

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF.

Vol. V

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SATURDAY, JUNE 2, 1923

No. 8

FIGHTS RADIO CHURCH



Miss Edith Church (above) is the highly gifted prima donna of WHK, Cleveland, Ohio. Miss Church will be heard every Sunday from this station during the summer months. In the center is Miss Lela Gordon Saling, who sang recently from Station KPO, San Francisco, and was heard in Hawaii, Samoa and Alaska. At the right is a photo of Miss Margaret Buckley, soprano, who recently sang for the listeners of KQV



LIGHTNING STRIKES "FL," EIFFEL TOWER

ANTENNA SYSTEM CRASHES
DOWN TO EARTH

Giant French Plant Forced to Halt
Service Until Repairs Are Made
—Tours Handles Traffic

PARIS.—Lightning recently struck the antenna of the Eiffel Tower Radio Installation and cut one of the six 1,200-foot wires which stretch from the ground to
(Continued on page 2)

AIR SERVICES NOT WORSHIP SAYS PASTOR

Boosts Weekday Sermons
Reverend P. E. Osgood Claims
Church Attendance Drops
Twenty-five Percent

By S. L. Huntley
Has broadcasting church services cut down on the attendance of the churches as a whole? This is the issue that is

CFCK Broadcasting Music
EDMONTON, ALTA.—New license papers have been received from Ottawa for the broadcasting station of the Royal George Hotel, operated by the Radio Supply Company here. This station is working under the call CFCK and is now broadcasting musical programs from 8:00 to 8:30 o'clock every night of the week days and from 3:30 to 4:30 o'clock on Sundays.

AIRPHONE TO BENEFIT ICE PATROL SERVICE

KFOG to Broadcast Location of
"Danger Zone"

BOSTON, MASS.—Radio will play an important part in the international ice patrol service which will begin for the summer when the coast guard cutter Tampa leaves Boston. The purpose of this service to which the cutters Tampa and Modoc have been assigned by the coast guard is to locate dangerous ice near the trans-Atlantic steamship lane, patrol the section and broadcast warnings twice daily on 600 meters.
The ship on patrol answers to call KFOG and gives information upon request.

Airway Interscholastic Meet Held by Oklahoma

Ten High Schools Compete in
Three Tests

NORMAN, OKLA.—The University of Oklahoma electrical engineering department recently completed successfully what is believed the first state Radio interscholastic meet in the United States. Thirty-five entrants from 10 different high schools over the state competed in the three tests which were held in connection with the nineteenth interscholastic track and field meet. The three contests consisted of a code test, theory test and equipment test of receiving sets.

being met pro and con today by the American clergy.

In a recent address at the Church Club, Chicago, Reverend Phillips E. Osgood says, "There is many a report that broadcasting church services are depleting the
(Continued on page 2)

ZITHER MAKES DEBUT AT ATLANTA STATION

ATLANTA, GA.—The zither, a musical instrument popular in the Spanish-American war days, invaded Dixie ether for the first time during a recent broadcast by WSB, Atlanta. Although the Journal station has been in operation fourteen months as the first newspaper broadcaster in the south, the old-fashioned instrument had never made an appearance before.

SPECIAL LICENSE TO BE ISSUED STATIONS

WASHINGTON.—In an effort to encourage the scientific development of broadcasting and apparatus for that purpose, the Department of Commerce has created a new form of special license known as the "Broadcasting Development Class." Licenses in this class will be issued to station owners having transmitting and receiving sets of their own design.

FIGHTS RADIO CHURCH

(Continued from page 1)

congregations of the non-broadcasting churches. In some country churches the percentage may even mount to twenty-five or more. I have been told that even such services as the Sunday Night Club, in Chicago, have fallen off a thousand in attendance since the broadcasting begun.

"Hearing a sermon and religious music is not worship. Participation in worship is the essence of worship. I have seldom heard of a Radio listener who knelt for the prayers, stood to join in the hymns,

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-door photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs with negatives and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT, Radio Digest, 123 W. Madison St., Chicago.

said the Creed, created any churchly atmosphere for his hour of listening. Occasionally someone mails in an offering, but if money talks, the ratio of caring is still very scant. But the climactic argument is that of the Communion Service; that certainly cannot be broadcast so that the homestayer participates. You get out of anything what you put into it, always.

Fears Spiritual Let-Down

"Here is a more subtle danger, however, than mere physical absence from worship. There is the danger of spiritual let-down on the part of the person who considers listening-in the equivalent of worship.

"But, so far as the Church is concerned, there is another side of the question. (Please understand that I am speaking now ONLY of the broadcasting of the regular services of the Church as they occur.) How of the effect upon the churches which do NOT broadcast?

"The sick and isolated are after all substantially a minority of the listeners-in. There is a great majority of able-bodied town or village dwellers. (I recognize that too many of these would not go to church anyway, and that they do listen in, more or less, to broadcasted services just because they come in over their Radio sets. I do not forget the possibility of missionary good to these. In passing, my only answer is that these persons would probably listen in at any other time as well.)

Comfort Keeps Radiophan Home

"You can see how the argument runs in the mind of the Radio owner. 'Why should I bother to dress up and plod out (or drive over) to the village church. I won't be half so comfortable as I am here at home in my slippers and soft collar, in my rocking chair. The choir over at the church can't touch the one I can hear over the Radio. And our parson, though he's good as gold, is no such star preacher as I can hear in Detroit or Pittsburgh or Pasadena. And besides, if I get sleepy I can turn off the machine and take forty winks. This old rocking chair and my pipe for me this morning!"

"There is no question at all that weekday sermon and music will reach its proper constituency. Invalids and the isolated can listen as conveniently on a Wednesday evening as on a Sunday morning. As for the great number of Radio possessors, they, too, will as readily be brought to listen to the weekday program from the Church as to an orchestral dance program now available. The religious program for 'edification' (to use the old-fashioned, but appropriate word) will increasingly be recognized by key churches as their opportunity and duty.

"My urgency is only that the churches leave the usual worship-time untouched by broadcasting, and that, particularly for the sake of the sick, shut-in and isolated, they undertake the broadcasting of sermons and religious music at some other time, preferably on a weekday."

LIGHTNING HITS "FL"

(Continued from page 1)

the top of the great tower to serve in receiving and transmitting messages.

The cable and its giant insulators crashed to the ground and were buried deeply in the earth.

Four other insulators were broken and the entire service put out of action, so that receiving stations all over Europe for the first time in years failed to get their usual evening call from the Tower.

Repair Work Being Pushed

The electric discharge which caused the accident seems to have been in no way remarkable, and insulated as the cables were, they were believed to be immune from any risk of rupture. The break occurred just below the top of the insulators, and only one of the six cables remains undamaged. Repair work is being rapidly pushed.

AN EVENING AT HOME WITH THE LISTENER IN (SEE NOTE BELOW FOR INSTRUCTIONS)

Table with columns: Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various stations like CFCN, CKAC, KDKA, etc. with their respective broadcast times.

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Table listing contents: All the Live News of Radio, An Evening at Home with the Listener In, KYW Broadcasts Black Friars, Roxie, Lil, Bert and Louise of WEA, This Week's Advance Broadcast Programs, How to Make One Condenser Flivver Super Set, Part V—Operating Kinks, by E. T. Flewelling, Directory of Broadcasting Stations, Reviews of Books, Editorials; Indigest; Condensed by Dielectric, First Steps for Beginners in Radio, Chapter IV—About Condensers and Inductances, by Thomas W. Benson, Characteristics of Some New Vacuum Tubes, Laboratory Tests Show Interesting Facts, Selective Four-Circuit Tuner, Questions and Answers, Radio Illustrated, a Page of Pictures.

Looking Ahead

Why Is a Variometer and What Does It Do?—That's just one of the many questions to be answered next week by Thomas W. Benson in his beginner's series chapter on "Condensers and Inductances." Why does turning the rotor ball over change the wave length, although no switch was used to cut in or out turns of wire? Let Mr. Benson tell you June 9.

"Tubes Are Often the Black Sheep of the Radio Family," says H. J. Marx. Mr. Marx has found the wide variance in the tube characteristics responsible for much Radiophan "grief" and will continue next week to tell of his research and what can be done to remedy the situation.

The Best Flewelling Super Question will be answered next week by the best authority, E. T. Flewelling, who has just concluded his One Condenser Flivver series this issue. See page seven for further details.

Want Apparatus? Save the Coupons—The Digest has a Special Reward Offer beginning this issue. See right column, this page. Quite a nice idea, isn't it? All you must do is save consecutive coupons, so buy the June 9 issue early.

How About a Portable Set? Planning one, surely. Let the Digest aid you. June 23 is the date of the Digest Portable Set Number, but ideas for vacationists will receive their due share of attention before and after that date as well. Which reminds us. How about a few outdoor Radio photos? Read the box in the left column of this page. See if you can land a dollar.

Wave Length Changes Are Occurring Thick and Fast—but they can't get ahead of the Digest Broadcasting Station Directory. See the additions made this week. For example, wave lengths for all plants, station slogans, ranges, schedules, owners, kind of time used. Buy the next two issues and you'll have the directory complete.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest, 123 West Madison St., Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name

Address

City..... State.....

BIG REWARD OFFER TO DIGEST READERS

TO GIVE PARTS FOR COUPONS AND REMITTANCE

Special Offer to Benefit Regular Readers in Return for Splendid Support Given Publication

SPECIAL REWARD OFFER

Coupon Number 1

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer given below.

