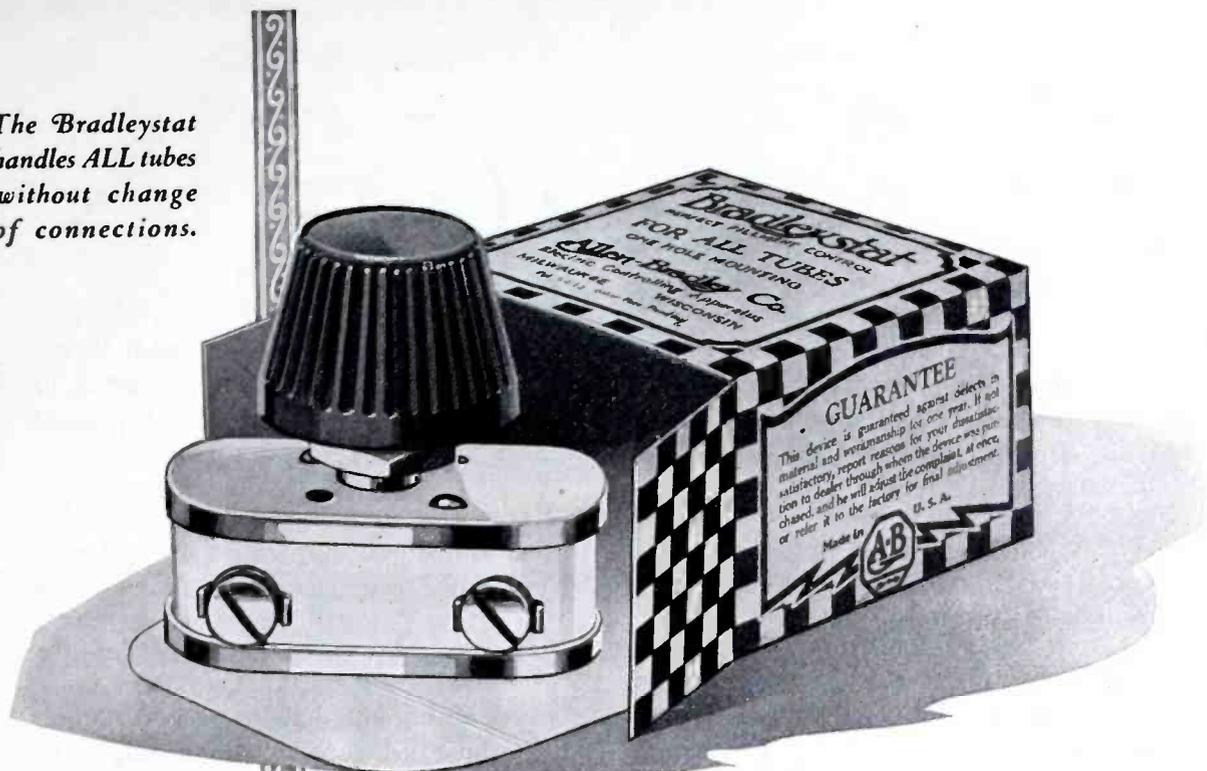
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Because certain statements and expressions of opinion from correspondents and others appearing in these columns from time to time may be found to be the subject of controversy in scientific circles and in the courts either now or in the future and to sometimes involve questions of priority of invention and the comparative merits of apparatus employed in wireless signaling, the owners and publishers of this magazine positively and emphatically disclaim any liability or responsibility for any statements of opinion or partisan expression if such should at any time appear herein. Printed in U. S. A.

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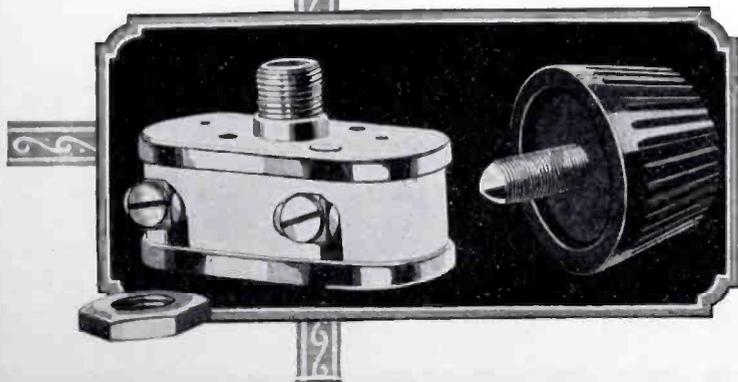
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Editorial Chat

IN this, the last issue of WIRELESS AGE—The Radio Magazine, I wish to extend to our contributors, readers and friends a full measure of appreciation of their work and support in the development of WIRELESS AGE to its present advanced position in the radio publishing field.

WIRELESS AGE combined with Popular Radio (see announcement on page 28) means a continuation of that development so that a medium, supplementary and complementary to the radio broadcast era that has dawned upon the civilized world, may be obtained and supported.

To its many readers for their constant interest during its thirteen years' issue, and to its many able contributors in creating and maintaining that interest WIRELESS AGE is indebted. It is for that reason, and that some measure of credit might be given, that the panel entitled, "The Workers and Their Work," appears on this page. Our devotion to the realization and perpetuation of the ideals set for WIRELESS AGE has been our obligation to your loyalty. You have been the trustees of our faith, and so it is that we leave with you, in this concluding issue the will to carry on—with Radio.

B. S. Anderson

MANAGING EDITOR.

THE WORKERS AND THEIR WORK

K. M. Melvain, D-Coil and Technical Articles; Dr. John P. Minton, Loudspeakers; Dr. M. Talmey, A. I. L.; V. T. Miller, "Spirit of Radio"; Ed. Randall, Cartoons; F. R. Buckley, Fiction; Revere F. Wistehuff, Cover Designs; W. S. Fitzpatrick, Operators' Dept.; Wm. West Winter, Fiction; Helen F. Dittus, Cross-Words; R. E. Bogardus, Technical Articles; J. W. Taber, "The Ethereal Symphony"; John R. Meagher, Technical Articles; D. G. Ward, Technical Articles; O. C. Roos, Engineering Articles; S. Miller, Technical Articles; William F. Crosby, Technical Articles. Contributors of broadcast material:—Golda M. Goldman, Mrs. Christine Frederick, Dr. Ralph L. Power, Ann Lord, Austin Lescarbours, Mildred C. Smelker, Dorothy Brister Stafford, J. Eddy, Raymond Voorhees, Harriet Works Corley, Edna Cahn and a host of others in addition to our regular editorial staff.



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THE satisfaction you receive from your radio depends not on what it does once in a while—but night after night and month after month. Whether you grin or cuss depends on the service behind your radio.

Ozarka radio instruments are *only* sold by trained factory representatives, men who not only specialize in radio but sell and service Ozarkas only. 3,100 of these men, trained directly under Ozarka engineers constitute a service force, unequalled elsewhere in radio today.

When you buy a radio you'll compare appearance, tone, volume and selectivity by having various instruments set up in your own home but—that isn't enough—compare the service behind each one.

Any Ozarka factory representative will set up an Ozarka in your home—he will not even operate it himself, but depend for his sale on what you yourself do. If you, by your own operating, do not bring in the distance, the volume and tone, you expect a radio to give, then

do not buy the Ozarka. If you do buy it, you can rest assured, no matter what happens, a competent service man is at your call at all times. No Ozarka representative can sell Ozarka Instruments without giving Ozarka service. You are entitled to such service—demand it!

The Ozarka Representative knows every part, every wire of the Ozarka. In fact he completely assembles his own instruments. His training on installations, aerials, ground connections, operation and service comes directly under our own engineers who designed and perfected the Ozarka circuit.

That is why our book, "Ozarka Instruments No. 200," describing all models of Ozarka should be of particular interest to you. This book and the name of the Ozarka representative near you, will be sent immediately at your request. Please give the name of your county.

We Have Openings for a Few More Ozarka Factory Representatives

OZARKA Incorporated, is now entering its 4th year. From a beginning with one engineer, one stenographer, one salesman—our present president, the Ozarka organization has grown to over 3100 people. There must be some good reason for this growth.

Ozarka instruments have made good—they have more than met competition. Ozarka representatives have made good not only because Ozarka instruments were right, but because they have been willing to learn what Ozarka engineers were willing and capable to teach them—Ozarka unusual salesmanship and Ozarka service.

There are still openings for the right men in this organization—men who believe in the future of radio—men who are tired of working for some one else—men who want a business of their own. Prove yourself by sales and willingness to learn and exclusive territory will be given you. The man we want has lived in his community for some time. He has the respect of his fellow men because he has never "put anything over" just to make money. He may not have much money, but he is not broke and is, at least, able to purchase one demonstrating instrument.

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Radio offers a wonderful opportunity to men who are willing to start at the bottom and build. You need not know salesmanship, but will you learn what we will gladly teach you? You may not know radio, but we can and will teach you if you will do your part. With such knowledge and willingness to work, it doesn't seem possible that you cannot make good. Sign the coupon below, don't fail to give the name of your county. Better still write a letter, tell us about yourself and attach the coupon. If interested in our salesman's plan ask for "Ozarka Plan No. 100."



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"Quality Goods to Quality People"



Enjoying the Radiola portable between dips at the seashore

SUMMERTIME RADIO

broadcast entertainment may be enjoyed at seashore, camp or mountainside—on boat or auto

By W. F. Crosby

EVER since the earliest days of radio communication, there has always existed an intangible something which caused experimenters to become disinterested in the "sport" just as soon as the weather began to get warm. Since broadcasting has come into being, each year sees a certain amount of propaganda on the subject and in every case the trend is toward making radio an all-the-year-around affair.

Just how successful all this has been is a mighty hard thing to settle, but one thing is absolutely certain, we find more interest in radio during the warm months right now than ever before. This may be partly due to the propaganda, but we are under the impression that it is directly due to the fact that there are now more fans than ever before and hence there is bound to be a certain percentage who will wish to continue listening no matter

what the weather may be. In any "game," which has become as large as radio, we will always find some people who will hang on throughout the year.

This is true mostly of the experimental class of fans, but we are finding, as the industry grows, that there is a strong possibility that radio will come into an entirely new field during the summer and the day may even come when we will find some fans who will use radio in the summer only and not touch a set all winter long!

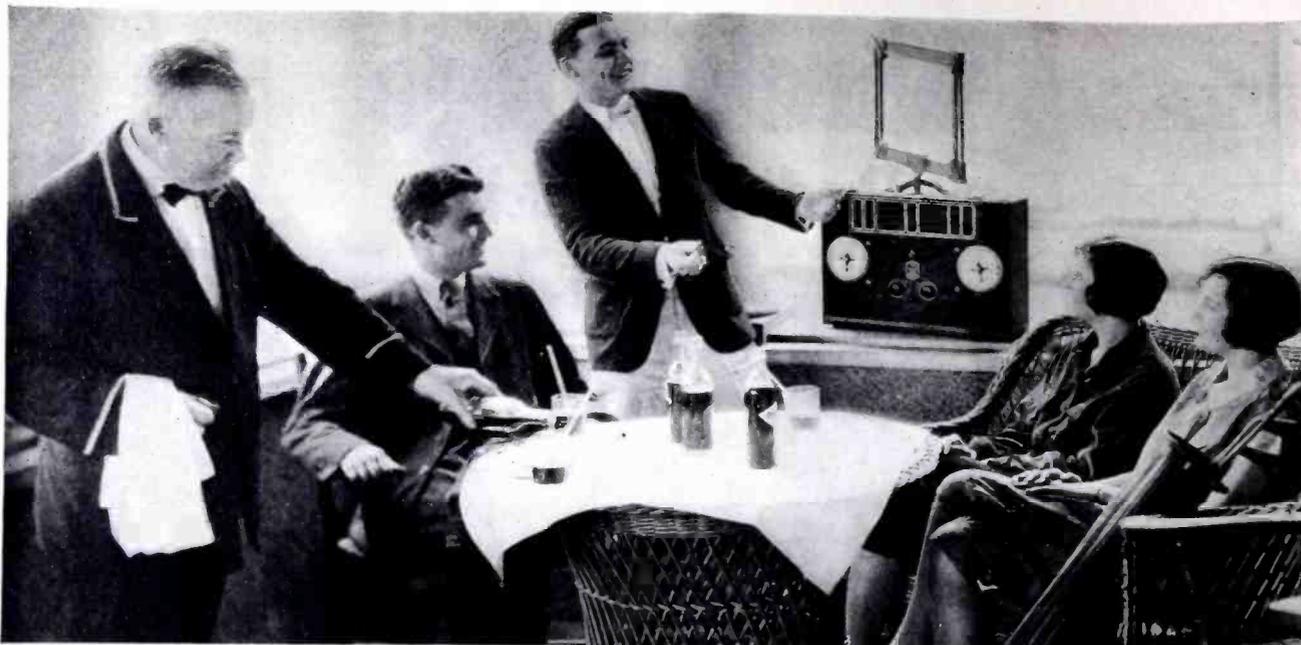
These are the fans who use sets for vacation purposes. With phonographs it has been found that some people will buy small portable machines for summer purposes, yet will never lay out the money for a large phonograph for home use during the winter months.

Let us look into the subject and see in just what ways radio may best

be used during June, July and August, those months when most of us have out-door thoughts, when vacation is the big thing and when we wish to get away from it all. You who have taken camping trips, boat cruises or auto trips have been up against the problem of amusement during the long evening hours and unless you happened to be near an amusement resort or had a portable phonograph with you, you found that time hung rather heavily after the dishes had been cleaned up and everything made ready for the night.

RADIO ON BOAT HELPS

SUPPOSE that you have a small motor boat, one of those little ships where two or three people may sleep comfortably and where you can drop your anchor and stay as long as you wish—a self-contained unit. You have spent a day out on the deep water



The "nineteenth hole" and a little jazz by radio go well together

fishing and have just finished a repast of freshly caught fish with possibly a mess of clams dug at low tide in a nearby cove. Your little ship is snuggled down for the night and with anchor light swinging from the yard-arm you and your friends sit there and idly discuss the situation, when you will go back to civilization and what you will do when you get there. Possibly the talk will turn to business, surely not a good topic for those who are supposed to be vacationing and are considered to have such thoughts farthest from mind. To make the picture complete we must have a snug anchorage, with the moon just coming

up over the distant hills and possibly the roar of a heavy surf somewhere in the background. Below decks the last dish has been rattled away to its resting place and the pungent odor of pipe tobacco fills the cockpit.

It is at about this witching hour that the "first mate" should come up from below with the loud speaker and place it on the deck just for'd of the cabin bulkhead, plugging the leads into an already prepared jack system on the bulkhead. This would, of course, be connected to the radio set down inside of the cabin. Soon the strains of some stringed ensemble

would fill the air and the evening's enjoyment would really begin.

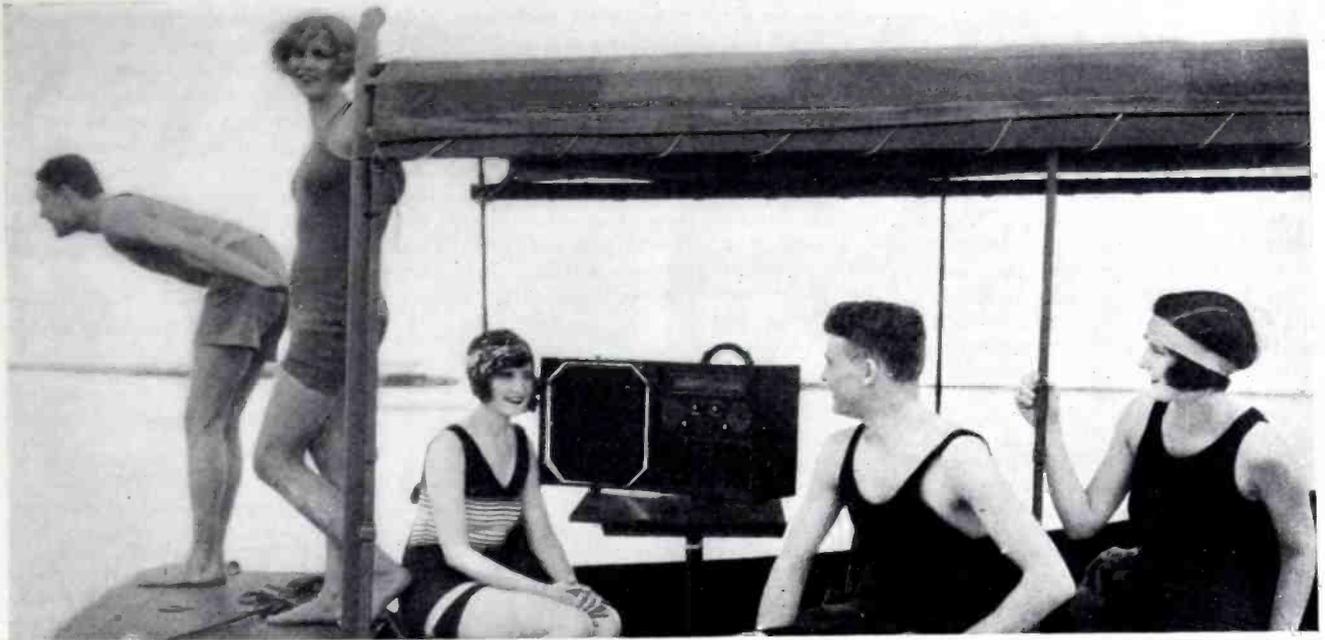
This "word picture" is not any wild fantasy of what might happen, but is based on hard facts and also on what has already happened on board many small boats. Theoretically and structurally there is no reason why a radio set could not be installed and operated successfully on even the smallest of cruisers.

PREPARING AN AERIAL

OF COURSE the chief difficulty is the erection of an aerial suitable for the work and as most of these boats are less than forty feet in length



The portable Radiola 26 lends itself admirably to the roadside picnic



A portable receiver adds to the enjoyment of motorboating

it stands to reason that this part of the equipment must, of necessity, be cut down to the barest working minimum. With a boat forty feet in length the aerial may be slightly in excess due to the height of the mast, which should be erected amidships. The higher the mast the longer the aerial will be, because we are taking in the sides of the triangle rather than its base, which, in this case is the length of the boat. One wire will usually do the trick nicely, but in some cases a slight improvement may be secured by using two. The addition of further wires will seldom help matters and with so many wires dangling about overhead it is possible

that complications may set in should things get loose during a storm. The lead-in should, in all cases, be taken from one end of the antenna and never from the middle.

INSULATION IMPORTANT

THE matter of insulation is a highly important part of the equipment as in boats conditions are usually rather damp and insulators which are apt to absorb moisture will become "grounded" and consequently seriously affect the receiving range and volume. Insulators should be chosen which are hard, and have a glazed finish such as certain types of por-

celain or, better yet, glass. Along these lines particular care should be expended where the lead-in is brought through the deck or cabin and in to the receiving equipment. There are several good makes of such devices now on the market and the yachtsman should make a careful investigation before buying this part.

In some instances, where there is a lot of metallic rigging with which the antenna is apt to come in contact, it has been found practical to use regular No. 14 rubber covered wire for both the aerial and lead-in. The insulation on the wire will not affect the receiving qualities in the least, yet will prove a



Riding at anchor—a light repast, the sunset and radio furnish a fitting close to a day's trip

real aid toward the prevention of an accidental "short."

In any of these boat installations there is usually plenty of "ground" for the radio equipment, because water, and especially salt water, is particularly effective for this purpose. All that remains to be done is to see that a good connection is made. This, of course, must come about through the use of a metallic surface and sometimes by loosening up one of the bed bolts a wire may be fastened in such a way that the shaft and propeller will act in this capacity. In other cases

ing the wire to it, secure it with several small machine screws and nuts.

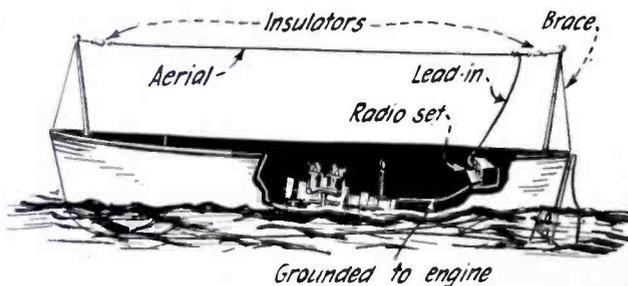
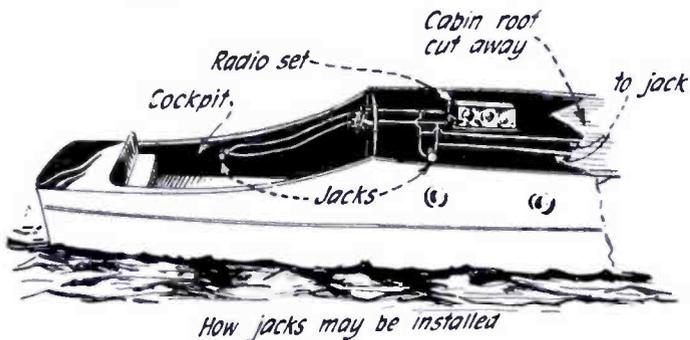
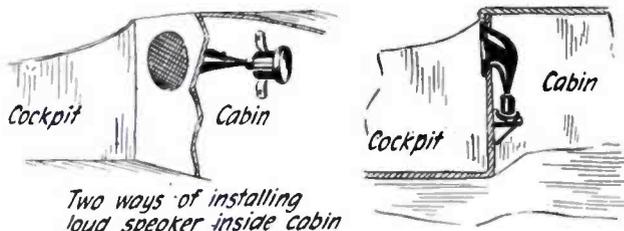
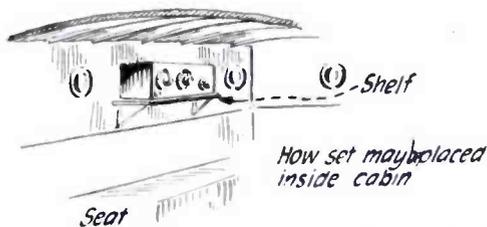
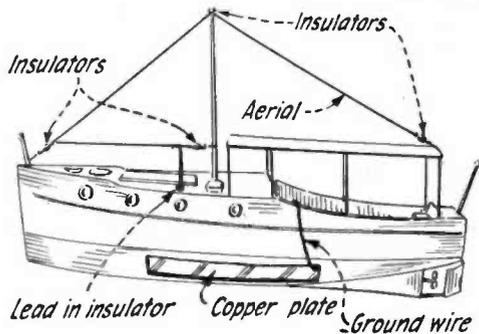
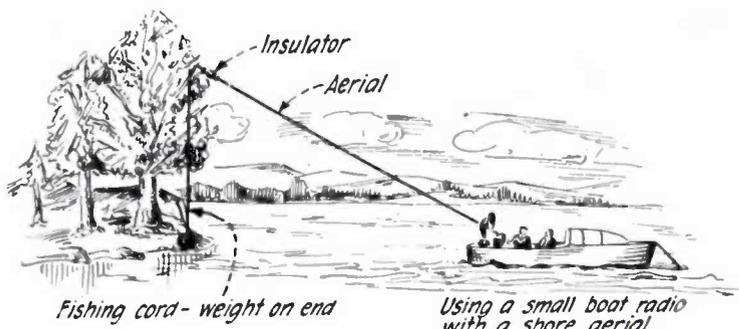
BEWARE ELECTROLYTIC ACTION

IF the "ship" is equipped with a bronze shaft, propeller or rudder, and a galvanized or zinc plate is used for the "ground," it will be found that the action will soon wear the plate away and you will find yourself without a suitable ground. In any case this plate should present as large a surface as possible to the water in order to give the most effective results.

place of the ground. In other words, the two wires are absolutely independent of each other, one being connected to the regular aerial binding post and the second wire to the post where the ground would normally be fastened. Both wires should be carefully insulated so that no possible connection can be made with either the woodwork on the boat or with the other wire.

WHAT SET SHALL IT BE?

AS far as the actual receiving equipment is concerned almost any good circuit may be used. Of course, since



Suggestions for installing receiving sets in small boats

the bronze rudder and skeg have proven effective.

However, the surface is not always sufficient to guarantee the best of results and in some cases it may be more advisable to attach a copper or zinc sheet to the outside of the hull below the water line. If the boat is to be used in salt water, care should be exercised at this point to prevent possible electrolytic action. A soldered connection to a copper plate will not last long when immersed in salt water and likewise a copper plate fastened to the hull with galvanized iron nails or tacks will not hold for any length of time. If copper is used for the plate, use copper tacks and instead of solder-

The matter of receiving broadcasting while the engine is running is one which has never, apparently, been fully solved. In some installations reception is possible under almost any conditions, while in others, just as soon as the engine is started nothing can be heard but the ignition. Whether or not your set will work is a matter which you will have to find out for yourself. It may be possible to obviate or at least lessen this kind of interference by using a ground which has no connection whatever with the engine, and possibly using a two-wire aerial may help to solve the difficulty. One of these wires may be used as an aerial and the other as a counterpoise in

we are limited in the length of the aerial, it may be a good plan to have the set just as sensitive as possible. Generally speaking the crystal outfit is entirely out of the picture unless the boat happens to be located quite close to the broadcast stations, and generally a three or more tube set will be found to be most effective. The superheterodyne tuned radio frequency, reflex or regenerative set will generally be found the most effective. Many of these sets will work well with hardly any aerial at all, but in nearly all conditions, the reception will be somewhat limited owing to the small aerial and its rather poor height.

(Turn to page 54)

the LADY of the HOUSE

By Jean Allister

THE head of the house threw back his head and roared. "Lord, that's rich. Say it again."

"Please—Mista Radfor' & Co.—needa more polish for dissa 'trapshun."

For the past half year, at regular intervals, Francesca had apologetically halted him at the front entrance with this same statement. Her capable looking right hand held aloft for his inspection an empty bottle, bearing a flaming label that guaranteed to make "old things new," and her great dark eyes met his amused grey ones with a look of understanding and loyalty.

Nine years previously, with a similar look, she had annexed herself to Mr. James R. Radford for life. Upon that occasion the illness of his wife had compelled him to scurry to the nearest employment bureau in search of some one to care for his young son and still younger daughter. This large, bare-headed woman had risen from the bench upon his arrival, and without the slightest hint of interrogation in her soft Latin voice, had quietly but definitely decided:

"Me like worka for you."

And picking up her meagre belongings from the floor, she had started toward the doorway. Radford, choosing the line of least resistance always, lacked the courage to disillusion her.

True, his instructions had been lengthy and clear.

"Now, James, listen carefully. A nice, clean-appearing Swedish or German girl—about twenty."

Francesca had been neither Swedish, nor German, nor twenty. Her black wavy hair, parted in the middle, framed a broad face that said nothing. When she spoke not a muscle moved except her lips. Radford had never seen such waiting calmness. But it was her smile that decided it all for him.

As she walked confidently beside him, he had glanced dubiously at the red fringed silk shawl that covered her broad shoulders. This bit of vivid color against her sombre dress brought her dark eyes and still darker hair into bold relief, and gave to her a truly gypsylike personality.

His wife had almost burst into tears after the first interview.

"Oh, dear, dear, dear. Just like a man. Why James, I have never heard of an Italian maid, let alone possessing one. And you could never in a thousand years put a frilly cap and apron on her and let her serve at the table. As soon as I get up, she's to go right back. Do you hear me, James? Right back!"

And James, looking out of the window, had mumbled:

"All right. Right back."

"She would listen enraptured while he sang the old folk songs, but came very near slapping him when he evinced a decided preference for rag-time and jazz"



RADFORD & CO.
Sole Agents for
Chapman Radios.

and explained that, whenever necessary, he could be reached by telephone at the number stated thereon.

Questioning eyes had been raised to his with new interest.

"You be—Radfor' & Co.?"

"Sure as you're born. That's me."

"Al' ri'. Now me know."

Nevertheless, he was a bit startled that night when a smiling Francesca had announced with an air of great achievement:

"Dinner ready—Mista Radfor' & Co."

And in all the years of her service, she had never given him any other appellation. Not Company; just Radfor' & Co. Persistent and laborious explanations had proven of no avail.

He also recalled the sob that had caught in his throat the evening she had laid before him numerous samples of breakfast foods and washing powders that had been left at the door.

"Man say give dis to Lady-o-de-house. Me no find. Where Lady-o-de-House?"

"I guess you're the Lady of the House now, Francesca."

And shoving the small packages into her wondering hands, he had hurriedly left the room.

THUS Mista Radfor' & Co. and the Lady-o-de-house began a lifelong friendship that was as strange as it was rare.

Once Radford had made a mistake.

After the funeral, his wife's aunt, who had arrived unannounced from Albany, stated she had come prepared to take over the house, himself and the children. But Radford stood firm.

"No, siree! Not for a minute! You did not come near us when she was alive, and she would not want you here now. We can manage fine and Francesca is worth her enormous weight in gold."

"Hump! That outlandish foreign person? I am surprised you even allow her near the children. And why doesn't she wear aprons like all other respectable maids instead of those foolish colored shawls?"

Radford then realized, in an absent-minded sort of way, that it was Francesca's apronless body that made her appear different. When a bundle arrived from Albany a few weeks later containing six large, white, reversible aprons, he called the Lady of the House and explained their use.

Francesca listened respectfully and quietly. Then taking up the garments one by one, she refolded them neatly and replaced them in their original box.

"Please—who tell you geta dis for me?"

He hastened to elucidate.

BUT his wife did not get up, and Radford had more than once thanked his Heavenly Father that his two youngsters had had the ample motherly bosom of Francesca to cry upon during that trying period. With the irresponsibility of happy childhood they had accepted her without question, and under her able management the routine of Radford's lonely life was resumed.

One day, he stood before her and placed in her hand a neat, raised type business card, reading:

"Mmm—mmm—mm." One end of the string was in her mouth, and she was busily tying up the package. Straightening, bundle under one arm, she turned and faced Radford.

"Apron for servan' girl. Me give 'way to wash woman."

Radford had learned his lesson, and from that moment no one could ever refer to Francesca as a servant in his presence. In the years that followed, through all the illnesses of his children and himself, she had been his greatest prop.

If she had a past, it had been most carefully left outside the door on the morning she stumbled over the sill in his wake. She brought no references—nothing. Said she was just, "Francesca." A wedding ring, worn thin, decorated her left hand, but she affected no coral earrings or other jewelry.

Also, contrary to most of her type, she seemed utterly devoid of religious inclinations of any kind; never attended church or read a prayer book. Sometimes, pretending to be buried in his evening paper, Radford would follow her shawled figure trying to fathom what was lacking. She appeared simply a shell living for himself and his children, with a peculiar, listening expression in her eyes. He knew she had prayed until there were no more prayers to be said and that she had cried until there were no more tears.

But she had two passions.

His son and good music.

JAMES RUSSELL RADFORD, JUNIOR, she had christened "Bambino" at first glance. Marie-Louise, the impish female, with her father's curly sandy hair and turned up mouth, had simply become Maria-Louisa. Both children called her the "Lady" and made a pal of her. Junior was the one person on earth that could penetrate her deadly calm.

But he was now fifteen, going on sixteen, and beginning to sense a difference. He ceased bringing his boy friends to the house. A boy verging on manhood did not want his pals to hear himself addressed as "Mio Bambino" by a huge red-shawled female every time he stuck his head in the back door, even if such greeting were accompanied by an outstretched hand bearing one's favorite muffins or cookies fresh from the oven.

She would listen enraptured while he sang the old folk songs, but came very near slapping him when he suddenly evinced a decided preference for rag-time and jazz. However, his voice, the pride of his singing teacher, was changing, and he would not be called upon to humor her for quite a while.

Francesca's knowledge of classic music was astounding. Every winter most of her savings were invested in the Opera House and numerous concerts. This was her only form of recreation. Radford observed that she returned from these trips with a disappointed look; very tired and very white. But to all inquiries, she replied quietly:

"Some day, I hear."

As for Radford himself, he felt sure he hated music of any kind—canned, bottled or loose. The very nature of his work compelled him to reach this decision. While he fully appreciated that the radio had been Heaven itself to thousands of shut-ins, on bad days, he almost wished that these very shut-ins had to do the selling.

Sometimes, on Saturday night, when he saw a mother push her noisy brood through

"So engrossed was he in the blue of her eyes and their long curly lashes, he did not see Bob Stanton approach the instrument to vary the entertainment"



REVEREND WICKHOFF

the swinging doors of the demonstration booth, he would casually saunter in that direction.

Radiant and happy, clapping little hands together in glee, these tots would listen in awe.

"And then the train man would blow his whistle j-u-s-t l-i-k-e t-h-i-s: T-o-o-t! T-o-o-t! T-o-o-t!"

And the little chipmunk went hippity-hop, hippity-hop....."

Lord, what a funny youngster he must have been. He remembered that no less than ten Indians had to bite the dust, and each belt had to have no less than five gory scalps hanging triumphantly from it, before he would even begin to drowse!

IN SPITE of all their pleadings, a radio was the one thing Radford denied his children.

"If you must hear it, go visit your neighbors. There are more than enough of them around here. I can almost tell by the stuff they grind out, just how many installments have been paid."

And the children went. One night Marie-Louise dragged Francesca to a neighbor's fence. Brahms' Hungarian Dauce was being rendered by a particularly good orchestra on a particularly good radio. The "Lady" listened in wonder and peered at the queer box with the big horn. That night a new desire was born in her heart.

It was Radford's habit, during the holiday season, to call the Lady of the House to him and ask:

"Well, what is it this year?"

Last year, after much figuring, it had been a work basket and multi-colored yarns. Her clever fingers had evolved therefrom a beautiful mat closely resembling old tapestry, which now graced the library table. The year previous, it had been beads of many colors, and a marvelous handbag for Maria-Louisa's birthday had been the result.

But this year, there had been no hesitation whatever. Francesca had hurried upstairs to her room and returned beaming. A bit of folded paper had been timidly held out.

"Please—please, Mista Radfor' & Co. Me



wanta dis. Oh, so bad, me wanta dis."

Radford opened the paper and stared. Then he stared again. This was the last straw. He was in a rotten mood anyway, a sale of half a dozen instruments for the Community Club having fallen through that very morning, due to lack of

funds.

"Oh, the devil!"

It was one of his own circulars setting forth the fact that no home could be happy or complete without the Chapman-Five-Tube-Beauty!

James, Jr. and Marie-Louise shrieked in glee.

Radford rose to his feet.

"Francesca, do you mean to stand there and tell me you want one of these blankity-blank contraptions for your present?"

Fascinated by his language, she came closer and gazed at the photograph.

"What you call heem?"

He repeated it with a vengeance.

"Yes, oh, yes, please. Me wanta—dissa 'trapshun."

From Radford's expression, she sensed something was wrong.

"Too mucha—money?"

Then he realized he could not fail her. Turning to his offspring, he glared:

"What are you two fools giggling at? Get out of here and go to bed!"

After they had departed, he sat down again and looked with disgust at his prize radio advertisement of the year. Solemnly he spoke:

"Francesca, I'll get this for you," pointing an accusing finger at his firm's latest model, "but if you ever play it while I'm in the house, out you go and it after you. Un-

derstand that, do you?"

"Si, si, Signor, Mista Radfor' & Co."

NEVERTHELESS, the head of the house left his office half an hour earlier the day it was installed. Approaching his home from the garage side, he could not resist the temptation to look into the nearest living room window.

A queer sight met his eyes. James, Jr. and his sister were joyfully dancing the Charleston on the best rug his home possessed, but Francesca was nowhere to be seen. Baffled, he hurried up the front steps to be met with cries of delight from the two.

"Gee, Dad, it's just great. Watch me do this step. Listen to that jazz! Hot dog!"

Marie-Louise said nothing, but gave him a longer hug than usual as she dragged him into the living room.

"But where is the Lady of the House? It belongs to her, you must remember."

With shamed faces, they searched. In the attic, squatted on his best fishing nets and tackle, Francesca was crying as if her heart would break. Jumping to her feet when Radford approached, she controlled herself sufficiently to exclaim:

"Oh, oh, Mista Radfor' & Co. They cheata you. Take dis box back. Noise box—no music come out. Take heem back—queek!"

"Well, didn't I warn you not to get it? I'm not going to take the blame now, and furthermore....."

"No-no-no—no! I mean get 'nother like I hear uppa street."

She excitedly pointed to Marie-Louise for explanation and help.

"I've got the doggone b-l-u-e-s,

Yes, indeed, the doggone blues;

Come on honey and we'll dance for money

To the tune of these jazzy b-l-u-e-s" shrieked up from the lower floor.

"For God's sake, choke that thing off, Jim. Stop shaking her, Marie-Louise. I'll do all the explaining necessary, and maybe then we can get something to eat in this house."

WHEN Francesca had finally become convinced that merely by turning the knob on the little clocklike arrangements, you could secure whatever form of entertainment desired, her joy in the gift knew no bounds.

Hours were spent polishing it. Only her "Bambino" was ever permitted to tune in for her. Maria-Louise could not even put one little pink-nailed finger on the shiny surface, but every smear left by the none too clean hands of her idol was excused. Francesca always stood behind him with the oil rag. On rare occasions, as a special favor, she would allow him to connect with his favorite jazz. Then, with a snort, she would ascend to her room and slam the door until it was all over.

The climax of her devotion, as far as James, Junior, was concerned, came on his sixteenth birthday. After considerable pleading, he had won the privilege to tune in to his heart's desire for the party to be held that night. Nevertheless, she reserved for herself the right to stand guard on the top landing to see that no one else came within two feet of her fetish.

The party was in full swing. Junior had never been happier. Wasn't his sweetheart there, and hadn't she promised to dance with no one else? So engrossed was he in the blue of her eyes and their long curly lashes, he did not see Bob Stanton approach the instrument to vary the entertainment.

"Bambino! Bambino! Queek! Tell him go 'way."

With scarlet face, he jumped to his feet and came toward Francesca, now on the bottom step, oil rag being rung in her excited hands. His only thought at the moment was of his sweetheart.

"For the love of Pete, my name isn't Bambino. It's James—Jim! Can't you say Jimmie?"

"Sure, I say," came the obliging, smiling answer.

"Then, why don't you do it?"

Her lips pursed obediently.

"Shimmy! Shimmy! Mio Shimmy-Bambino."

His first he-man "Damn" was lost in the roar that followed.

But from that night on, the outside world knew him as "Shimmy-Bambino." He could still blush when he recalled the anonymous postcards sent him depicting shameless Hula-Hula girls, and wondered if the clerks in the local postoffice were of the female gender.

He reached the lowest depths of ignominy, however, when he discovered that he had been listed on the school football team as:

Half-back... Shimmy-Bambino Radford.

On that day, James Russel Radford, Junior, passed the bewildered Francesca without a word and marched straight to his father's room. Closing the door carefully behind him, without any preliminaries, he declared:

"If she doesn't stop calling me that, I'll—I'll leave home. Dad, you gotta tell her to stop it."

Radford looked at his son and understood. Placing his hands on the boy's shoulders, now almost level with his own, he said:

"James, my boy, I think you are old enough to know that if it hadn't been for Francesca showing me the way, I would have gone under years ago. And I won't hurt her for all the money in the world. No, not even for you, son."

When that interview was over, Father and son were closer man-to-man fashion than they had been for years. After dinner, Jimmie boisterously linked his arm into that of the "Lady" and danced her huge bulk around the kitchen table, singing at the top of his cracked voice:

"You are the only, only, only o-n-e for me...."

Radford had to turn away from the look in her eyes.

ANOTHER puzzling link came to light a few weeks later, which, in a measure may have accounted for her adoration of Jimmie.

Marie-Louise, in need of a particular shade of silk thread, in the absence of Francesca, had entered her room and rummaged in the work-basket. Her hand had come in contact

(Turn to page 59)

HORNLESS

loud speakers

By Dr. John P. Minton

WE have discussed thus far in our series of articles on "Sound and Radio Reception" the subjects of sound, the ear, the voice, the composition of speech and music, the various types of loud speaker units and the performance and theory of various sizes and shapes of loud speaker horns. We now want to add an article on recent developments in loud speakers, in which we shall cover the hornless types of loud speakers.

The idea of a hornless loud speaker cannot be considered in any sense a recent idea. If a person's only claim to achievement was the idea of using a vibrating body with a relatively large surface rather than a small diaphragm and a horn to produce loud sounds, then he can hardly be awarded a distinguished medal for his idea. The idea of producing loud sounds from large objects is probably as old as the human race itself. The very oldest musical instruments, of which we have any record, show that the people knew that relatively small vibrating bodies oscillating with minute amplitudes of motion would produce strong sounds when attached properly to suitable objects. No doubt they did not know the cause of this. This is not to be wondered at, however, because the average individual today does not know the cause of it, even though he is perfectly familiar with the phenomenon. Consequently, when today we attach a receiver unit, vibrating with weak or small amplitudes of motion, to a relatively large body capable of taking up or responding, so to speak, to these small vibrations, we must not look upon the idea as representing a new or novel idea. Many musical instruments are based on this idea.

Professor Tyndall of England, a famous authority on the subject of sound some fifty years ago used to demonstrate to his audiences a very beautiful hornless loud speaker. In the basement of the Royal Institution in London, where Professor Tyndall lectured, was a musical box, a long rod was attached to this box and extended to the lecture room two or three stories above. By means of various objects with relatively large surfaces (perhaps three or four square feet or so) held in contact with the end of the rod he was able to make the music perfectly clear and distinct to all his hearers in the hall. This made an excellent loud speaker—the vibrations

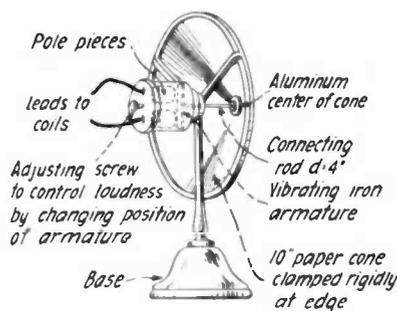


Figure 1

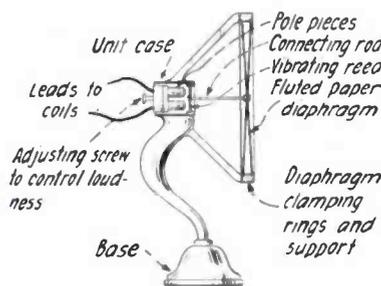


Figure 2

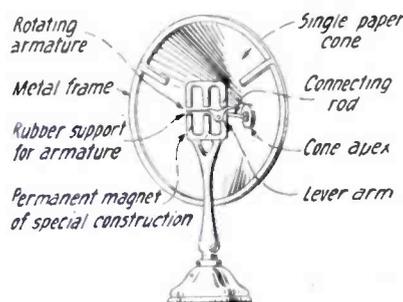


Figure 3

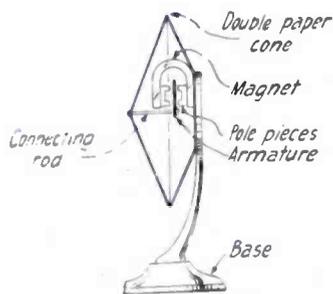


Figure 4

we shall discuss in this article are really of the Tyndall type. They have a rod whose purpose is to conduct the small vibrations from a loud speaker unit to a suitable surface which shall take up these vibrations and radiate the vibrational energy in the form of sound into the surrounding air. Since lightness of the vibrating body is one of the essential factors for good reproduction, paper has been used almost exclusively for such a body of hornless loud speakers. The paper has been designed with various shapes and sizes with the object to secure good reproduction. I shall give rough sketches for several of these hornless loud speakers together with a discussion of their performance accompanied by their response—frequency characteristics. The sketches are not meant for working drawings but are merely to illustrate the essential structural features.

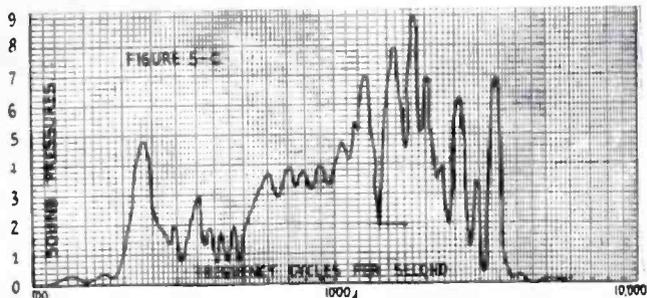
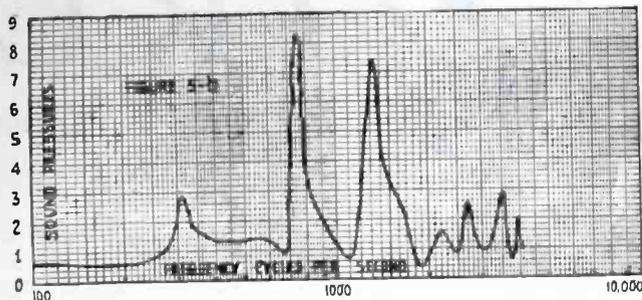
One of the first hornless loud speakers to appear on the market is illustrated in figure 1. As the figure indicates, the paper cone is a simple one about 10 inches in diameter and 2½ inches deep at the center. It is rigidly clamped around the periphery by a strong aluminum frame. The unit is supported at the center on the interior of the cone by means of an aluminum spider. The unit itself is of the ordinary bipolar type which we have described in one of our earlier papers. Over the pole pieces is an iron armature, suitably hinged so as to permit it to vibrate when excited by the signal current. A rod connects this vibrating armature to the center of the cone. This speaker will be referred to as No. 1.

In figure 2 is shown a sketch for another type of hornless loud speakers. This also was among the earlier hornless speakers appearing on the market. It is built up of paper, fluted, much like an ordinary fan is constructed, but is completely circular. It is about 16 inches in diameter and is driven by the usual type of bipolar, permanent magnet type of receiver unit. A short rod is attached at the center of the fluted diaphragm and to the other end of the rod is a piece of soft iron which is caused to vibrate by the signal current in the coils of the unit.

Another loud speaker of the single cone variety is sketched in figure 3. The cone is about 10 inches in diameter and is quite similar in shape to that shown in figure 1. In the case of

from the musical box being transmitted to the large vibrating surface in the hall by means of the long rod.

The hornless loud speakers which



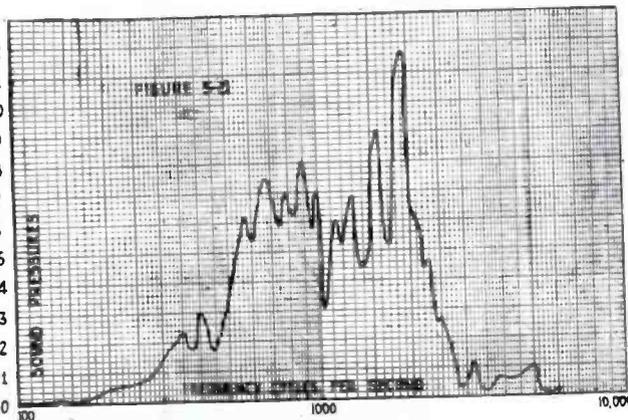
loud speaker No. 3, however, the cone is not rigidly clamped; it is shaped and placed between felt rings around its edge. In this case, then, the cone is somewhat loosely clamped. A short rod is attached to the unit at one end and through a lever section to the cone at the other. The unit is a special type of balanced armature construction, as indicated in the sketch.

In figure 4 are shown the essential features for a hornless loud speaker of the double cone type. The cone is a very rigid structure to forces directed along its axis, consequently, in the double cone construction we have a very rigid structure. It was probably one of the objects of the original developers of the double cone idea to have a rigid structure which would vibrate as a rigid body back and forth about the rear supporting ring. This ring is about 8 inches in diameter, whereas the cone itself is about 18 inches. However, the double cone acts substantially like a single cone rigidly clamped around its perimeter and I suspect that the action is entirely of the diaphragm type without any motion as a rigid body. These double cones, then, are merely similar to the diaphragm action of large, rigidly clamped single cones.

This double cone is driven by a particularly efficient unit of the balanced armature type. The unit is of the ordinary type but has low eddy current losses and is, therefore, more efficient for high frequencies than the usual run of units. The magnet is also quite

strong and permits of high flux density at the pole tips where it is needed. A small rod, about 4 inches long, connects the armature of the unit to the center of the front half of the double cone.

There is on the market another double cone quite similar to the one shown in figure 4. The only difference between these two is in their structural details, such as size and position of magnet, pole pieces, driving rod con-

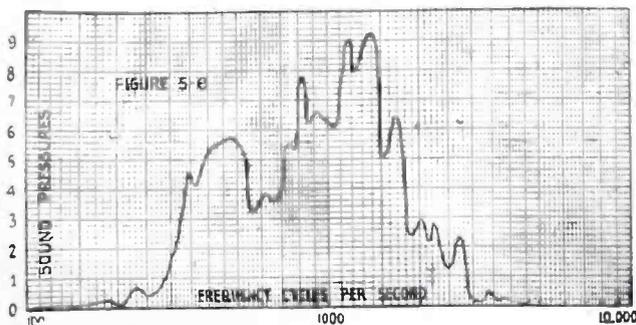
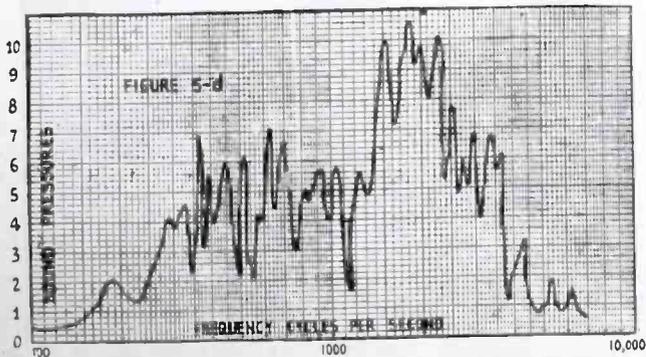


necting armature of unit to the cone, etc. In the case of this double cone, for which no sketch is shown, the pole pieces are laminated to cut down the eddy current losses which have a large effect on the efficiency of the unit at the higher frequencies. The driving rod is shorter, but heavier, than it is for the loud speaker shown in figure 4. The paper of which this cone is made is heavier and thicker than it is for the cone shown in figure 4. The cones, however, are practically of equal size and solid angle.

There are several other hornless loud speakers on the market, but those described above are sufficient to indicate the construction of these usual types. In our next contribution we shall complete the discussion of the hornless loud speaker. Let us now see what these usual hornless loud speakers do for us on radio signals and compare their performance with the horn types.

In figure 5 are shown a group of curves for the loud speakers described above. The curves are lettered a, b, c, etc., to correspond to loud speakers Nos. 1, 2, 3, etc. The heights of the curves are proportional to the sound pressure that the loud speakers would exert on the ear at the various frequencies. We have learned to look for several important points in these curves. Our observations and study of these points will indicate very definitely to us the intensity of the sound and the quality of the speech and music we may expect from the various loud speakers. Since the hornless loud speaker is comparatively new to most people and since it has been advertised very widely, we are apt to expect some new and marvelous performance from them. Psychologically, then, it is comparatively easy to convince most people that the performance is remarkably superior to that of the horn types. However, a careful reading of this paper is sufficient to convince one that fine results do not come from any hornless loud speakers. From the poorest to the best of the six types

(Turn to page 53)



RADIO GIRL

and the

By Mrs. Christine Frederick

EVER since radio has made its appearance, it has, like the early days of politics and baseball, seemed to be the special privilege of the men and boys. Women and girls were *persona non grata*, insofar as radio was concerned—and boys were given special parental dispensation to “tinker” with it if they liked, while girls were not even expected to listen in.

But like in politics and baseball—and even prize fighting—women are no longer debarred, and since our growing girls, those who are beginning to flap their feminine wings and are referred to as the “rising generation” are no longer kept from these typical man and boy activities, I believe radio is as important to girls as it is to boys; possibly more so.

Undoubtedly the majority of girls are not given to delving deeply into the mechanics of radio or any other technical device, but there is no doubt of the fact that the life of the modern girl touches radio at many points, and that even in the matter of making sets and tinkering with them, girls find something that distinctly adds to their education. In these days of girls who drive

automobiles and motor boats and who like to do things boys do, radio does not stump the modern girl.

Furthermore, during the summer and its incidental girl camp activities, I believe that the radio plays an increasing role. In fact, I believe that no real girl's camp will want to be without a radio. What a chance to listen to the Philharmonic orchestra while in the deep pine woods or in a canoe! I can visualize a group of girls, *sans* city clothes, in the August moonlight, their slender forms rhythmically dancing on the lawn to the tune of radio; achieving an effect of magic and poetry vastly enhanced because the music is not canned and rasping, but tones evolved from out of the balmy evening air.

GIRLS nowadays are taking the sort of vacations that are more in keeping with their healthier tastes. About this time of the year, they seem to say—

“Where am I going? I don't quite know
Down to the stream where the King-cups grow—
Up on the hill where the pine trees blow—
Anywhere, anywhere. I don't know.”

The organized group, tent camp by the lakeside in the woods, with its central mess hall and dancing pavilion, has been enormously popular with girls in recent years. Hundreds of them have sprung up and are crowded to capacity. The owners of such camps have, in most instances, installed radio sets, not to bring civilization any nearer, but to bring good music to the girls in the woods and lakeside camps. Girls have always been born appreciators of music, and are, therefore, born lovers of radio.

Picture the scene. It is raining at the camp. There is a fretfulness on the girls. They cannot be outdoors. The “Social Hall” is ringing with “flapsome” voices. Suddenly someone tunes in on the radio and jazz music comes through, the syncopated, never-may-stop tune. Soon all the girls have taken partners and the uneasy atmosphere is dispelled, in a way that no phonograph or piano could quite accomplish. A Tschaikowsky waltz comes through. Perhaps by that time the rain has ceased. Some venture outdoors again. Some girls adore a swim in the rain. They plunge in, nearby the social hall. Can you imagine anything



Girl Scouts generally tote a radio receiver to camp these days



The girl automobile tourist has found the radio receiver essential to the enjoyment of the night stop-over

more glorious than shooting out in rhythmic motions of swimming, while in the near-distance a very fine orchestra in New York or Chicago plays?

Again: it is evening in the same camp. There has been such heavy tennis and hiking that the girlish limbs are too stiff to dance. The lamps have been lit and girls are reading in their tents. Comes strains of music of the finest kind. Not an amateur, but an artist. Do you wonder that they love radio. Or, perhaps the girls have gathered together in the social hall of the camp to listen to a lecture that is being broadcast. Could anything be more useful to a camp?

I have taken the subject of girls' camps, first, because of the many advantages of radio to these camps. The younger the girls, the more the practical advantages, for it is often a problem at such camps to keep them interested. For young women's camps radio is indispensable, because of its remarkable provision of good music, for which young women have an insatiable appetite.

BUT I do not merely want to stress the need of radio in connection with girls' camps. For special reasons I believe girls are more interested in radio than boys. I do not mean the mechanism of it, but the enjoyment and use of it. Personally I have watched my

three daughters, seven, nine and fourteen years old, get the keenest enjoyment out of radio. Long after my 16-year old boy had gotten over his radio "craze" and lost interest, the girls were developing an unquenchable interest in tuning in, which hasn't stopped yet. The older one is even a DX fan, the younger ones like special features. But all are interested in whatever is being broadcast. They have even listened quite attentively to lectures for grown-ups and to "highbrow" music. This latter feature of broadcasting is undoubtedly one of the finest on the minds of children, for they learn to appreciate good music, without truly understanding it, and if, in later years, they become interested in music, it serves as a wonderful preliminary musical education. Considered solely as a memory training for the names and sounds of standard high grade musical compositions, it has been a splendid education. Also pronunciations! Constantly my daughters are seeking the dictionary to settle a dispute caused by radio!

I have seen these young girls dance to the tune of radio, listen to speeches, talks, etc., which were far advanced beyond their scope of understanding, with a compliment of attention far in excess of that of young boys. The latter, I think, are much more apt to be interested in the pure mechanism, and once they have taken apart a set and put

it together, built a lot of new circuits, etc., they don't like to go over the same proceeding again. They lose interest in radio; the content of what comes over the radio is not so interesting to boys as to girls. And even when they are interested, it is confined mostly to getting new stations—far off stations—and are constantly twisting the dials.

My older daughter has, with a group of girls of her own age, taken a very special interest in radio, which I think is a permanent interest. She plans to have a set in college when she goes in September, and not even the whirling activities of the campus will wear her away from the dials. Incidentally, the increasing use of radio sets among girls at boarding schools and colleges is a significant indication of the extent to which girls are alive on the subject of radio.

Not long ago my daughter gave a party. As we have a large radio set prominently in place in our living room, it was soon the object of general interest, and a considerable part of the evening was spent listening in, in preference to other usual party occupations.

Says my daughter: "Of course, I know it's brother's special privilege to fix anything that's the matter with our radio, and I know father has a fit when I monkey with the antenna, but do you

(Turn to page 60)

EUROPE AND THE

Some sources of information
By O. C. Roos

Research Engineer F. A. D. Andrea Co.

AIL

IN a previous article on the L. D. system of the A. I. L., the principal American sources of information thereon have been considered. It was impossible to give all as some are just starting out, but the powerful leaders were treated.

The special systems treated are the L. D. and Ilo and its improved variant, as explained by Dr. Talmey in his A. I. L. course.

The present article is intended to give the novice some idea as to where similar information may be obtained regarding European work in these systems. He must be warned, however, that the European field is not in sympathy with the "laboratory" attitude of the American leaders in the A. I. L. movement. European A. I. L. literature and grammars all follow the rigid lines of the grammars of the L. D. as laid down in 1913.

The official organ of all friends of the A. I. L. idea who are not Esperantists (Zamenhof) Nov-Esperantists (Rene de Saussure), etc., is the "U. L. I." or "Unio por la Linguo Internaciona."

This institution is so important—at least theoretically—as a basis of European propaganda literature and information that a translation from the L. D. of its statutes will be given.

The organizations of the Union are:

1. The Congress (Kongreso).
2. The Committee (Komitato).
3. The Academy (Akademio).

The Congress usually assembles annually, the time and place being fixed by the preceding Congress. Otherwise the "Komitato" decides the matter.

The Congress consists of delegates elected by the members of the national or international organizations. These severally elect two delegates for the first 50 members:—for every other fifty—one delegate. Countries with isolated members may have from 1 to 2 delegates. The members of the Komitato are, of right, members of the congress. 2d. The Komitato consists of the president, the secretary and the treasurer of the Union and at least four extra members. It is elected until the session of the next ordinary congress and is re-electable. Between congresses the Komitato may by co-operation refill its own vacant offices.

The Komitato represents the Union and represents it officially in all prac-



Fred Smith, of the Crosley WLW broadcasting station where Ilo lessons have been broadcast

tical affairs. The President and Secretary sign for the Union.

3rd. The Academy consists of at least nine and at most fifteen members, elected according to nomination of the Academy by those members of the Union, certified by the Academy as teachers. Its function is the perfecting and united development of the language. It decides definitely all linguistic questions. The Academy may nominate competent linguists as counsellors and form special sub-committees of experts, whose labors shall have only a preparative character for the decisions of the Academy.

The Komitato and the Academy are completely independent and each decides by its own statutes, questions of its internal organization.

The Komitato and the Academy are obliged to publish in the official organ of the Union, at least three months before the taking of a vote, all questions to be decided by them (except about their internal organization) for discussion by the membership of the Union.

The official organ of the Union is "Mondo," published in Finland. All official communications of the Komitato or Academy therein, are considered as actually made to all "Union" members.

The L. D. has thus a flexible organization and provided the members of the Komitato and Academy are possessed of good judgment as well as scholarship, the L. D. will progress gradually but constantly. However, Dr. Talmey and a few others are trying to keep them on the "qui vive" by forthright experiments on moot points and derivation of grammar or syntax. Talmey is of course considered as a species of heretic but so was Columbus, Watts, Fulton, Edison and a host of other path breakers.

There is one bad thing about the above organization plan. The Congress, representing all friends of the L. D. should naturally have full and ultimate power. However, it seems that the Komitato and Academy may legally withhold information of certain things from the Congress. This is a recent ruling to cover political exigencies and may lead to embarrassment later.

In England there is "The International Language (Ido) Society of Great Britain. Secretary J. Warren Baxter, 57 Times Grove, Lewisham, London. This Society gives examinations and issues diplomas and is reaching out for membership in the Americas. However, it is not in sympathy with Talmey's ideas of greater logic and flexibility in the improved L. D. Hence although Dr. Talmey is one of its honorary Vice-Presidents it no longer supports him, although some of its past leading members do so.

In France there is the Societe Idiste Francaise, Secretary, L. M. de Guesnet, 83 Rue Rochechouart, Paris IX. There is also the co-ordinate branch of R. A. I. L. S. in France, "French Ido-Radio-Klubo," which sends for one franc a complete instruction book as the basis of a free correspondence course in the L. D. Address E. Gallin, 33 quai de l'arriere Port, Dieppe, S. I., France.

In Belgium there is a very live Radio-Ido group. Secretary, E. Hack-aert, 112 Chausee d'Houthem, Vilvorde.

The Swiss Radio-Ido club has as Secretary Fred. Lagnel, Chapelle, Vaud, and one of the best stocks of L. D. literature in the world is found at the Ido Kontoro, Zurich, Switzerland. Prop., Alfred Noetzli.

It is only when the latter's present

(Turn to page 51)

Lessons in Improved Ilo

By Dr. Max Talmey

SECOND LESSON: THE VARIOUS PRONOUNS

IV. PRONOUN

7. The personal pronouns are:

me, I, me;	vi, you (plural);
tu, thou, thee, you;	lu, he, him, she, her;
vu, you, (singular, polite);	lo, it (refers to a fact);
ni, we, us;	on (onu), one (French 'on');
il (ilu), he, him;	li, they, them.
el (elu), she, her;	
ol, it (refers to a thing);	

Lu is to be used only of a person of unknown sex, never of a thing. Instead of the general pronoun li, they, one may use ili (masculine), eli (feminine), oli (neuter, referring to things) to avoid ambiguity.

The accusative form, required whenever the object precedes the subject, is obtained by adding -n to the above forms: tun, thee; nin, us; ilun, elun, olun, him, her, it.

Ipsa, self: el ipsa, she herself; li ipsa, they themselves; ni ipsa, we ourselves.

The reflexive personal pronoun of the third person singular and plural is su, himself, herself, itself, one's self, themselves.

8. The possessives (possessive pronouns and adjectives) are formed by adding -a to the personal pronouns. Singular (one possessor): mea, my, mine; lua (ilua, elua for the sake of clearness), his, her, hers; olua, its; onua, one's. Plural (two or more possessors): nia, our, ours; lia (ilia, elia, olia for the sake of clearness); their, theirs.

Sua, his, her, hers, its, one's, their, theirs, is the reflexive possessive of the third person singular and plural. It must (not "may") be used whenever the possessor is the subject and the possessed thing (or person) is a complement (direct or indirect object) to the same predicate; sua is then invariably the epithet of this complement. La kindi amas sua ludo (not lia), the children love their play. L'arboro forjetas sua folii (not olua), the tree throws off its leaves.

The possessives as adjectives have the same form in the singular (one possessed thing) and plural (two or more possessed things): olua pordo, its door; olua fenestri, its windows. Used substantively, however, they have in the plural (two or more possessed things) the ending -i: via, yours (letro, letter, understood); vii yours (letri, letters); elua, hers (fingro, finger); elui, hers (fingri, fingers); olia, theirs (muro, wall); olii, theirs (muri, walls).

As in English so also in Ilo the article is excluded with the possessives: la mea, la mei is just as wrong in Ilo as "the my," "the mine" in English.

9. Demonstrative pronouns (adjectives): ca (ica), this, these; ta (ia), that, those: ca (ica) navo, this ship; ta (ita) landi, those countries. Used substantively the demonstratives take -i in the plural: ci (ici), these; ti (ifi), those. Il, el, ol may be prefixed to the demonstratives for the sake of clearness: ilca, elti, olti, etc.

The pronouns co(ico), this: to(ito), that refer to a fact (or to an indefinable thing): mea amiko arivis, co joyigas me, my friend has arrived, I am glad about this.

10. Relative (interrogative) pronouns (adjectives): qua, who, which, that, what; plural: qui, who, which, that: la puero, qua rakontis co a vu, trompis vu, the boy who told you this has deceived you. La pomi, quin vu kompris, ne esas matura,

1. A form olu must not be used because the ending -u always denotes a person. The accusative form olun is unavoidable; it is so exceedingly rare as to be negligible.

2. Bearing in mind that a possessive always implies both a possessing and a possessed person or thing will facilitate in all languages the application of rules regarding the possessives. This important point is neglected in all grammars.

3. Olua, never lua, should be used when the possessor is a thing.

4. According to this rule sua can never be the epithet of a subject (co-subject), but only of an object (direct or indirect, complement). Paul e lua fratino ekiris, Paul and his sister went out. Sua is never permissible in such an instance because fratino is not an object, but a subject (co-subject).



Wilhelm Schwarz, of Lauenburg (Elbe), Germany. He is one of the circle of "most able Ilists" who approve unqualifiedly of Improved Ilo (see Wireless Age, Apr., 1925, p. 32), and he even puts it to "extensive practical use with great success" (W. A. J. ulv. 1925, p. 39, Introduction).

the apples that you bought are not ripe. Qua urbon li kaptis? Which city did they take? Quin el selektis?, which ones (ganti, gloves, understood) did she select? The substantival interrogative referring to a person is quu?, qui?, who;: quu venis?, who came? Quun tu vidis ibe?, whom did you see there? Qui esas li?, who are they?

Quo, what, which, that, refers to a fact or to an indefinable thing; el departis nerekupereble, quo dezolis mea kordio, she has departed irrevocably, which has desolated my heart. Quo esas ico?, what is this? Quon el trovis?, what did she find?

Ta, qua, he, the one who; ti, qui, those who; to, quo (or qua), that which; nulo, qua (not quo), nothing that.

Il, el, ol may be prefixed to the relative pronouns to avoid ambiguity; la filiino di mea amikulo, elquan vu vidis hiero en mea domo, recevis un premio, the daughter of my friend whom you saw yesterday in my house received a prize.

Il. Indefinite (determinative) pronouns (adjectives); altru, another one (person); altro, something else; irgu, anybody whatever; irgo, anything whatever; ulu, somebody; ulo, something, etc. The forms in -u denote a person and end in -i in the plural; altri, others.

All the words of this class (determinatives) are also used adjectively with the ending -a: amfa, both; certena (certenu, certeno), a certain; cetera, the remaining, the rest; kelka, some, a few; multa, much, many; nonula (nonulu, nonulo), many a; nula (nulu, nulo), no one; omna (omnu, omno), all, every; plusa, further, additional; poka, little, few; quala, what kind of; quanta, how much, how big; sama, same; singla, every single; tala, such; tanta, so much, so big; utra (utru, utro), either, one of two; nulutra, neither; omnutra, either, each of two; quautra (trisyllabic), which of two. These adjectives have the ending -i in the plural when unaccompanied by a substantive: la kindo koliis multa grozeli; kelki esis matura, altri nematura, the child has picked goose berries; some were ripe, others unripe.

Ula altru, some other one; irga altru, any other one whatever; omna ceteri, all the remaining ones; omna ti, qui, all those who; ni omna, we all; omna co, all this; omna ca blumi, all these flowers; ca poka blumi, these few flowers. (See Raporto 16.)

EXERCISE TO §§ 7-11

Autuno, a u t u m n,	ka(kad), whether fall (not to be translated in a direct question)	povar, to be able
bonfacar, to benefit, do good	danjero, danger	prestar, to lend
dianto, pink (flower)	dicar, to say, tell	pri, about, concerning
domajita, damaged	domajita, damaged	printempo, spring (the)
donar, to give	donar, to give	pro, because of
ecelanta, excellent	donar, to give	qualezo, quality
excepte, except	donar, to give	quar, four
enemiko, enemy	donar, to give	recevar, to receive
entraprezar, to undertake	donar, to give	savar, to know
facar, to do	donar, to give	serchar, to seek
fratino, sister	donar, to give	shuo, shoe
frequentar, to visit, keep company with	donar, to give	signatar, to sign
ganto, glove	donar, to give	skribar, to write
granda, big, great	donar, to give	staciono, station
haltar, to stop	donar, to give	tirar, to draw
	donar, to give	tre, very
	donar, to give	treno, train
	donar, to give	trezoro, treasure
	donar, to give	tro, too (much)
	donar, to give	ube, where

1. This rule, adopted by the original, highly competent Academy for the LD through decision 950, was abolished by the present Academy. The latter has thus violated the periodo di stabilizezo and has thereby set a dangerous example which is now bearing fruit. (See Raporto 11 and last two paragraphs of Raporto 18).