Save Me—I Am Valuable

Appreciative of the splendid support of you regular readers of the paper and the interest you have shown in the growth of the Digest, we have decided to inaugurate a Special Reward Offer for your benefit. With this offer which starts with this issue you are given the opportunity of securing desirable standard apparatus at a decided saving by simply clipping the coupons which will appear on this page each week in the Digest and sending them to us accompanied by the necessary small remittance. As you will note below many kinds of parts and apparatus dear to the heart of every Radiophan have been included in this special offer. Other items will be added later.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents (\$0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin Copeland Sta Put Plug.

Class B Articles

For four consecutively numbered coupons and sixty cents (\$0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV1199 Socket; 1 Martin-Copeland UV-199 Adapter; 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-Point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch; 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch.

Class C Articles

For six consecutively numbered coupons and ninety cents (\$0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents (\$1.20) any one of the following articles will be sent: 1

(Continued on page 9)

WASHINGTON WILL HAVE WEAF'S TWIN

NEW PLANT TO HAVE PUBLIC BROADCAST SERVICE

Washington Broadcasters May Organize Association and Arrange Time to Care for Members

WASHINGTON.—A new class B broadcasting station is now under operation here. It is owned by the Chesapeake and Potomac Telephone Company.

This company, which is a member of the American Telegraph and Telephone Company, has erected the second of the Bell-System broadcasting stations, and plans to duplicate in power and quality the New York station WEAF.

A unique feature is that the new plant will be a public service station; that is, it will be operated without profit and may be leased or chartered by other interests for periodic broadcasting at a rate equivalent to the proportional cost of operation.

Broadcasters May Organize

It is understood that a local broadcasters' association may be organized and the operating time of the station scheduled to care for its members. This, it is believed, will save small operators considerable money in comparison to the costs of installation and upkeep of private broadcasting stations. Certain hours of any schedule would be received by the Telephone company for the transmission of matter of public interest such as presidential addresses, congressional debates and governmental information. Important concerts broadcasted from WEAF in New York may be sent by land line to Washington and broadcasted simultaneously from the new station, officials say.

The electrical equipment is the product of the Western Electric Co., and has been installed under the direction of C. & P. and A. T. & T. Co. engineers. The station is located on the telephone building, 725 Thirteenth street; the towers are erected on the roof.

STATIONS SAY IT WITH MUSIC TO DODGE LAW

6XB and CFCN Find New Method of Communication

By Jeffery J. Dingman

CALGARY, ALTA.—No laws were ever enacted, no rules ever promulgated, no regulations ever laid down in which loopholes could not be found and which could not be avoided, even regulations governing Radiophone broadcasting in the United States. This is the opinion at which Canadian Radio operators have arrived after a recent occurrence.

Recently CFCN at Calgary came on the air on its test night, calling 6XB (KFDB), Telegraph Hill, San Francisco.

"Hello, 6XB; San Francisco," said W. W. Grant into the CFCN microphone. "Hello, 6XB. How are we coming through tonight I know, old man, it is regrettable, but you cannot answer me. However, if we are coming through good play the 'Parade of the Wooden Soldiers' and if we are coming through poorly play 'Mr. Gallagher and Mr. Shean.'"

CFCN signed off and listened in for 6XB. In a few moments the stirring strains of the "Parade of the Wooden Soldiers" could be heard.

The barriers of restriction imposed by regulations governing the sixth district had been overcome.

Mr. Grant, while on a test, suggested to 6XB that it launch a petition to obtain permission to communicate with other broadcasting stations while operating on its experimental license. The CFCN operator pointed out that in the seventh district this was allowed. Evidently there was some misunderstanding, as the rules are complicated and different inspectors read them in a different way.

TRAIN RECEPTION IS FIRE CHIEFS' STUNT

SPRINGFIELD, MASS.—A recent successful test of the reception of Radiophone music on board a moving train was the first ever held in New England. The firemen's special from Boston to the National Safety Week convention held in this city accomplished the feat. The train carried 100 representatives of the Massachusetts Fire Chief's Club.

ATLANTA PLANT WSB BECOMES GODFATHER

ATLANTA, GA.—WSB became a sort of a godfather recently when this station named a baby via Radio at the request of the infant's mother, Mrs. J. F. Coker, of Atlanta. The name announced was Winnifred Susan Beatrice, the initials representing the station's call letters, WSB. Two visiting Chicago newspaper men, who selected the name for the baby, sent handsome presents.

NEW RECORD MADE BY CRUISER OMAHA

CODE MESSAGES RECEIVED 1,800 MILES AWAY

New Scout Cruiser Reaches Pearl Harbor, 2,300 Miles, on 300-Watt Radiophone Set

WASHINGTON.—Naval Radio experts are delighted with the performance of the Radio equipment on the new scout cruiser Omaha, which recently broke all long distance records in transmitting during her "shake-down" cruise in the Pacific.

While maneuvering at sea off the coast of Washington, the newly installed Radio transmitting sets were given a thorough test. Code messages transmitted with the 20 KW arc set, such as the larger naval craft, as now equipped with, were copied by all naval Radio stations along the west coast from lower California to Saint Paul, Alaska, and on the East coast at Bar Harbor, Me., Washington, D. C., and Key West, Fla. One of the stations reached was San Diego, 1,800 miles away from the Omaha. This new cruiser's arc was copied by the battleship California, which was 1,800 miles distant, but it is reported that she could not pick up the California's replies.

Heard by Pearl Harbor

Not only in code dispatches did the Omaha Radio experts excel, but with her 300-watt tube set, spoken messages were transmitted to Pearl Harbor, Honolulu, 2,300 nautical miles distant. They were also heard at Key West, Fla., approximately 2,100 miles over land and sea.

Part of the credit for the long-distance work is attributed to the 180-foot wooden masts, which carry the Omaha's aerials, almost 50 feet higher than the steel masts on battleships. The mean effective height on the Omaha is better than 100 feet, it is stated by naval experts. Her Radio equipment is also installed on the "top-side" and not below eliminating long cable and wire leads.

Radio Personnel in Navy Over Two Thousand Men

Many Men Transferred to Meet Shortage at Plants

WASHINGTON, April 30.—An exhaustive study of the Radio personnel situation in the navy is now under way, both afloat and ashore, in an effort to increase the efficiency of naval communications. Some of the less important shore establishments have been closed and the personnel sent to busy stations where shortages existed or to ships at sea which were in need of new operators and experienced Radio-men. The present Radio personnel of the navy is 2,419 men.

The training of Radio-men now in naval schools is to be pushed, it is understood, with a hope of relieving all shortages by July 1. Previously all third class Radiomen were at once assigned to fleet work for military training, with the result that the ships-of-war were deprived of a number of higher rates, including first-class men and chiefs. This matter is now being adjusted so that some third-class men will be assigned to shore duty. In the near future many transfers will be made between the fleets and shore stations to adjust the situation.

Atlanta Star's Friends Hear Her Sing at WEAF

ATLANTA, GA.—An especially large audience of Atlanta listeners tuned in on WEAF, New York, recently, when Madeleine Hauff, sensational Atlanta coloratura soprano, now preparing for a Metropolitan opera debut in New York, gave a recital at the American Telephone and Telegraph Company station.

KYW BROADCASTS BLACK FRIARS



Above is a photo of Clark Shaw, of the Black Friars of the University of Chicago, as Ethelind Nielson, the movie vamp. The photo was taken as Mr. Shaw appeared in the "Filming of the Friars," a musical comedy recently produced by the organization and broadcast by Station KYW, Chicago. Altho the cast called for feminine roles, all parts were played by men. © Khonigon.

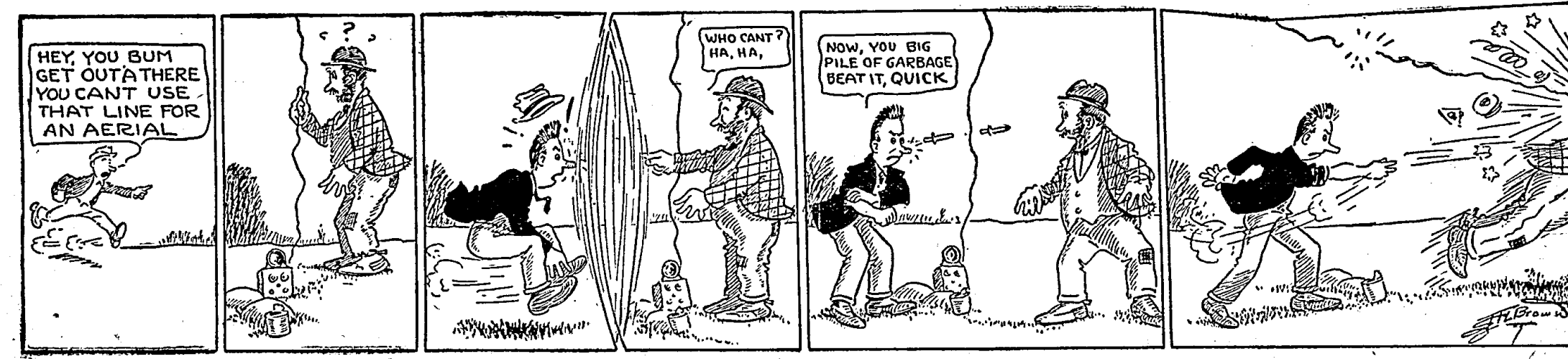
One Broadcaster for India

WASHINGTON, D. C.—Broadcasting in India will probably be limited to a single company, composed of British and Indian firms, according to a report of the recent Delhi conference forwarded to the Department of Commerce by Vice Consul Harold Shantz, Calcutta. Non-British firms will not be allowed to participate, it is said.

No Change in Time

DAVENPORT, IA.—Station WOC will continue to broadcast all musical programs, market quotations, weather reports and lectures according to Central Standard Time, the same as heretofore, and those living where Daylight Saving Time is being used will have to be governed accordingly.