(Turn to page 50)

Dr. Hugo Reisenfeld and the Rialto radio trio



The RIVOLI RIALTO HOUR

By
Golda M. Goldman

NOT many theatrical managers on Broadway can boast that they manage three theatres simultaneously, but this is the claim that Dr. Hugo Reisenfeld can make about his work at the Rivoli, Rialto and Criterion Theatres which continue to draw thousands of patrons daily. It was therefore not a very tremendous undertaking for him to decide to broadcast an hour of music every week through Station WNYC, as he has at his command two symphony orchestras and any number of excellent instrumental and vocal artists. However, Dr. Reisenfeld approached his broadcasting with the thoughtfulness and care which has marked all of his theatrical work, and which has enabled him to combine the roles of music composer, orchestra leader, and motion-picture presenter-de-luxe. You are all undoubtedly familiar with Dr. Reisenfeld's innovation known as "Classical Jazz." As he explains it "Classical Jazz" is a definite attempt to show the value inherent in popular music. He says:

"I am a believer in the voice of the people. If the crowd has placed its stamp of approval on anything, that thing must have some merit and should not be disregarded. People laugh at 'Yes, We Have No Bananas,' and say anyone could have written it. That isn't so. I have tried many times and have failed. What could be simpler than the tune of 'Ach De Lieber Augustine'? I feel that anything that becomes anything must have gone through a period of development. It must have passed the censorship of many ears all of whose owners must have said,

'That is what I like.' Therefore, I am convinced that anything that is approved by the multitude must have merit and should not be received with cynicism. I treat this product of the popular writer as something showing just as much talent as the work of the serious writer that is, I treat it with one hundred per cent seriousness. I merely make it my business to present it artistically. It is not necessary to have your trombones out of tune. The only difference is that where a cabaret plays it with a Jazz Band, I play it with an old-fashioned orchestra with all its strings so that it becomes a very color-

ful thing. I started this movement three years ago and did not know what to call it. I realized that it would be copied so I gave it my name for protection. It was not particularly easy to put over because my musicians did not want to undertake it. It took quite a while to convince them that it was something worth while to do, but I stuck to it. Now, while we may rehearse a classic in five minutes, it may take us hours to produce the popular thing in satisfactory form. But the public has put its stamp on 'Classical Jazz' and if I wanted to, or found it possible to spend the time my orchestra could play every day at big charity affairs."

The fact that the Rivoli-Rialto Hour on the air, on Tuesday evening, is a popular and important feature is attested by the scores of letters which come into the office. When the hour was first started Dr. Reisenfeld broadcast a great deal of it directly from the stage of the two theatres, but he found that many numbers which sound well when played by the orchestra in open house do not carry well through the microphone, particularly the patter songs. Therefore, he concentrated upon the broadcasting value of his numbers and so developed almost completely a studio program using the overture from the theatre and

then working with a string trio or quartette and an especially arranged and well balanced program from the studio. Simplicity is the key note with plenty of melodious tunes, and he tries to get away from the songs which have been overdone so as to bring something fresh to the listeners-in. He says:

"My poor artists have to work overtime looking for



Barbara Rowe, Rialto radio star



Miriam Lax, Rialto radio star soprano

contralto. Of these the best known to the Rivoli-Rialto audience is Miriam Lax who got her start four years ago with Dr. Reisenfeld. She has never worked at any other theatre and in the last four years she has worked at least forty-eight weeks out of fifty-two, sometimes playing at both theatres on the same day. She is an American trained artist studying under Desire Zuri, she does almost every type of song because she seems to be just the right height, the right size, and quite sufficiently pretty for any role at all. You may have remembered her in the charming prologue to the "Covered Wagon" at the Criterion. She says, "The real thrill came the first night that the Rivoli-Rialto broadcast from WNYC. A special car called for us and escorted by police we traveled down Broadway in style, and in full costume from the stage. No traffic stops impeded us; the city bowed before us, and so we arrived at the Municipal Building with colors flying."

Apropos of his multitudinous duties which carry him around between his three theatres, Dr. Reisenfeld tells a very amusing story. He says:

"Do you remember the story of how the Dachshund got his short legs? Once upon a time a Russian wolfhound chased a rabbit and the rabbit had eight legs; four in front and four in back. When he got tired of running on his front legs he switched over to his four hind legs. But unfortunately the wolfhound had only four legs so he had nothing to change to. The rabbit ran and ran, but the longer the wolf-hound ran and the more he used his one set of legs, the shorter they grew, until he turned into a Dachshund. Now they keep me running about the same way



Frances Newsome, lyric soprano on the Rialto radio programs

new songs and the Rialto won't pay any dividends this year because we buy so much new music!"

Among the particularly well-known artists who appear regularly on the studio programs is a string quartette composed of Michael Rosenker, first violin; Maurice Price, second violin; Edward Yudal, violi, and Sdal Salerki, 'cello. There is a remarkably fine looking group of girls at the theatre, among them Barbara Rowe, mezzo soprano; Frances Newsome, Eva Sobel, Miriam Lax, lyric sopranos; Helen Sherman, coloratura soprano; and Inga Wank,

so that if you meet me on Broadway and see that my legs are growing shorter you will know what is the matter with me."

Now, if you are not moved to pity by that sad tale perhaps you will like this one better. He asked me to publish this one particularly for he is looking for information. He says:

"I was walking down Broadway the other day when a brick fell on me. Could you manage to find out whether this was purely accident or whether some one had been listening to WNYC?"

Well, you tell him; I can't!



Rialto string quartette—(left to right)—Willy Stahl, Herman Salesski, Gaston Dubois and William Eastes

the triple tube AMPLIFIER

for the triple torus tuner

By K. M. MacIlvain

IN the July issue of WIRELESS AGE, an article appeared, concerning the construction of the "Triple Torus Tuner." This tuner consisted of two stages of radio-frequency amplification and a detector.

Due to lack of space in that issue it was impossible to cover the tuner and the audio-frequency amplifier at the same time so the discussion of the suggested audio-frequency amplifier unit to use was reserved for this issue.

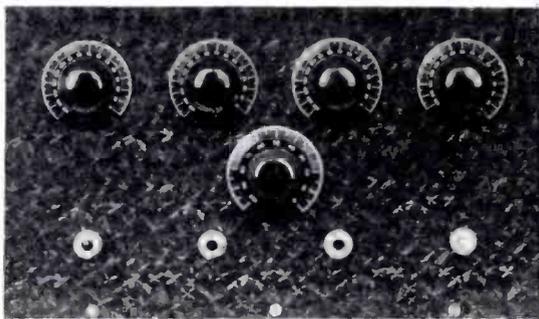
This amplifier consists of one stage of transformer coupled amplification and two stages of resistance coupled amplification. Due consideration has been exercised in the choice of apparatus used, to produce good volume, good quality and flexibility of operation.

The schematic wiring diagram is shown in figure 1. The application of audio-frequency transformers and the correct ratios to use has been quite thoroughly covered, but up to the present time I have failed to see any article showing how the values of the resistances used in a resistance coupled amplifier, were arrived at, therefore it seems feasible to discuss that question at this time.

Looking at the diagram in figure 1, we see that the variations of the grid potential of T_1 will cause a corresponding variation of the plate current in the plate circuit of this tube. This varying plate current will flow through the resistance R_1 , causing a varying difference of potential across this resistance.

If the resistance of the by-pass condenser C_2 is small as compared to that of the parallel circuit composed of the grid-filament circuit of T_2 and the resistance unit R_2 , there will be a negligible drop in potential between the points (p) and (g), (the majority of the potential drop can be considered as existing between the point (g) and the negative filament terminal). Thus any variation in the potential difference across R_1 will be impressed upon the grid of T_2 .

R_1 , then, can be correctly termed, the "repeating resistance." C_2 can be termed a "by-pass" condenser or a "grid-insulating" condenser, since it not only offers a low resistance path to



Front view of the triple torus tuner which includes the amplifier

the flow of audio-frequency currents, but insulates the grid of T_2 from the direct electromotive force which is applied to the plate of T_1 .

The grid leak resistance R_2 is made essential by the use of the grid condenser C_2 . It is a theorem in radio that whenever a condenser is connected in series with the grid of a tube, if the grid is highly insulated, the operation of the tube is very erratic, unless a leak resistance of the proper value is connected between the grid of the tube and the negative filament terminal.

For the benefit of those who wish to know how certain conclusions in radio engineering are arrived at, I will submit a few simple equations which will show how the values of the proper resistances and condensers to use in this circuit, are obtained.

Let; E_{g1} = the effective value of alternating voltage impressed upon the grid of the first tube T_1 .

E_{g2} = the effective value of alternating voltage impressed upon the grid of the second tube T_2 .

I_p = the effective value of the alternating component of the plate current of the first tube T_1 .

u_1 = the amplifying constant of the first tube T_1 .

R_p = the AC resistance of the plate-filament circuit of the first tube T_1 .

It is logical to assume in this case that the output impedance of T_1 plus the impedance of the output circuit is equal to $R_p + R_1$. With this in mind we can write the first equation:

$$I_p = \frac{u_1 E_{g1}}{R_p + R_1}$$

Since the potential at points (p) and (g) is practically the same, we can write:

$$E_{g2} = I_p R_1 = \frac{u_1 E_{g1} R_1}{R_p + R_1}$$

Then:

$$\frac{E_{g2}}{E_{g1}} = \frac{u_1 R_1}{R_p + R_1}$$

From the last equation it is obvious that the ratio of E_{g2}/E_{g1} increases as R_1 is increased. Since this term represents the degree of amplification, we are aiming to make it a maximum. The value of this term approaches a maximum as R_1 becomes large as compared to R_p .

The maximum possible value of E_{g2}/E_{g1} occurs when R_1 becomes so large that R_p can be disregarded and at that point, $E_{g2}/E_{g1} = u_1$.

If a curve is plotted, using values of E_{g2}/E_{g1} as ordinates and values of R_1 as abscissae, you will find that the curve rises quite rapidly at the start and then slopes off towards a horizontal position as R_1 becomes very large.

This shows that it is not necessary to increase R_1 to a value much greater than five times the output impedance of the receiving tube used, as the gain obtained by so doing is not worth while. The proper value of R_1 , then, is not critical and lies between 50,000 and 100,000 ohms.

For the sake of flexibility it is advisable to have a variable resistance unit at R_1 and it has not been until recently that such a unit that would satisfactorily answer the purpose, has been available on the market. You see, it is important that this resistance should stay fixed at whatever point it is set at. It would never do to have a resistance unit that was varying all the time and that is not what I mean by a "variable resistance" unit.

What we do want is a resistance that has a positive means of being varied and one that is not "microphonic." A "microphonic" resistance unit is one whose resistance is continually varying by a very small amount and hence gives rise to undesirable noises in the amplifier output.

There is a unit termed the "Royalty," type B, variable resistance, by means of which it is possible to obtain any resistance value between 1500 and 100,000 ohms. This is the unit I used for R_1 in this circuit.

The by-pass condenser C_2 should have a small reactance as compared to that of the parallel circuit consisting of the grid-filament resistance of T_2 and the resistance unit R_2 . Since the resistance of the parallel circuit in question is of the order of hundreds of thousands of ohms and even millions of ohms it is permissible for C_2 to have a reactance of 30,000 ohms to audio-frequency currents.

The larger the condenser we use the less will be its reactance, but the mechanical limits of the amplifier assembly make it advisable that we use as small a condenser as we can get away with. Thus, the 30,000 ohms that we have decided upon as a permissible reactance value, tells us how small we can make the condenser.

The most important frequencies within which the majority of voice frequencies fall, are between 200 and 2000 cycles, so if we use 1000 cycles for computation we will hit it about right. The value of the capacity which would offer a reactance of 30,000 ohms at 1000 cycles, is expressed by the equation:

$$C = \frac{1}{2\pi f X_c} = \text{farads}$$

C = the capacity of the condenser in farads.

f = the frequency in cycles per second.

X_c = the capacity reactance of the condenser in ohms.

π = a constant, 3.1416.

Substituting the proper values we have,

$$C = \frac{1}{2 \times 3.1416 \times 1000 \times 30,000} = \text{approximately } 5. \times 10^{-9} \text{ farads and } 5. \times 10^{-9} \text{ farads is equal to } .005 \text{ microfarads.}$$

Therefore a fixed condenser having a value of .005 mfd. is satisfactory for C_2 and it is advisable not to make this

condenser any larger in value than is necessary, as the larger the value, the greater is the possibility that the amplifier will block during operation.

It is hard to use any exact formulae for the determination of the value of the proper grid-leak resistance to use, since the elements governing its value

are somewhat indeterminate. This resistance is a function of the size of the tube, the degree to which it has been pumped during the course of manufacture and the value of the by-pass condenser. From a consideration of the foregoing facts it can be seen that the value of this resistance is not particularly critical and lies between 100,000 ohms and 10,000,000 ohms.

In this circuit I have used a "Royalty," type A, variable resistance unit for R_2 . This unit has a minimum value of 100,000 ohms and a maximum value of 7,000,000 ohms.

It follows that the plate resistance R_3 will be the same as R_1 and the grid resistance R_4 will be the same as R_2 . Also, the blocking condenser C_3 is the same as C_2 .

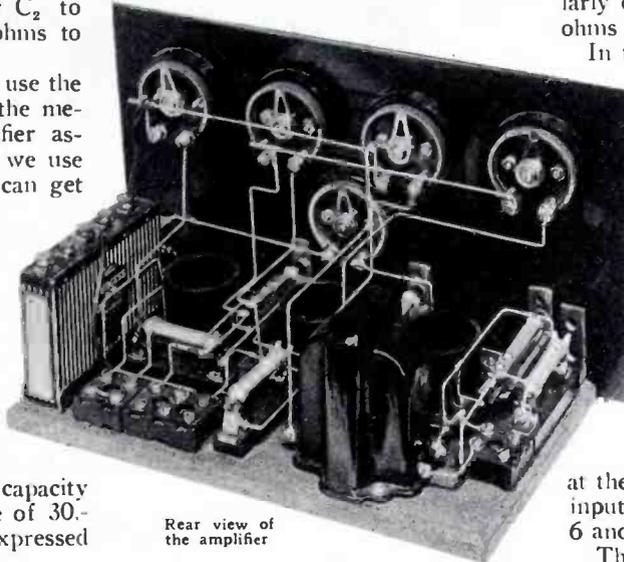
The back view of the unit shows how the apparatus is mounted. The double terminal block which is mounted on the baseboard and shows at the right end of the view is for the input connections, terminals number 6 and number 7.

The jack at the right is the input jack, J_1 and the condenser adjacent to this jack is a .002 mfd. by-pass condenser C_1 . The transformer at the right, on the baseboard is the General Radio type 285.

The four variable resistance units are shown mounted on the back of the panel, at the top. The three tube sockets are mounted on the baseboard right behind the panel.

The jack between the first and second tube sockets is in the output of the first tube, T_1 . The jack between the second and third sockets is in the output circuit of the last tube T_3 .

The two condensers mounted on the baseboard behind the second and third tube sockets are the blocking condensers, C_2 and C_3 . The double and (Turn to page 54)



Rear view of the amplifier

- LIST OF MATERIAL**
- One open circuit jack (J_1).
 - One closed circuit jack (J_3).
 - One double circuit jack (J_2).
 - One Burgess "C" battery, type 5540.
 - Two "double terminal" terminal blocks.
 - One "triple terminal" terminal block.
 - Three tube sockets.
 - One .002 fixed condenser (C_1).
 - Two .005 fixed condensers (C_2, C_3).
 - One General Radio, type 285, amplifying transformer.
 - Two "Royalty" variable resistances, type "A" (R_2, R_3).
 - Two "Royalty" variable resistances, type "B" (R_1, R_4).
 - One 30 ohm filament rheostat (R_5).
 - One 12" x 7" panel.
 - One 10½" x 6" baseboard.

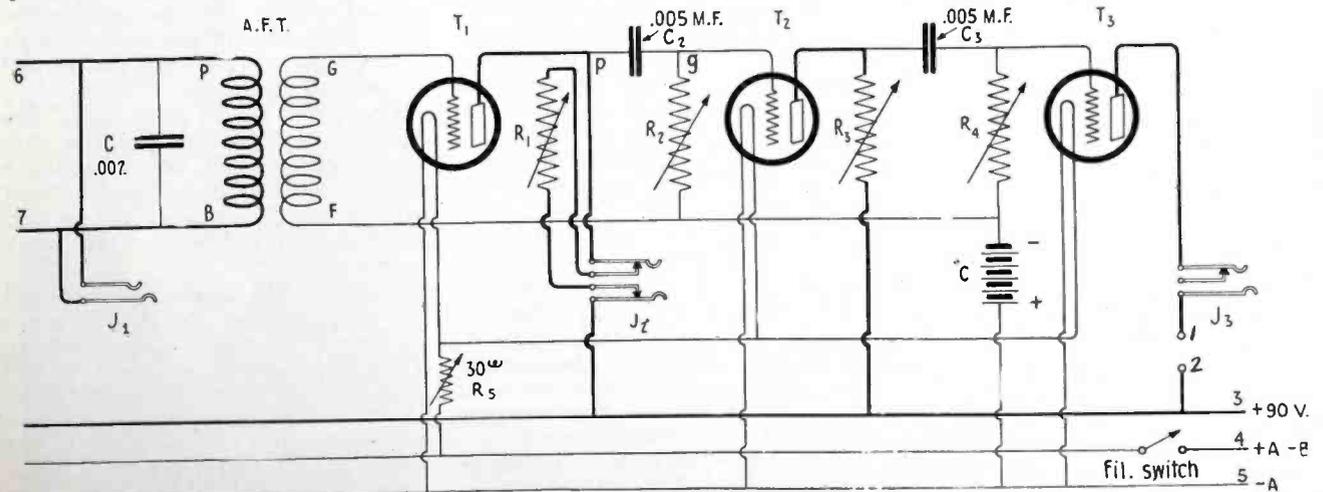


Figure 1—Schematic wiring diagram of the triple tube amplifier



Ensemble scene from "The Mikado" with De Wolf Hopper in the cast

THEATRICAL PRODUCTIONS

on the air

By *Russell Raymond Voorhees*

SOMETIME ago radio fans had the pleasure of listening to the Gilbert and Sullivan opera "The Mikado," and also "Pinafore," broadcast by WGN from the Great Northern Theatre, Chicago, where they were sung by the world famous De Wolf Hopper Comic Opera Co. No better proof of the reception of this broadcasting need be given than to state that the second opera was broadcast because of the success attending the first.

And so it would only be natural to think that others would likewise be broadcast. Maybe they will and maybe they won't, and thereby hangs a tale. So in order to get this whole thing straight in our minds, let's run back, review very briefly the broadcasting of these two operas, notice what happened, and then catch up with what appears to be the only fly in the ointment.

To begin with, everybody in the company was opposed to the broadcasting of the opera. De Wolf Hopper was opposed to it because he believed it would cut into the revenue. Just a natural opposition. And others in the company were opposed to it.

But somehow or other arrangements were completed and "The Mikado" was broadcast. Here's how they did it: A microphone was placed in the orchestra pit on top of the piano. That was the microphone that gathered up everything and shot it out on the air.

Quin Ryan, announcer for WGN, sat in a box at the theatre with a microphone in his hand. He would cut in from time to time and indicate en-

trances and exits, and where any business took place on the stage he would also cut in and explain it. The result of this frequent cutting in was that people getting the opera over the air could follow it with ease and with a thorough understanding of the whole thing. The difficulty that has apparently stood in the way of the successful broadcasting of stage productions was apparently surmounted in this case at least.

Well "The Mikado" was broadcast, and everyone patiently awaited results or reactions. Here's what happened:

Up to this time, the business at the Great Northern Theatre had been fair, just fair. "The Mikado" was broadcast on a Tuesday night and beginning with the Wednesday matinee following, the very next day, the theatre was a sell-out for the rest of the week. Business just flocked to the Great Northern Theatre to see De Wolf Hopper in "The Mikado," the same opera that had been broadcast.

One party of several people came 85 miles from the south of Chicago just because they heard "The Mikado" on the air. They bought over \$85 worth of seats. And that is just one instance of direct returns from broadcasting "The Mikado." The management of the company has scores of other instances to prove that it boosted business in no uncertain terms.

By that time things began to change in the De Wolf Hopper Comic Opera Co. Hopper himself saw the light and became a booster for broadcasting. So

much so that arrangements were made to broadcast "Pinafore," which was done on a Tuesday night in the same manner.

With what results? A sell-out for the rest of the week. The writer of this article was back stage when "Pinafore" was being broadcast and before the box office closed, the Wednesday matinee had been sold out and it wasn't even nearly sold out when the curtain went up on the preceding Tuesday night. The people had phoned in for seats almost as soon as they had heard the opera.

Now all this is fine and dandy, and it begins to look as if Brady and others are shedding wasted tears by their anxiety over the radio and the theatre. But like everything else, there is a fly in the ointment. Let's fish him out and see what he looks like.

One can sit on the stage when "The Mikado" or "Pinafore" is being presented and enjoy it without seeing a thing, because much of the enjoyment of these two classics lies in their music, and music can be broadcast very easily over the air.

It would seem, then, that theatrical productions whose chief interest lies in music can be successfully broadcast. Theatrical productions which depend for their success upon "business," lines, situations and other purely theatrical contrivances are facing a far different situation, it would seem. Whether they can successfully be broadcast is another question.

That is the conclusion that the De

Wolf Hopper people reached after two successful attempts at broadcasting. So it would seem that any theatrical production depending for its value on music can successfully be broadcast—and that is 100 per cent. the truth.

But here is where the nigger in the woodpile comes in—or is it the fly in the ointment?

Theatrical managers are beginning to believe in broadcasting for the musical type of productions because it means business to them. Broadcasting stations, of course, believe in it because that is their business but the music publishers, owners of the copyrights on the music used in musical productions are the flies in the ointment. They do not believe in broadcasting because broadcasting cuts into their revenue, and that settles it once and for all. That's the whole thing in a nut shell.

In the case of the Gilbert and Sullivan operas, there is no copyright restrictions to contend with because the copyright has run out. Everything is clear sailing. But when it comes to the more modern productions with their copyright music then, even though the theatrical managers are willing, the publishers will hold back, and so radio fans are deprived of the pleasure of hearing those productions on the air.

That is the situation as it stands today as far as the broadcasting of theatrical productions is concerned. If some way can be worked out to win over the publisher of the music, then it looks as if everything would be fine and dandy.

But until that time comes, radio fans will just have to wait and watch and see what will happen.

But I hear some small voice up in the gallery.

"How do you know the radio was responsible for the increased business

secured at the Great Northern?"

Now isn't that just like a gallery god, after everything is all proven, all the dope put away and everything ready for a quick getaway, then up pipes a voice with a challenge in its tones.

Well here's the proof.

WGN is the broadcasting station for the "Chicago Tribune," but the broadcasting received no publicity in the "Tribune." Before the performance started, Quin Ryan, the announcer, announced over the radio that everyone who sent in his seat stubs would be sent a copy of R.

H. L.'s Line Book which is published by the "Chicago Tribune." As I said, no publicity regarding this offer was given in the "Tribune," and, of course, none in other Chicago newspapers. The only publicity that this offer had was over the radio, but between 500 and 1,000 seat stubs were received. And not only were the seat stubs received, but also letters telling of the pleasure that the reception of the operas had given those who had tuned in on them, and also indicating that the broadcasting of the operas had been the direct means of their going to see it in the flesh, as it were.

It is only natural to believe that everybody who went as a result of hearing it over the air didn't write in for the Line Book, so with hundreds writing in for it, it is only natural to believe that many, many more hundreds went to see it, but didn't write to the newspaper.

"Alright, Captain, I'm satisfied."

It's the same voice from the gallery telling us of his conviction. But I'm not going to take any more chances with that gallery bunch, so here are some of the letters that were sent in after hearing the operas on the air. They clinch the point in no uncertain terms.

"I enclose seat checks for 'Mikado.' The radio was the direct cause of four of my family going to the opera."

"Your broadcasting of 'The Mikado' Tuesday night was wonderful. So good, we went to see it and were well repaid as well as agreeably surprised."

"Don't let anybody tell you that by broadcasting operas and operettas the audience is lessened. It just arouses the curiosity of seeing the things in real. Your performance over the radio of 'The Mikado' was very good, but it just

Quin A. Ryan describing the settings and action of "The Mikado"



took me down to the 'Great Northern' to see it with my eyes. Am ready to listen to 'Robin Hood' and also to go down right after that to hear and see it."

"We certainly enjoyed the opera last Tuesday night and heard every word of the singing and announcing. We were particularly interested in the bamboo fence in the word picture, so went Saturday afternoon to see it."

"I enclose herewith two seat checks for one of last week's performances of 'The Mikado,' and can truly say that radio was responsible for the purchase of these tickets."

"On Tuesday evening of this week I was pleasantly surprised when tuning in on your station to find you were broadcasting De Wolf Hopper in 'The Mikado.' Reception was very clear and not 'jumbled-up' like some of the plays I have heard over the radio. Of course, we couldn't see what was going on, but the announcer made up for this deficiency."

"Your excellent broadcasting of 'The Mikado' Tuesday evening led me to take my family to see the production. We thoroughly enjoyed comparing the close-up with the radio reception we had heard. Can't we have more good things like this?"

"Heard 'The Mikado' broadcast and bought tickets the following night."

Aiming to chalk up another theatrical broadcasting success, following the triumphant staging of De Wolf Hopper's "The Mikado" and "H. M. S. Pinafore" on the air, Station WGN broadcast the successful comedy, "The Show-Off" from Cohan's Grand Theatre, Chicago.

It was a "radio theatre party," given by the radio department of the Fair Store, in Chicago, for radio listeners everywhere and it proved as entertaining as "The Mikado."



De Wolf Hopper who played the stellar role in "The Mikado"



Fourteenth Esperanto World Congress

ESPERANTO

as world radio language

By *James Denson Sayers*

President New York Esperanto Club

IN THIS article, before showing the weaknesses and difficulties of Dr. Talmey's Ilo as compared with Esperanto, I want first to point out a few inaccuracies that appear in articles by him recently printed in *WIRELESS AGE*. I haven't the space to recount them all, but the following will serve as examples:

On page 11, *WIRELESS AGE*, April issue, the statement is made that "*** able students, including Dr. Zamenhof, became convinced of the necessity of radical changes in the system (of Esperanto)." I have the collected writings and speeches of Dr. Zamenhof and in no place is there anything to justify such a sweeping statement. He firmly opposed touching the fundamentals in any changes and repeatedly expressed such opposition. He did state on many occasions that whenever such authoritative forces as governments came to realize the need of an international language and should appoint an official body to investigate proposed solutions of the problem, that such a body should be given full power to make such changes then as long practice should have proven desirable. To have submitted Esperanto to any less authoritative body or bodies would



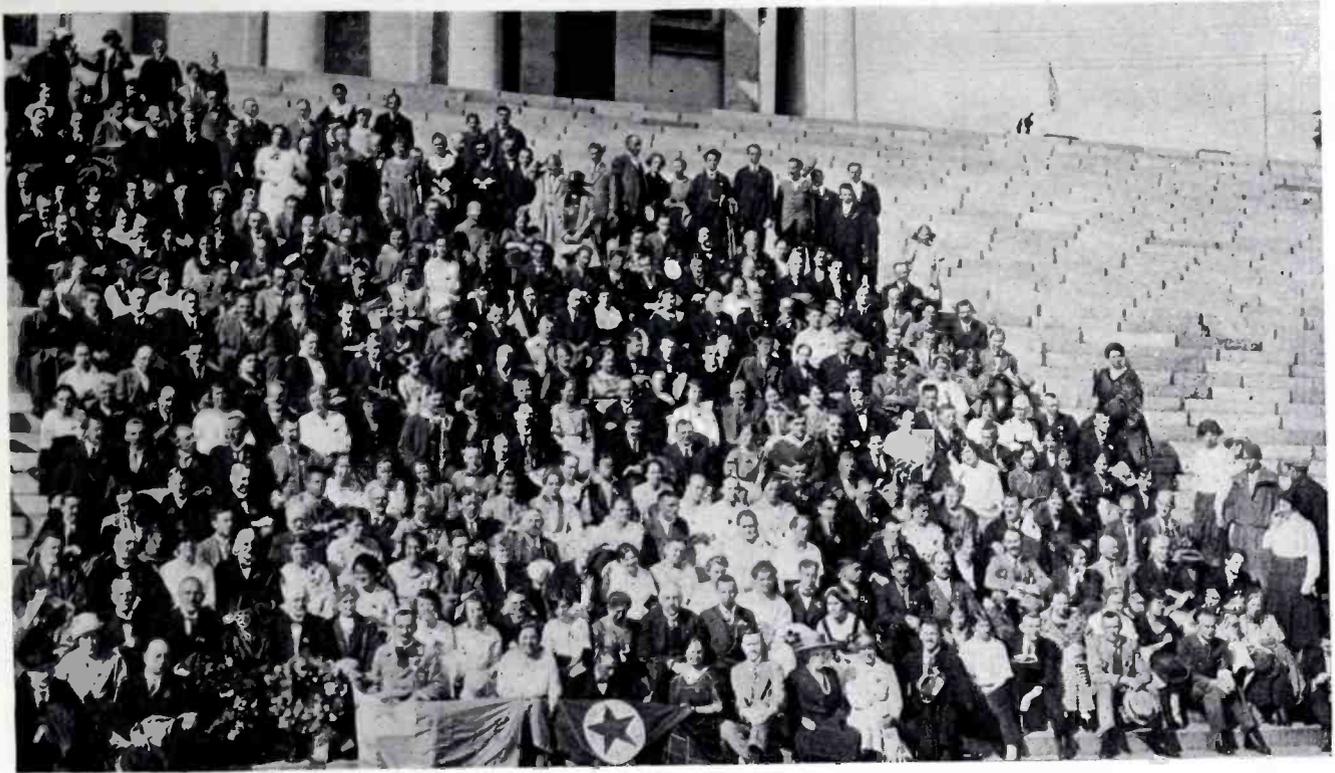
M. Belin, Honorable President of the Paris International Amateur Radio Conference

have resulted in such chaos as we today see in the Ido (Ilo) movement itself as proven in these same articles by Dr. Talmey, who, with his American colleagues, makes no secret of their nonconformance with the European authorities of Ido. It is quite likely that some Idists in China, or Japan, or Russia will see things in their own way for improving Ido and follow the independent example of Dr. Talmey in showing their anarchic tendencies against authority.

Also on page 11, April *WIRELESS*

AGE, Dr. Talmey makes the statement that "Zamenhof, for instance, was a young college student in his teens when he constructed his system (Esperanto)." Dr. Zamenhof was born in 1859. He began actual work on his system in his high school days, but it was years after he had begun the practice of his medical profession when he first gave Esperanto to the world in 1887. During the years of intense labor on his creation he mastered the classical languages and seven modern languages, besides delving deeply into many other languages. And there are those who assert that Zamenhof had no qualifications as linguist and philologist.

A highly important point illustrating the striking superiority of Esperanto in at least one phase over Ilo is brought forward by a paragraph in the editorial note preceding the *ALL* article in May *WIRELESS AGE*. In the fourth paragraph "brodkastar" is mentioned as an example of an international word adopted into Ilo. What possible twist of philology is applied here? "Broadcast" is found in no other language but English. It is derived from the old Anglo-Saxon "brad," meaning broad or wide, and the Icelandic "kasta," to throw or cast. Some Eng-



This congress was held in Helsingfors, Finland in 1922

lish Esperantists wanted to Esperantize "broadcast," but in the discussions in Esperanto journals it was shown that loading another arbitrary word on Esperanto, a word unknown to all peoples except those knowing English, was wholly unnecessary and bad Esperanto. It was shown that the rule of building new words out of pure Esperanto elements, in order that any Esperantist, of whatever nationality, might instantly recognize the new term, could be applied in this case with the usual facility and clarity of word-building in Esperanto. "Audi" is the Esperanto word "to hear." "-Ig" is the suffix indicating "to cause a thing to be done." "Dis-" is a prefix with a similar meaning to the same in English; that is, "to scatter widely in all directions, to disunite." By applying these Esperanto words, known to all Esperantists, we achieve "disaudigi," which, in connection with radio, any Japanese, Russian or Malay Esperantist, as well as any Englishman or American, would recognize instantly without a thought of reference to a dictionary or radio vocabulary, which would be required by all non-English nationalities in the case of "brodkastar."

I promised in the July issue to point out the vital difference between the Ilo and Esperanto systems of lexicography. The Idists aim always to appeal to the eye of the superficial student, that is, to the person who is looking over the field, giving a short "once over" to the different systems. I am sure that in a majority of cases that sort of investigator will look at first with favor upon Ilo. The Esperanto

supersigns and the plural endings "j" are quite unacceptable to the eye of an Englishman or American. The Ilo text looks more natural and homelike. The fact that the "j" is pronounced about like a final "i" or "y" in English or that we have in English all but one of the supersign sounds, does not help Esperanto with the hyper-esthetic sense of sight predominant in ye hasty inquirer. And in enlarging this same appeal the Idists boast of their much more extensive dictionary. They claim some 30,000 words and point with disdain to the less than 5,000 in Esperanto. Don't ask them too pointedly for details. But here are the details:

In Esperanto every word that has a direct opposite has one root only for the idea, while the opposite is expressed by the prefix "mal-." "Bona" means good, while "malbona" means bad. "Lumo," light, "mallumo," darkness. The Idists did not like "mal-" as an affix, so they eliminated it, thus increasing by at least a third the number of arbitrary words to burden the memory with. Not content with this one fell swoop of loading the dictionary unnecessarily, they go to great lengths to bring in arbitrary words from widespread national (natural) languages, especially from English and Latin tongues, where in Esperanto we build the extra words easily and with fine clarity out of the easily mastered Esperanto roots and affixes.

A good example of this last point is furnished in Dr. Talmey's first Ilo lesson in July WIRELESS AGE. There is the word "lernar," to learn. Then "skolano," pupil or student, from

"skolo," school, a mutilated English word, quite out of accord with the boasted Idist rule of internationality. In Esperanto we build these and many more related ideas upon the one fully capable root "lern-." "Lerni," to learn; "lernanto," pupil, student; "lernejo" (pronounced lern-ey-o), school, from the suffix -ej, meaning a place where that action expressed in the root is habitually carried on, etc.

Unnecessary and very cumbersome ballast is added to the language in Ilo by the two extra (past and future) infinitive endings of the verbs and by the greatly complicated system of placing the accent, instead of the simple, direct and absolutely sufficient Esperanto single infinitive "i," and one invariable accent, always on the penultimate syllable. A child can master the Esperanto on these two points at one glance, while it requires a mature scholar a long time to master the intricate Ilo of the same. Remember these points and carefully compare in the Esperanto lessons to follow.

I will here discuss the complicated Ilo adjective and also the Ilist unworkable theoretical "Rule of Derivation" as against the thoroughly sufficient Esperanto principle of word-building, but I wish that every reader of WIRELESS AGE could find the time to go deeply into this subject and read the masterful presentation of the subject by Dr. Rene de Saussure of Bern, Switzerland. A reading of his "Fundamental Rules of the Word-Theory in Esperanto" and of Kotzin's "History and Theory of Ido" would set any one right without

(Turn to page 49)

ANNOUNCEMENT

THE publication of WIRELESS AGE in its present form ceases with this issue. At the conclusion of thirteen years of publishing experience the Radio Corporation of America expresses the feeling that radio publications have now reached a degree of development at which it is satisfied to withdraw from the publishing field and to combine WIRELESS AGE with POPULAR RADIO, published by Popular Radio, Inc. The combination will become effective with the September issues and all present subscribers of WIRELESS AGE will henceforth receive "POPULAR RADIO, combined with WIRELESS AGE" until the expiration of their normal subscriptions.

POPULAR RADIO is known everywhere as a specially well edited periodical reaching the general public and we feel that our readers will approve of the choice and that they will secure a full measure of value.

Back in 1911, when radio was practically unknown, when a handful of people were engaged in the operation of stations, when still fewer were doing any research work to advance the art, the Marconi Wireless Telegraph Company of America realized the need for a publication that would overcome a lack of public knowledge on matters radio, and that would make it possible for young men to secure training that would fit them for this new work. The magazine was called the Marconigraph and its success was instantaneous. At the end of the first year, the demand had become so great the publication was enlarged and its scope widened. Thus in 1912 the WIRELESS AGE was born.

Since then, much has happened in Radio.

The Radio Corporation of America acquired the assets of the Marconi Wireless Telegraph Company of America in December, 1919. Invention followed invention, new adaptations came in startlingly close sequence, until today we find ourselves well into the "age of broadcasting" after only four short years of development.

And this is just our point; the development of broadcasting has so vitally affected the lives of the American Public that their interest in these forward strides supports at least six ably edited radio magazines. POPULAR RADIO, as well as other leading radio periodicals, hold aloft the torch that was first lighted by the "Marconigraph." The purpose of WIRELESS AGE has been realized, and its publishers, whose interests are primarily those of "doers" in Radio, announce their retirement from the publishing field.

Our greetings to those who will carry on the work of radio reviewing; our sincerest thanks to a public which has, from the first, given its interested attention to WIRELESS AGE.

THE PUBLISHERS.

THE VOICE of the PEOPLE

By Mildred C. Smelker

He ne'er is crowned
With immortality who fears
to follow
Where airy voices lead."
—Keats.

I REMEMBER, as a child, gazing intently at telephone wires and wondering how my voice traveled along them for miles and miles, why it didn't bounce off when it hit a pole, and why it could be heard only at the telephone receiver. Now I am equally puzzled, and a little apprehensive about the air being quite as densely and invisibly populated with voices as it is with germs. I cannot help but feel that it is only a matter of time before I can go out on my apartment fire-escape and, with no appliances whatever, talk to my deaf aunt Ellen way up in Buffalo.

This leads us to the matter of thoughts. A recent course in practical psychology was fortifying me with a hale and hearty self-confidence complex until it struck me, suddenly, that it was quite within reason that some day mental concentration will be so widely practised that it won't be wise to sit and think—just sitting will be safer.

The dreamers we laugh at today are the wizards of tomorrow.

Longfellow warned long ago to—

"Listen to voices in the upper air,
Nor lose thy simple faith in mysteries."

The human voice has inspired reams of poetry, dozens of romantic songs, and numberless mystery plots. "Somewhere a Voice is Calling" has been immortalized by John McCormack—the two are definitely linked together. "The Voice in the Dark" as a title to a story intrigued our interest at once. Poetic license permits of a voice "like the tinkle of a bell."

Now comes the radio and we find ourselves largely dependent on the human voice for entertainment over this ever mysterious little arrangement that brings things to us "out of the nowhere into the here."



Graham McNamee broadcasting a baseball game in his own inimitable style

Until recently the Voice of the People has been heard mainly through the medium of the ballot box—and a sturdy masculine voice it has been. There may or may not be significance in the fact that the perfection and ever increasing use of the radio followed fast on the heels of the Nineteenth Amendment. In any case the air is literally full of voices now of both genders. They come into our homes at all hours of the day and night merely with the turning of a little dial or the adjustment of the family cat's whisker.

And how do you like these voices? Are they melodious, interpretive, pleasing, or are they discordant, meaningless, tiring? The voice is the receivers' only means of visualizing the broadcaster and it is interesting to speculate on who is maligned and who is flattered by this visualization. Right here we, the receivers now, but always potential broadcasters, might ask ourselves if we would be willing, in turn, to be classified by our voices.

Shelley puts it that

"Music, when soft voices die,
Vibrates in the memory."

I recently tried the experiment of carefully listening to various broadcasters and announcers, then, through

their voices, forming mental pictures of them. Some I verified.

A scientist, bristling with statistics, told me a lot concerning the celestial sphere in a flat, monotonic, unemotional voice. I listed him as a sand-haired, lean, middle-aged man hedged in by sparsely settled chin shrubbery, who peered into the dotted heavens through thick spectacles while he computed distances by the millions of miles—missing the while all the beauties of that vast jeweled canopy. I have since learned that he is around thirty-five, an ex-football star, built accordingly, and quite capable of moon madness. Think what

he could give his unseen audience if he would only put a little enthusiasm and romance into his voice—he'd kick any number of goals for science and send many a maid star-gazing.

Of course, such things work both ways. An enthusiastic exponent of beauty culture first made me conscious of my facial defects and blemishes, then gave me solace and inspiration by telling me how to improve and overcome them. She made me want and demand to be beautiful. She even had me to the point where it seemed possible to the extent that I spent one solid hour with creams and lotions before retiring that night. From her voice I visualized an attractive, vivacious, young woman with a peach and cream complexion and marcelled hair. As a matter of fact she is a wizened-up old maid. Having failed herself to heed the ravages of sun, wind and time, her self-appointed mission is to make the rest of us profit by her mistakes.

Then there is an announcer 'out there' whom I have put among the holier-than-thou people. His voice patronizes me and how I hate to be patronized! I feel that he is certain that his offerings are far over my head, but that he is willing to tolerate my presence in order that microbes like myself may be lifted

(Turn to page 49)

COILS

low-loss and otherwise

By
William
H. Fortington

DURING the past twelve months, the radio market has been overflowing with a multitude of coils of the "Low-Loss" variety. While quite a number of them are very efficient instruments, few can, however, lay just claim to the name of low loss. The exact definition of a low loss coil, is as obscure as the design of the coil itself. There are many factors governing the design of an efficient coil, especially if it is to be used as a radio-frequency transformer. In the following article, the various factors encountered are discussed, and the experimenter will find great interest in conducting experiments along these lines.

Following the avalanche of low loss coils, many so-called innovations made their appearance on the market. The D-coil, Torus, star shape, basket-weave, honeycomb and many others suffered resurrection, after being allowed to sleep for many years. There are very few coils on the market today, sufficiently novel or radical to be called new. However, many of them have undergone considerable change, and some few good coils have been produced therefrom. For years gone by (and I believe for years to come) the solenoid has been accepted as the world's standard of inductance. From this coil others were developed, and when once departure is made from the contour of the solenoid, complications arise both in calculations and practical application.

Now, in designing a low loss inductance, the following points must be observed:

The inductance value (usually expressed in microhenries) must be high, as against the ohmic resistance. This applies to all frequencies. The distributed capacity must be negligible, the dielectric absorption of the covering of the wire and the former upon which the coil is wound, must also be reduced to a minimum. It is for this reason, that many coils are "wound on air," or in other words, they are self

supporting. The less solid substance there is near a coil, the more efficient a coil becomes. Adhesive matter should be used as sparingly as possible where such substance is required to hold the turns of wire together.

If these factors are investigated a

that any deviation from the contour of the solenoid, raises the high frequency resistance. Distributed capacity should be as low as possible without reducing the inductance value or raising the high frequency resistance.

(3) Absorption due to dielectric losses and to the proximity of resonant objects should be avoided.

Now, the chief factor under discussion today is the high frequency resistance. Many manufacturers have defeated themselves in their attempts to lower the high frequency resistance of their inductances. Various methods have been resorted to, such as the use of Litz wire or high frequency cable, and heavier gauges of solid wire than is generally used. It is now common knowledge that there exists a critical frequency at which Litzendraucht offers a higher resistance than ordinary solid wire of the same dimensions. This wire may, however, be used on the broadcast wavelengths to advantage, but in the writer's opinion, the increased efficiency does not warrant its use when compared with its cost. Another thing against Litz is that every turn must be electrically connected at its two ends only, and any strand left unsoldered in any portion of the coil will send the high frequency resistance upenormously. Dielectric losses are heavier in some of the cheaper grades of high frequency cable than in ordinary cotton or silk covered wire. Bearing these facts in mind, only the use of solid copper wire will be considered here.

Figure 1 is intended to represent (a) the flow of a direct current through a coil of solid copper, (b) the flow of a radio frequency current through a straight piece of solid wire, (c) the flow of a radio frequency current through a coil of wire.

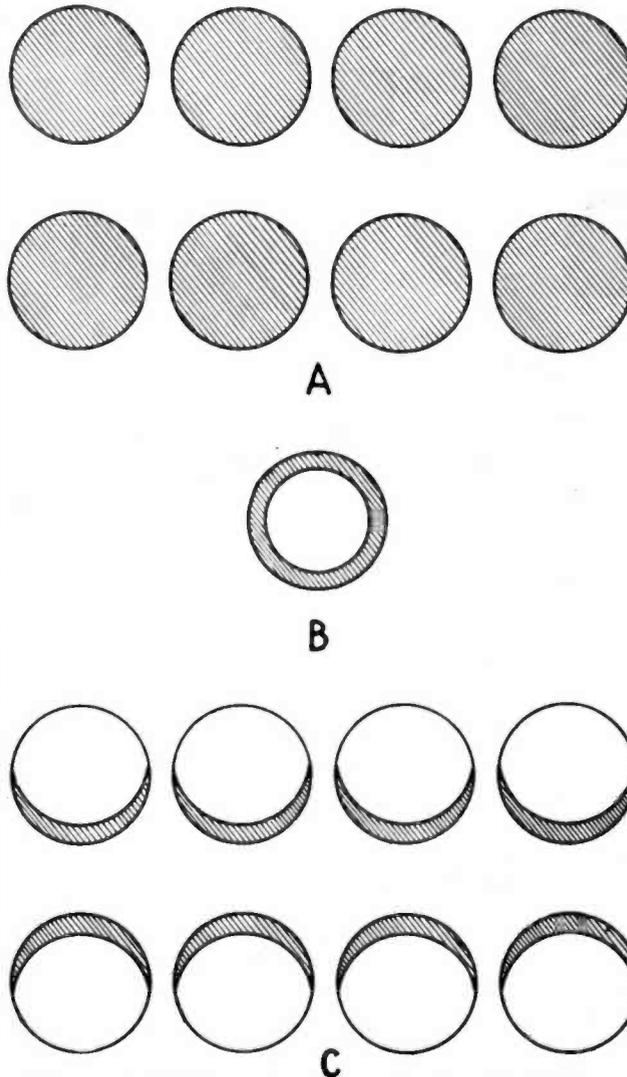


Figure 1—(a) The flow of direct current through a coil of solid copper, (b) The flow of r. f. current through a straight piece of solid wire, (c) The flow of r. f. current through a coil of wire

little more closely, the following empirical data may be obtained:

(1) The inductance of a solenoid is higher than any other form of winding for the same direct current resistance of the coil.

(2) Although the distributed capacity of a coil may be lowered by special methods of winding, it will be found

frequency current through a straight piece of solid wire, (c) the flow of a radio frequency current through a coil of wire. It will be seen by this diagram what is meant by "skin effect," and it is obvious that the greater the area of the conducting surface, the lower the high frequency resistance will be.

Where compactness is not an im-

portant factor in design, coils may be wound with a heavy gauge of wire, such as No. 16 or No. 18 B. & S. The use of such wire is really only warranted in the aerial tuning circuit, or the grid circuit of the first tube. In designing an R.F. transformer, the experimenter might be a little more conservative in his choice of wire. It is deemed not necessary to use heavier than No. 20 or No. 22 in such an instrument, as over-zealousness along these lines results in unsightly coils. The writer has recently been conducting experiments and measurements upon every type of coil available, and is giving the reader the conclusions obtained by this series of experiments, and it is hoped that it will be of use to experimenter and BCL alike.

After conducting measurements on no fewer than twenty-three different coils, the odd three were chosen as standards for use in their own particular phase. The method of winding in the case of these three coils is somewhat similar, being as follows:

No. 1 coil. 70 turns of No. 22 double silk covered wire, wound on a former of the 15 pins driven in a board. Diameter of former was 3 inches. The pins should form a perfect circle, and the wire is wound over each alternate peg. The completed winding takes the form of a Bi-Octagon, that is, a form of successive octagons in alternate order. This is shown in the accompanying illustration. In winding this coil, thin pins should be used.

Shunted with a variable condenser of .00028 mfd. capacity, this coil will tune from 230 metres to 550 metres.

This is a cheap coil to construct, and has about the same all-round efficiency as the second coil, which requires a special form to wind it on. The chief factors of No. 1 coil are as follows: D.C. resistance 1.02 ohms. Resistance at 200 metres 5.09 ohms. Distributed capacity 14 micromicrofarads. This coil has the lowest distributed capacity of any tested, consistent with a low resistance at high frequencies.

No. 2 coil is composed of 66 turns of No. 24 silk or cotton covered wire, wound on an octagon former of 8 pillars of quartzite glass which are supported by rings of hard rubber 3 inches in diameter. Shunted with a variable condenser of .00028 mfd. it will tune to approximately the same wavelength as No. 1 coil. Where this special kind of wire is not obtainable, the coil may

be wound with 66 turns of No. 22 double silk covered wire, without detracting from the efficiency of the coil in any way. By doing this, the general efficiency of the coil will be raised instead of lowered. The factors of the coil under test were: D.C. resistance 1.425 ohms. Resistance at 200 metres was 7.18 ohms. Distributed capacity 20 micromicrofarads. No adhesive matter whatsoever is used in the construction of these coils.

Coils Nos. 1 and 2 were designed primarily to be used as the secondary

of 19 micromicrofarads. When used as a secondary in a three-circuit tuner, the writer suggests coupling it to say, 12 turns of the same gauge of wire to form the antenna circuit. The coupling should be variable, regeneration being accomplished in the usual manner. While on the subject of three-circuit tuners, a few words might be said regarding these instruments. The average three-circuit tuner in use today, embodies an aperiodic primary. If the amateur will discard his aperiodic primary, substituting for it a tuned primary, having about three-quarters of the inductance of the secondary and a variable condenser in series with the aerial as a tuning device, he will find results much improved and a looser coupling between the two circuits may be utilized. The chief improvements will be found to be increased selectivity and volume, not to speak of improved sensitivity.

Returning to the first two coils, which may be used in the same manner as the last, we will see what governs the design of a radio-frequency transformer for which these coils are intended.

The four diagrams of figure 2 are intended to represent the chief methods of coupling in radio-frequency transformers on the market today. Now, in designing a radio-frequency transformer, there are a number of precautions to be taken, each entailing a certain amount of thought. It is proposed to take them one at a time and discuss them separately.

Referring to figure 2 the diagram (a) represents an R.F. transformer with the primary inside or outside the secondary, as in the "Neutrodyne." The chief objection to this method is that there is a certain amount of capacity coupling between the primary and secondary, as shown by the dotted condenser "C." This tends to produce self oscillation in the amplifier. Where the coils are wound on bakelite tubes, this effect is raised in direct proportion to the specific inductivity of the material of which the tube is made.

(b) represents the primary and secondary wound on together, (c) represents the primary coupled to one end of the secondary.

Now, the chief points to be considered in the design of a radio-frequency transformer are:

(1) The capacity coupling, or "condenser effect," between the two coils

(Turn to page 40)

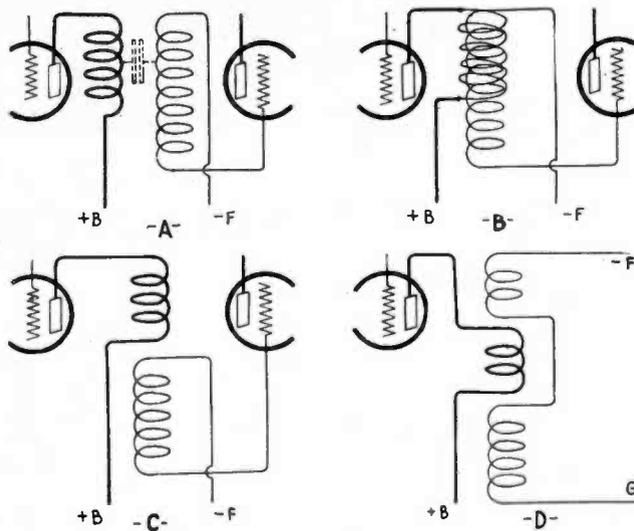


Figure 2—Chief methods of coupling in r. f. transformers

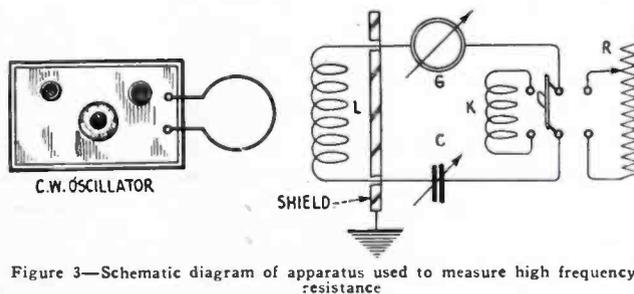
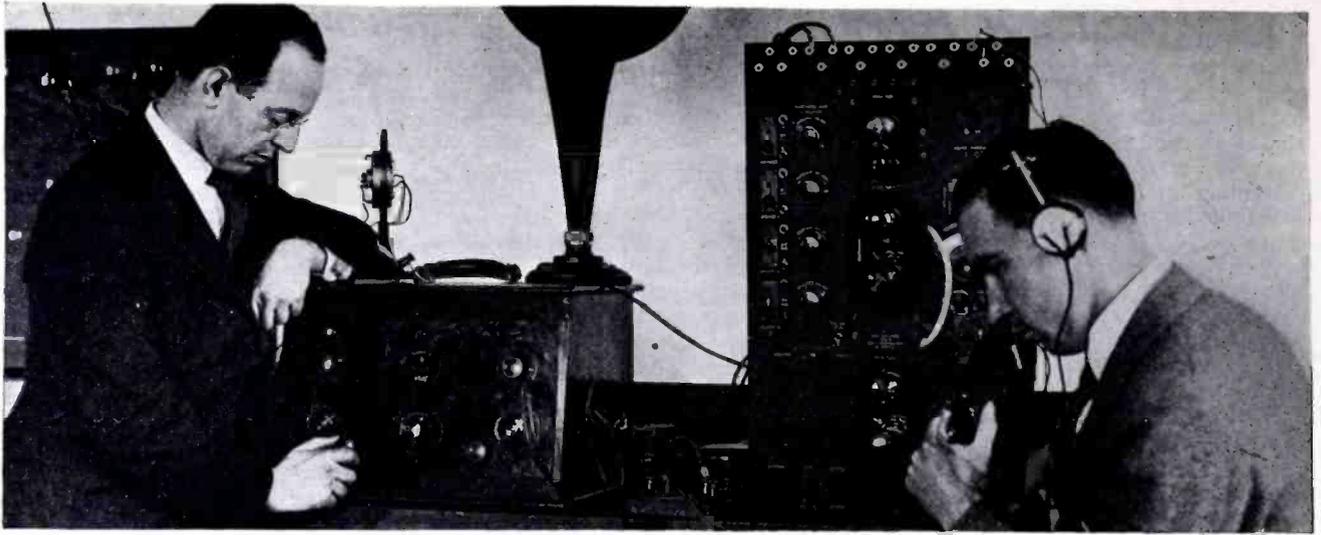


Figure 3—Schematic diagram of apparatus used to measure high frequency resistance

winding in a radio-frequency transformer, and their application to this part of the circuit will be considered later.

Coil No. 3 is wound on a form of 16 pins arranged in a circle of 3½ inches diameter. Total winding is composed of 50 turns of No. 18 double cotton covered wire. In winding, two pins are missed at every movement, the contour of the winding taking the form of a six-sided polygon with one unequal side. Adhesive matter should be used sparingly, a small amount being used only at the point where the wire crosses. This coil makes an excellent secondary, or grid coil, for use in a three-circuit tuner. When shunted with a variable condenser of .0005 mfd. it will tune from 210 to 550 metres.

This coil has a distributed capacity



Rebroadcasting of foreign programs is a modern accomplishment—this is the receiving set used in relaying a London program to WJZ and WRC listeners

Review of Development in

By
A. F. Van Dyck

PART II—Continued from June WIRELESS AGE

T RADIO Telephony

THE question of program is, of course, of paramount importance in broadcasting. This question is rather closely associated with that of higher power or super-power broadcast stations. Since super-power stations increase the stability, reliability, and range of reception, a suitable number of stations would carry the best of the programs originating in the great cities of the countries into practically every home, winter and summer, day and night. Once a reasonable number of super-broadcasting stations are in successful operation, every listener will have reliable service at all times from one or more of them and most listeners will have a considerable choice of program. Furthermore, those listeners who are within range of the lower power local stations can receive additional service from them. Super-broadcasting will not interfere with this because the super-power stations will be so located that the signals they produce in the populous centers will not be excessive.

At the same time, the economic basis for high-grade broadcasting will be firmly established by the super-broadcasting station. It is clear that nationally interesting and highest quality programs can be sent out economically only from such stations as can reach large numbers of listeners. The smaller stations are obviously better suited to carry out the useful but different functions of catering to special local groups and to sectional tastes. The

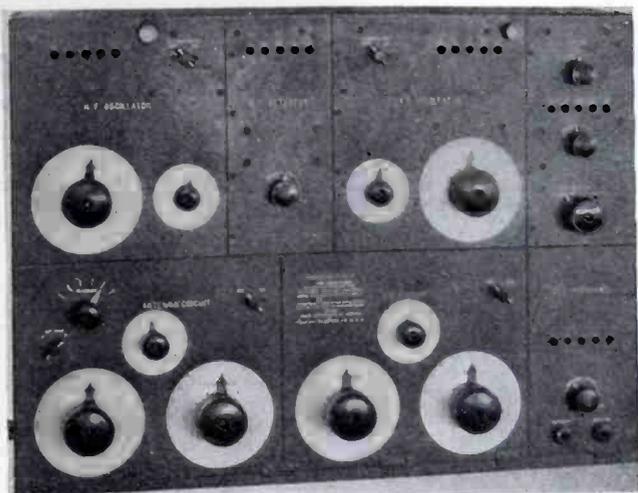
super-broadcasting station is, however, a very expensive project to establish, and to maintain, if the highest quality programs only are to be sent out. The radio industry, insofar as broadcast receiver sales are concerned, is the direct beneficiary of broadcast transmission and could not continue if broadcast transmission ceased or were lowered in quality. Yet it has not been possible hitherto for more than a few concerns in the radio industry to furnish a share of transmission either by operating a station or by contributing toward the program expenses of other broadcasters. It is simply out of the question for the radio industry to attempt to support impartially the more than 500 miscellaneous stations which now exist in the United States. Super-broadcasting stations would have as their sole object the improvement of radio broadcasting, with all that this implies to the listening public and to the radio industry, and therefore it deserves the support of the government, the public, and the radio industry itself. There seems to be little question that once the physical agencies for super-broadcasting are in existence and have proven their value to the public, the radio industry will co-operatively support this agency as its life-giving source. There would thus be provided a solution to the economic problems of the broadcast transmitting stations.

Another aspect of broadcasting is the merchandising of the equipment sold to the public. The value of sales

to the public only a few years ago was less than one million dollars a year. Today it is nearly one million dollars a day. The growth of the business to this magnitude in a short time has naturally been accompanied by some "growing pains," and the industry is going through a period of stabilization in this respect. There is a large seasonal variation in the demand for equipment, and the public has experienced many fads and preferences, largely encouraged by various publications, which have complicated the situation. It is the aim of responsible leaders of the industry to stabilize equipment and its production, and it is likely that in a very few years more radio receivers will have become more or less standardized into a few types of recognized class and value.

RECEIVING APPARATUS

AT THE present time the aspect of broadcasting which has most general interest perhaps is that of the receiving apparatus, in technical characteristics. There have been no fundamentally new inventions in radio reception since broadcasting started, but there has been a great development of basic circuits and devices in making them in form most suitable for the special requirements of broadcasting. Receivers which are to be operated by untrained, inexperienced persons must be simple in operation, free from critical adjustments, and effective with a minimum of care and expense in mainten-



Commercial super-heterodyne receiver as used before broadcasting became popular



The latest type of super-heterodyne designed for portable use

ance. The early broadcast receivers were therefore very simple in circuit, number of tubes used, and so on, and more complicated ones have been introduced as it has become possible through development to make them without complicated operational characteristics, without too much power required for the tubes, et cetera. Today we have receivers using six or more tubes, yet supplied by dry cells, and using the justly famous super-heterodyne circuit yet with very simple control. Two of the illustrations shown picture a super-heterodyne set of the kind used before the days of broadcasting, in marine service, and the broadcast super-heterodyne. The development from one to the other has taken three or four years, and pictures clearly the problem facing the designer of radio broadcast receivers.

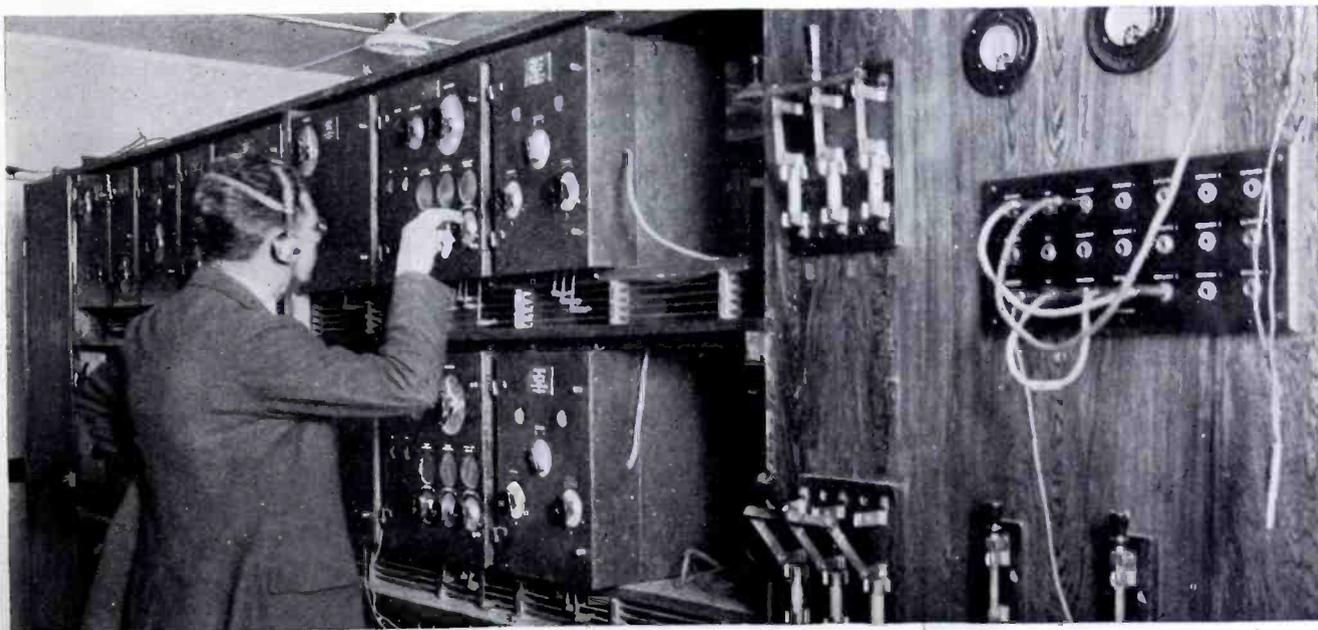
It is helpful in studying radio re-

ceivers to understand the basic circuits known today. There are but four of these and every receiver uses some one of them. The four fundamental circuits are the regenerative, the super-regenerative, the radio frequency amplifier, and the super-heterodyne. There are many varieties of each of these, some of which have been given special trade-names, but which are actually mere modifications of the circuits named. The super-regenerative circuit is not used at present for broadcast receivers because it has some operational characteristics which make it unsuitable in its usual form. Future development may find forms of it which will be suitable, but at present, commercial broadcast receivers use either regeneration, radio amplification, or the super-heterodyne principle. Each of these possesses definite characteristics which are more or less generally well

known and which need not be discussed here. But a few words about the super-heterodyne circuit are warranted because that is the best form of receiver, and one which will doubtless have increasingly extensive use in all radio telephone services.

The general requirements for a good radio telephone receiver are sensitivity, selectivity, high quality of reproduction, ease of manipulation and reasonable power supply required. There may be other special requirements in special cases, such as portability or light weight, large output, etc., but these are features dependent upon detail design and supplementary to the fundamental circuit. The super-heterodyne receiver meets all these requirements in ideal manner. In sensitivity it is capable of hearing any signals which are louder than the static level, and this on a

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Trans-Atlantic receiving apparatus of the Radio Corporation of America's station located at Riverhead, L. I.

The *H.I.* in Broadcasting

By
Dorothy Brister Stafford

IF you are not so old that you have forgotten when Peter Rabbit was your favorite character in fiction, as he went lipperty-lip through the orchard, (and one doesn't have to be so terribly young to still enjoy Peter), you have no doubt had considerable pleasure the past winter in meeting Peter's biographer, Mr. Thornton W. Burgess, when he has been broadcasting through Westinghouse station WBZ, New England. And from statistics gathered by Mr. Burgess, a good many of you *have* been listening to him.

This well known naturalist's radio experience has been similar to that of many others. The results have been beyond the most sanguine expectations. Though Mr. Burgess' nature study talks, which are one of WBZ's educational features, are broadcast during the children's hour, he found that fully 50 per cent. of his listeners are adults, comprising many elderly people, as well as what he regards as the most difficult age to interest in nature study, those from eighteen to twenty years of age.

That people interested in birds, small wild life, flowers and trees are not confined to any one section of the country, is proven by letters from Louisville, Ky., Ishpeming, Mich., a sportsman in California and a trapper in Quebec, and those who are interested in this topic are quick to grasp the opportunity to hear such an authority as Mr. Burgess at first hand. Out of the naturalist's talks has developed a unique organization, which Mr. Burgess calls "The Radio Nature League," and which he organized for the purpose of bringing together all those interested in preserving and conserving desirable American wild life, whether birds, fish, animals, flowers or trees. In a little over five



"Bernice," popular pianist at WCX

months Mr. Burgess' league has rolled up the very considerable membership of 10,000, representing thirty-four states and five provinces in Canada. The members' ages range from nine months to ninety-four years, and include persons in all walks of life.

Personally Mr. Burgess' statistics interest us a lot. In this hectic, jazzy age one's friends seem to think it a little queer, when we grasp at the opportunity to gather up the bird-book and opera-glasses, and venture forth for a day in the hope of chancing upon the wary bob-o-link or the elusive cedar wax-wing. And it is nice to know that there are 10,000 other people, at least, who have "queer" ideas as to what constitutes a good time. And there is no question that many more people have become interested in the absorbing study of bird life and wild things through listening to Mr. Burgess' talks. Radjo is so universal in its subjects, that it seems possible to find people who are interested in any topic that may be put on the air, and while nature study would seem to appeal primarily to children and those in rural communities, Mr. Burgess' letters have proven that there are many city people devoted to this attractive hobby.

"Here," said Mr. Burgess, "is a letter from a gun manufacturer, who enthusiastically endorses my program. He expressed the hope that the league will actively support sane conservation, and he earnestly requests membership. There are aviators and miners enrolled in the league, I have superintendents of national parks, blind men and women, and entire lists of homes for the aged."

And of course, the Scouts and many schools have come in en masse.

"One surprising feature of the league membership," goes on Mr. Burgess, "is that the members get absolutely nothing out of it, excepting the knowledge of aiding in a worthy movement, yet they come in by thousands. I cannot spend a cent on them. I am unable to even answer the letters, but they continue to enroll in increasing numbers."

"I like the radio better than the written word in many respects. The touch is much more intimate. My voice gets right into the living room of these people's homes, and they feel as though they knew me intimately. They listen to me most intently. It is surprising what a quantity of home town gossip is written to me. Some of the letters are in poetry. Many of them are illustrated."

It is simply the old story of the intimacy that comes through radio. It is the personal contact that is ever its chief fascination. While many thousands of people have read Mr. Burgess' books, after hearing him in person, they are bound to have a livelier interest in what he has written, and want to delve further into the study to which he has devoted his life.

And this brings up a thought that doesn't precisely belong in Mr. Burgess' story, but as he is one author who has made a success of broadcasting, his experience will serve as



Clyde R. Randall, announcer at WSMB



Thornton W. Burgess, nature story teller at WBZ

an example for the subject under discussion. Radio has been accused of hurting almost every legitimate business under the sun; but it was not until we had a letter from one of the large publishing houses the other day, that we realized there were rumors going around that it was going to hit the book business.

On its face, the supposition sounds most absurd to us. For, great as is our devotion to radio, we can't easily imagine ourselves foregoing the pleasure of reading a book that has come to our attention for all the radio programs that have ever been broadcast. Our opinion would be that radio is going to boom the book business. Take Mr. Burgess, for instance. Surely the people who had never read him, would be immediately moved to do so after hearing him talk. And everyone knows that Merian C. Cooper's talk over the radio in the spring sold many additional copies of "Grass." Any author appearing personally before the microphone, if he has the happy faculty of "getting over," must certainly add to his royalties thereby. At least, that is our opinion.

Another radio feature that is put on by a number of the better stations, in co-operation with the book publishers, seems to us the best book advertising we have ever happened upon. It is the review of new books that is programmed regularly by several stations, and those we have heard, (WGY, in this instance), have presented clear, concise reviews of current fiction, biography and travel in a manner that should interest every reader. Of course, if one isn't in the habit of reading books, it is scarcely to be hoped that the radio is going to drive him to it, unless it be that personal contact with an author will stimulate his curiosity to the



Miss L. Metcalfe, musician at WSMB

point of becoming better informed. But no one can convince us, at the present time, that the book-lover is going to be proselytized to the extent of giving up his reading, as long as his eyes hold out.

To go back to Mr. Burgess. One can visualize a great army of vacationists, now in the woods and open places, getting acquainted with Peter Rabbit and Jenny Wren, and profiting by the interesting facts of outdoor life they heard from the naturalist last winter. And when they come back with their summer experiences fresh in their minds,

there will no doubt be many additional members enrolled in the Radio Nature League. To us this slightly different feature of radio entertainment seems quite an important educational experiment.

A HUSKY newcomer has invaded radio in the past few months, a lusty infant, who, ruthlessly brushing aside the old reliable WGR, and the newer, but exceedingly robust KOA, sat himself down in their rightful place upon the dials and proceeded to roar across sixteen hundred miles in a way that demanded immediate attention.