THE ANTENNA BROTHERS Spir L. and Lew P. The Set Was on the Bum



PRESIDENT TO USE ALASKAN AIRPHONE

TO KEEP IN DIRECT TOUCH WITH STATES

Experts Looking Forward to Time When Alaska Will Be World Relay

WASHINGTON.—President Harding, on his coming trip to Alaska, will be almost entirely dependent on Radio to keep him in touch with affairs back home.

The President, heretofore just a Radio fan like most of his fellow citizens, will have an opportunity to see its great practical use demonstrated.

By Radio the President will learn of political developments following the series of speeches he will make through the West on his way to Alaska. On account of the prominence of several issues he will develop it will be most important that he keep constantly in touch with the reaction to the international court of justice speeches, as well as those on the railroad consolidation plan and his shipping program.

Cable Break Possible.

After the President and his party get to Alaska, there will be only a thin thread of copper cable between him and the United States, as far as wire communication is concerned. It stretches 1,000 miles from Cordova to Sitka, and thence to Seattle. During cable breaks, which sometimes last for several weeks, this system is useless.

But cable breaks are not so disastrous as formerly, for Radio can take up their burden, as it frequently has in the last few years.

When the President gets to Alaska he will also find that the land wire systems are very inadequate, on account of the contour of the country. On the other hand, conditions are exceptionally favorable to Radio transmission. In the summer "static season," atmospheric or other disturbances are much less severe in Alaska than in the United States. During other seasons of the year static is rarely experienced. Radio waves do not lose their effectiveness in Alaska as in this country.

Radio Stations Plentiful

Alaska and its coast are well supplied with Radio stations, so that the President will always be in touch with the United States, as well as with parts of Alaska with which he wishes to communicate. There are also nine Radio stations maintained by the navy along the coasts of the Gulf of Alaska and in the Behring Sea. They are in touch with Radio stations along the Pacific coast in Washington, Oregon and California, and thus with the entire United States.

President to See Conditions

While the President is in Alaska he will also learn the great possibilities for future development of Radio in Alaska, both as a means of communication within the rich territory itself and as a connecting link between international Radio lines.

Radio experts are looking forward to the time when Alaska will become the crossroads in the ether lanes of the northern hemisphere—the point of relay for Radio signals between North America, Europe and Asia—for which it is particularly adapted from its situation literally at the top of the world.

FANS HAVE QUEER VISION OF CANADA

U. S. Consul Reat Asked if Canucks Speak English Throughout Country

CALGARY, ALTA.—Inter-communication by Radiophone between the United States and Canada has still a great deal to accomplish. At least, this is the conclusion which has been reached in Calgary Radio circles.

Samuel C. Reat, United States consul at Calgary, has received a letter from a resident of Philadelphia asking whether the English language is spoken in Canada. How many thousands of Radiophans in the United States, who nightly are entertained by powerful Canadian broadcasting stations, can testify to the fact that real American is spoken, with no British accent or dropping of the "H's".

Evidently there are still some residents of the great republic across the line, who picture Canada as a vast wilderness, a land of everlasting ice and snow, inhabited by only a few hardy pioneers. It is these erroneous impressions which Radio is facilitating the abolition of. Canadian Radiophones are among the finest and most powerful in the world, and operators are telling the world so!

Canada is a civilized country, a country of cities, of farms, and of pleasure haunts in the bigger cities. For the information of the Philadelphia resident, it might be stated that many avenues can be found in Canada to compare favorably with Michigan boulevard in Chicago.

Here is a copy of the letter received by United States Consul Reat:

"The American Consul; Honourable Sir: Kindly let me know if the English language is spoken in part or parts of Canada and surrounding islands.

Also what other language other than their native tongue is spoken and what race of people inhabit the country.

Thanking you in advance,
Sincerely,

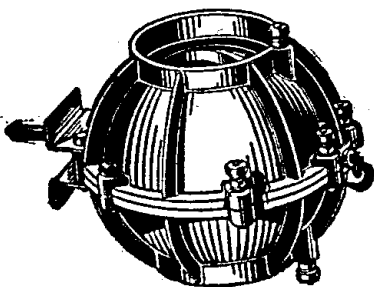
We Live In Kansas

—but we receive programs from Atlanta, Minneapolis, Davenport, Fort Worth, Madison, Los Angeles, Dallas, Kansas City, St. Louis, Denver and San Antonio on Crystal without batteries. Your crystal set requires only easy inexpensive changes. Send stamp for further information or \$1.00 for copyrighted drawings and instructions. Everything explained. Satisfaction guaranteed.
LEON LAMBERT, 501 South Volusia, Wichita, Kansas.

Cockaday Circuit TUNER COILS

Complete as per specifications.
No. 18 Wire Used—D Coil Bankwound. Price, \$2.75
Hook-up, Directions and Material List furnished free with each set of coils
MAIL ORDERS FILLED
Dealers Communicate
Eastern Radio Mfg. Co.
22 Warren Street, New York, N. Y.
Dept. "R. D."

Kellogg Radio Equipment For Better Results



The Kellogg Variometer

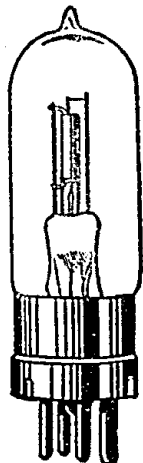
The stator and rotor are of Kellogg Bakelite, with properly proportioned windings of well insulated copper wire.
Two terminals are provided for the rotor and three of the stator, permitting the variometer to be used in all known variometer circuits.
Kellogg variometers have no sliding contacts; nothing to wear or short. A spring takes up all play and allows the rotor to turn with a smooth even motion.
No. 501.....Each \$8.00
KELLOGG SWITCHBOARD & SUPPLY COMPANY
CHICAGO

LIGHT HOUSE SERVICE ISSUES NEW CIRCULAR

Gives Four Blueprints and "How to Wind Coil"

WASHINGTON, D. C.—The Light House Service is sending out an announcement to officials in the nature of a circular letter of Radio information, which is accompanied by four blueprints showing the method of assembling and wiring Radio apparatus, as well as instructions how to wind a spider web coil.

The information is being sent out to those in the service who are interested in a Radio receiving set that is simple, cheap, easily constructed and easily handled. The service states that after experimenting for some months with several hook-ups with the object of developing a set with these advantages, this set has been decided by the amateur members of the Radio Club at the Bureau of Lighthouses as being the best at this time. The announcement states that it is a single type receiving set only, but amplification may be added at the option of the builder. The volt and one half-type soft tube is recommended, using a single dry cell for the filament current, thereby eliminating the storage battery and charging device.



At Last!

You Can Buy a Real 1 1/2-Volt Clear Tube

The W. D. 12's only Competitor.
Functions at 1 to 1.1 Volts. Genuine Platinum Coated Filament.

Fits Standard Socket

Do not confuse this tube with common Silvered Tubes advertised as 1 1/2-Volt.

Detector—Amplifier

Absolutely Guaranteed \$4.50

MAIL ORDERS FILLED PROMPTLY
Cash or Money Order (No Stamps)
Dealers write for Quantity Discount
TREXO TRADING CO.
200 Broadway (Suite 210), N. Y. City

White Star Steamer Has Loud Speaker Installed

NEW YORK.—On a recent trip of the White Star liner, Olympic, from here to Southampton, a big loud speaker was used for the first time. This was attached to the ship's Radio receiver by a cable, the loud speaker being placed in the foyer of the upper deck. Concerts, speeches and all the features of the many broadcasting programs were received from both continents and heard on three decks at the same time. Tuning was done in the regular Radio cabin of the ship. If the innovation meets with approval of passengers it will be made permanent.

Summer Static Overcome

"Good-bye Aerial"



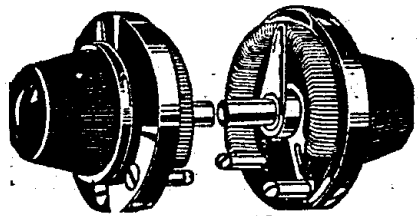
ANTENNELLA

No aerial or antenna needed
All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated. Merely plug Antennella in any light socket and you can enjoy all Radio pleasures in any room in your home, apartment or hotel. No current consumed.

New Improved
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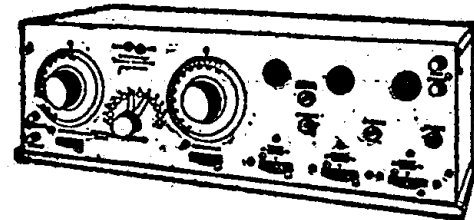


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—Lao Tzu.