If you live this side of the Arctic circle you will know that the reference is to WSMB, N'Awlins. While WAHG and WGBS occasionally set up a protesting howl, for some reason, (doubtless known to the gentlemen who draw up all the intricate and amazing diagrams neighboring us here on the right and left,) the new southern broadcaster goes serenely on his way, constantly getting his programs through the congestion with the ease of an expert chauffeur negotiating the traffic on Fifth avenue. When nearby stations blast and squawk, and their superpower becomes but an ominous growl, WSMB floats in clear and distinct, without a trace of distortion. And they say they use but five hundred watts! While we are concerned chiefly with what comes out of stations, and not how it comes out, one can but marvel at this performance.

While it was its remarkable reception that first attracted us to this new station, one is pleased to comment on the intelligence and discrimination that is being shown in its programs.

New Orleans has ever been a name to conjure with; it brings up impressions of
(Turn to page 38)



The WEAF staff on one of the "WEAF Home Talent Nights." Seated left to right—Eunice Diebert, Winnifred T. Barr, and Kathleen E. Stewart. Standing left to right—Leslie Joy, Graham McNamee, Geo. J. Podyen, Benedict Fitzgerald, Phillips Carlin and G. W. Johnstone

Shenandoah

The most powerful electric-radiating system in operation on any aircraft

4 K. W. Transmitter

Ten 250-watt tubes pump one kilowatt energy into the antenna

By S. R. Winters

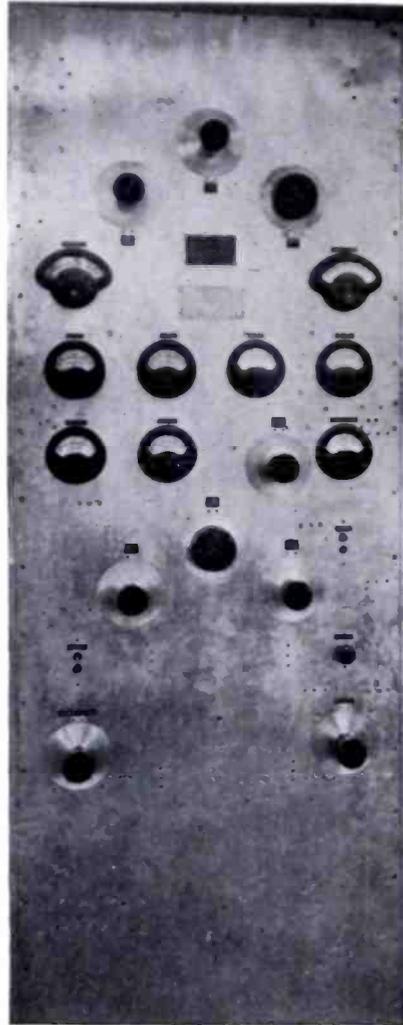
THE main radio-transmitting equipment installed on the *Shenandoah*, one of the huge dirigibles of the United States Navy Department, is one of the most powerful electric-radiating systems yet placed in operation on aircraft.

The main transmitter on the *Shenandoah* is rated as having a maximum power of 4 kilowatts or 4,000 watts. As impressive as this rating may be, the electric energy radiated by this transmitting apparatus is more graphically portrayed in comparison with the power now used by broadcasting stations. The 530 broadcasting stations in existence are supposed to limit their use of power to one kilowatt or 1,000 watts, which is only one-fourth of the power rating of the transmitter on this big dirigible.

This powerful radio-transmitting equipment consists of ten 250-watt electron tubes, and more than one kilowatt or 1,000 watts are pumped into the antenna. Or, expressing it differently, this transmitter is capable of putting 25 or 30 amperes in the antenna. This electric-radiating system, for the first time shown in the accompanying photograph, operates over a wide band of wavelengths — from 500 to 1,500 meters. The dimensions of this transmitter suggest its size, namely, 7 feet 4 inches high, 30 inches wide, and 24 inches deep.

The master transmitter on the *Shenandoah* derives its power from a gasoline driven engine. The latter operates a 5-kilovolt-amperes, 220-volt, 660 cycle alternator. This is a special design, and was built by Warren Noble, an eminent engineer of Boston, Massachusetts. There is, incorporated with the alternator, a 4-kilowatt direct-current excitor. The exhaust from this machine yields considerable heat, which may be usefully applied for cooking purposes and in affording warmth to the bodies of the occupants of the *Shenandoah*, in the event that she invades the Arctic regions.

The antenna system for use with the main transmitter consists of 2,000 feet of wire. Although classified as belonging to the trailing type of antenna, commonly used on aircraft, these 2,000 feet of wire are arranged in a shape resembling the letter *W*. That is to say, it does not take the form of a single wire, which is truly characteristic of the trailing type of antenna used on aircraft. The wire need only be



The panel of the 4 k. w. transmitter

reeled out several hundred feet from the dirigible, thus lessening the chances of the two thousand feet of wire becoming entangled with any object on the ground.

A radio compass is included in the communication facilities provided the *Shenandoah*. This direction-finding equipment was originally planned as an invaluable aid in the event that this dirigible made a journey to the North Pole. The radio-receiving outfit used with the compass coil consists of six vacuum tubes and the set operates over a wave band ranging from 500 to 19,000 meters.

The addition to the radio-compass receiver, there are three other radio-receiving units carried on board the *Shenandoah*. These, as well as the

other radio equipment thus used, were specially designed and built by the Bellevue Naval Research Laboratory, under the direction of Dr. A. Hoyt Taylor. The long-wave or low-frequency receiver is selective enough to respond to a tuning or resonance adjustment of one-fifth of a kilocycle. This type of receiver consists of seven vacuum tubes and operates over a band of wave-lengths ranging from 2,000 to 20,000 meters. The receiving set designed for the interception of radio waves of medium length makes use of six vacuum tubes, and this receiver is capable of intercepting signals on channels ranging from 150 to 2,000 meters. The radio-receiving unit built for the interception of radio signals transmitted at high frequencies employs three vacuum tubes, and its wave-length range is from 40 to 150 meters.

Supplementary to the main transmitter on the *Shenandoah* is a high-frequency or short-wave transmitting device, which is classified as a standby or emergency unit, in the event that the principal electric-radiating system is put out of commission. This auxiliary transmitter is capable of putting 50 watts of electric power in the antenna, and it operates on a band of wave-lengths ranging from 89 to 98 meters. This auxiliary transmitter derives its energy from a dynamotor, which supplies 200 milliamperes at 750 volts. The dynamotor operates from a 24-volt storage battery. The use of high frequencies or short waves by transmitting equipment on aircraft for communication with ground stations is a departure, and recent tests have demonstrated the success of the innovation. Radio amateurs co-operated with the Naval Research Laboratory in the development of this high-frequency transmitter.

As elaborate as the radio equipment on the *Shenandoah* already described may seem, standard aircraft transmitting units are also included on board this dirigible. These are used for broadcasting purposes, and signals thus dispersed on the maiden journey of this big airship were picked up by broadcasting stations at Buffalo and Schenectady, New York, and re-broadcast for the benefit of broadcast listeners. Only two radio operators are on board the *Shenandoah*—these busy bodies being Junior Lieutenant Carlton D. Palmer and Gunner G. W. Almour. (Turn to page 62)

EMINENCES

on the air

By Ed Randall



Bishop Manning



Dean W. R. Inge



John Young and Frederic Thomas of the Criterion Quartette

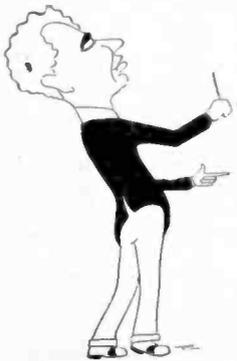


Mario Chamlee

STATION WJY of New York City has done and is doing many things to bring great personalities closer to the people. On May fifth, a Tuesday evening, it had the privilege of broadcasting the speeches made at the dinner of the Church Club of New York. The ball room of the Astor Hotel held a capacity crowd, and that crowd was held entranced by the words of Bishop Manning of the Cathedral of St. John the Divine of New York, and the Very Reverend W. R. Inge, D.D., C.V.O., F.B.A., Dean of St. Paul's Cathedral, London. No one knows how many more listened to those speeches on the radio, but for the benefit of those listeners who heard but did not see, the writer attempted to convey herewith something of the jovial earnestness of Bishop Manning and Dean Inge. Bishop Manning is doing a wonderful work toward completing the cathedral, and newspapers invariably refer to Dean Inge as the "Gloomy Dean," but both men inject into their words a deep and human sympathy with sparkling spontaneity.

Two of the members of the Criterion Quartet are shown in action, singing "David, Play on Yo' Harp!" John Young is the tenor of that organization, and Frederic Thomas is the bass. This Quartet has appeared in almost every large town and whistling post in America, and is now sponsored by the Brunswick people in their recent hours of music.

Mario Chamlee is another Brunswick artist, a tenor soloist. In announcing his appearance before the radio audience, Mr. Cross said that Mr. Chamlee's voice was the outstanding tenor of the generation. Your correspondent believes that Mr. Cross was right, erring possibly on the side of moderation, only.



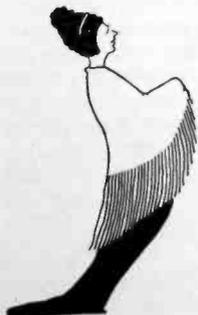
Here is Edwin Franko Goldman, than whom nobody ever got more publicity in New York for conducting band concerts. His was the Band that was paid by a wealthy family to give concerts last year in Central Park on the Mall, and the Mayor caused to be distributed dodgers bearing the legend, "Mayor Hylan's People's Concerts." Now, the concerts are given on the sloping green at New York University, and over the air via WEF



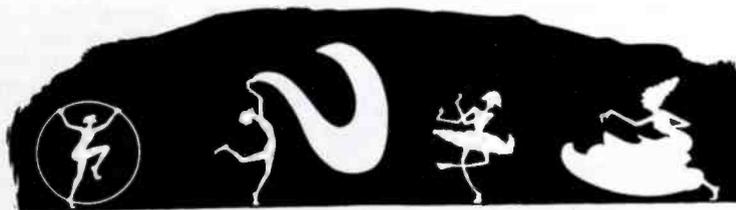
Arthur Pryor is depicted in this spirited engraving in action leading his band at Luna Park, Coney Island. Pryor's band music is well and widely known on the phonograph discs, and his summer evening concerts are boosted over the radio by WEBJ



Willem van Hoogstraten is the conductor of the Philharmonic Orchestra for their summer concerts at the Lewisohn Stadium at the College of the City of New York, broadcast by WJZ and its allied stations. All radio enthusiasts know of the high standards of musical composition observed by the Philharmonic. Mr. van Hoogstraten is highly pleased at the full house which always greets their appearance in the Stadium, but estimates that between four and six times the capacity of that Stadium listens to their concerts on the radio. Toward the close of each summer season, he keeps two girls busy acknowledging letters of appreciation from his distant and scattered audience. They come from Pendleton, Oregon, and Yucatan, from Blissville, Arkansas and Greenwich Village, New York City



Ruth St. Denis



The Denishawn Dancers, accompanied by the Philharmonic Orchestra, presented a delightful program at the City College Stadium. WJZ, as usual, officiated for them on the air. Distant listeners on the radio could even sense the rhythm and grace of the lightly moving figures, so perfectly marshalled by Ruth St. Denis and Ted Shawn



Ted Shawn

H. I. in Broadcasting

(Continued from page 35)

old romance, colorful tales of the French quarter, Mardi Gras, pralines, the Louisiana derby, Creole intrigues, a thousand fascinating images that have thrown a glamor about it and fixed it in one's mind as the quaintest and most foreign of American cities. It seemed almost too much to expect that those responsible for placing it on the radio map would be sensible of these fascinations to the remoter parts of the country. But that is exactly what they are doing.

The first time we happened in they were reading telegrams, and one thought "It is just another station," but the next night they settled down to their business of broadcasting the charm of New Orleans. And it was only a few weeks later when in came one of the most delightful features we have heard in some time. A very charming woman, a member of one of the old French families, spoke on "The Romance of New Orleans," and if she hadn't said anything worth hearing, the attractive, soft, cultivated Southern voice would have held one for hours. She did say much of interest, however, and the way in which she pronounced the name of her native city was in itself a joy to northern ears.

Those responsible for the programs of this new station have the good sense to know that it isn't possible to force any one type of radio entertainment into the ears of the whole listening public. They realize that there is, and always will be, an audience that demands the lighter form of entertainment, so on one night of the week WSMB caters to this class of listeners with the Patio Royal dance orchestra playing jazz with a southern twang and singers dispensing the popular brand of melodies. On other nights there are fine concerts with artists from the New Orleans Grand Opera Company, and excellent orchestra music by remote control from the Strand Theatre.

In Mr. Clyde R. Randall, WSMB has an announcer with one of the pleasantest voices on the air, and while it is to be regretted that the policy of the station forces him to read telegrams, they will undoubtedly grow away from that as they become older. In addition to bringing to northern listeners much of the charm of the old south, the new station is putting some excellent entertainment on the air. Those familiar with New Orleans will be interested in knowing that the broadcasting plant is located on the edge of the old French quarter.

WERE you fortunate enough to be among those present when WEAFF'S "Home Talent" Night went on the air? And were you as surprised as this listener?

There is nothing on the air that so irritates us as the horse-play and alleged comedy produced by the average station when they attempt this sort of thing; and the fact that WEAFF'S innovation pleased and entertained to a high degree proves the artistic and clever manner in which it was done. Listeners must have marvelled at the talent uncovered, for while the staff of this studio is recognized among the leaders in their line of work, one was scarcely prepared for the high quality and versatility of the program as a whole. It was put on by the announc-

ing and business staff, assisted by the studio's professionals.

Graham McNamee's pleasing tenor prompted one listener to observe that this versatile announcer on that memorable day down in Washington when he was killing time until the senate should have recovered from the shock of Mr. Dawes' pyrotechnics and go on with their business of inaugurating a president could have given his hearers much greater pleasure by warbling an aria or two than by his interminable description of everything in Washington. If the trumpets hadn't sounded just when they did, he surely would have had to start counting paving-stones, for everything else had been covered!

We forget just who else sang, aside from Leslie Joy, and were suitably astonished when Miss Bauer, Miss Stewart and Mr. Fitzgerald, whom we had previously suspected of being able to play the piano, were joined by G. W. Johnstone, the station's publicity representative, in a piano quartette. Apparently to be able to hold a position at WEAFF one must double in brass.

Some confusion was caused at our house by The Man Who Buys the Batteries shouting in the middle of a number.

"There he is. I knew he was an announcer."

It develops that our engineer has long been annoyed by the elaborate camouflage built up by Phillips Carlin, about "The Man in the Silver Mask," who sings with the Silvertown Cord orchestra, and has been heard to mutter, "I'll bet he hasn't any more mask than a rabbit." So his excitement was justifiable, when the familiar voice came over the air. Altogether it was a most enjoyable program, and one hopes they will do it again. They have been kind enough to have their pictures taken for WIRELESS AGE, and now that you have met them all informally and know how they look, you will doubtless think of them as personal friends, when they make their dignified announcements.

CARLTON CULMSEE, of Nada, Utah, has expressed in verse what radio means to those who dwell in the lonely parts of the earth. Two verses of his "Comrades of the Sky," sent out through the courtesy of WGY, Schenectady, have a particular appeal.

"The desert's raw and bare and bleak
In roaring winter weather,
The trails may trackless lie a week,
And sometimes months together;
One cannot see a dance or show,
A theatre or steeple.
It's cold and bare—but lonely? No,
The air is full of people.

The hours no longer hunger by
With dull and listless motion,
For those who tread the tuneful sky
Of continent and ocean
Come down to whisk the night away
With merry song and laughter,
And leave, to cheer the empty day
A trail of gladness after."

A kind hearted woman who owns a farm in a remote section thought to brighten and broaden the lonely life of the tenant's young daughter by presenting her with a radio set. She took it down with her on a visit to the farm, and at ten o'clock that night descended the stairs to see the result of her experi-

ment. Gay dance music filled the kitchen. It was coming from a Canadian hotel, and up there the dancers have the pleasing custom of singing with the orchestra. Hundreds of fresh, young voices carried the popular chorus. To the woman's astonishment, the daughter of the house was weeping bitterly, her head on the kitchen table. Asked for an explanation, she lifted a tear-stained face, and said bitterly:

"Those people are having such a good time and I never have any good times. It makes me perfectly miserable."

And that's that!

BROWSING about our favorite magazine shop, we were puzzled by the large demand for an extremely mediocre magazine. Careful examination failed to reveal anything of universal appeal, and we questioned the dealer. He smiled.

"You notice it is mostly the girls who are buying it," he said, and opened a copy to display a photograph of a popular radio announcer.

"They buy his picture now just as they used to Valentino's."

"You couldn't pack a Broadwood half a mile—

You mustn't leave a fiddle in the damp—
You couldn't raft an organ up the Nile
And play it in an equatorial swamp—"

SO went Kipling's old Banjo song, "Broadwood," if we remember correctly, being Anglo-Indian for piano.

But they have all gone traveling this summer, the pianos, organs, fiddles and banjos, to say nothing of the artists who perform upon them. For the radio has packed itself into suit cases and trunks and invaded the resorts, the summer camps, the seashore; and whether it be from the home-built crystal set in the canvas-topped portable house, or the big superheterodyne in the twenty-room summer cottage, all America is tuning in as usual. One of the largest manufacturers of radio sets was all ready for the vacationist with a compact, practical, portable outfit, and now, even from the running-board of automobiles, he who runs may listen.

Our neighbor over the border, which by reason of its becoming a moist spot in an arid land, seems to expect the entire American public to cross the boundary-line this summer, has overlooked nothing that might add to the comfort of its thirsty invaders. CKAC, Montreal, has sent out notices to tourists to carry radio sets with them, and take advantage of the information this station broadcasts each day in regard to touring conditions. We suppose all motorists are now stopping for tea at 4 P. M., and tuning in on CKAC to get the latest reports on the state of roads in Quebec, detours and repairs, to say nothing of talks by various Provincial officials on points of interest in the province. It is an innovation that doubtless by this time has many supporters.

Away up here at the tip-end of Michigan, where for several years we have spent our summers, one has always seemed singularly removed from that world in which we live the other ten months of the year. Dress and dancing, bridge and formality, all are forgotten, and with the heavenly blue lake stretch-

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Cross Word Contest

By Helen F. Dittus

C. E. GARRETT of Hammond, N. Y., captured first prize in the June Cross Word Contest through the following short summary of the qualities he likes best in *WIRELESS AGE*:

"Exceptionally well balanced contents, constructional information, valuable and reliable (witness D-coils, super-Hi-F. receiver, power amplifier, etc.), stories and articles showing radio 'as is,' a vital influence on national character and life. Discussions of both sides of radio, amateur and commercial. Informative, unbiased reports on new parts of various makes."

Accompanying Mr. Garrett's solution and summary is a rather complimentary letter, from which we quote in part:

"Enclosed find papers in connection with my solution of your cross-word contest. I wish to take this opportunity of expressing my sincere appreciation of your magazine without the limitations of 'condensation to 50 words.'

"My standard of judgment is not drawn by haphazard as I buy most of the radio and part-radio publications, weekly and monthly, and also have the opportunity of scanning most of the remainder, Canadian and English as well as American. I also have been constructing and experimenting with a large variety of hook-ups for the past 18 months or so, as a hobby. * * *

"I can appreciate fully that in your magazine you can draw upon the versatile and brilliant talent of the best research organization there is, and you are, therefore, in a position to keep your readers up-to-date with accurate and practical information regarding the development of radio in all its phases; I also note with interest the marked ability of these technical contributors to write in a manner quite intelligible. * * *

"What is perhaps outstanding, however, is the remarkable bal-

SOLUTION TO JULY PUZZLE



ance you preserve by means of articles, diagrams and pictures covering a large variety of topics, all appreciable by any one interested in radio. For instance, you avoid the Jules Verne type of story, dealing with highly imaginary forecasts of what radio applications may ultimately reach, but the stories you print, instead concern themselves with *present-day life*, incident and character in such a way as to make one feel that ever-growing social influence—for good, for very much better in fact—of radio.

"As a former newspaper man, may I also express my appreciation of the able editing of the magazine. I note that you do not have to publish correctional data from month to month and apologize for mistakes, and the good printing and fine get-up of the magazine in general."

Charles H. Devine of Boston, Mass., also appends his solution and essay with a letter. In this he strikes the keynote voiced by a number of the readers:

"I know of only two magazines which give any attention to the commercial operator, *WIRELESS AGE* and *Radio News*. And sad to say, both these sterling magazines in their last few issues have omitted this department.

"Any radio magazine you pick up has an amateur department * * *. No doubt the amateur and BCL are better buyers of the materials advertised * * *. Be that as it may, a page or so for the commercial operator should not be waste space. Surely, they must buy radio magazines and would most likely give preference to the one recognizing their line of endeavors.

"Please arrange for the return of 'Afloat and Ashore with the Operator.' If the worthy Fitzpatrick is on a fishing trip or abroad, there must be some other old timer who could make up an interesting page."

JUNE WINNERS

THE awards made in the June puzzle contest are:

First Prize, Radio Receiver: C. E. Garrett, care Loren D. Allen, R. R. No. 2, Hammond, N. Y.

Second Prize, Brandes Headphones: Tom A. Carr, Box 227, Newport News, Va.

Third Prize, Two Radiotrons: John J. Hannigan, 484 East 164th Street, New York City.

Fourth Prize, "Vacuum Tubes": Robert A. Hubner, 755 Dawson Street, New York City.

Next in order of merit, but who did not win prizes, are: Marian C. Brown, Meriden, Conn. (One of the most clever letters and excellently executed solution); Mrs. Ethel B. Franklin, Pawtucket, R. I. (Very neat drawing); George C. Haseltine, Fort Stockton, Tex. (Might have gone close to top were it not for losing out on a few points); Irving Sandrowitz, New York City; James L. Crosbie, New York City; Walter E. Schneider, Jersey City, N. J.; Farwell Bessellieu, Hoopston, Ill.; Walter S. Haring, Yonkers, N. Y.; James Frank, Jr., New Haven, Conn.; Pierce

Anderson, Union City, Ind.; C. J. Rhea, Martins Ferry, Ohio.

Others in order of merit are: W. Vincent Barry, New Haven, Conn. (Clever letter); Miss Clara Kohl, Milwaukee, Wis.; T. F. Ryan, Bronx, N. Y.; F. J. Zebell, Jr., Odell, Ill.; Russell J. Schembh, Peoria, Ill.; Joseph G. Huckins, Melrose Highlands, Mass.; George J. Deinzelman, Chillicothe, Ohio; Mrs. W. B. Dayton, Bloomfield, N. J.; Ernest H. Bensch, Miami, Okla.

Further down the list in order of merit are: R. B. Blake, Nacogdoches, Texas;

Fifth Prize, "Wireless Experimenters' Manual": August E. Droste, 84 Bloomfield St., Hoboken, N. J.

Next Five Prizes, Annual Subscriptions: C. H. Schiorring, 41 Medford Street, Medford, Mass.; Harlan E. Williams, Wolcottville, Ind.; Webster J. Gillen, 216 East Main South, Gainesville, Fla.; L. E. Fullerton, Radio Operator, S. S. West Lashaway, International Freighting Corporation, 44 Whitehall Street, New York City; R. H. Gilkey, 647 E. 37th Street, Savannah, Ga.

Berita I. Barber, Winnipeg, Man., Canada; Victor E. Pashey, Miller Field, S. I., N. Y.; John Wasilik, Jr., Franklin, N. C.; William Haas, Perth Amboy, N. J.; John Jung, Jr., Chicago, Ill.; I. F. Baker, Orange, N. J.

Some others are: N. Touroff, Marysville, Utah; W. D. Strong, Oklahoma City, Okla.; J. W. Teale, Bethlehem, Pa.; Miss Inez M. Peck, Lyme, Conn.; Charles H. Devine, Boston, Mass.; B. Forrest Voeks, Molson, Wash.; Harold I. Jacobson, Kerkhoven, Minn.; E. W. Mayer, San Juan, Porto Rico.

Coils

(Continued from page 31)

should be as near zero as possible, for the reason which has been explained previously.

(2) The co-efficient of coupling between primary and secondary should be as high as possible without causing appreciable capacity effect between the two coils.

(3) The number of usable turns of wire in the primary is limited, since the resonant frequency of the primary must not be near that of the secondary, neither must it be in resonance with any of the harmonic frequencies of the secondary. The primary should, however, be as large as possible, bearing in mind the previous statements.

All who have used the old time regenerative set employing a variometer in the plate circuit know that when the plate circuit is tuned to resonance with the grid circuit, the set breaks into oscillation through the tube feeding back through its own inherent capacity. By this, it will be seen that the number of turns to be used in the primary of an R.F. transformer is strictly limited, and can best be determined by experiment so far as the amateur is concerned.

The next most important factor is the co-efficient of coupling between the two coils. Various methods have been resorted to, to obtain a tight coupling in many of the R.F. transformers in use today. If the coils are wound as at (b) the coupling will be tight, but the capacity effect between the two coils will be considerable. For this reason (b) will not be considered as usable.

At (c) will be seen one of the best methods of coupling, inasmuch as the capacity effect is very small, and the co-efficient of coupling high. The primary is of the same diameter as the secondary, and is usually wound in the same form. The coupling may be variable and the best number of turns for the primary tried out by experiment.

At (d) will be seen what is probably the best method of coupling in R.F. circuits. The primary is between the two parts of the secondary, that is, a few turns of the secondary are first wound on the former, followed by the complete primary, and the secondary is then completed. The writer has found this a most efficient way of winding R.F. coils, and the following will be found to be quite good.

With either No. 1 or 2 coils, 15 turns are wound on as part of the secondary. Then 9 turns as the primary, followed by the remainder of the secondary. The end of the secondary furthest away from the primary is connected to the grid of the tube, and the end of the primary nearest the grid end, is connected to the positive "B." Any reversal of these connections will cause the set to oscillate violently. With two stages of tuned R.F. the writer has en-

countered no trouble with these coils, no neutralizing device being used. There is endless field for experiment with inductances, and with this view in mind, simple methods of conducting measurements upon coils are being given here for the benefit of the experimenter who wishes to make measurements for himself.

MEASUREMENT OF HIGH-FREQUENCY RESISTANCE

The following is a simple method of measurement of H.F. resistance and is within the scope of the average amateur.

The apparatus is set up as shown in figure 3. L is an inductance of say 30 turns of No. 22DCC. The value need not be known. G is a thermo-couple galvanometer or hot-wire milliammeter. K is the inductance to be measured, R a variable non-inductive resistance, and C a variable condenser of .001 mfd. Particular care must be used in selecting this condenser. Its losses must be very low at the frequencies measured, and its resistance at all capacities must be fairly constant. In other words it must be a real low loss instrument. The writer finds a General Instrument type 56F fills the bill excellently, being fitted with a long handle to avoid hand capacity effects. The resistance R must be non-inductive and should take the form of a very fine constant or other form of high resistance wire. The C.W. oscillator should deliver an undamped wave. Only the inductance L should be coupled to the oscillator, care being taken that no coupling exists between K and any other part of the circuit. For this reason, the rest of the circuit should be shielded.

The oscillator should be set at 200 meters or at whatever wavelength it is required to measure, and the condenser C varied until the galvanometer registers a maximum deflection. This is first done with the coil K in circuit. After the maximum current is indicated in the galvanometer, change over the double-pole switch, connecting the variable resistance in circuit. Retune the circuit by varying the condenser C until resonance is again obtained as indicated by the meter. The resistance is then varied, until the same current is obtained in the galvanometer. The resistance R then equals the resistance of the coil under test, at the particular frequency delivered by the oscillator. The coil to be measured should be supported upon glass rods to reduce any undesirable effects caused by the proximity of adjacent objects.

MEASUREMENT OF DISTRIBUTED CAPACITY

There are many methods available for the measurement of distributed capacity in inductances, the better known of which are perhaps the "Wavelength Squared Method" and

the "Harmonic Method." Although the former is more generally used, the writer prefers and uses the latter, as there is a distinct limit to the accuracy of the former when conducting small measurements.

A variable condenser which should be calibrated is used in the coil test receiver. The maximum capacity should be .001 mfd. The oscillator is tuned to a high wavelength. Resonance is established between the oscillator and the detector circuit as indicated by the intensity of the signal in the telephones. After the "fundamental" has been tuned in and the capacity of the condenser noted, the capacity of this condenser is varied until the "first harmonic" is detected. The higher frequency harmonic should be used, and will of course be found on a lower wavelength. The note of the oscillator should be very high during these tests. After the first harmonic has been detected, the capacity of the condenser should again be noted accurately. Now, since the value of the inductance under test is constant, and the frequency varies inversely as the square root of the capacity, it is obvious that the capacity required to tune in the harmonic, is one quarter of that required for the fundamental. This may be expressed in an equation as:

$$(C_1 + C) = 4(C_2 + C)$$

$$C = C_1 - 4C_2$$

3

Where C_1 is the capacity required to tune the fundamental,
 C_2 is the capacity required to tune the first harmonic,
 c is the distributed capacity of the inductance.

This method will be found to be quite accurate, providing sufficient care is taken in reading the condenser capacities.

One other important test was conducted by the writer on these coils, namely the voltage amplification on a weak signal. An oscillator delivering an output of a few milliwatts was placed so that the note was just audible. Each coil was checked for sensitivity or voltage amplification, the indicating device being a sensitive mirror galvanometer in the plate circuit of the tube. It registered a deflection of a few microamperes on all the coils selected. Several coils tested gave no deflection whatsoever, such were some of the "Low-Loss" coils. It is hoped that the details given in this article will be of use to the amateur who "makes his own" and to the man who "wants to know." With new broadcasting stations of high power coming on the air, the amateur and BCL will have to look to their tuning arrangements, but not until the higher frequencies are reached need the amateur display any over-zealousness on the part of low loss tuners.

**EVEREADY HOUR
EVERY TUESDAY AT 8 P. M.**
(Eastern Standard Time)

For real radio enjoyment, tune in the "Eveready Group," Broadcast through

WEAF	New York	WEAR	Cleveland
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Such complete and voluntary endorsement can lead to but one conclusion—for best reception and longest life, Eveready Radio Batteries lead the field.

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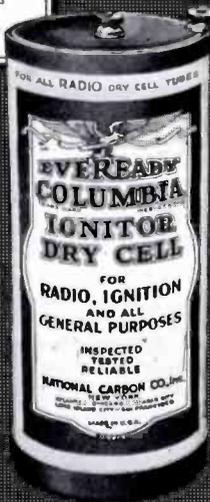
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Large
Vertical
Price
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No. 767
45-volt
Large
Horizontal
Price
\$3.75
With
variable
taps

"Quality Goods for Quality Readers"

H. I. in Broadcasting

(Continued from page 38)

ing its twenty miles away to join Lake Michigan, the smell of the Norway pines and cedars, the scurry of a chipmunk across the gravel road and the trout jumping over the power dam, all that other world seems long ago and far away.

True, at the big hotels in Petosky and Charlevoix one may find all the urban distractions he has left behind, but our little community, forty miles from a movie and ten from an ice cream cone, caters to the tired business and professional man, whose every waking thought at this season of the year is to fish and fish and fish. The over-worked phrase "fisherman's paradise" must be hauled out to adequately describe our resort. No bridge-tables clutter up our verandahs, it's reels and drying lines, minnow-buckets and landing-nets, trout creels and outboard motors, not even a phonograph has been present in past seasons to take one's mind off the important business in hand. After a long day whipping the stream, casting for the tricky bass, or cranking a reluctant motor in pursuit of the wily Mackinaw, the exile is content to sit, pipe in hand, and watch the magnificent sunset, which would form the principal hallyhoo of this country, if it needed a press-agent. Those who come here year after year regard it as the loveliest spot on earth.

"Yes," said a New York woman, as she packed feverishly for departure, after having spent three days as a fishing widow, "it is as beautiful as Heaven, and just as lonely."

The wise man sends his wife elsewhere, unless she be that *rara avis*, a woman who likes to fish, eat fish three times a day and listen to piscatorial adventures by night. Thus it has been in former years. An occasional flicker of interest in the outside world would come with the arrival of three-day old New York papers, but no one had time to read them.

This year all has been changed with the coming of radio. We suspected it on the long drive up, as every summer cottage had sprouted an aerial, where none grew last year. Even the caravanning Fords, which in former seasons seemed to be carrying everything the family could reasonably be expected to possess, have found room on the running board for some kind of a little black box, and a mess of wire, from which an aerial will be fashioned when the destination is reached.

And it is making a vast difference in the life up here. Even the most rabid nature-lover dislikes to be entirely cut off from the world's happenings. When we came out of the woods last year and learned that there had been a Democratic convention, one couldn't help feeling a little out of things. Now in the calm, cool, fragrant evenings, when the put-put has been put to bed in the boathouse, the fish (if any), cleaned and tucked away on the ice, and the poplar logs are crackling, and the inevitable cribbage game is in progress, it is mighty nice to settle down and hear the familiar voice of Mr. Tyson, down at WWJ, giving the baseball scores.

Where once the nocturnal stillness was disturbed only by the wail of the whip-poor-whoop (and if you've ever been up

here, you know he doesn't say "whip-poor-will" at all), there comes the tinkle of the banjo, the plaintive whine of Hawaiian guitars, and an occasional shuffle of feet on verandahs, where Jean Goldkette or the Orioles have been tuned in loud enough for dancing. True, there is static, and much talk of mysterious interference from ore deposits, and the ever-present code of the lake boats, but much gets through with satisfactory reception.

And what radio must mean to the four or five families who live here all the year! Cut off even from the village for weeks by heavy snows, the lake frozen over, mails delayed for days at a time, the city dweller can only guess at the loneliness of this northern isolation.

One can't help feeling thankful also for the new blood radio has injected into our conversation. After many weary nights of listening to the never-ending argument as to the virtues of a "pikie" as opposed to those of a "dare-devil" in luring his bass-ship, how many minutes it took Miller to land that German brown, and where is the cheapest place to buy "muddlers," it is rather refreshing to hear how Coffeerville, Kansas, gets the east on its neurodyne, how KGO invades Louisville on one tube, and how the Chicago doctor can't get anything but Chicago, though he has moved four times. One interested in radio gathers much from an experience meeting where all parts of the country are represented. The current suspicion that radio waves travel east rather than west, comes in for a lot of discussion, and interesting testimony is advanced on the subject of reception, until one feels as though he were attending a radio convention. Radio is running the weather a close second as a universal topic of conversation, and the man who doesn't speak the language soon knocks out his pipe, and trails yawningly to bed. But when they begin to drift off to cryptic comparisons of grid leaks, condensers, vernier rheostats and like contraptions, one almost wishes they would go back to fishing, the vernacular of which one has acquired after a long and painful apprenticeship.

One of the leading outdoor magazines sent out a questionnaire to its subscribers on the subject of summer radio, and collected the surprising statistics that 28,000 of its subscribers used their radios in camp, and 55,000 in summer homes and cottages. 35,000 stated that the sets they expected to use on their vacation would be in addition to those they already had at home, and 19,000 expected to use outdoor radio this year for the first time.

This seems to prove conclusively that no longer will radio be packed away with the winter underwear. Hereafter, like the banjo, "it will travel with the pots and pans." It has become one of our necessities.

MR. E. F. ALBEE, when he issued his ultimatum restraining Vincent Lopez from broadcasting, and announced that "under no circumstances would he permit any artist or employe of the Keith circuit to broadcast during the term of his or her contract," doubtless felt that radio was now flat on its back, and might shut up shop when no assistance would be forthcoming from the Big Time.

One who possibly has a little wider knowl-

edge of vaudeville than any other type of entertainment, might respectfully suggest that Mr. Albee has erred. There is an ever-growing army on the "D-X Circuit" that is going to make standard vaudeville look to its laurels. We haven't the vaguest idea where they all come from—possibly from the small time and Chautauqua platforms—but they are far from being amateurs. As this class of entertainment has the most universal appeal, for the first demand of the radio audience is for light amusement, may we cite a few instances, picked entirely at random, where entertainment comparing favorably, even to that put on in the "cathedral" at Forty-seventh and Broadway, has come to our notice. Any snort of derision from the N. V. A. doesn't affect us in the slightest, and while one reviewer's opinion isn't going to make or break an act—when we learn that these performers' fan mail runs into hundreds of letters per day, that surely is an indication of the way the wind is blowing.

Radio is very much at the mercy of the powers who control the country's best music. But vaudeville is an evanescent thing, and its quality cannot be measured by any standard existing in the musical arts. What makes a Tanguay, the Gallaghers and Sheans, the Sophie Tuckers and the Joe Cooks is still a deep, dark mystery, and it is this very fact of lack of standardization in vaudeville entertainment that makes it possible for unknown names on the radio circuit to gather unto themselves a following far in excess of that enjoyed by their more famous brethren of the footlights.

And the listener to radio vaudeville. He is going to be a czar in his own domain. No longer need he squirm in his orchestra chair, while the smart young monologist, who isn't getting over as he thinks he should, makes insulting remarks about the audience sitting on its hands, and tells how he hates to follow the trained elephants and dress with the performing seals. If they get on our nerves, we just flip a dial. The nearest thing to a "dumb" act on the air is the time-signal, and as most listeners wait for the final squawk, the performer need have no qualms about following it.

Let us begin with Jack Little and Paul Small, a team of young song-writers, which was organized out at WCX last year. They have been heard from many stations this winter, and to our notion are as good as any act of this type appearing on the Big Time. These boys have good voices, an uncanny perception of how to put a song over, the personality gets through without giving offense, and to date their popularity hasn't seemed to have affected their common sense. They are followed from station to station by enthusiastic dial-turners, and we have found ourselves many times on their trail when we wanted a little light entertainment. We do trust, however, they will soon have some first-class funerals and bury some songs. That is going to be the stumbling-block of the radio performer—the life of a song on the air being about as ephemeral as that of an orchid.

And there is a certain amiable pianist, who wanders about the hinterland, talking about his cat. We caught him one night down in Memphis, and the impromptu argument he had with the announcer was just as funny as any we ever heard Frank Tinney put over with the orchestra leader. His

(Turn to page 44)

GENERAL RADIO

Transformers

*bring out
all the
Refinements
of
Tone Quality*



USE A 6 to 1 RATIO
IN THE FIRST STAGE
AND A 2 to 1 IN THE SECOND

\$ 6 each



THE better loudspeakers today are capable of reproducing music with all its truest refinements of tone quality. Consequently a higher standard of transformer design is necessary to deliver to the loudspeaker the desired volume with a purity of tone that makes radio reception delightfully natural.

In designing the General Radio Type 285 transformers great stress has been laid upon tone quality—yet volume has been increased to a very marked degree.

Due to the special design of the core and adjustment of the coil turns these transformers are capable of high and

even amplification of all tones common to speech, instrumental and vocal music.

In spite of the pronounced superiority over other transformers they sell at a popular price.

Enjoy music in its unmodified form—as pure, full and natural in tone as it enters the microphone at the studio of the broadcasting station. Use a 6 to 1 ratio in the first stage and a 2 to 1 in the second.

Ask to see them at your local dealers' or write for our descriptive folder 285W—showing Amplification curves and wiring diagrams.

GENERAL RADIO Co
Cambridge, Mass.

“Behind the Panel of Better Built Sets”

“Quality Goods for Quality Readers”

H. I. in Broadcasting

(Continued from page 42)

piano seems to be incidental, like Will Rogers' rope.

A pleasant-voiced young woman who gives impersonations, comes to mind. And while we haven't a doubt that at some time in her career she has heard Elsie Janis, she is clever enough to give her work a personal touch.

"Bernice" is the name by which the seventeen-year old pianist of the Red Apple Club at WCX, Detroit, is known, and we daresay she has a much wider following than any young person acting in a similar capacity behind the footlights.

And occasionally this station, which you know is the Detroit *Free Press*, prevails upon the paper's famous poet, Mr. Edgar A. Guest, to recite for its listeners—which is always an event, indeed. It is not only the cheery, home-y philosophy of Mr. Guest's poems that appeals to the great mass of people, but his inimitable manner of presenting them, which seems to project his personality straight out of the loud-speaker, and one may close his eyes and fancy a dear, personal friend is sitting over in the corner, telling one how he has gotten around some of the troublesome things in life. On second thought, we wonder just how Mr. Guest will feel about being classed as a vaudeville attraction, but we don't know of anything they have listed in the booking offices that can compare to his act.

"I'm tempted to write to that Pittsburgh station and find out what has become of those girls who played Hawaiian guitars there last month."

It won't be long before there will be radio vaudeville route sheets. And it is not fair to leave this class of entertainment without a mention of Roxy's show de luxe. But that aggregation is so well known, that comment is unnecessary.

TANNHAUSER tenors, wistful Marguerites, blackface comedians with wide, white grins, Pagliacci Canios with wide, white collars, dreamy-eyed violinists, jazz-masters, with the inevitable saxophones, Polish pianists, all dressed up in their Sunday clothes, and issuing from the loud-speaker in a beaming company—this seems to be the average advertising man's conception of radio.

We don't entirely agree with his interpretation (even though we are trying to write this with the plaintive strains of the beautiful Dio Possente, sung by a ravishing voice, rising above the click of the Corona,)—in the first place because he is using old stuff, the phonograph people's perfectly legitimate talking-point; and in the second, because he is not presenting one-half of radio. Could he have his artist picture a gathering of people from all parts of our huge country—oil-men from the southwest, cattle-men and ranchers from the far west, dirt farmers from the prairies, the people of Main Street, mechanics, artisans, tradesmen—all with their thoughts, interests and aspirations written large upon their countenances, this would but faintly convey what radio brings into our homes. For after all this is what it amounts to.

When the brusque verdict of the oculist knocked the foundation from under our own particular house, and rendered necessary

some interest to take the place of the three or four books we had been reading a week, we felt that there was nothing on earth to fill the space Michael Arlen, Aldous Huxley, John Galsworthy and a number of other sophisticated ladies and gentlemen occupied on our mental horizon. There wasn't, but we found it in the air. At that time our viewpoint was as insular as that of a resident of Manhattan Island, who has never been west of Yonkers.

We balked at the suggestion of radio.

"But we shouldn't want to go to a concert every night," we protested, "even if the music were good, which it isn't."

This was before the millennium of Victor and Brunswick concerts had arrived, and besides, we had been listening to a poor set. Though having the average appreciation of good music, more time had been spent in art galleries than at Philharmonic concerts, and we belong to that great class of "music lovers" who are likely to give the symphony tickets away, if there is a chance to go see "Saint Joan" on the same evening.

However, there came a day, when from an abstract idea, the radio became a concrete thing of dials and batteries, tubes and aerials, and we set about trying to work up an interest in the strange invader. Followed several mildly exciting days of compiling a "log," but when we learned that "getting" California meant hearing "Sally" interpreted in exactly the same manner as by local stations, we knew that the novelty of "D-X-ing" was not going to loom very large in our life. So it was that we cast about to find what was coming out of the small stations, that heretofore had been passed up by the uniform mediocrity of their programs, and were known only as mysterious combinations of letters on the log.

Thus we happened upon what is to us the most fascinating thing about radio, the surprising insight it gives one into the lives of the people of the far-flung sections of our country.

We were started upon our voyage of discovery one Sunday night, when we chanced on a small western station, broadcasting a program of gospel hymns, sung by entirely untrained voices to the accompaniment of a cottage organ. Vague wonder filled our somewhat cynical mind as to what manner of people could listen to anything that to our ears sounded so atrocious, until the idea crept in that there were doubtless hundreds of toil-worn men and women on remote farms in this prairie region, to whom this meant more nearly religion than the most dignified Te Deum, sung by highly-paid choristers. As we listened further we had no impulse to laugh when the announcer presented the soloist as "the well known feed and grain merchant, of Brown county, who in response to many requests, will sing 'Rock of Ages,'" for we realized as never before that here were a people, with an entirely different outlook upon life from any we had ever met. We simply could not visualize them, for they were an unknown quantity. And as we listened to the simple, homely program, punctuated with naive comments by the announcer, we felt a friendly, neighborly, charitable spirit, that we had never before encountered anywhere. And we wondered if the capacity for enjoying this simple, and to us, rather primitive entertainment, might not be envied. We came to know this community well during

the winter, and feel it was a liberal education. Nothing that has ever been written could have brought the understanding of these people to us as did the radio.

And about this time Missouri was discovered. Prompted by curiosity about a station whose sole raison d'être seemed to be advertising its State, we began tuning into WOS, though—like two-thirds of the rest of the world, we were annoyed at that time by the persistent exploitation of its convict-pianist and his ubiquitous press agent—and from it we learned some strange and wonderful things. One night we heard a speech—and it was a good speech, (after we had become accustomed to the accent which was as strange to our ears, as ours, no doubt, would be to Missouri), in which a man told of the wonders of his county, and invited the whole world and his wife to come out and camp in their neighborhood this summer. Living in a country where one may drive from daylight until darkness without finding a foot of pleasant woodland or grassy meadow that does not bear a "No trespassing" sign, one's first thought was that the man must be insane. But presently we understood that he really meant it. They apparently have a lot of room in Missouri—they have an open-hearted, friendly spirit, that we of the more congested communities know nothing about, and their love for their State seems to amount to a passion. We can only compare it to the affection of the people of France for their country. Back here in the effete East such an emotion is inexplicable. Their feeling is best illustrated by a story, very well told one night by no less a person than the governor of Missouri, who comes over the air in a most pleasing and convincing manner. The story was a climax to the customary eulogy of his State, and went as follows:

The governor was quoting a mean, jealous Kansan, who perpetrated the libelous cavil, when telling of a Kansas family, who were removing to Missouri. When the lares and penates were all packed and the caravan ready to start, the little girl of the family went back into the house, knelt down and prayed,

"Goodbye God, we're going to Missouri!"

"But," went on the governor, "the Kansas man quoted the little girl's words correctly, but not her punctuation. What the child really said was,

'Good! By God, we're going to Missouri!'"

We'll never forgive that governor if this is an old story, for it so perfectly illustrates the viewpoint of these people. The next time you are satiated with metropolian tenors, de luxe dance orchestras, and the sophisticated comedy that comes out of stations in the larger cities, tune in on WOS; and if you stay with them long enough you are bound to hear something that is distinctly worth your while, and you will form the acquaintance of a people it is a pleasure to know.

And Texas—it is ever a joy. We will never forget the red-letter night when we caught that highly original genius at Ft. Worth broadcasting a negro revival. Combined with the amazement that anything so primitive as this religious orgy could exist in this day and age, the intimate and confidential comments of the announcer provided an entertainment more unique than any heretofore encountered,



COMING!

Factories of this Company are in quantity production of the new Jewett Receiver. Deliveries have begun.

These facts are supremely significant. For this new Jewett constitutes beyond question, *the longest recent forward step toward perfect Radio Reception.*

In fundamentals, and in details, the Jewett is emphatically *new.*

Its tuning element is *new.*

Its method of audio amplification is *new.*

Its beauty of line and finish is *new* and distinctive.

Originality that can come only from genius—young, untrammelled, triumphant—such will be your confident verdict.

Make no Radio investment until you have seen the new Jewett and listened to the marvel of its performance!

The Jewett will be marketed in a beautiful cabinet of the new Clairmount Mahogany, at a price far below any receiver of comparable performance.

"THERE IS NO SUBSTITUTE FOR THE BEST"

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5678 TELEGRAPH ROAD PONTIAC, MICHIGAN

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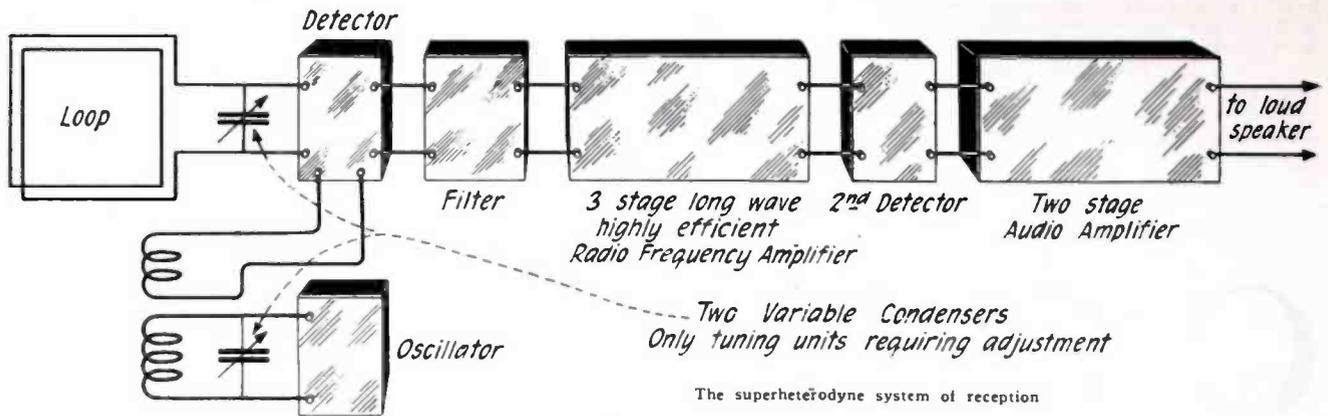
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Jewett Quality Products

"Quality Goods for Quality Readers"



WHY THE SUPERHETERODYNE?

By E. T. Jones

THERE are so many dynes on the market today that very few if any of the broadcast listeners know the difference which exists between them. To make this point very clear before starting on my general subject let me say that there are but two dynes—all of the so-called dynes and the Super-heterodyne.

These so-called dynes — (trade marks)—are radio frequency receivers utilizing either tuned or fixed—coupled or resistance—radio frequency amplification units. All of them use some well known method of stabilization—sometimes called neutralizers.

These four and five tube radio receivers trade-marked as dynes are indeed one step in the right direction, and that is, elimination of regeneration. Single and double circuit regenerative receivers placed in the hands of the novice in congested districts reap havoc amongst the many listeners. But—it must not be forgotten that, when regeneration is eliminated, it is necessary to place at least two stages—two more tubes—ahead of the detector before very nearly the same volume is obtained as was had with the regenerative receiver and two stages of audio amplification. This means that the five tube radio-audio receiver is just about as good as the regenerative three-tube receiver. The former will, however, respond slightly better to extremely weak signals.

The great disadvantage of radio frequency amplification of short

waves is that maximum amplification is not uniform as shown roughly in figure 1. This is a chart showing amplification on a scale of wavelengths which take in the entire broadcasting range.

Curve line 1 shows the maximum efficiency at different wavelength settings. This is considered exceptionally good for the average transformer coupled receiving set with radio frequency amplification. A very inefficient transformer, except for operation on but two wavelengths, i. e., 250 and 450 meters, is described by the curve line 2.

After many years of tedious and painstaking research work on the part of many prominent radio engineers Major Armstrong finally decided that it was practically impossible to accomplish efficient radio frequency amplification on short wavelength bands such as we use today in broadcast re-

ception not to include transmission.

He knew at the time that radio frequency amplification could be accomplished very efficiently on wavelengths in the order of 4, 5, or even 10,000 meters. He immediately set to work to devise means and ways of stepping up or increasing the wavelength of the incoming waves so that they could be efficiently amplified on long wavelengths even though the radio receiver was picking up the music and voice on wavelengths ranging from 200 to 546 meters.

That was not all that was accomplished by stepping up the wavelength of the incoming wave. Let's go back to curve line 1 in figure 1 and consider the wavelength scale changed to read from 3,000 meters to 6,500 meters, inclusive instead of 200 to 550 meters.

We would then find that maximum amplification was obtained at 4,500 meters. We can, therefore, arrange to increase the wavelength of each station received to this wavelength and amplify each one at a maximum through each stage of amplification. Irrespective of the wavelength being received—once converted to 4,500 meters, amplification will be accomplished very efficiently and at a maximum per stage.

In the average Super-heterodyne receiver, but three stages of radio frequency amplification—long wave—are employed, and are all that is required to bring in stations from great distances.

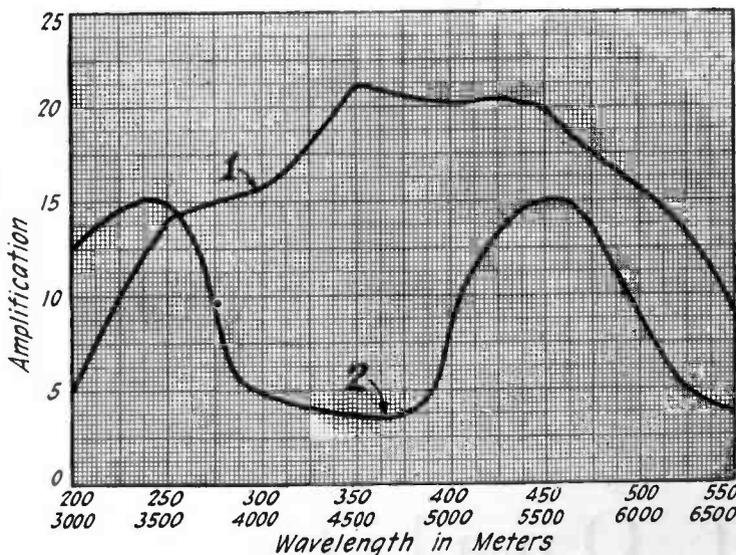


Figure 1—Chart showing amplification values of two different transformers

(Turn to page 62)

“No Virtue is Acquired in an Instant, but Step by Step.”—Barrow

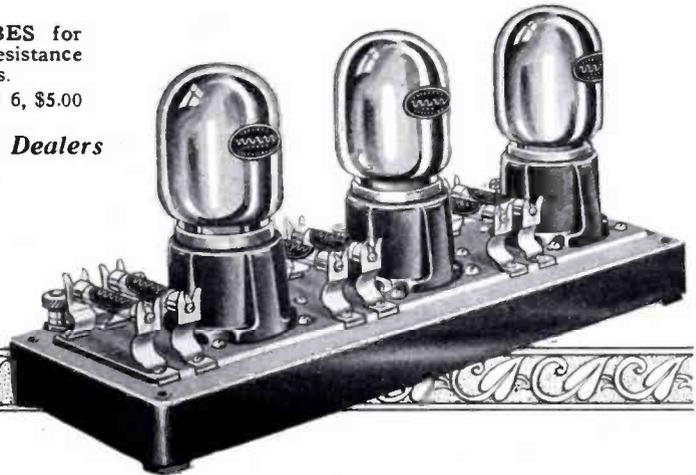
Months of careful investigation and experiments with the DAVEN SUPER AMPLIFIER have conclusively proven that Resistance Coupled Amplification is the best method known to procure quality and volume without distortion; and now, to add to the efficiency of the SUPER AMPLIFIER, the Daven engineers have created a new product—the Daven High Mu Vacuum Tubes. They are designed for use in Daven Resistance Coupled Amplifiers to increase the amplification so as to exceed that of the ordinary transformer coupling. Truly another step toward perfection of amplification.

The SUPER AMPLIFIER for use in any existing set or circuit. Price **\$15.00**

HIGH MU TUBES for use in Daven Resistance Coupled Amplifiers. MU 20, \$4.00—MU 6, \$5.00

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Daven Amplifier Kit \$9.00

A three stage amplifier in Kit form is supplied for those who wish to enjoy the pleasure of self assembly. It brings perfection of amplification to you.

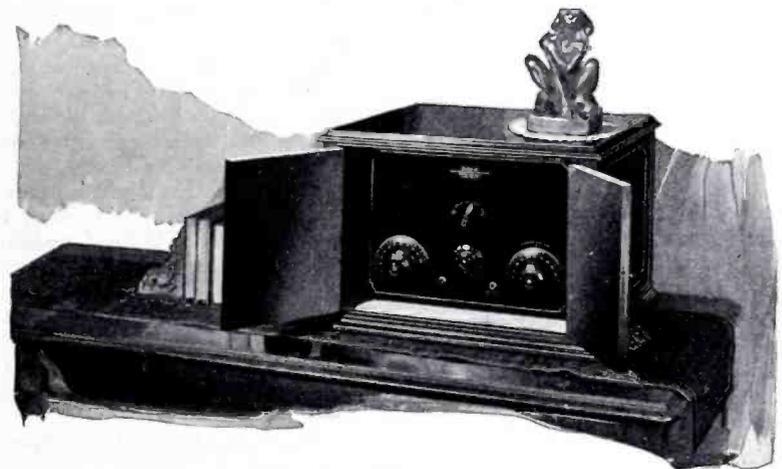
Interesting information on Resistance Coupled Amplification will be found in our RESISTOR MANUAL. At your Dealers, Price 25c, or direct by mail postpaid, 35c.

Do you believe in trial marriage?

NO? Then learn now that the radio set you buy is also destined to be a “home companion”—to squawk and blare at you or to rest and comfort you after the daily grind.

The man with a good wife, a good car, and a good business will always choose a New Federal because he knows:

- | | |
|--|---|
| 1. Each part is designed, made and guaranteed by Federal | any tubes may be used |
| 2. Each part is matched—for perfect team-work | 5. All precision parts are enclosed in sealed container—as insurance against dust or injury |
| 3. Two dials—and only two—control its easy, positive operation | 6. The final factory test is for tone quality—a big point beyond the mere volume, selectivity and distance range. |
| 4. The set is not limited by tubes— | |



Choose the Federal model that fits most perfectly into your home. “Exclusive but not expensive.”

The New Federal is made in four beautiful two-tone models, designed to blend with the decorative schemes of better class homes: a table type without loud speaker—a table type with enclosed loud speaker—a complete console with batteries and loud speaker enclosed, and the de luxe console for the palatial home. A permanent top is an added advantage in the New Federal. The complete set, suspended upon ball bearings, slides out like a drawer for changing tubes, etc. This eliminates the old style lift top and leaves a permanent flat surface for flowers or other decorations.

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Federal

Standard RADIO Products

“Quality Goods for Quality Readers”

R making a esistance-Coupled Amplifier

By W. F. Crosby

RESISTANCE coupled amplifiers are generally regarded by those who are supposed to know, as the highest development of audio frequency amplification. It is also conceded that such an amplifier is easier to make and also considerably cheaper. It is claimed that an inexperienced person can build an amplifier of this kind and make it work the first time, something which is not always true of the usual transformer coupled amplifier.

There are just two things which may be said against this resistance amplifier, and we might just as well have them out right here at the start. The first is that generally more "B" battery is needed than with the usual transformer coupled amplifier. This is necessary because each of the plate leads has a resistance element in series with it, thus reducing the actual voltage at the plate. For this reason it is advisable to use higher voltages on both the amplifiers and also on the detector, because the plate of the detector also has a resistance element in series with it.

The second point against this kind of amplification is that it is generally necessary to use one more tube than with the other type. Two stages of resistance amplification will, as a rule, give slightly less volume than the transformer amplifier and for this reason it is necessary to add the third stage. However, unlike the transformer-coupled amplifier, there are no difficulties in making this third stage work well. Of course the actual volume will be slightly in excess of the transformer amplifier, but when we remember that the set may be cut down a little, this excess volume will not do

any particular harm. With resistance coupled amplifiers it is claimed that the quality is so greatly improved that the slightly excess volume is not displeasing.

Dollar for dollar resistance amplification is far superior. The cost of a three-stage amplifier of this kind is less than two stages of transformer coupled and no "C" battery is necessary. The drain on the "B" battery is also considerably less than the amplifier with the transformers. Such an amplifier takes up less room, tube for tube, and is more stable in operation. It may be added to any set where transformer coupled audio amplifiers are now connected, provided, of course, that these are first removed from the circuit. In some cases an arrangement of one stage of transformer coupled and two stages of resistance coupled amplification has worked very well indeed.

As far as the actual building of such an amplifier goes, the diagram is almost self explanatory. Starting in on the left hand side we have the output usually the detector tube, in any kind of a circuit, with the possible exception of the reflex circuit, where it may be necessary to make some slight changes. This may consist of shifting the tubes back and forth or it may be that a change in the resistors is needed.

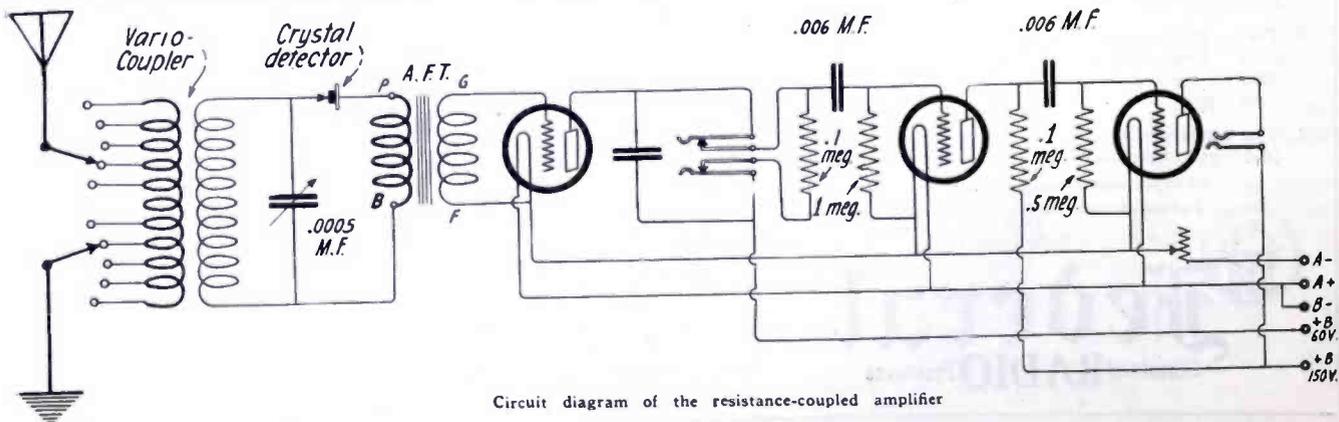
The output of this detector tube is connected across a fixed resistance of 100,000 ohms. This might be likened to the primary of the audio transformer. The lower end of this resistance goes to the "B" battery for the detector, which as explained before, is rather high, in order to overcome the resistance.

The "secondary" of this first unit is

the ordinary 1 megohm grid leak, while that for the second stage is one quarter of a megohm and for the third stage 50,000 ohms. The "primaries" remain the same throughout. Notice that between each plate and grid we have a small fixed condenser and may consist of three fixed condensers of values from .006 mfd. to .05 mfd. A little experimenting here may show you something worth while. Notice that in the last stage plate circuit another resistance has been added. This is customary in order to keep the extremely high "B" battery voltage from the plate. Of course a lower voltage tap on the "B" battery will give exactly the same result.

The values as given are generally for the standard amplifying tubes as used to-day. With dry cell tubes the results will not be quite as loud and it may be necessary to make a few changes in the resistors in order to get the utmost efficiency. Sometimes the last stage will howl and if this is the case, it may be necessary to change the resistance of the last coupling element. Generally it is necessary to increase the resistance. While the values of the resistors may be slightly changed without trouble, it is advisable to make sure that the ones you buy are close to the figure called for.

It will be absolutely useless to attempt to build an amplifier of this kind unless the directions are followed to the letter. It will not work satisfactorily on low voltage "B" batteries and unless you have sufficient voltage on hand, it will be inadvisable to even attempt its construction. Some of the "B" battery eliminators, which work from the electric light socket, will do very well.



Circuit diagram of the resistance-coupled amplifier

The Voice of the People

(Continued from page 29)

to a higher plane. The inflections in his voice are condescending in the extreme. Some day I am going to visit that studio with quaking knees and an apologizing-for-living expression—I wonder if I'll leave it still a microbe, or as a regular person with all the modern improvements.

Being a base-ball fan I listen to many of my team's out-of-town games. I know that a sport writer sits in the press box, say at Cleveland and dictates the plays to a telegraph operator who relays, by ground wire, to a local newspaper studio where a local sport writer relays them, through a local station, to the listening fans. This local sport writer's voice, however, would lead one to assume that it is he who sits in the press box at Cleveland and gives out, direct, each play as he sees it. The enthusiasms, the rising inflections, the disappointments, and the suspense of a true fan are in his voice. Yesterday I let out a lusty cheer when he said, "Here it comes—Goslin hits it—it goes straight down the inside of the right field foul line—over the fence—it's a HOME RUN!" He takes you step by step to every climax. Given cold facts by a receiving telegraph operator he ingeniously injects life into them and passes them on full of pep and personality by means of an expressive voice.

On the other hand a recent pen sketch in this magazine of an announcer was most disillusioning—with his voice he shouldn't be so big nor, of all things, go in for plaids! I suppose such things are to be expected though for the same reason that lyric tenors invariably weigh well over two hundred, while deep, sub-cellular basses rarely average above a hundred and thirty pounds.

Few things are isolated, most of them are linked with something else and so on into an endless chain. We cannot consider the voice without considering what goes to make up a pleasing voice. Besides being well modulated and musical the voice should be augmented by a large and well chosen vocabulary and a clear diction. No matter how interesting a story may be we like to see it illustrated. The broadcaster must bring us a word picture of his offering, the tones and shades of which are quite as important as the lights and shadows in the printed picture. A stinted vocabulary limits the scope while careless pronunciation blurs it.

The human voice out there all alone in space must make up for the absent facial expressions and missing gestures of the speaker, it must supply the personality and the individuality.

Through the medium of the radio the Voice of the People should become a thing of beauty and a joy forever.

Esperanto

(Continued from page 27)

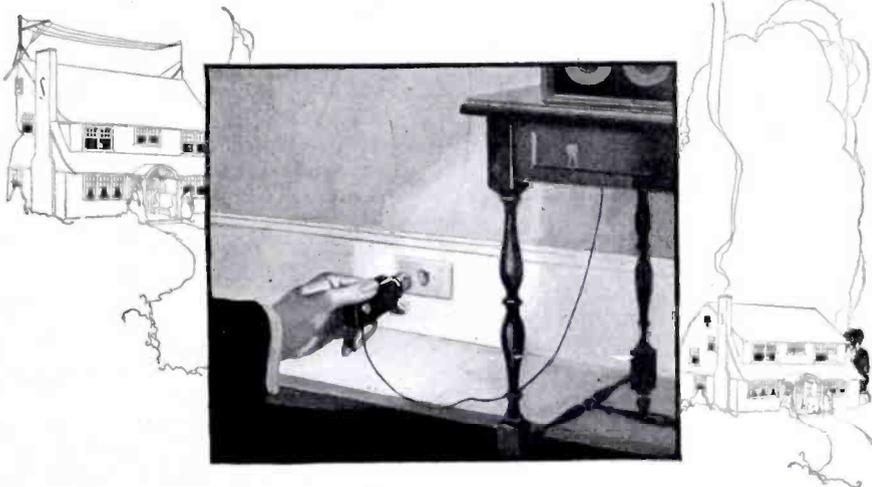
further wavering. Dr. Saussure, for years a member of the Esperanto Academy, has produced what is claimed to be an orthographic improvement of Esperanto (Nov-Esperanto) without touching the fundamentals. In Nov-Esperanto every possible reasonable objection to Esperanto is eliminated, while retaining all the elements of genius rejected by the two men, Beaufront and Couturat, who constituted the working unit of the so-called "Delegation."

The Ido rule of derivation "rejects attributing a grammatical sense (species) to roots" (statement of Dr. Couturat). We find Dr. Talney maintaining (page 353 "The Problem of an

Auxiliary International Language and its Solution") that such a sense is inherent in most of the roots. This, of course, is quite radically different from Couturat and the central authority of Ido, one of Dr. Talney's indications of nonconformance to standard.

In his textbook, "Ido, Exhaustive Textbook of the International Language of the Delegation and Fundamentals of an Artificial International Language," Dr. Talney states:

"The roots themselves have no grammatical role so far as the four principal parts of speech are concerned. The grammatical role of a word is obtained only after the respective grammatical ending has been added to the root, making of it a verb, noun, adjective, or adverb."



The \$1.50 Ducon —and no antenna!

A small Ducon screwed into a light socket—or a cumbersome, unsightly aerial? Surely a Ducon! It's so inexpensive—so easy to use—so sure in its results.

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In Esperanto every root, every prefix and every suffix is a word in itself, and you should not add a prefix if the meaning of the root is sufficiently clear in itself.

In Esperanto the suffix -a is quite sufficient to express the general adjectival idea. In Ido you have -a, -al, -oz, -iz, and -iv, which compel one to do in ninety-nine cases out of a hundred what Esperanto requires but once. In Esperanto if we say "ghardena pordo" we know it means a "garden gate," but in Ido it signifies "a gate that is a garden," therefore, one must say "gardenala pordo." In Ido "doma laboro" means "labor that is a house!" One must say "domala laboro" in order to be correct.

In the following words, selected from some Ido sentences, I have enclosed in parentheses the absolutely unnecessary suffixes made necessary by the Ido rule of derivation. In each case the adjectival meaning is as clear as crystal in Esperanto by means of the simple adjectival ending, -a: Mirakl(oz)a, land(al)a, pac(oz)a, lingu(al)a, hom(al)a, naci(on)(al)a, amuz(iv)a, mond(al)a. In Esperanto one would say "Ido estas lingvo terure logika," while in Ido one must say "Ido esas lingvo teror(ig)(iv)e logik(oz)a."

Then, the Ido rule of derivation deviates from the rule in all "national" (natural) languages by imparting to certain roots a sense that is wholly arbitrary. For example: In all national languages "blind-a" means "a state," "a condition." In Ido "blind-a" means "a blind person;" "blinda hundo" would mean a "dog belonging to a blind person." If you wish to indicate a "blind dog," you must remember that you are not describing something with human characteristics, therefore you

must say "blindala hundo." In Ido "bel-o" means "a beautiful person," and yet in all national languages we would say "bela virino" a beautiful woman, (bel-ul-in-o in Esperanto).