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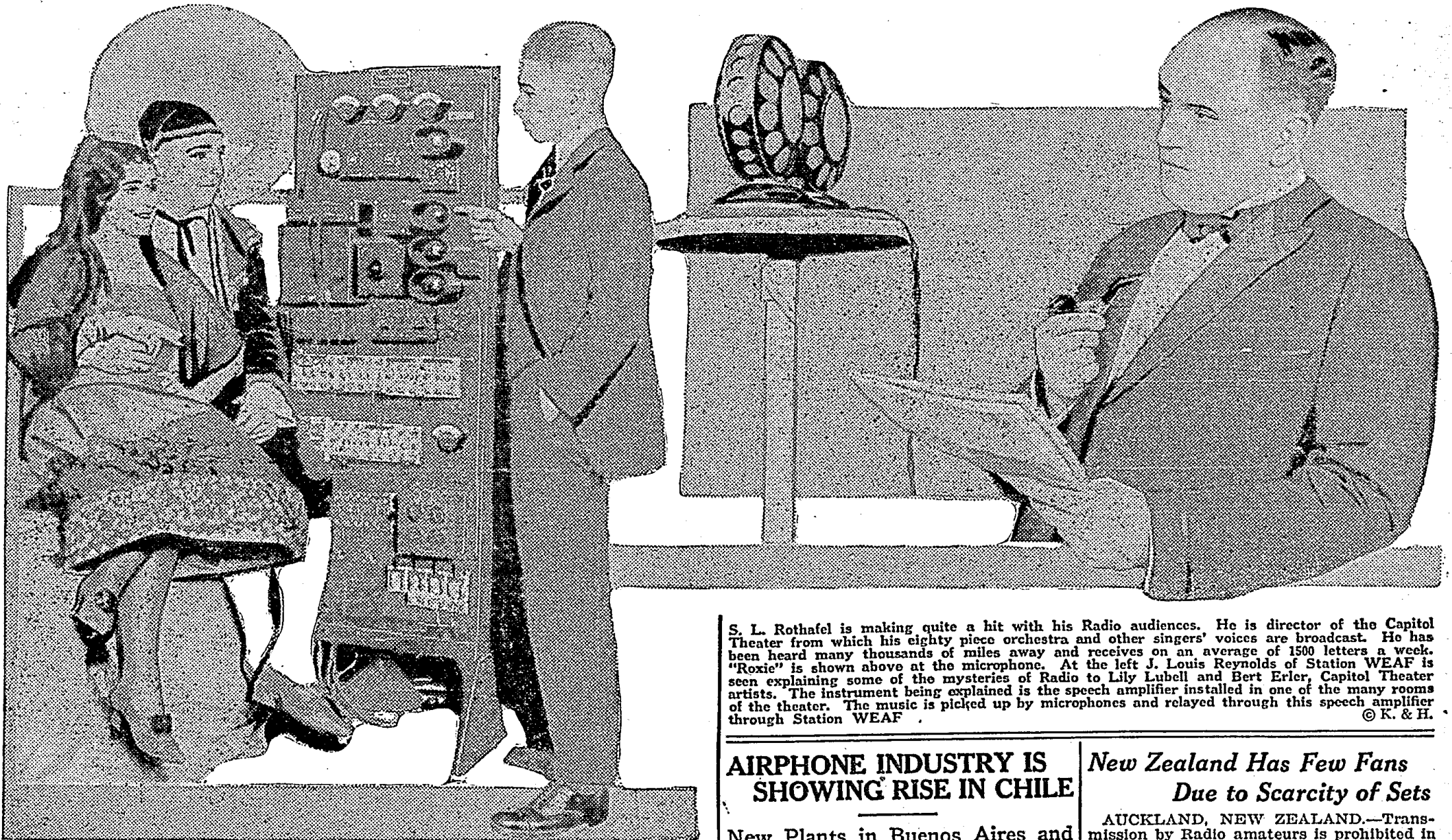
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ROXIE, LIL, BERT AND LOUIS OF WEAF



Capitol Theater, New York, Broadcasts Sunday Evening Programs Through WEAF

By Evelyn Lanzius

Ten thousand letters a week pour in upon "Roxie," S. L. Rothafel, Director of the Capitol Theater, New York City, largest moving picture theater in the world. This theater, with an orchestra of 85—supplemented by a wonderful organ, equipped with a special studio, is the biggest individual unit broadcasting in the world—every Sunday evening at seven-thirty the musical program, including overture, music incidental to the magazine, the subjects of which are explained by Mr. Rothafel to the Radio audience at seven-twenty before the music begins. For instance, one evening recently, previous to the rendering of "Love's Old Sweet Song" by "Betsy," Mr. Rothafel requested his Radio audience to lower their lights, thus bringing his own lighting effects into their homes. Many wrote in to say that they had followed this suggestion with telling effect. The following week, "Roxie," in beginning the customary announcing, apologized for his oversight in forgetting to suggest that the lights be raised again. The "Radiophans" forgave him, so we are told.

Mr. Rothafel brings a human interest touch into his broadcasting which is quite different from the cut and dried program announcing which is practically always the rule at the big studios. So many requests have been made for pictures of the artists broadcasting from the special studio of the Capitol Theater, that Mr. Rothafel has had a special studio picture made, from which a postcard will be reproduced to be mailed out to all the fans who have requested photographs of the various artists. Thousands of these requests are on file waiting to be filled.

Many people accustomed to go out for dinner Sunday evening, now wait for the announcement in Mr. Rothafel's inimitable manner of the Capitol's musical programs, which are uniformly the finest series of concerts offered either on the air or in the concert hall. They include the best of the symphonic overtures and orchestral compositions, the tabloid presentations of the popular operas performed by well known operatic artists, while the studio concert which supplements the regular program is devoted to classic and semi-classic numbers.

By his unusual method of announcing, Mr. Rothafel has established a personal contact between the million Radio listeners and the various performers in the studio. Dr. William Axt, whose services at the piano are one of the invaluable features of each week's program, is

familiarly known as "Dr. Billy"; Betsy Ayres, whose fresh young soprano and periodical ripple of laughter is known to all of the Capitol's Radio listeners, is just plain "Betsy," and Eugene Ormandy Blau, whose violin leads the strains of the Capitol Trio numbers, answers to soubriquet of "The Blue Blonde." "Roxie" introduces each artist most informally, and encourages them to talk in little personalities to the invisible audience, these being mostly in humorous vein, and there is no doubt that there is an unusual sympathy and bond of interest between the artists of the Capitol broadcasting studio and the Radio listeners.

Mr. Rothafel feels that the motion picture is in a peculiarly favorable position with respect to broadcasting. Its chief form of entertainment, the picture, can not be transmitted through the air—yet—and if people who hear the Radio concert like them in Radio form they must actually attend the theater to get the picture and their interest is greatly stimulated by the Radio presentation. Of course, the most rabid Radiophan does not claim that the musical program on the air is as perfect as that given in the theater and that thousands of Radiophans attend the theater to get the original music and to see the performers who have been broadcasting is an indubitable fact.

At seven-twenty each Sunday evening, "Roxie" "takes the air" and describes the regular theater performance which is about to be broadcast. He describes, briefly the operatic impressions to be given. All this is done from a microphone near the stage, and without interference with the performance in the theater. The performance is then given and frequently the manager during a short subject film will describe various shots on the screen. The complete musical program, a half hour of music, is then given, a microphone hanging in the auditorium about 20 feet from the orchestra pit transmitting the performance.

At about 8:15, selected artists from the regular performance are taken into the private broadcasting room where the evening concert is given. The concert room in this case happens to be the private screening room.

An interesting feature of this broadcasting experiment is that the heavy expense is not borne by the theater. The equipment is installed by the broadcasting service. It is compact equipment which is hooked up to broadcasting station WEAF, American Telephone and Telegraph Co., New York City.

S. L. Rothafel is making quite a hit with his Radio audiences. He is director of the Capitol Theater from which his eighty piece orchestra and other singers' voices are broadcast. He has been heard many thousands of miles away and receives on an average of 1500 letters a week. "Roxie" is shown above at the microphone. At the left J. Louis Reynolds of Station WEAF is seen explaining some of the mysteries of Radio to Lily Lubell and Bert Erler, Capitol Theater artists. The instrument being explained is the speech amplifier installed in one of the many rooms of the theater. The music is picked up by microphones and relayed through this speech amplifier through Station WEAF. © K. & H.

AIRPHONE INDUSTRY IS SHOWING RISE IN CHILE

New Plants in Buenos Aires and Montevideo Aid

WASHINGTON, D. C.—In Santiago, Valparaiso, and several other smaller Chilean cities, interest in Radio telephony is growing steadily and its fuller development only awaits the establishment of a broadcasting station within the country such as those now in operation on the east coast of South America, says Assistant Trade Commissioner W. E. Embry in a report to the Department of Commerce. It is reported that the broadcasting stations recently erected in Buenos Aires, Montevideo, and Rio de Janeiro have given very satisfactory results and large numbers of amateur receiving sets have been sold in these countries.

New Zealand Has Few Fans Due to Scarcity of Sets

AUCKLAND, NEW ZEALAND.—Transmission by Radio amateurs is prohibited in this colony, and the amateur is much restricted, being required to get a special permit for receiving. Prices are high, Radio sets are scarce, and conditions generally are discouraging for the amateur. In spite of this, however, there are some enthusiasts, and according to advices sent to the American Radio Relay League, American amateurs have been heard here. R. Slade, owner of station 6-KA at Timaru, South Island, has been receiving American signals frequently, and picked up 5PX calling CQ; 6-BCR calling 9-BED and 9-BED working 9-UU.

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VARIOCOILERS	Emoloid 3-inch Unbreakable......30
Eastern Green Silk Wound.....1.60	Emoloid 2-inch Unbreakable......20
Queens (180 degree).....2.30	Vernier Dial Adjustment......20
Moradio (Cotton covered).....1.50	HEAD TELEPHONES
Moradio (Enamelled).....1.50	Royal Phones.....3.75
Eastern Long Wave (150-3200 meters).....5.50	Telephone Connectors, Regal, for 3 Pair Phones......90
Cockaday Coils.....2.25	Phonograph Attachment "Y" Shape.....1.00
CONDENSERS	Radophone Adapter (Rubber Moulded).....1.35
Regal, 43 Plates, .001 Mfd. Cap.....2.25	TUBES
Regal, 11 Plates, .00025 Mfd. Cap.....1.65	Meyers High-Mu (Last Lot).....4.25
American Bell, 43 Plates with Vernier.....3.65	BATTERIES ("B" Only)
Arrow, 23 Plates with Vernier.....3.50	Volton 2 1/2 V., Small Size......90
Phone By-pass, A. J. M......85	Volton 2 1/2 V., Medium Size.....1.14
RHEOSTATS	Volton 2 1/2 V., Large Size.....1.55
Regal (High quality, 8 ohm)......70	Volton 4 1/2 V., Medium Size.....1.98
Klooner Vernier......55	Volton 4 1/2 V., Large Size.....2.50
Paragon......60	MISCELLANEOUS
Roberts 6 Ohm Standard.....1.80	Single Circuit Jacks......25
Bradleystats.....1.20	Double Closed Circuit Jacks......25
Resistances......25	Telephone Plugs......65
SOCKETS	Bus Bar Wire, per foot......015
Moulded......35	Spagetti (any color), per length......07
Rameco......35	Single Coil Mounting......35
Turney (All Metal)......25	Double Coil Mounting.....2.00
TRANSFORMERS (Radio Frequency)	Triple Coil Mounting.....2.50
Tricoll (of Subway Reception Fame).....1.35	All Atwater-Kent, Radio Corporation of America, Fada, DeForest, Dubilier, General Radio and Brach merchandise—Special prices on inquiry.
Radio Laboratory RT-1.....2.50	We also carry in stock at all times all parts for Flewelling, Reinartz, Reflex, Cockaday, Hazeltine, Neutrodyne, Mawhinney and Armstrong Super-Regenerative Circuits.
Murad T-11.....2.20	All merchandise guaranteed by both the manufacturer and ourselves. Will be shipped upon receipt of purchase price, including postage.
Baldwin.....1.55	
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Kesco 3 1/2-inch Moulded......30	
Kesco 3-inch Moulded......25	
Kesco 2-inch Moulded......25	
American Hard Rubber, 3-inch......50	

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The Week's Advance Broadcast Programs

Tuesday, May 29

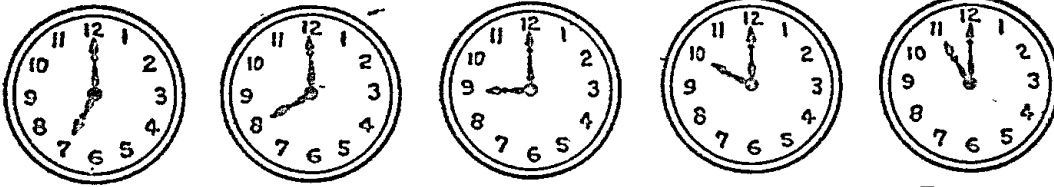
KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; Lecture, "The Dependent Child," Geo. B. Enlinger.

George Faulkner; 9:15 P. M., Concert, Mrs. Luella O'Brien, soprano; Mrs. Hilda Butler Farr, pianist.

Alchele Orchestra; Prologue from "Three Springs," Ladies' Trio, First Presbyterian Church, Harrison, Ohio.

KPO (Pacific, 423), 8:00-10:00 P. M., Musical program arranged by Y. M. C. A. Four minute talks by prominent men.

What Time Is It?



THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating.

WJAX (Eastern, 390), 7:30 P. M., Concert arranged by Cleveland News Dealer.

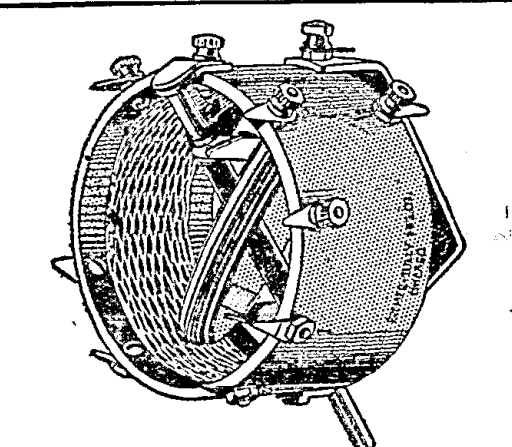
Stephens, auto editor of Daily News; Norman W. Taylor, pianist; 9:15 P. M., Concert, Mrs. Beatrice F. Erlinger, soprano; Frank Pfau, pianist; Frank Polesny, violinist.

Thursday, May 31

KFDB (Pacific, 400), 2:00-3:00 P. M., Special music; 8:00-10:00 P. M., Musical program, Mills Trio, harp, piano and violin, Mills College.

Friday, June 1

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; Lecture, "Character—The Basis of Bank Credit," Andrew Miller.



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Wednesday, May 30

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, Decoration Day; 8:00-9:00 P. M., Program, Memorial Day, G. A. R.; Spanish War Veterans, American Legion.

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Table listing various radio parts and their prices. Columns include PHONES, SETS, COUPLERS, VARIOMETERS, TRANSFORMERS (Audio Frequency), TRANSFORMERS (Radio Frequency), DETECTORS, SWITCHES, MISCELLANEOUS, and TUBES.

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How to Make One Condenser Flivver Super Set

Part V—Operating Kinks; Troubles; Conclusion

By E. T. Flewelling

MR. FLEWELLING ends his series with the following article. However, he has volunteered to answer each week the best Flewelling super question addressed him in care of the Digest. In this manner he hopes to put to end some of the troubles Radiophans have encountered in experimenting with his excellent, but critical, circuit. The weekly Flewelling question and answer will be given a special department outside of the usual questions and answers.

IN this, I believe, the last article of our series on the one condenser Flewelling Super, I am going to try to describe the best method of operating the set and also try to show the method that I have found best to use in order to get the set to operate in the beginning. From the letters received we must form the opinion that many fans are operating a Flewelling without any "soup" in it.

Power of Amplification

The "soup" or extraordinary power of amplification in the Flewelling comes from a blocking and freeing of the action of the vacuum tube working in conjunction with a charge and discharge ripple from the .006 mfd. condenser in the circuit. This action results in the high pitch whistle in the phones that we have so often mentioned. Unless this whistle is evident you may be sure that you are not getting proper results from your set. Knowing this then, we had best show how to put our set in this condition.

First look at the diagram and note the two points at the input side of the set, marked A and B. This diagram shows the wiring of a set that may be used either as a Flewelling super or as a straight regenerative set. As we are concerned for the moment with the Super part let us consider this side of the set first.

Super Action in Set

Place the 2-point switch on the point marked X, that is, to the connection that runs to a point between the phones and the inductance L-2, or tickler coil. This completes the super diagram and leaves condenser C-3 in its operating position. Now (and this is the most important thing that I can say to those that are trying to get a Flewelling to operate) do not connect the set to any antenna or ground whatever, while you are testing it for the super action. Once you have heard the whistle you will always remember it. This statement applies to either of the types of super that we have discussed, do not, until after you have heard the whistle, connect the set to anything but its own batteries and phones. Light the tube to full brilliancy and connect the B battery. As the connection is made, you should hear a sharp click in the phones. If you do not, reverse the leads to the B battery and if the click is not then heard you may be sure that you are wrong somewhere and connections should be entirely checked up.

Finding the Whistle

Granted that the click is heard we may proceed. Loosen the coupling between coils L-1 and L-2. In the honeycomb coil type this means that the coils should be spaced about 1 to 2 inches apart. In the receiver we are discussing, the ball should be at about a one quarter turn position. Next slowly (emphasis on slowly) turn the variable condenser from its zero position to full value. If the whistle is then heard you may skip reading the next paragraph, but if it is not heard you have two more things to check.

Leaving the coils as they were, slowly move the variable grid leak from its zero point to its full capacity and if no whistle results somewhere in its travel you may be positively sure of where to locate the trouble. Either your set is wired incorrectly or the polarity of the tickler coil is such that the coil is working against instead of with, the inductance coil L-1. It is then simply a question of reversing the tickler coil, or finding the

incorrect wiring in the set. For the above tests on the honeycomb coil type of set you are sure that you have the correct values of inductance. On the variable inductance that we are using in this set, however, some difficulty may be had with this point and I would suggest that you try the tests with the tap switch on one of the intermediate points, such as 3 to 5.

Variable Tuning Condenser

Now this set has the variable tuning condenser connected in series with the

super gives it more like the coal man putting a ton of good hard coal into your cellar. If you are tuning your station through this noise you certainly will know what "noisy reception" means, but it is not necessary to do so. The station will come in just on the edge of this noise, or just as the noise is beginning.

The noise is entirely absent on local stations and enters into the scheme of things in direct proportion as such difficulties as lack of energy collector, static,

Radio operators will go right past a station without knowing that it is there, while tuning as they ordinarily do. One must, while tuning this set, use extreme care and move the controls very slowly. This is not a hardship with this set because there are but two controls, the variable condenser and the tickler.

When used as a super the tube is at full brilliancy and neither the rheostat nor the polarity of the A battery are of any interest to us. The B battery voltage will be as high as your tube will stand for the super, and should be cut down to the average normal value when the set is used as a straight regenerator.