Dr. Talmey says (Page 96 "IDO"): " * * * * * Since the affixes have meanings by themselves, it follows that the sense of a word built by affixes is at once given. It comprises the meanings of all the elements of the word."

Carefully note the last sentence, as I will shortly point out the difference between Dr. Talmey's statement and the Esperanto principle of word-building.

The Idist (Ilist) writes "kronar," to crown, and he argues that if you return to the root "kron-" and add -o, then kron-o would signify "the act of crowning." But in this instance the Idist does not use "kron-o," but "kronizo," the suffix -iz meaning "to cover with."

Now, in Esperanto there are no "rules of derivation," and there can be none, because the words are not derived one from the other. Each word is an independent structure, and the meaning of each word is found by analyzing the word itself. In Esperanto a word cannot possibly have two meanings. According to the rule of word-building in Esperanto, the word "kron-o" contains two elements, the substantive root-word "kron" (a crown), and the substantive ending-word -o, which means "a thing" in a general sense; hence "kron-o" can signify only the "thing" crown, because both elements of this word contain the "idea" of "a thing." "Kron-o" can never mean "the act of crowning," for the simple reason that the word contains no verbal element, that is, no element implying the idea "to act." You may submit this word to any transfor-

mation you please by adding new elements "kron-o, kron-iz-o, kron-iz-ar," but so soon as you take away these elements and restore the original form "kron-o" you restore the original meaning of the word. As Dr. de Saussure says, "This is the only natural form of the law of reversibility, and it is fully and perfectly realized in Esperanto."

The Idist claims, as noted above, that the added element makes of the root to which the element is added the part of speech represented by the added element. Esperanto, on the other hand, claims that the adding of, say, the verbal element -i to the substantive root "kron" does not change the character of the substantive, but does express, in the shape of a compound word, an act denoted by the substantive "crown," just as in English we add the word "to" to the word "crown," making of it an infinitive.

I hope that those interested in this problem will follow the suggestions in this article and make a sincere comparison in the Ilo lessons by Dr. Talmey with the Esperanto lessons by myself and go even deeper into the comparison in further study. If this is done, there can be no chance of the readers of WIRELESS AGE giving time to a project and later discover that the time was practically wasted.

As further proof of my absolute certainty that Esperanto is superior to Dr. Talmey's project, I close this article with an offer to enter into a competition with Dr. Talmey or any Idist he may elect to do so in teaching a class of new students in these proposed IL's. At the end of a specified course I will have my Esperanto students far better masters of Esperanto than the others will be of Ilo.

Lessons in Improved Ilo

(Continued from page 19)

hiere, yesterday	pensar, to think	violo, violet
hike, here	perdar, to lose	vokar, to call
homaro, humanity	perisar, to perish	vera, true
irar, to go	plezuro, pleasure	volar, to have the
jus, just, a moment ago	plumo, feather, pen	will, want
	populo, people	

El ne povis trovar sua ganti, e pro co el prenis elui (iti di sua fratino). Kad vu dicis omno ad il? No, me ne facis lo. La magneto tiras la fero a su. Quu vizitos vu morgo? Un amiko di me. L'egoisto pensas nur a su ipsa. Kad vu vokis me od il? Vun me vokis, ne ilun. Kad esas vera, ke l'ennemiki depozis sua armi? Me ipsa lektis lo en la jurnal. Qua librin vu volas? Me volas ici, ne iti. La historio laudas ti, qui bonfacis al homaro. Qua trovis un vera amiko, trovis un trezoro. En qua stacioni haltas la treno? Me ne savas lo; me savas nur, ke ol haltas nur en tre poki. Ica shui esas tro granda, iti tro mikra, montrez a me altra paro. Omna blumo havas sua qualez; la violo havas sui e la dianto sui. La kustumi dil antiqua populi esis diferanta fro nii. Ne facez ad altru to, quon (quan) vu volas, ke altri ne facez a tu. Quon vu deziras? Me deziras nulo. En ica mondo nulu esas kontenta pri sua fato. Kad vu konocas ulu en ica urbo? No, me konocas nulu. Nulu esas sen defekto, omnu havas sui. Prestez a me tua plumo, mei esas omni domajita. Dicez a me, quun tu frequentas, e me dicos a tu, quu tu esas. L'autuno e la printempo ofras plezuri; ica bringas blumi, ita bringas frukti. Felica esas ita patri, qui havas bona filii. Ne signatez un letro,

quan tu ne lektas, nek drinkez aquo, quan tu ne vidas. Qua serchas danjero, perisas en ol. Qua entraprezas multe, exekutas poke. Il abandonis ni, quon ni omna regretas. Hike esas ulo, quan me ne komprenas. Omnon il perdis excepte la honoro. En ca foresto esas imensa arbori, di qui kelki havas un periferio di quar metri. La letro di nia amiko, pri olqua me parolis a vu, donas granda plezuro a ni omna.

THIRD LESSON: ADVERB, VERB

V. ADVERB

12. The original adverbs have no characteristic ending: ankore, still, yet; apunte, just (to the exact point); denique, at last; ever, ever; forsan, perhaps; hiere, yesterday; hodierna, to-day; jus, just (a little while ago); never, never; nur, only; olim, once upon a time; retre, back; sat, enough; so, so, to that extent; statim, at once; tre, very; velut, as, like; yam, already; etc. Adjectives are obtained from such adverbs by changing the ending -e into -a, or by adding -a when the adverb ends with a consonant: balda, early; forsana, possible; nura, only; statima, immediate; hodierna, hodiernal.

The derived adverbs are obtained from adjectives, substantives, and verbs by changing their grammatical ending into -e and from prepositions by adding -e: facila, easy; facile, easily; ita, that; ite, so, in that manner; qua, what; que, how, in what

1. The LD uses the word quik instead of statim and ja instead of yam. The former is entirely inappropriate (R. 24) and the latter is a mutilation of déjà (French) or già (Italian). (See Fil. Tempi, p. 73).

(Turn to page 52)

Europe and the AIL

(Continued from page 18)

stock of translations from natural languages is examined with reference to its rate of growth by new translations that we realize there is a "race" on between the "Mondo-Biblioteko" at 37 Surbrunnsgatan, Stockholm, Sweden, which publishes "Mondo," and A. Noetzli, whose magazine "Ido" always is out on time and has never failed.

In Germany there is a strong Ido-Radio-Society. The most powerful group, however, is the Germana-Ido Federuro, Frankfurt am Main, Bockenheimer Anlage 45, Germany.

Dr. Auerbach, an ex-member of the L. D. Academy who lives in the same city at Nerenstrasse 7, is in close touch and sympathy with the efforts of Dr. Talmey to keep improvements as a live issue in Ilo to the front. There are also the Ido-Centrale, address H. Jakob, Soorstrasse 75, Berlin-Charlottenburg 9, Germany, and the Ido-Verlag, Leipzig, Germany.

In Luxemburg one can obtain a list of L. D. correspondents from M. Henke-Meier, 113 rue Victor Hugo, Esch-sur-Alzette. There is much A. I. L. enthusiasm here.

In Russia there are strong groups, with however, laboristic leanings which give a political slant to the progress of the L. D. there. In one province Ido is compulsory in the schools. At Moscow the "Rusa-Mondolingual Uniono" functions at Bolshaya Sandovaya 10, ch. 29.

We have "La Radio Telephonie pour Tous" in France, and L'Etincelle with A. I. L. articles. Denmark has a "Dana Ido-Federuro," address, Ido-Kontoro, 8 Ringstedgade, 11, Kobenhavn, Denmark.

The Radio-Lexicon, compiled by Feder-Nordin and Roos in five modern languages besides the L. D., caused the Italian radio magazine, "Radiofonia," very recently to renounce its Esperanto course promised in 1924.

Information about all of these sources and many more can be obtained from O. C. Roos, Secretary, NAILS, 1575 Townsend Ave., Bronx, N. Y. City.

What is valuable now to remember is that there is a terrific struggle between the "stand-patters" in both the Esperanto and L. D. camps all over the world and those who want to build up a solution of the A. I. L. problem gradually. The latter have broken away from the parent bodies and produced "Nov-Esperanto," "Esperido," etc.

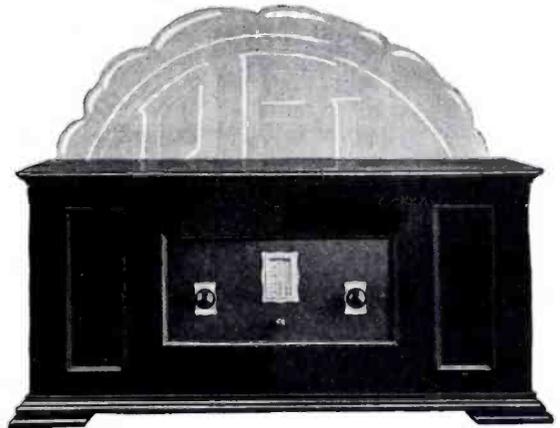
The Latinists have their "Interlingua" Kosmoglot, Medial, etc., all of

which are archaic from a technical standpoint. The radio engineer would only waste time on them, just on the score of average letters per word, double letters, etc.

There is one bright ray amidst all this confusion—Couturat, the Newton of the A. I. L. movement—discovered that there are irrefutable logical principles governing the formation of a rational eclectic language of the European type for international use. This means that like Einstein's law of two

events, there is only one correct "norm" of relationship. It compels a certain rather rigid type of word formation for clearness and logic.

All attempts to use arbitrary rules in this connection lead to ambiguity. Dr. Talmey and others are pointing out how all recent candidates for the position of auxiliary language, especially for the professional user, must and do, willy nilly, approach the type first shown by the L. D., but not perfected yet by the Ido Academy.



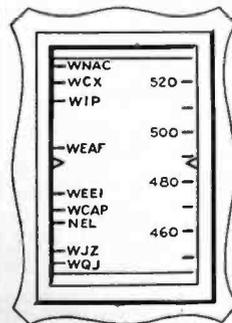
**Announcing
the Results of an Ideal**

THREE YEARS ago a group of men organized the Radio Frequency Laboratories, Inc., because they believed in the future of the radio industry. One result has been the development of a broadcast receiving system which is unique in its combination of power with simplicity.

This new receiver is believed to be a near approach to the ideal home radio equipment. It employs a novel high frequency amplifier and filter system which opens an entirely new range of possibilities in radio reception.

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A group of well-known and substantial manufacturers will make available to the radio public the RFL receiver—certain models of which will appear on the market during the present year. Further announcements later.



**Illuminated
Station Selector operated
by knob at right of panel.
Volume control at left.**

**RADIO FREQUENCY LABORATORIES, Inc.
Boonton, New Jersey**

"Quality Goods for Quality Readers"

Lessons in Improved Ilo

(Continued from page 50)

manner; quante, how much; tante, so much; nokte, at night; itere, again; apude (also prope), nearby; kontree, on the contrary; pone, behind; etc.

The comparison is the same as with adjectives (§6): ite klare velut, as clearly as; plu, min gaye kam, more, less cheerfully than; maxim eloquente, most eloquently; minim fiere, least proudly; or synthetically; boniore, boneste, better, best.

Note the expressions maxim balde, multe posible, as soon, much as possible; un preco maxim basa posible, as low a price as possible; tante plu bona (boniora), plu mala (maliora), so much the better, the worse.

VI. VERB

13. The vowels a, i, o are characteristic of the present, past, and future respectively. The infinitives end in -ar, -ir, -or, the participles of the active in -anta (-e, -o, -u), -inta, -onta, and of the passive in -ata, -ita, -ota; balnar, to bathe; kurir, to have run; manjor, to eat (in the future, not translatable directly); dormanta, sleeping; ridante, laughingly; fluginto, anything whatever that has flown; mortontu, one who will die; portata, being carried; senditu, one who has been sent, messenger; skribota, about to be written.

14. Finite Modes. Simple Tenses. There is no distinction of person and number. The indicative ends in -as, -is, -os, the conditional in -us, and the optative (imperative) in -ez; me docas, I teach; ni semis, we sowed; vi rekoltos, you will reap; li florishus, they would thrive; irez, go; ne alterkez, do not quarrel; ni supozez, let us suppose.

The subjunctive or suppositional mode is formed by the endings -al, -il, -ol; il esal, he be; el esil, she were. This mode is extremely rare in Ilo.

15. Compound Tenses. The perfect (compound) tenses are formed either by combining the simple tenses of the auxiliary esar, to be, with the past participle or by the suffix -ab.

Perfect: ni esas esinta or esabas, we have been; el esas livinta or livabas, she has left.

Pluperfect: il esis vendinta or vendabis, he had sold.

Perfect future: li esos trovinta or trovabos, they will have found.

Perfect conditional: vu esus falinta or falabus, you would have fallen.

Perfect optative: Deo esez salvinta or salvabez, God may have saved.

16. Passive Voice. The passive is formed by the passive participle of the present (-ata) in combination with the special auxiliary verdar; verdar audata, to be heard; verdir elektata, to have been elected; el verdas vexata, she is (being) teased; il verdus lezata, he would be injured; verdez benedikata, be blessed; me verdabas (or esas verdinta) persuaduta, I have been persuaded; ol verdabis (esis verdinta) furtata, it had been stolen; li verdabos (esos verdinta) guidata, they will have been guided; tu verdabus (esus verdinta) mokata, you would have been mocked.

The participle of the past can never occur in combination with verdar.

A synthetic passive is obtained by attaching the suffix -verd to the root of the verb; admirverdar, to be admired; dismisverdir, to have been dismissed; li punisverdis, they were punished; il pozverdabas, he has been placed; ol mutilverdabus, it would have been mutilated.

The v of the suffix -verd may be elided in all instances and must be elided in some, as after a v and after a double consonant: dronerdir or dronerdir, to have been drowned; but only li produkterdabis, they had been produced; ol salverdis, it was saved.

Also esar may be used as auxiliary to form the passive, but verdar is preferable; ol esas (verdas) retardata, it is (being) retarded; li esos (verdos) defetata, they will be defeated.

The participle of the past has a passive sense only when the subject of the active is mentioned; otherwise it is a mere adjective denoting a state; konvinkita da mea amiko, convinced by my friend; but agro extensita, extensive field; animalo fatigita, weary animal. The participle of the past may be used with esar (not with verdar) to form the compound tenses, but only when the subject of the active is mentioned, otherwise the suffix -ab is to be employed (as with verdar); il esas, -is, -os traktita (= esabas, -is, -os, verdabas, -is, -os traktata) da un mediko, he has, had, will have been treated by a physician.

A synthetic passive can be formed with the suffix -es only by attaching it to the root of the participle, but not to the root of the verb: Deo amatesas, Satano odiatesas, God is (being)

1. A passive never equivocal is obtainable only through a special auxiliary which has no other function but the one of forming that voice (Rap. 26). The LD employs esar as auxiliary and therefore its analytic passive is often not clear. Its synthetic passive is egregiously equivocal: la kordio pulseas means in the LD both "the heart is driven" and "the heart is a pulse."

loved, Satan is hated; but Deo amesas, Satano odiesas, God is love, Satan is hate'. This passive is not recommendable; it produces forms that are too long; reprezentatesabas, has been represented.

17. Secondary Tenses. The English imperfect tenses (to be + imperfect participle) are rendered in Ilo with the simple tenses: el kantas, she is singing; ni marchis, we were marching. The English construction may be employed for the express purpose of imitating an English text: Naturo esis brasanta. Nature was brewing (Dickens).

The participle of the future with esar signifies; to be about, at the point; li esas retretonta, they are about to retreat; il esis cedonta, he was at the point of yielding; el esas promocota, she is about to be promoted.

The English perfect is ordinarily rendered with the simple past tense: me pruvis, I proved, I have proved; ni trahizverdis, we were, have been betrayed.

EXERCISE TO §§ 12-17

Abolisar, to abolish	klosho, bell	povra, poor
agar, to act	kovrar, to cover	pro ke, because
ajornar, to defer	kozo, thing	radiko, root
anke, also	kulpo, guilt, fault	rakontar, to tell, re-
apene, hardly,	kustumigar, to ac-	late
scarcely.	custom	raptar, to rob, tear
askaltar, to listen	lauta, loud	away
bitra, bitter	leciono, lesson	roziro, rose tree
desde, since	linguala, linguistic	sika, dry
dormeskar, to fall	matro, mother	skolo, school
asleep	nam, for	sonar, to ring,
fluar, to flow	ne - plus, no more	sound
fonto, source, foun-	neverajo, untruth	stilo, style
tain	ornar, to adorn	stranjeru, stranger
forirar, to go away	patrulo, father	tarda, late
forta, strong	per, by, through	tempo, time
frapar, to knock	permisar, to permit	turbo, crowd
hemo, home	plantacar, to plant	urbano, citizen
hipokritezo, hypoc-	plikto, duty	uzo, use
risy	por ke, in order	vartar, to wait
ibe, there	that	verezo, truth
kande, when	pos ke, after	

Me traktedis tre polite. Li kredis forte, ke quon il rakontabis a li, esis vera. "Con," me pensas, "tua matro povas facar maxim bone," dicis mea patrulo sike. Omnu savis, ke me esis bitre povra; e me pensas, forsan esis la kulpo di mea bona matro, ke me anke esis bitre fier. Quu frapas so laute e frapas so tarde? Verezo parolas tro nelaute, hipokritezo tro laute. Un mikra fonto murmuras apude. Never ajornez til morgo, quon tu povas facar hodie. Il facis sua plikto ne plu bone kam irga altra oficio. Hike il donas tro multe, ibe tro poke. Vi ne plus povas vidar li, nam li esas foririnta desde longe. La urbani yam esis livinta (livabis) la urbo, kande l'ennemiki arivis. Aceptez afable la stranjeri. Ni ne parolez multe, ni agez statim. Kad vu deziras, ke me vartez vu? Me parolis, por ke vi askoltez. Pos ke ni verdabos examinata, ni livos la skolo. La puerino forte deziris venar, ma el ne povis, pro ke elua matro ne permisio lo. Lernez boniore tro leciono, por ke tu savez ol boniore. Quante bela roziro! Ol esas tote kovrita per rozi. La kozo, qua verdabis rakontata a ni, esis pura neverajo. Vu ne plantacis bone ica planto; olua radiki apene esas kovrita per tero. El apene dormeskabis, kande la klosho sonis. El promisis venar balde. La noblesta muliero, qua ever ornis un hemo, rapterdis for il da kruela fato. La lernanti verdabus laudata, se li facabus boniore sua taski. Absurda linguala formi, a qua la granda turbo kustumigis su per uzo dum longa tempo, ne plus povas abolisverdar.

In defense of Zamenhof's cacophonous project it has been asserted that the 18 sentences in WIRELESS AGE, May, 1925, page 27, represent "a horrifying array that never did and never can exist in any sample of Esperanto literature" (WIRELESS AGE, July, 1925, page 19). Now two of them are from "La Virineto de l'maro" (Sea Virgin) by Zmb. and most of the others are so plain and common that they may often occur in everyday language which is a far better test for the euphony of a system than the language of literature. Besides, whole pieces of "classical Esp. literature" can be cited (see Exhaustive Text Book, pp. 12-16) which are even more repulsive to the visual sense in print and to the acoustic sense in speaking than the above disconnected sentences. Another assertion, not less superficial, to justify almost unpronounceable letter combinations in the project is that "a universal language must be a strong language" (W. A., July, 1925, p. 18).

The idolatry of Zamenhof and his project is a veritable modern mass-psychosis. It has a quasi-religious character (see "Unconscious Factors in the Intern. L. Movmt. with Esper. Refer. to Esperanto," Intern. Jour. of Psychoanal., Apr., 1925). Perversion of the aesthetic sense and weakness of the comparative faculty are salient symptoms of the psychopathy. The patient is insensible to the grating sound of the project in speaking and to its hideous aspect in print; he may find them even pleasant, "strong." Criticisms of the idol are refuted with arguments of pathological shallowness.

Debating with psychopaths upon their delusions is contraindicated in psychiatry (see "Psyche"—Talmey, pp. 141-143); hence those idolators should not be argued with.

1. The natural languages use the imperfect in such clauses, and there is no valid reason for deviating from this usage in Ilo by employing the present tense.

Hornless Loud-Speakers

(Continued from page 15)

of hornless loud speakers discussed in this article represents a vast range in quality of reproduction. From the best of those discussed here, the new type to be discussed at a later date is even a greater achievement and much credit is due those executives, scientists and engineers who have made these new loud speakers possible.

One of the first points we look for is low frequency sensitivity. Curve A indicates that we cannot expect much at low frequency until about 275 cycles, in the region of middle C on the piano, are reached. In other words there are no low frequencies given off by this hornless loud speaker. The same may be said for the hornless loud speaker corresponding to curve B. In this curve we find a substantial indication that we can expect a considerable amount of sound in the region of 300 cycles, due to the resonance in the paper diaphragm. This would be sufficient to fool the average listener into believing that he was getting low frequencies. Curve C indicates that loud speaker No. 3 will not give off any sounds whose frequencies are below 300 cycles.

When we come to curve D, however, we can expect better performance in regard to low frequencies than was obtained from the first three types of loud speakers. Loud speaker No. 4 begins to reproduce appreciably at 175 cycles, which is a whole octave below the frequency where the first three loud speakers come in. This represents a very distinct advantage over the first three speakers and an inexperienced observer could notice the improvement after a few minutes.

Finally we come next to the performance of loud speaker No. 5 as indicated in curve C. This loud speaker comes in just above 200 cycles. It is much better than the first three speakers, but not so good as the fourth one for low frequencies. We must have these low frequencies reproduced if we are to have satisfactory reproduction of speech and music.

We come now to the high frequency region. No. 1 cuts off at about 2,700 cycles, No. 2 at about 2,000, with some up to 4,000 cycles; No. 3 is out at 2,700 cycles, No. 4 drops appreciably at 3,800 but is still effective to some extent up to 6,000 cycles, while No. 5 is completely out at about 3,600 cycles. These speakers, then, with the exception of No. 4 are all unsatisfactory for high frequency reproduction. With the exception of Nos. 4 and 5, these particular hornless types are not in any way superior to the horn types from the viewpoint of the frequency-range covered by them. No. 5 is inferior to the Doublette discussed in our

preceding paper and No. 5 is probably inferior to the Triplette.

We come next to uniformity of response at the various frequencies given by the particular loud speakers discussed in this paper. Of course, the response is not uniform over the whole frequency scale for the speakers do not go to sufficiently low frequency or high frequency. Let us consider the range, then, over which the speakers are efficient. None of them are uniform in response over this range. There are short peaks due to resonance in the paper diaphragms or cones as the case may be and due to interference at certain frequencies of the sound given off from the front and rear of the vibra-

ting element. Furthermore, there are whole regions of depression in sensitivity, as in loud speaker No. 5 from 250 to 500 cycles. Again there are certain regions of too great sensitivity compared with the rest of the curve, as in curve *b* from 700 to 900 cycles and from 1200 to 1600 cycles; or as in curve *d* from 1400 to 3000 cycles.

To summarize then, the hornless types of loud speakers are *no more satisfactory than the horn types because*: First, there are insufficient low and high frequencies present. Second, the response is not sufficiently uniform. Third, there are regions of insufficient or too much sensitivity. Fourth, there are numerous sharp resonant peaks.

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Triple Tube Amplifier

(Continued from page 23)

the triple terminal blocks mounted together on the baseboard at the rear, are connections number 1, number 2, number 3, number 4 and number 5 as designated in figure 1.

The "C" battery is at the left of the view and the filament switch is mounted on the back of the panel at the extreme left side of the picture. The filament rheostat is mounted on the back of the panel, below the four variable resistance units mentioned before.

Looking at the front view of the amplifier unit. The four dials at the top are on the shafts of the four variable resistance units which are in the two stage of resistance coupled amplification and they are, reading from left to right, R_1 , R_2 , R_3 and R_4 .

The dial in the center of the panel is on the shaft of the filament rheostat. The three jacks at the bottom of the panel are, reading from left to right, J_1 , J_2 , J_3 . The filament control switch is at the lower right hand corner of the panel.

Now that the apparatus is all mounted, we are ready to wire it up. The input terminals are connected to the primary winding of the GR 285 transformer. These two primary terminals are marked (P) and (B).

The .002 mfd. fixed condenser C_1 is shunted across the primary winding to by-pass any radio-frequency currents in this part of the circuit.

The secondary terminals of the transformer are marked (G) and (F). The terminal marked (G) is connected to the grid of the first amplifier tube T_1 . The transformer terminal marked (F) is connected to the negative terminal of the common "C" battery. The positive terminal of this "C" battery is connected to the negative filament lead.

The value of this "C" battery is a function of the type of vacuum tube used and the plate voltage applied. Considering the best and consequently the most popular type of storage battery tube, the UV-201-A, the proper "C" battery potential to use when a plate potential of 90 volts is used, is 4.5 volts.

If you boost the plate potential to 110 volts you should increase the value of the "C" battery to 6 volts. On the other hand, if you should only use 67 volts as a plate supply, decrease the "C" battery voltage to 3, and if you drop the plates to 45 volts, drop the "C" battery to 2 volts.

I think that summarizes the proper values of "C" battery potential to use under various conditions of plate voltage, when using the UV-201-A.

Considering one of the most effi-

cient types of dry cell tubes, the UV-199, a 7-volt "C" battery should be used with a 90-volt plate, a 3-volt "C" battery with a 67-volt plate, and no "C" battery at all with a 45-volt plate. By considering the last few paragraphs carefully there is no logical reason why the proper "C" battery voltage should not be used. This one point has an important bearing upon the quality of the output signals as well as upon the length of life of the tubes and "B" batteries.

The plate of the first tube is connected to the number 1 spring of the double circuit jack J_2 . The second and third springs of this jack are connected to the extremities of R_1 . Number 4 spring is connected to the positive "B" battery lead.

The .005 mfd. condenser C_2 is connected between the plate of T_1 and the grid of T_2 . The resistance R_2 is connected between the grid of T_2 and the negative terminal of the "C" battery.

The plate of T_2 is connected to the positive "B" battery lead through the resistance R_3 . The by-pass condenser C_3 is connected between the plate of T_2 and the grid of T_3 . The resistance R_4 is connected from the grid of T_3 to the negative terminal of the "C" battery. The plate of the last tube is connected to the positive "B" battery lead through the closed circuit jack J_3 .

The filament temperature of the three tubes is controlled by means of the 30 ohm rheostat, R_5 . Of course a 6 ohm rheostat would suffice here, but a 30 ohm unit seems better. There will be many times when you will be satisfied with the output volume obtained by plugging in the plate circuit of the first amplifier tube T_1 . In this case the economical thing to do is to turn out the last two tubes by loosening them in their respective sockets so their prongs do not engage the socket contacts. In this case a 6 ohm filament rheostat would not give you the proper control of the one tube still in operation, hence the idea of using a 30 ohm unit.

To operate this unit, connect the two input wires to the terminals number 6 and number 7 or connect them to a plug and insert the plug in the jack J_1 . Connect the "A" and "B" batteries to the unit, insert the tubes in the sockets and turn on the filament switch.

Now if you insert a plug, with phones attached, in the jack J_2 , you will not cut out the loudspeaker, due to the way in which the amplifier unit is wired.

When the phones are thus inserted in the plate circuit of T_1 you can see that the function the jack performs is to disconnect the resistance R_1 from the output circuit of T_1 and replace

this resistance by the impedance of the phones.

When you have the unit in operation, set the resistances R_2 and R_4 at their optimum points and do likewise with R_1 and R_3 . You will find that if you decrease either of the last two resistances below a certain definite value you will decrease the output volume of the amplifier. Here, then, are two points where the output volume can be easily controlled without the necessity of detuning the radio-frequency circuits.

I think you will find this unit answers the requisites mentioned at the start. Good quality, good volume and flexibility.

Summertime Radio

(Continued from page 10)

For economy of space the portable superheterodyne set should prove most effective. A circuit employing one stage of tuned radio frequency, a tube detector and then reflexing for audio frequency back through the first tube again should prove effective provided a third tube is added as a stage of straight audio amplification. The diagram for such a set is shown in figure 1.

Most of the constants are given. The inductances may be wound at home. The primaries consist of four turns of No. 22 double silk covered wire and for the secondaries use the same size wire, but have 56 turns. The secondary and primary of the first inductance, L-1, are all wound on the same tube, with a tap taken off at the fourth turn to form the common terminal between primary and secondary. The tube is three inches in diameter and should be of bakelite or some other equally hard material. The second inductance, L-2, has exactly the same number of turns as the first, but is wound on two separate tubes. The outer one is the secondary and should be about three inches in diameter and the inner one, with the primary on it, should be just small enough to fit inside of the secondary coil. The terminals are clearly marked in the diagram and should be followed closely. Both secondaries are tuned by means of .00035 mfd. variable condensers.

USE BEST OF MATERIALS

THROUGHOUT the set the sturdiest of materials should be made use of, and everything possible should be done to prevent dampness from having a bad effect. Cheap parts will have a tendency to get out of shape and in some cases poor results have been traced to the fact that certain inductances and materials will have a tendency to absorb moisture. Take this into consideration in every part of the set.

USING THE BOAT'S BATTERY

THE majority of small cruisers are equipped with electric lights run either from a storage battery, dry cells or a generator attached to the engine. Usually the equipment is only six volts, which is exactly right for filament lighting in the radio set using six-volt tubes. However, in some installations an arrangement is made by which the lighting is accomplished by a dynamo just as soon as the engine is started or the battery is left "floating" on the dynamo all the time and is on charge just as soon as the engine is started.

Connecting the radio set to such an outfit is perfectly all right just so long as no attempt is made to use it when the generator is in use. If this is done, the result will either be burned out tubes or a bad humming sound, caused by the segments of the commutator passing the brushes. It is not advisable to attempt to use the radio set under such conditions.

The ordinary six-volt storage battery, so often used for starting and lighting, is quite capable of running the tubes in the radio set, provided the voltage is proper, and a connection may be easily accomplished. Make sure that the polarity is right.

As far as the actual installation goes, it is greatly a matter of how much room and how much of a set is desired. On most small cruisers room is at a premium, but there are still a few places left where the set may be put.

Frequently a "hanging" shelf may be arranged on a bulkhead or alongside and well above one of the bunks. The set may be placed high up on this so that it will not get injured and will be out of the way. Make sure, though, that it is secured in place by either straps or by wood screws. In some instances the whole equipment may be placed inside of a locker on a shelf well up near the cabin roof. In such installations, though, there is danger of moisture getting inside the receiver with consequent loss in efficiency.

PLACING THE LOUD SPEAKER

THE loud-speaker is, of course, adaptable to many locations and the most common place for it is in the cockpit. However, salt water is not friendly to such devices and most certainly the "works" should be protected against the effects of wind and weather. A valuable suggestion along these lines is that the speaker be mounted just forward of the cabin bulkhead, inside of the cabin, with a grated opening through the bulkhead arranged in such a way that the horn bell, or opening, is aimed out into the

cockpit. This will keep the horn itself out of the weather and it should not prove to be much of a trick to arrange a shelf well up on the bulkhead to which the speaker may be fastened. If necessary the horn may be placed on its side right up under the deck beams with the opening arranged to come out alongside the steering wheel.

Another arrangement calls for wiring some jacks arranged in such a way that the horn may be plugged in on deck, in the cockpit or inside of the cabin. By arranging these jacks in parallel it is possible to use the speaker wherever desired and to even use more than one at the same time if they are wanted. The diagram suggests how this may be done.

Of course if the boat is too small for a regular aerial and the owner does not wish to invest in a loop aerial set, it is always possible to arrange one end of the antenna from a tree on shore and then carry the other end out over

the water to the anchored boat. Such a scheme as this will give a good-size aerial and one which would prove quite effective with a small set.

AERIAL FOR OPEN BOATS

THE aerial should be composed of flexible stranded wire to the end of which is attached a regular aerial insulator. The further end of this insulator may have a piece of heavy fishing line secured to it and after about thirty or forty feet, a lead sinker. This may be thrown over the branch of an overhanging tree, the aerial pulled up so that the insulator just clears the branches and then the receiving set attached to the other end of the wire in the boat. The boat may then be backed off shore until the aerial is clear of the water. Of course the aerial should not be too tight for if this happens the boat is apt to swing and pull the whole thing down.

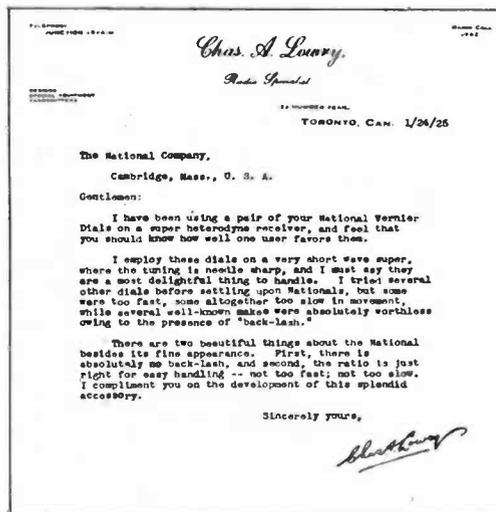
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where, even if conditions are cramped, they will not be as bad as in the average automobile. The bigger spread of aerial and the better ground will always permit better reception and the usual quiet evening anchorage may be made more enjoyable by some excellent music. Of course reception will undoubtedly be somewhat limited, especially in the hot months, but stations at least fifty miles away should be brought in without any difficulty and it is a pretty hard thing to find a stretch of water where no broadcasting station is within that range. Along the sea-coast, where most of the summer boating takes place, there will usually be several such stations within easy reach of the set.

Don't miss the opportunity this summer to install a good radio on your boat.

Radio Telephony

(Continued from page 33)

small loop aerial. In selectivity it gives the maximum which it is possible to use without destroying the quality of telephone signals, and any desired selectivity can be had by suitable design. In case of manipulation the modern super-heterodyne is supreme, since only two tuning controls are needed at most. Such characteristics of operation can be secured by using only four or five vacuum tubes, if headset receivers are used, and by six tubes if loud speaker operation is desired. It is the present belief of radio engineers that the super-heterodyne affords the ultimate in desirable radio receiver characteristics, and that the highest grade receivers of the future will employ this principle of reception. It is even difficult to see wherein future developments or discoveries can be better than this method, except in minor details, because this method already approaches so closely to the theoretical limits of possibilities of the art as known today.

THE VACUUM TUBE

ANY consideration of radio receivers is incomplete if it does not include consideration of the vacuum tube. The whole art of radio telephony depends upon the vacuum tube, and developments in this most versatile and wonderful device are responsible for the high degree of perfection which the art has attained in a short time, in both transmission and reception. Vacuum tubes are used in receivers for a variety of purposes, as amplifiers, as oscillators, and as rectifiers. They were first used as rectifiers, or detectors, and the other uses came later. The difficulties of manufacture of the new device at first were such that the product was expensive, and not very uniform in characteristics. Soon, how-

ever, the theory of the device was understood and the technique of manufacture was improved. Now, although tubes are made and sold by the millions, they are remarkably uniform in those characteristics which determine the performance of radio receivers using them. The manufacture of good vacuum tubes is a very difficult problem. Not only must correct processes be found and applied for apparently trivial operations, but exceedingly great care must be exercised continually in the materials used and in the execution of all parts of the processes. If this is not done, the resulting tubes will almost certainly be defective.