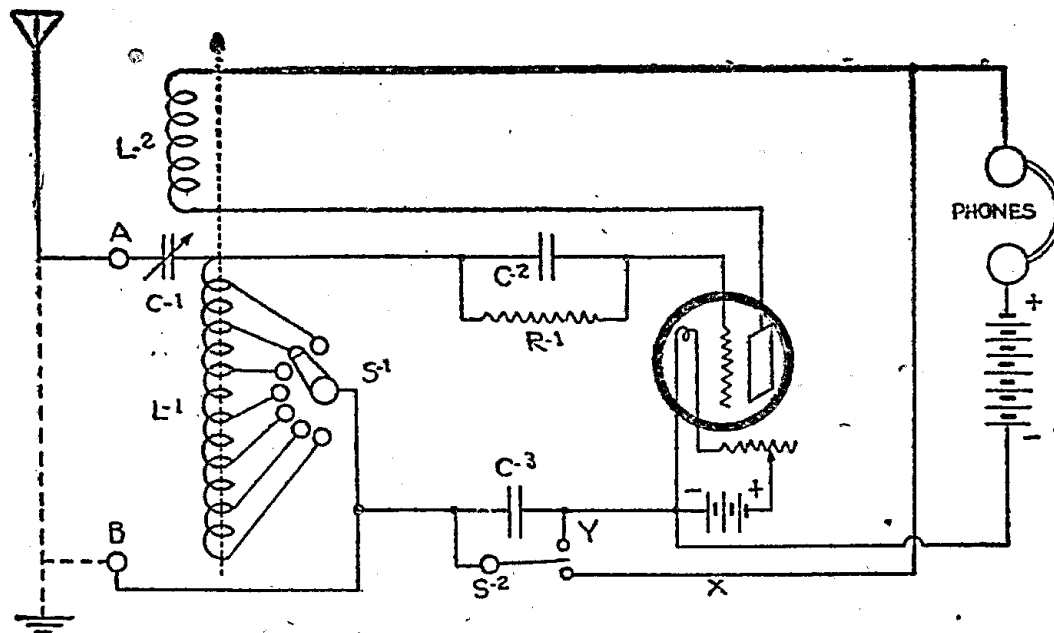
When using the set you may if you wish, use both antenna and ground in the usual manner either with or without the super. This is purely a matter of personal preference or convenience.

Locals Not Much Louder

Before closing the series I would like to bring out one point. If the super is used correctly you need expect not much greater results on local stations than a good regenerative set will give you. This can easily be checked with this set by changing from one set to the other. On the other hand, however, the super has a distinct field of its own. That it is with a weak signal, one that the plain set could not detect at all.

Perhaps the best way to find out if your super is up to normal is to check it up with a weak signal. If the set is operating correctly you should be able, without antenna or ground of any kind, hear a station if it is within 20 miles. This, during the daytime. At night conditions are very much better and we have received letters claiming reception of 500 to 1,000 miles. The writer believes this last to be more or less freak reception although he has himself done it, but it will show that there is at least the possibility of bringing the distant fellow if you handle the set correctly. Of course, things are considerably easier if the set is working on an antenna or a ground. In such a case you should, without trouble, consistently operate over distances of 1,000 to 1,500 miles and more.

(THE END.)



Wiring Diagram for One Condenser Circuit

inductance and the energy collector, as the ground or antenna when they are used. When they are not used the condenser has but little value in the circuit as it is shown, but we can secure the full value of it by either of two methods. If we connect post A with the post marked B you can see that the condenser is then in multiple with the inductance and can then be used for tuning. Our other way out is to connect the post marked A to a short length of wire. This wire may run from 3 to 5 feet long up to a regular antenna, or it may be substituted for by any metallic object at hand. In other words, if you do not wish, or it is inconvenient, to use an antenna, then connect the post marked A to anything that is handy that you think might conduct a Radio wave to the set. Start in with the smaller objects first and then you will be able to follow the action and see when your energy collector is too large for your setting.

Controlling the Whistle

The great point about the above is that your set should whistle and you should be able to control the whistle, and you will more likely learn how this is done if you start with the set itself before it is connected to anything. Watch, too, that the whistle is neither too loud nor too soft and this can best be judged by variation of the grid leak while listening to a station. Note also that once you have tuned a station with the grid leak that it should not be necessary to change the leak after that for other stations.

Having shown how to check the whistle of the set we can refer to another sound that should be heard. As the tuning is varied you should hear a sound like tearing of cloth. The ordinary regenerator gives this sound as a sort of hiss. The

distance or other obstacles present themselves.

Selectivity

A statement that the Flewelling circuit is not selective, is sure evidence that the person is not correctly operating the set. We are all willing to admit that the use of a vernier condenser adds nothing to the efficiency of a Radio circuit, yet the writer has consistently advised the use of one with the super. The answer is that the set tunes so sharply that even experienced



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Ask your dealer for Federal Standard Head Sets. If out of stock he can get them from our nearest office. Accept no substitute.

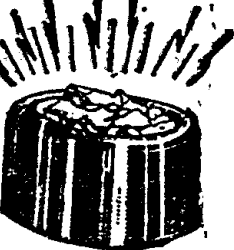
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3/32" THICK	1¢ PER SQ. INCH
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3/16" THICK	2¢ PER SQ. INCH
1/4" THICK	2 1/2¢ PER SQ. INCH
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ADZ, Wenatchee, Wash. 360 meters. 700 ml. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music.

- AG6, Canton, O. 425 meters. 500 ml. Hdqtrs. 135th Field Artillery...
ADZ, Wenatchee, Wash. 360 meters. 700 ml. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music.

Serially Continuously— THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here.

- KFBB, Havre, Mont. 360 meters. 150 ml. F. A. Buttrick Co. Daily ex Sun, 12:30 pm, agriograms, weather, news, Tues, Fri, 8-9:30 pm, music. Mountain.

- KFHF, Kearney, Neb. 246 meters. Radio Bug Prod. ucs Co.
KFHR, Seattle, Wash. 360 meters. Star Elec. & Radio Co.

(NOTE—The second part of the station schedule list will appear next week.)

ADVANCE PROGRAMS

(Continued from page 6)

Concert, Vreeland Mandolin Orchestra. WGY (Eastern, 380), 5:30 P. M., Special children's program...

Saturday, June 2

KSD (Central, 546), 3:00 P. M., Concert, Dorothy Corkins, vocalist and reader... WGY (Eastern, 380), 7:00 P. M., Address, 'League of Nations'...

Sunday, June 3

KPO (Pacific, 423), 11:00-12:15 P. M., Organ recital, Gladys Salisbury...

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CIRCUIT USE MY SPECIAL COUPLER 100 TURNS ON ROTOR PRICE \$3.00 Postpaid FREE With Above 3 .006 Condensers...

WBAP (Central, 476), 11:00 A. M., Church services, First Methodist Church... WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class...

Monday, June 4

WBAA (Central, 360), 7:15 P. M., Purdue news of the Week; Educational lecture. WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Orchestra...

Reviews of Books

Radio Telephony. By Alfred N. Goldsmith, Ph. D. This book is intended for Radio engineers, operators and experimenters.

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to be clearly informed concerning Radio need this book. It is written in a clear style, fully illustrated with wiring diagrams and photographs of Radio apparatus.

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$2.00.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, \$1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, \$2.50.

Radio for the Amateur. By A. H. Packard and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted.

SPECIAL REWARD OFFER

(Continued from page 2)

Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents (\$1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents (\$1.80) the following will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents (\$2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Democal Variable Condenser 11 Plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars (\$3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4).

Importance of Good Aerials

To get the maximum results out of any installation and to receive the loudest signals, it is necessary to have a carefully constructed and well-insulated aerial. A poorly insulated aerial is as bad as a leaky bucket.

HOOK-UP BLUE PRINTS WITH ALL PARTS' VALUES GIVEN FOR—

Table listing hook-up blue prints: 1-Hazellone Neurodyne, 2-Gibbons Ultra Audion, 3-Cockaday Four-Circuit, etc.

THE LARGEST RADIO STORE IN AMERICA BUY HERE FOR LESS THE LARGEST RADIO STORE IN AMERICA. Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise. 10A WESTERN ELECTRIC LOUD SPEAKER, complete, \$161 value, . . . \$98.45. BRACH LIGHTNING ARRESTER, 95c. COMPLETE PARTS FOR ULTRA AUDION CIRCUIT (Known as Wonder Circuit) . . . \$11.90. HONCHARGER, De Luxe Model \$12.95. COMPLETE PARTS FOR 2 STEP AMPLIFIER \$12.45. THORDARSON AMPLIFYING TRANSFORMER, High and Low Ratio \$2.45. COMPLETE PARTS FOR FLEWELLING CIRCUIT \$12.45. ORIGINAL BALDWIN PHONES. These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at \$9.95. U. S. A. SIGNAL CORPS (Aviation Type 194-W) WESTERN ELECTRIC PHONES. \$7.95. Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special \$4.65. 3000 Ohm GUARANTEED HEADSETS, \$8.50 Value. \$3.65. LOOP AERIALS \$5.95. COMPLETE PARTS FOR KNOCKED DOWN RECEIVING SET \$17.95. COMPLETE PARTS FOR ULTRA AUDION CIRCUIT (Known as Wonder Circuit) . . . \$11.90. Moulded Variometers \$3.45. 180° Moulded Variocouplers \$4.45. Mahogany Variometers \$3.95. 180° Bakelite Variocouplers \$1.75. Freshman Variable Grid Leak and Condenser. . . 75c. CRL Adjustable Grid Leak and Dubbler 1.35. Master Baldwin Type C Units with Cord. 3.95. Master Baldwin Type C Headsets. 6.95. Brandes Superior Headset. 5.75. Antenna Aerial Plug. 1.15. 3 Coil Honeycomb Mounting 3.45. 2 Coil Honeycomb Mounting 2.60. WD-11 Bakelite Sockets.60. Fifth Cord Tip Plugs.50. VARIABLE CONDENSERS \$3.30 Value, 42 Plate, now \$1.75. 3.70 Value, 23 Plate, now 1.45. 3.30 Value, 11 Plate, now 1.35. 3.10 Value, 5 Plate, now 1.25. 2.70 Value, 3 Plate, now 1.15. 7.00 Value, 43 Plate Vernier Var. Condenser. . . 3.95. 6.50 Value, 23 Plate Vernier Var. Condenser. . . 3.45. 6.00 Value, 11 Plate Vernier Var. Condenser. . . 2.95. JACKS Patent Single Circuit. \$0.35. Patent Double Circuit.50. Federal Single Circuit Filament Control.35. Federal Double Circuit Filament Control.50. HONEYCOMB COIL 1,500 Turns \$1.50. 1,250 Turns 1.50. 1,000 Turns 1.25. 750 Turns 1.00. 500 Turns75. 150 Turns50. 100 Turns50. 75 Turns40. 50 Turns40. 35 and 25 Turns.40. CABINETS—MAHOGANY AND WALNUT 6x 6 3/4" by 6" deep \$1.45. 6x 7 3/4" by 6" deep 1.95. 6x14" by 6" deep 2.45. 6x16 1/2" by 6" deep 2.95. 6x12 1/2" by 6" deep 2.95. 9x12 1/2" by 7" deep 3.95. 9x10 1/2" by 5 1/2" deep 2.95. Sphagetti Tubing, yard10. Phone Caps, for mostly all phones. 25. Lightning Switches 2.65. Hydrometers, now at45. Rheostats45. Sponge Rubber Ear Caps, Pair.50. Dials, 2, 3 and 3 1/2" Inch.25. Grevol Detectors 1.35. Signal Corps Super Sensitive Microphone Transmitters 2.45. Solid Copper Aerial Wire, 100 ft.35. FORMICA PANEL, Black or Brown, cut while you wait, SQ. IN. 1 1/2c. We guarantee all merchandise purchased of us. Mail orders receive immediate attention. BUY HERE FOR LESS CHICAGO SALVAGE STOCK STORE CHICAGO, ILLINOIS 509 South State Street

Radio Digest Illustrated

REG. U. S. PAT. OFF.

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Secret Communication

Machine Reception Beats the Human Ear
BIG BUSINESS and other organizations will soon be sending their messages through the air with greater speed and secrecy than even their own private telegraph lines. The long expected system of secret and fast Radio communication is almost ready for general adoption. Tests made show that messages can be sent out faster than they can be typed by a competent stenographer. These messages are received with the same speed and a machine slows them down so that the typist may be able to copy them.

Now another step in the development of the device makes it unnecessary to slow them down, a machine sends and receives them in typewriting. More important, however, is secrecy. Large business firms have seen the practicability of interbranch Radio communication. Soon they will be using it to their advantage.

Ever Meet the Near Expert?

Meddlesome Parties Do Much Damage

AS A RULE everything goes along happily with the new Radio set until the near expert friend horns in. Having built a successful crystal set he feels qualified to advise the world.

If you have an adjustable grid leak on your set his fingers just itch to jiggle with it until it is hopelessly out of adjustment. Ofttimes, hearing that varying the plate voltage on the tube gives better results, he will bungle things until he gets the filament leads hooked up to the high voltage B battery and blow your tubes.

The wise Radio set owner never lets a novice monkey with it at all and plainly tells him to keep off. You know your outfit, or should at least, and know how to work it to get best results. It will function right if not tinkered with in an unintelligible manner. Beware of the near expert as you would smallpox.

Summer Boom Expected

Outlook Very Bright for Summer Reception

WHETHER the present boom in Radio business will keep up throughout the summer months depends largely on the attitude of the Radio manufacturers and the dealers themselves. There are many reasons why good business may be expected this summer. If there is a decrease in interest in Radio it need be only a slight one compared to the corresponding seasonal decrease in the phonograph business.

Radio has been until the past year an indoor sport. The usual apparatus is bulky and includes heavy storage batteries, and is difficult to move from indoors to outdoors to meet summer time conditions. The use to which an increasing number of people are putting Radio, that is, the day-by-day reception of broadcasting, makes the receiving apparatus fill to an increasing extent a place in one's daily program which is quite similar to that of the phonograph. Dealers who make a specialty of complete Radio receiving sets appreciate that for many purposes a portable Radio set is as desirable as a small portable phonograph.

During the past year there have been two important things developed that brings Radio up to a level where it can be conveniently used out-of-doors. The dry battery tube and the loud speaker. It is quite possible now with the small portable sets to receive broadcasting while out camping, boating or on an automobile tour. It is a noteworthy fact that exploring parties now take Radio receiving sets with them for a dual purpose of furnishing amusement during the evening hours at camp and for receiving time signals with which to check their chronometers.

It must be conceded that transmission conditions are not as good in summer as in winter, but this need not interfere with good reception from local stations. Last year we had about 135 broadcasting stations and this year over 500 well distributed stations and it is quite possible to get reception in any section. About 95 per cent of the population is within 100 miles of a broadcasting station.

While this increase in the number of broadcasting stations in operation is an important factor in the Radio situation this year, a still more valuable factor from the viewpoint of the listener is the very notable improvement in the quality of broadcast programs.

RADIO INDI-GEST

CONTEST TO END

Contest letters are still coming in in our big \$500,000.-000,000.19 Cash Copper Contest and the judges swear they are going to strike on us if we do not close it soon. We have decided to close the contest and announce the winners in the issue of Indigest dated June 9. However you still have time to get your letter in. If you have not entered the contest—GET YOUR LETTER IN IN TIME TO GET IN THE JUNE 9 ISSUE. Below is a photo taken of two of the judges opening the mail.



When Pa Listens in

When Pa comes in, we kids sure scatter
Can't stay around at all, with out noise and clatter,
For when Pa listens in on our Radio,
Even Ma must whisper and act just so.

He fusses around turning each dial,
Gives each little knob and switch a trial,
Then settles back with a contented sigh
To listen to the jazz from W. O. A. I.

From the Red Apple Club and W. M. C.,
From the Merry Old Chief or W. D. T.,
Or the hired hand or Shut 'er down Ed,
Never moving except to smile or nod his head.

If old man Static should happen in, too,
We all know that trouble will sure brew,
He says the funniest things I ever heard,
But I can't understand, not even a word.

It's all about an aerial, a condenser and a ground,
And all he can get is that awful sound,
He even blames the fellow that lives close by,
Says when he tunes in he doesn't half try.

And so it goes on until way after two,
Then Pa retires just mad through and through,
He falls asleep wondering just what is wrong,
And hoping next time it will come in strong.

I wish the man that made the first Radio,
Had jumbled it up so it wouldn't ever go,
Then Pa would still be just one of the boys,
Instead of an old grouch that don't want no noise.
—I. M. HARNEY.

Absolutely. The Station Is Hanging New Wall Paper

Dear Indigestion: I know a fellow who has a friend who said he was fooling with the rheostat on his crystal set, after having disconnected the antenna, ground, batteries and loud speaker, and got Station AEIOU (and sometimes W and Y) in Kamtachatca, Mars. I say, 'taint true cause said station ain't operating no more on account of being remodelled and to prove it I showed him the "Advanced Programs" on page 8. Ain't I right? Yours until Niagara Falls. —Mike Rofrads.

Since printing the announcement of the Kink Department, in which we said Send A Dollar, we have received so many contributions with the dollar enclosed that we now have \$0.04 as total collections from same. Our staff is working overtime to refund this money to the senders as we really did not mean for you to send them in. Indigest is supposed to be a funny column. Honest to goodness, we'll swear it. Don't take us so seriously. —Indi.

We Congratulate You

Dear Indi: Having read your article on the American Rum Running League I though I would try your plan out. I placed the faucet in the ground circuit and at once began to get some Wireless Raw Whiskey from WRW. This was too strong for me so I tried WHB and got some Wireless High Balls. I then tried for some Wireless Light Wines from WLW but there was so much Wild Orange Squeeze coming from WOS that the high balls were rather weak. I must have been a little tipsy then for I accidentally tuned in KOP and one of them must of smelled my breath, because I'm writing from the jail. —Edward S. Pattison.
W.S.F.P. (Wireless Sets For Prisoners.)

Dear Indi: I have just built a ten-tube portable set with a two-ton motor generator in the cabinet. However I am having trouble with the howls of the tubes. Do you think I have been successful? —Polly W.
A.—Yes, by all means. Your set is a howling success.

Here lies the remains
Of Johnnie McHoltz,
He tried to grab hold
Of three thousand volts.

We Have Taken Steps to Stop It

Dear Indi—In listening in on a recent program I heard the announcer say, "The next number will be when the leaves come tumbling down by request." I have been looking forward to spring and want to know if there is some way we can stop the Broadcasters changing the season. —I. M. Hart.

Your Dollar Was Excepted

Dear Indi: Your ish of May 5 received and I see you are excepting good one dollar notes from anyone so foolish to send it with a kink that will prove bothersome to Radio-knits. I have discovered that connecting a 45-volt B battery to the filament posts of a tube will quickly dispose of same. Some wise dummy named them "B Batteries" because this is one way you can get stung. —I. Amthleck.
P. S. Enclosed try to find a dollar.

Looking Ahead

Indigest Is Going to Have a Broadcasting Station. We have the buildings built and the apparatus installed, all that is lacking is the antenna system and the interior decorators and paper-hangers are now at work on the finishing of this. As this goes to press a speeding airplane is on its way from the Pacific Coast with the latest pictures of the station and we are going to show them to you next week. Get INDI-GEST from your most prosperous news dealers—10c—and read all about our new plant NEXT WEEK!



Condensed

By DIELECTRIC

We have been reading of "largest" stations for some time past, and they have been increasing in power right along, but now comes the station with power to transmit over a range of several thousand miles. This is to be built in Oakland, Cal., by the General Electric company and officials of the company claim it will have the most power of any station in the world. "More power to it."