The first vacuum tubes required considerable power to energize their filaments, some four or five watts. Research and development has brought large improvement in this respect, and the most modern receiver tubes require less than two-tenths of one watt, which is only one-twenty-fifth of the power previously required. It is probable that still further improvement is possible and will come from further research.

While receiving tubes have been developing in the direction of requiring less power to run them, transmitting tubes have been growing in the other direction. Commercially feasible tubes are now available which can deliver radio frequency power outputs of one, five and twenty kilowatts. Research work is progressing toward solution of the problems of construction of tubes to deliver hundreds of kilowatts each. There is no better evidence of the great versatility and value of the vacuum tube than the fact that it can be made to handle powers of hundreds of thousands of watts, or to detect and amplify almost infinitesimal fractions of one watt.

Now let us summarize what has been said about the field of broadcasting. First, it seems definite that broadcasting will be a permanent and increasingly useful public service, perhaps becoming comparable as an industry with the motion picture business. Transmitting stations are being improved in quality of equipment, in power used, and in programs sent out. The receiving equipment available to the public has been improved to the point where high quality of reproduction is possible; where reception may be chosen from any one of many transmitting stations; where the apparatus is simple to operate, and is housed in cabinets appropriate to the home. Further improvements will be had in still higher quality of reproduction and ease of operation and maintenance, and most important of all, it is hoped that the use of higher power transmitters will make reception in every home reliable and enjoyable at all times.

RADIO MOVIES AND PHOTOS

NOW let us consider another branch of radio which is not radio telephony strictly, but which should be considered in studying the trend of development of radio in general—the transmission of photographs, moving pictures, and television. This has been the dream of man since he first had any interest in scientific accomplishments, and a few methods of accomplishing it have been proposed and tried with some success. Recently, engineers of the Radio Corporation of America perfected a new method which is successful, and which promises to introduce another branch of radio into commercial usefulness. Briefly described, the method operates in the following way, and it should be noted that the method has been designed to utilize, for the radio transmitter facilities, the transmitting methods and equipment in existence and used for radio telegraph communication.

A photographic film negative of the picture to be transmitted is mounted on a glass cylinder, inside of which is a small intense light source, whose light is focused in a minute beam onto the film as the cylinder is rotated. As the light and dark portions of the picture are traversed by the light beam, the intensity of the light ray changes. This varying light beam is focused on a photo-electric cell, a device which in effect changes light waves to electric currents. This photo-electric cell is commonly spoken of as the "eye" of the transmitter. The electrical resistance of this cell changes in accordance with the amount of light which falls upon it, and thus the shading of a picture is converted into variable electrical power. Of course, the light beam passing through the film covers only a tiny spot at any instant, and in order to cover all of the film, the glass cylinder is rotated back and forth, while the camera (the light source and the "eye") is moved down the length of the picture, one notch at a time, until the whole picture is covered line by line. It therefore takes a certain length of time to transmit the picture, which at present varies from five to thirty minutes, depending upon the detail and definition desired.

The currents from the photo-electric cell are fed to a series of vacuum tube amplifiers and modulating devices, the output of which operates the telegraph relays which are normally used for code telegraph manipulation of the radio transmitter. This output really consists of a series of dots and dashes of variable length, although all of the same strength. At the receiving station the radio signals are received in the usual fashion except that instead of actuating telephone headsets or telegraph relays, they are caused to actuate

a magnet having an armature that holds a special fountain pen. The fountain pen, when actuated, presses upon a paper record wrapped on a cylinder which is rotated back and forth. The pressure of the pen on the paper and the length of time it remains in contact determine the degree of darkness of each spot of the picture reproduced. Absolute synchronization of the cylinders at the transmitting and receiving ends is, of course, essential, and this is accomplished by the use of special motors and synchronizing oscillators. In addition to the paper and ink record, which is of great value in permitting monitoring of the reception, a photographic record is made on a sensitized film on another cylinder by a beam of light energized by the signal currents.

The possibility of transmission of pictures may have two totally different applications, one the transmission of pictures purely, and the other, as a totally new method of telegraphy. The goal of all telegraph systems is the possibility of transmitting more words per minute, and if it becomes possible to transmit a picture of a printed page faster than the words on that page can be sent singly by automatic high speed code transmitters, picture transmission will be very useful in telegraphy. But of course its usefulness will in time be greater than this. We cannot say now that this new photoradiogram service is ready for every commercial adaptation that imagination suggests, but we believe that the major problems of transmission and reception of photographs have been solved, and that normal development will enlarge the usefulness of this new possibility of radio technique.

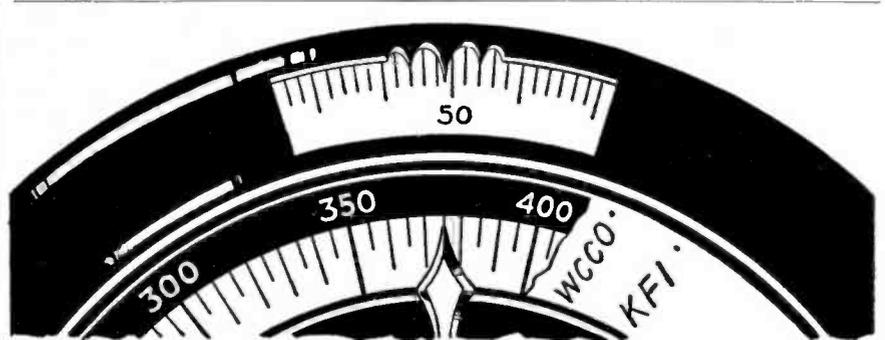
As concerns the transmission of movies by radio, or by wire, the problem being fundamentally the same, or as concerns television, little need be said or can be said at this time. The only methods known for transmitting a single still photograph require at least five minutes for good transmission. Normal moving picture rate of change is sixteen pictures per second, so that present picture transmission must be speeded up to about five thousand times faster to give motion picture transmission. The methods now known are not capable of working at such speeds, and it seems therefore that television and motion picture broadcasting must await the discovery of new methods or new principles. Many investigators are at work on the problem and there is little doubt that the solution can and will be found.

RADIO TELE-MECHANICS

THERE is one more branch of radio which should be mentioned briefly—tele-mechanics, or the control of mechanical forces at a distance. If current derived from a radio signal can

be received strong enough to operate a relay, or amplified to sufficient strength in the receiver, it is clear that a relay can be made to operate electro-magnets arranged to perform any desired mechanical function. If several different mechanical operations are desired, they can be had by separate magnets, each with its own relay, and each relay arranged to operate on a particular radio signal and on that one only. Fundamentally the proposition is simple, but its working out is not so simple. The greatest practical problem is the supply of some sort of radio receiver which cannot respond to the stray miscellaneous radio signals which fill the air, but which will respond to the special sig-

nals sent out by the special control transmitter. This problem, as well as many others incidental to the development of a successful practical system, has been solved by workers in this field, notably by Mr. John Hays Hammond, Jr., whose devices have been tried out experimentally by the United States Navy. These experiments have been carried to the point of controlling a crewless battleship. It is difficult, in fact impossible at present, to foresee what applications of this radio possibility will find real usefulness. One fact has bearing, namely, the control of mobile craft, either ships, aircraft, torpedoes, or the like, is not likely to be particularly useful outside the visual



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range of the control transmitting station. That is, it is not possible to steer or direct effectively any device which is not in sight. Operations at fixed points do not have this limitation, for example a mine could be exploded at any distance within range of the controlling radio transmitter, whether in sight or not. Commercial services of various sorts may find uses for this sort of control, for example, switches can be opened and closed at remote points by it without the presence of a human attendant. So, while the future applications of radio tele-mechanics cannot be seen readily, at least it can be said that here is another possibility of radio technique, ready for any service which can utilize it.

FORECAST

JUST as it is customary to begin radio articles with a history of radio, so is it customary to close them with a forecast of future developments. While we omitted the history, we cannot resist the temptation to include the other. So in conclusion, let us describe briefly the directions in which investigators are now working, and the results likely to be obtained. In this description we shall not be unduly imaginative, but shall confine our remarks to those things which are sufficiently definite to have certain importance and effect on the radio possibilities of the future.

The most conspicuous problem of the moment, and one which is almost sensational, is the investigation of transmission on very high frequencies, or short waves, as it is commonly, and confusingly, called. Until the advent of the vacuum tube oscillator, it was very difficult to build transmitters which could operate effectively at frequencies higher than about 2000 kilocycles. The vacuum tube made it possible to build transmitters for such frequencies quite readily; and during the last few years, experimentation with them has become general and extensive. It should be appreciated that this upper range of frequencies, if found practicable to use, will open up additional channels for radio communication far greater in number than now is used for all kinds of radio service combined. And since one of the great problems of radio today is to obtain more channels, the importance of this development is apparent. The frequencies used now for broadcasting, ship radio, and transoceanic radio (10,000 to 1,500,000 cycles per second approximately) have certain characteristics of transmission which have become familiar to radio users. For example, such frequencies travel much better at night than during the day, better over water than over land, they fade in and out at receiving stations in certain ways, require certain powers to work

over certain distances, and so on. But it has been found that the new band of ultra-high frequencies (2,000,000 to 10,000,000 or more cycles per second) behaves entirely differently, and in fact has many unexpected and spectacular effects. For example, it is found possible to work over great distances with less power than is necessary when lower frequencies are used. On the other hand, while these signals may be strong at some point distant from the transmitter, they are often very weak or perhaps inaudible at points much closer to the transmitter. The way in which signals of these high frequencies fade is also quite different. They often fade in and out again very rapidly, many times per second, thereby spoiling the quality of telephone transmission. This characteristic is serious in fact, and may prevent extensive use of these frequencies for high quality telephony unless some means of correcting it is found. Also these frequencies seem to have particular relation to the distance between the stations and the exact nature of the space between them. Two points may be able to communicate perfectly on a certain frequency and not at all on a slightly different one. They may be able to communicate by day and not by night, or vice versa. In brief, the laws of transmission which have most effect on high frequencies are not those having most effect on the frequencies which have been used heretofore. These laws are not yet known, and a great deal of careful systematic work remains to be done before we shall have exact knowledge of the character of ultra-high frequency transmission. Enough is known now to make it possible to say that this added range of frequency is quite sure to extend the possibilities and usefulness of every branch of radio service, and to relieve the present crowded condition of the various services in the "ether." More than this cannot be said with certainty at present. Data at present available indicates that these short waves do not offer revolutionary possibilities of radio transmission. They will take a useful place in the radio "spectrum" during the next few years, and be used for some special services, or for extension of services already existing, particularly those using telegraphy rather than telephony. It may even be found, when the novelty of these waves has worn off, that for really reliable communication, powers must be used approximately of the order to which we are accustomed to cover similar distances.

ENGINEERING and design improvements are in progress in all branches. Directive transmission of signals will add to the efficiency of "point-to-point" communication, and highly refined directive reception in

transoceanic work is giving a great degree of freedom from static interference. Direction finding is being improved, which affords most valuable assistance to sea and air navigation. Better methods of measurement of radio quantities are being found, which assists greatly in meeting the engineering problems yet to be solved.

In broadcasting we have already described the trend of technical development. In considering the future, it is more important perhaps, to think of the economic and political aspects than the purely technical. It can almost be taken for granted that within a very few years many transmitting stations of high quality, and very satisfactory receivers at moderate prices, will be available and in wide use. At that time the programs sent out by stations will be the important thing, and we shall have local programs, nation-wide programs, and very likely foreign programs. Perhaps broadcasting stations all over the world will be tied together for the broadcasting of world important events. It is left to your own imagination to consider how far-reaching will be the effects on individual and national life of a system of communication which reaches into every home and draws all people more closely together. The movement for an international language has already been strengthened greatly by this prospect and WIRELESS AGE has already afforded its readers information on this subject in the "AIL" articles by Dr. Talmey.

We would like to leave with you one thought about radio—its great versatility and varied uses. It is probable that there has never been a single instrumentality capable of serving man in so many different ways. Perhaps we can best show this by a forecast of the daily uses of radio by the tired business man of a few years from now. First he will be awakened in the morning by his radio alarm, then his morning physical exercises will be given. During his breakfast, the high-lights of the morning news will be read to him, and on his train to town a financial forecast may be given—and incidentally his train may be controlled by radio. When he reaches his office he might call up a certain ship at sea and talk with a friend who sailed the day before. Later he may call Europe and talk with one or more of his branch offices. He may also send or receive photographs of documents, signatures, etc., as preliminary evidence of transactions accomplished. At various times during the day, perhaps continuously, his receiver is giving market and stock reports. On his way home in a friend's automobile he may be entertained by music or news reports, and the police cars he passes are certainly in direct continuous communication with police headquarters.

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The Lady of the House

(Continued from page 13)

with a stiff cardboard at the very bottom, which when brought to light proved to be a faded photograph of a quartette of singers.

"Gee, Dad, the Lady must have a sweetie. Look!"

Radford gazed long at the photograph. Underneath the youngest singer, a boy of no more than seventeen years, with Francesca's large eyes, was a faint scrawl. Only one word was understandable—"Filio."

PEACE reined in the house of Radford & Co. It was close on to midnight when Jimmie let his sister and himself in after a party.

With a sigh of complete satisfaction, Marie-Louise flung herself on the couch and gazed at the daily radio program.

Station WERT. . . 12 midnight. International airs and folk songs—Hotel Glenmore.

It took just three seconds for this modern daughter of Eve to transmit her thoughts to Jim, and he, in turn, took just about three more to put these thoughts into action.

Suddenly, even their untrained ears recognized a real artist. A beautiful tenor voice was rising higher and higher.

"A—nostrì—monti,
Re—turn—"

"Oh, help! We have enough wop stuff in the house now."

Jimmie's fingers had barely turned the knob on the dial when he was literally lifted off his feet and flung with such force against the opposite wall that he smashed a picture frame.

"No-no-no—NO!"

Fascinated, the two watched Francesca. Had she gone mad?

Her right hand was pawing pitifully into the horn and in a voice of agony, she sobbingly called:

"Vito! Vito! Filio! Filio!"

Frantically she began turning all the knobs on the dials at once, and still more frantically she unloosened the bulbs, only to drop them to the floor, one by one, where they exploded like pistol shots.

"Bambino—please—the music—the music!"

It was useless to attempt to explain without bulbs the connection could not be resumed. Suddenly he felt her sag, and becoming thoroughly frightened, yelled to his sister:

"Run up stairs and wake Dad while I try to hold her up."

Marie-Louise kept pounding on her father's door.

"No, I won't get up."

"But, Dad, it's Francesca. She's fainted!"

A minute or so later he heard his son's voice with a queer note in it.

"Quick! Dad! Quick!"

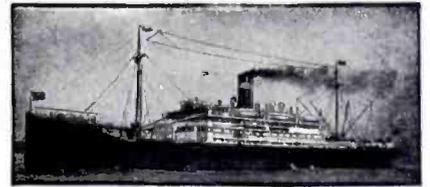
He was out of bed in one leap. When he reached the living room, he stopped short in his surprise.

Francesca, the Lady of the House, the woman of deadly calm and listening eyes, was seated on the floor babbling foolishly to herself.

In her arms, pressed tightly to heaving bosom, and rocking it back and forth like a baby, was the Chapman latest improved loud speaker, carefully draped with the redfringed shawl.

The monotonous crooning voice was nerve-racking. "Filio, mio—mmm—Vito! Vito! —mmm—mm—Filio! . . ."

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Radio and the Girl

(Continued from page 17)

know, mother, I could take our set or any one like it apart and put it together again just as good as father or brother! Why, you don't seem to know that we have radio classes in high school. I admit we're not so awfully much interested in the mechanism, as we are in the artists we get over the radio, but that doesn't mean we know nothing about it.

"As far as the joy of radio for girls is concerned," she went on, "you ought to see our gym class do calisthenics to the tune of radio!"

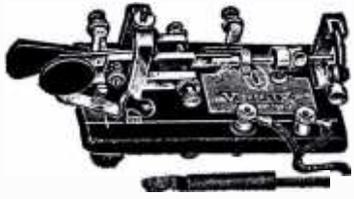
WHAT about the girl in the very small town and on the farm who is isolated? I find that radio is an even greater boon to such girls. For many decades the girls on farms and in small towns have had the worst of it; their brothers went off to the larger cities and they stayed behind. The possibilities of fun and amusement have thus been limited. There are millions of girls of this kind throughout the country who, until the coming of radio, have had little or no amusement, except an occasional movie; and now, through this marvelous medium, they get education, music, art, literature, and all the things that they so badly need and want. No wonder the figures of radio on the farm are surprising everybody.

One woman wrote to me recently and told me how she had, for years, hoped to send her daughter to college, but that circumstances had prevented, and the daughter had to help in the farm home. While I do not make the contention that radio is equal to a college education, at the same time there are actually college courses coming over the air, and education is being broadcast that would ordinarily be impossible for people in out-of-the-way places to get. Radio programs have advanced consistently and are progressing to a better and better standard all the time, to a large degree, I believe, because of the interest of women and girls.

I have only mentioned briefly the idea of entertaining at parties for girls, by means of radio, yet this is one of the most important phases of radio in relation to girls. It is always the case that girls are very much interested in giving parties, teas, at homes, and start at a very tender age to emulate their elders in doing the "social" stuff. They like to dance a great deal, (and where girls get the habit of dancing at home a lot, they get out of the habit of seeking that form of diversion in "dance halls.") Radio will undoubtedly do a great deal toward that end, for if a girl can dance to the music of Paul Whiteman's jazz band or Lopez' orchestra, she is hardly likely to tear out

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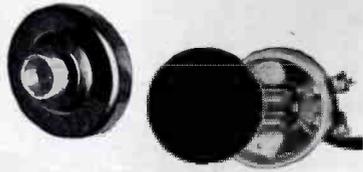
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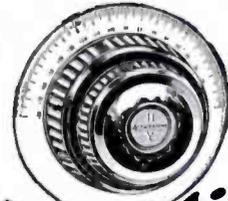
of the house (at the age of 15 or 16) on the pretense of going to the "library for some books" when she is actually headed for some cheap dance "joint" where the jazz music cannot be compared with what comes "out of the air." Hence I stress radio as an important factor in the home of the girl. It will make her dance at home and listen in at home; she will always feel grateful for the easy manner in which she can entertain her friends by radio. Years ago, a western piano manufacturer built up his fortune simply by telling the farmers that if they wanted to keep their girls on the farm, they'd have to buy a piano. The appeal always worked, because it was sound. The same thing is true of radio.

IN considering what radio is doing for girls, I cannot help but bring out emphatically its effect on the girl who is an invalid or one who is ill—or the girl who so often must nurse sick people in the home. The many weary hours that are bridged over by radio for the sick and those who nurse the sick! I have known small girls (with their minor illnesses which kept them in bed), who would ordinarily have made everybody unhappy with their petulance and impatience, if it was not for listening in. Then I know how in the case of my own daughter, how a prolonged illness of months was made tolerably passable because she had a radio set quite close to her bed and instead of feeling that isolated sense of not seeing anybody for long periods of time, she said whimsically one day that she could "bring far corners of the country to her bedside" by a mere turn of the dial. It gave her a sense of power and of touch with life which immensely heartened her.

Our home is out in the country, about thirty-five miles from New York, and occasionally my daughters have invited all the girls from the neighborhood, which is gathering them from several miles around, and given them a "show," using a miniature theatre which we have built in one of our rooms, with electric footlights and all. One of the girls, acting as stage manager, decided that to be a real theatre it should have an orchestra, but instead of having a third-rate harmonica orchestra offered by one of the boys, they had Joseph Knecht's Waldorf-Astoria Orchestra—which obliges conveniently with an overture before the raising of the curtain! Then after the curtain rises, there are several "acts" which are provided by Roxy and his gang, the Happiness boys or somebody—via radio.

You will see, therefore, that radio to my houseful of girls, as well as to girls out in camps and elsewhere, has come to be as necessary as the air—more necessary than the telephone.

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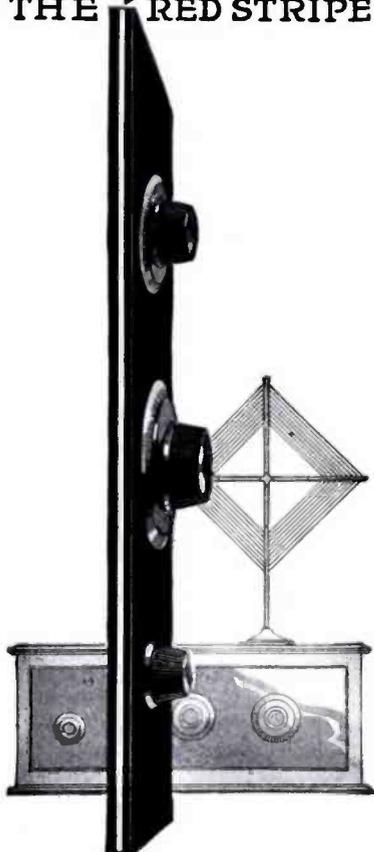
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 (distinguished by its red stripe)

ALL-AMERICAN
Reliable!
 Audio and Radio Frequency—Power Amplifying(Push-Pull)—Intermediate Frequency.
 Largest Selling Transformers in the World

Shenandoah 4 K.W. Transmitter

(Continued from page 36)

Lieutenant H. C. Rodd, in charge of the radio-aircraft section of the Bureau of Engineering, contemplates the possibility of duplicating the radio installation of the *Shenandoah* on the ZR-3, recently christened as the *Los Angeles*. This, the largest airship in the world, has no such pretentious radio facilities as shared by the *Shenandoah*. This monarch of the air, in its remarkable flight across the Atlantic Ocean, was equipped with a transmitter capable of sending the voice for a distance of 250 miles and radio-telegraph signals over a range of approximately 2,000 miles. The transmitter has a power rating of one and one-half kilowatts. The two passenger saloons of this trans-Atlantic liner are provided with facilities for radio entertainment, the receiving apparatus being independent of the service equipment of the airship. The antenna, which extends alongside the gas bag, is 350 feet long.

Why the Superheterodyne?

(Continued from page 46)

Just before the current is permitted to enter the three-stage long wave radio frequency amplifier it is passed through a filter or fairly sharply tuned radio frequency transformer.

This filter circuit makes it necessary to change the low wavelength station tuned in to exactly to the longer wavelength before it is permitted to enter the radio frequency amplifier. It also has this very advantageous effect: If there are two or three signals—loitering—in the loop or overhead antenna system, but one of them at a time can be converted to the exact wavelength of the filter circuit and consequently but one is admitted at a time. This increases the selectivity of the receiver even though the antenna system may pick up two or three stations of slightly different wavelengths.

Now, this transformer cannot be tuned too sharply, because that would have a tendency to distort the music and voice currents which must be faithfully passed through to the long wave radio frequency amplifier. The long wave amplifier curve discussed just a few moments ago and described in figure 1 will be referred to again. Instead of picking out the sharp point at 4,500 meters we will consider 5,000 meters as the peak—allowing for a slightly broader tuning and eliminating the possibilities of cutting off some of the music and speech.

The long wave radio frequency transformers are preferably of the iron core type rather broadly tuned to enhance clear reproduction.

When this system of reception was

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12-Cell—24-Volt Storage 'B' Battery

Positively given free with each purchase of a **WORLD "A"** Storage Battery. You must send this ad with your order. **WORLD** Batteries are famous for their guaranteed quality and service. Backed by years of successful manufacture and thousands of satisfied users. Equipped with **Solid Rubber Case**, so insurance against acid and leakage. You save 50 per cent and get a **2-Year Guarantee**.

Bond in Writing "I'll tell their friends." That's our best proof of performance. Send your order in today.

Solid Rubber Case Radio Batteries	WORLD Bat.	Approved and Listed as Standard by Leading Authorities
6 Volt, 100-Amperes	\$11.25	Including Radio News Laboratories, Popular Science Institute of Standards, Popular Radio Laboratories, Radio Broadcast Laboratories, Radio in the Home, and Lefaa, Inc.
6 Volt, 120-Amperes	13.25	
6 Volt, 140-Amperes	14.00	
Solid Rubber Case Auto Batteries		
6 Volt, 11-Plate	\$11.75	
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Send No Money Just state battery wanted and we will ship day order received, by Express C. O. D. subject to your examination on arrival. **FREE "B"** Battery included. **Extra Offer:** 5 per cent discount for cash in full with order. Buy now and get a guaranteed battery at 50 per cent saving to you.

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World For **AUTO and STORAGE BATTERIES** and **RADIO**

Valley Battery Chargers
 The Charger With Ten Points of Superiority
 Mfg. by Valley Electric Co., St. Louis, Mo. Sold by Radio Dealers Everywhere.

Small Ads of Big Interest
 80 cents a line. Payable in advance.
 Minimum space 7 lines.

RADIO APPLAUSE CARDS special designed—all fans like them. Send today \$1.00 for 100 cards. Sample upon request. **PENN DE BARTHE**, Designer and Illustrator, 929 Chestnut St., Philadelphia, Pa.

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MOTORS—New G. E. 1/4-HP., \$12.50; 1/2-HP., \$28.50; 1-HP., \$45. **GENERATORS**—Radio Transmission 500V \$28.50 Battery Chargers—Farm Lighting Generators all sizes. Lathes Drill Presses. New Catalog. **MOTOR SPECIALTIES CO.**, Crafton, Penna.

MAKE \$100 WEEKLY In Spare Time. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays \$100 profit. No big investment, no canvassing. Sharpe of Colorado made \$955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. **OZARKA, INC.**, 854 Washington Blvd., Chicago.



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Every radio dealer should test his tubes. Set owners expect it. Send for Jewell No. 110 Tube-Checker circular.

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The finest radio jacks made, for either panelhug assembly or usual installation. At your dealer's, 70c to \$1.00 list.

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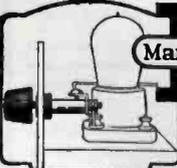
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radio antenna and lead-in wires in one minute without solder, tape or tools. Many other uses. A million perfect joints have already been made with these new Wire-Nuts. Listed by Underwriters' Laboratories. Booklet free. Ask your dealer for Wire-Nuts. We will send 3 Wire-Nuts post paid on receipt of 25c. A. TORK COMPANY, 8 W. 40 St., New York



Marshall-stat Price \$1.50

THE IDEAL RADIO RHEOSTAT

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Music Master

PROVEN RADIO PRODUCTS

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developed during the war there were so many controls visible to the host of constructors from pictures shown in various radio magazines that very little interest was displayed and this receiver did not receive much attention until quite recently when it was shown that it could be operated by the manipulation of but two dials.

A clear understanding of the system as a whole will be had if you will kindly refer to figure 2. There is a loop antenna system employed for collecting the energy delivered by the radio waves. This energy is fed in the usual way to the first detector. The loop is tuned by a variable condenser. The condenser and loop permitting the operator to tune over the entire broadcast range—i. e., from 220 to 546 meters.

In order to step up the wavelength of the transmitter wave it is necessary to provide some sort of interference such as the local oscillator. Before going any further let us consider what happens when two different piano notes are tapped with the fingers. A much lower note than either of the two results. In other words, the frequency or vibrating period is less than that of each individual note when struck alone. In the super-heterodyne receiver we consider the incoming signal one note of the piano and the signal produced by the local oscillator—actually a miniature transmitting station—the other note of the piano. The result is that a much lower period of vibration exists in the circuit leading to the filter. Bearing this in mind it is an easy matter for you to understand just how the wavelengths of both the oscillator and the receiver are adjusted in order to increase the wavelength to 5,000 meters in each case.

Now, since the filter circuit will only pass 5,000-meter waves to the three-stage amplifier unit—it is readily seen that the oscillator wavelength must be so adjusted that the difference between its frequency and that of the incoming wave automatically converts the latter to 5,000 meters.

This is accomplished in the following way—let's say we are tuning in Memphis, Tenn., which station operates on 500 meters—by dividing the standard 300,000,000 meters by 500 meters we obtain the period of vibration or frequency of Memphis' wave. The result is, 600,000 vibrations per second—cycles per second. The standard 300,000,000 is arrived at by reducing the velocity of radio waves in miles to meters. Radio waves travel at the same speed as light, i. e., 186,000 miles per second—or 300,000,000 meters per second. Now, we must find out what the vibration period must be in order that it may pass through the filter at 5,000 meters. By dividing the



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Economy and performance unheard of before. Recharged at a negligible cost. Approved and listed as Standard by leading Radio Authorities, including Pop. Radio Laboratories, Pop. Sci. Inst. Standards, Radio News Lab., Lefax, Inc., and other important institutions. Equipped with Solid Rubber Case, an insurance against acid and leakage. Extra heavy glass jars. Heavy, rugged plates. Order yours today!

SEND NO MONEY Just state number of batteries wanted and we will ship (ay order is received. Extra Offer: 4 batteries in series (96 volts), \$12.75. Pay expressman after examining batteries. 5 per cent discount for cash with order. Mail your order now!

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Makers of the Famous World Radio "A" Storage Battery
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All equipped with Solid Rubber Case.

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Laboratory Product **CRESCENT LAVITE RESISTANCES**

for Distortionless Amplification

12,000, 48,000, 50,000, 100,000 Ohms. List \$1.50 each. Special Sizes \$2.50 each. Dealers write for discounts. When Better Resistances are made they will be Crescents.

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PERFECT REPRODUCER

Tone loud and pleasing. Hand-some material and design.

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State and 64th Sts. Chicago

Spaulding BAKELITE RADIO PANELS

SPAULDING FIBRE COMPANY INC.
TONAWANDA, N.Y.

standard 300,000,000 by 5,000 we find that the circuit must vibrate at 60,000 per second. We now know that it is necessary to cause the local oscillator to vibrate at a period 60,000 above or below that of the incoming wave. We, therefore operate the oscillator—local transmitter—at either 660,000 or 540,000. Consequently, the operator of a super-heterodyne receiver will find two points on the condenser scale of the oscillator where reception will be possible—to but one point on the loop tuning condenser.

When this condition is reached the signal is passed through the filter into the highly efficient long wave three-stage radio frequency amplifier unit and thence into the second detector tube and from there to one or more stages of audio frequency amplification.

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May we tell you why, also why our products will bring you all the results you are hoping for?

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SILVER - MARSHALL 210 and 211 transformers are known as the finest intermediate transformers ever produced. They were an important feature of the receiver built entirely of S-M Parts, that won the grand sweepstake prize at the recent Los Angeles Radio Show. They are also recommended by experts for use in the new super-autodyne receiver.

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For the Crosley Musicone, designed and built on entirely new principles, covered by *basic patents* issued and pending, reproduces music and the speaking voice true to life—

Without distortion, extraneous overtones, resonance vibrations or other horn noises;
Over the *entire* musical scale, from lowest to highest notes, on *any* instrument;
Without overloading; and without chattering, because its diaphragm is a floating cone;
Without adjustments or additional batteries;
Without directional properties or a horn;
And at a price that is revolutionary.

Sound from it fills the entire room, the notes clear and round and mellow. No need to cluster round. Every note comes in at its true musical value—in solo, duet, chorus, orchestra and drums.

Your own radio set—no matter what circuit nor how many tubes—needs the Crosley Musicone; and until it has this instrument, it can never give you the best that its maker built into it.

Ten thousand radio dealers are now displaying and demonstrating the beautiful Crosley Musicone.

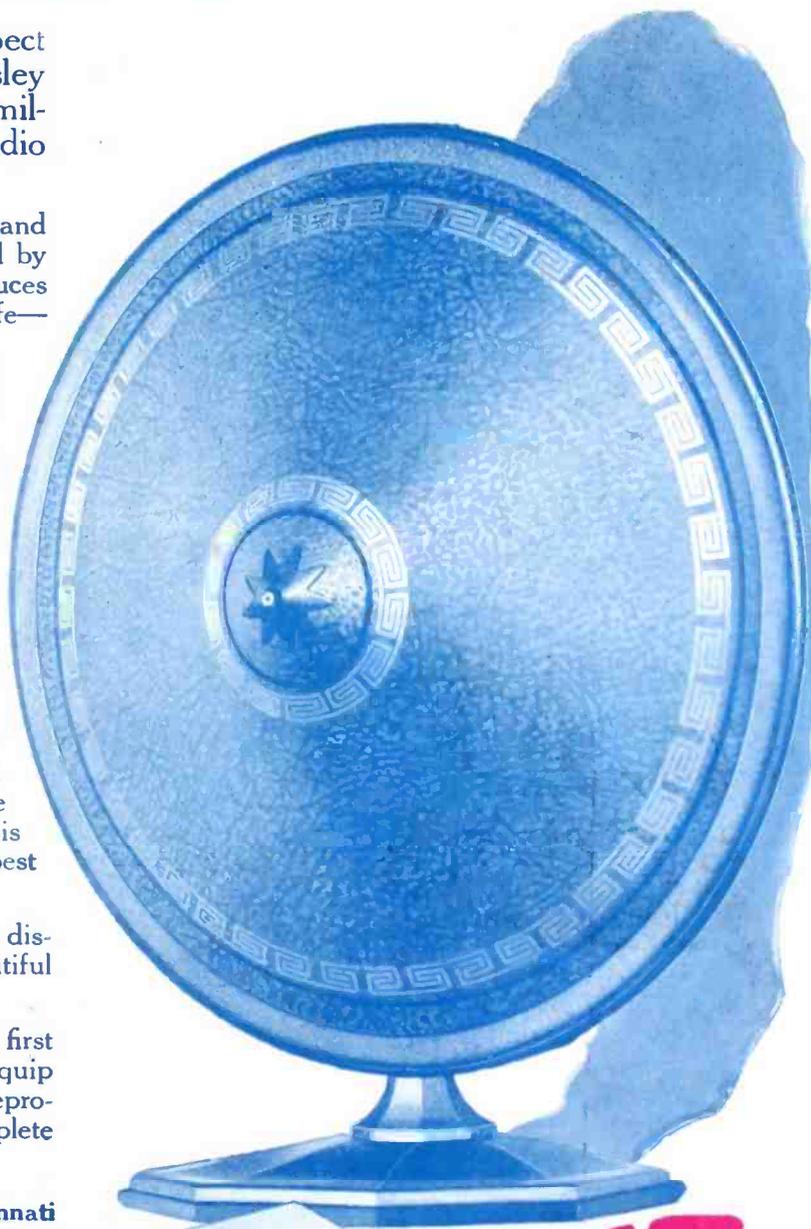
By all means hear it, and know for the first time what real radio music is. Then equip your set with this beautiful, compact reproducer and no other. Write for complete description.

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