Still another country is falling into line with the Radioized nations, which reduces the number of backward States in the world. This newest nation is Norway. It is planned to build three stations in Christiania, Trondhjem and Bergen so that Norway may keep in touch via Radio with the other broadcasting stations throughout the world. It will eventually be possible to talk from your room to ANY part of the civilized globe—and that isn't a pipe dream either.

No matter how fantastic the prophecy may seem to you at the moment depend on it most of them become realities. Many of the statements made but a short time ago were derided as "pipe dreams," yet in many cases we are witnessing the actual operation of the impossible. A Radio expert has said that within six months time anyone may talk from his home to parties in London or Paris by simply using the ordinary telephone and having his speech relayed by Radio to the other side.

You hear knowing ones who persist in telling you that this Radio stuff is all a fad and will die out in time. Well, don't dispute that point with them because it's true. In due season all things will come to an end, however, the fad part of it is pure buncombe. Every day it is being used in a business connection to disprove the idea of mere plaything. The city of Boston is getting ready to install Radio sets on the three fire boats kept in the harbor and the cost of so equipping them amounts to several thousand dollars.

Station KSD in St. Louis proposes to "show us" how to broadcast light opera now that the season of "heavy" opera is over. The Municipal Opera Company will have two of its evening performances sent out each week for the benefit of the regular Radio audiences of this popular station. Victor Herbert has the honor of having his opera "Naughty Marietta" open the season on the 28th of this month.

Since the new regulations with respect to broadcasting stations was determined upon there have been sixteen applicants for Class A licenses. These are pretty well scattered over the country, and while some of them are on the same wavelength such are not in one state or district, so do not conflict in the area in which they may best be heard. It is this feature of the new plan which augurs well for better reception by those anxious to hear stations in other states.

General Squier is ever on the alert to find new and better means of sending and receiving Radio signals. It is safe to say that few men active in this branch of science are giving more time than he to certain details which may result in a great saving of time and money. The plan which he has presented for a universal code would, if adopted, save many costly hours under the present system of pauses.

Those holding copyrights to certain musical compositions in this country have shown a jealousy as regards the general use of said music with a tendency well known to us all. In France it is reported a musical performance could not proceed until the musicians were assured no transmitting outfit could be used in the opera house. One famous opera singer complained of the very small remuneration he was to receive for singing in a studio, and insisted the public who could hear via Radio would never pay the price to come to the opera house to both see and hear him. I believe

First Steps for Beginners in Radio

Chapter IV—About Condensers and Inductances

By Thomas W. Benson, A. M. I. R. E.

A CONDENSER is simply a device that possesses the ability to store electrical charges. It consists of two conductors placed close together but separated by some insulating medium termed the dielectric. Thus any two conductors between which there exists a difference of potential acts as a condenser and they possess capacity or the power to store an electric charge.

Capacity of a Condenser

There are a number of conditions that determine the capacity of a condenser or the amount of current it will store. Thus the closer the plates are together the greater will be the capacity and likewise the greater the area of the plates, the greater the capacity. We find also that the insulating medium or dielectric between the plates has a great effect upon

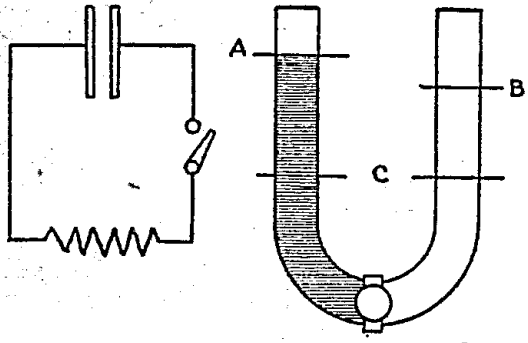


Figure 14—How a Condenser Oscillates when It Is Discharged

the capacity of a condenser. For the sake of comparison air is taken as unity or one and all other dielectrics are measured from that base. This property is termed the specific inductive capacity of the substance, the following table giving the more common insulators and their inductive capacity:

Plate Glass	8
Window Glass	5
Paraffin Wax	2
Shellac	3
Sulphur	3
Mica	5

It should be clear that if two plates a certain distance apart in air have a certain capacity and we insert a piece of common glass between them of the same

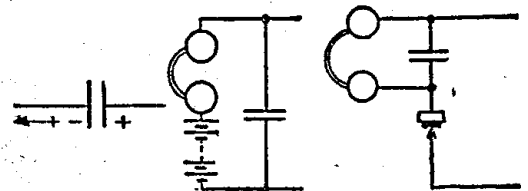


Figure 15—How a Condenser Acts to By-Pass Radio Frequency Currents

thickness as their spacing and the capacity will now be 5 times as great.

Unit of Capacity

The unit of capacity is the farad. That is, a condenser has a capacity of one farad when it will store 1 ampere of current at one volt potential. This unit is entirely too large for practical use, so the practical unit is the microfarad or one thou-

REFLEX

Erla Reflex Transformers
DEALERS: SEND FOR LITERATURE

HUDSON-ROSS
123 W. Madison St. Chicago

Crystal Fans Wake Up

"The Vacuum Tube's Only Rival"
Lasts Indefinitely

50c **CRYSTAL** 50c

Approved by Mail, Tribune, Radio, World. Make your set sound like a brass band.

RADIO CORPORATION OF AMERICA OPERATES use the L. D. R. Crystal as detector in conjunction with one or more stages of amplification. Satisfaction Guaranteed or money refunded. FREE. The Jaynxon Multiplex Catswhisker. Fits all detectors. Applied in Jiffy. Will make your set loud and clear.

FREE. Information and hook-up how to receive 475 miles on a crystal.
FREE. How to amplify your crystal set.
FREE. The Jaynxon One Tube Reflex. Local on loud speaker D. X. on phones.
FREE. SEND FOR THESE RIGHT NOW.
Dealers, Wake Up! Some Meow!

JAYNXON LABORATORY
57 Dey St. New York City

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:

- Chapter V—Tuners and How to Tune Your Set.
- Chapter VI—About Crystal Detectors.
- Chapter VII—Tube Detector Theory and Operation.
- Chapter VIII—The Regenerative Detector.
- Chapter IX—Radio Frequency Amplification.
- Chapter X—Audio Frequency Amplification.
- Chapter XI—How Super Regeneration is Accomplished.
- Chapter XII—Reflex Circuit Operation.
- Chapter XIII—About Headsets and Loud Speakers.
- Chapter XIV—Batteries Used in Radiophony.

sandths of a farad. This is abbreviated to mfd. The condensers used in Radio work are rated then in decimal parts of the mfd.

So much for the condenser itself, now let us see how it is used in the Radio receiving set and how it functions.

In Radio sets condensers are used for a variety of purposes and the particular type of condenser to be used will depend upon the service for which it is intended. The first and most important function of the condenser is to tune the circuits in connection with inductances to a certain wave length. How this is accomplished will be clearer when we consider the effect of a condenser in an oscillating circuit.

Analogy of Condenser

Referring to Figure 14 we have a condenser shunted across an inductance. As

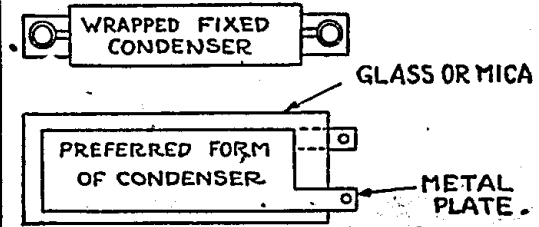


Figure 16—Types of Fixed Condensers

an analogy to this circuit there is also shown a U-tube fitted with a stopcock at the bend. When an electric charge is impressed on one plate of the condenser it is equivalent to filling one leg of the U-tube with water up to the point A. Confining ourselves to the tube it will be apparent that when the stopcock is suddenly opened the water will run out of one leg up into the other leg of the tube, but due to its inertia it will rise to the point B and will then flow back again. This

TWO SUPERSENSITIVE CIRCUITS

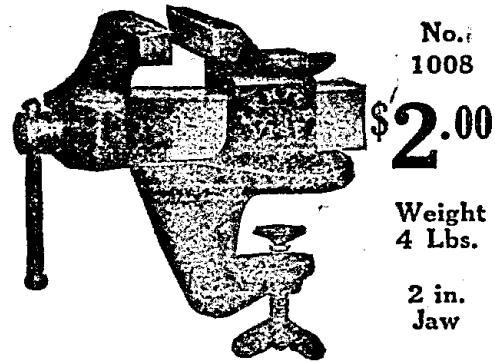
(Both Copyrighted)
My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, \$3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.
My W. D. (I) Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, \$3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.
These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.

S. A. TWITCHELL
1925 Western Ave. Minneapolis, Minn.

RADIO VISE



No. 1008

\$2.00

Weight 4 Lbs.

2 in. Jaw

The Handiest Tool for Building Your Own Set From Your Dealer or Send \$2.00 (\$2.25 west of Mississippi) and We Will Send One Postpaid
Bonney Forge & Tool Works
Bilghman & Meadow Sts. Allentown, Pa.

that the frequency of a current falls off as the wave length increases. Therefore when we increase the capacity of a condenser in a tuned circuit the circuit will oscillate fewer times per second and hence is tuned to a longer wave length. More about this will come in the chapter on tuning.

Condensers Used as a By-Pass

Condensers are also used as a by-pass for high frequency currents. This application is seen in the condenser across the phones in a crystal set, that across the phones and B battery in a regenerative set and across the audio frequency transformers in a reflex circuit. These condensers will pass the high frequency or Radio frequency currents but are effective checks to direct current.

Just how this is possible will be clear from the following. Consider Figure 15, which shows the two applications of by-pass condensers and also a simple condenser to explain their operation. When a positive charge is impressed upon one plate, as shown in the illustration, it in-

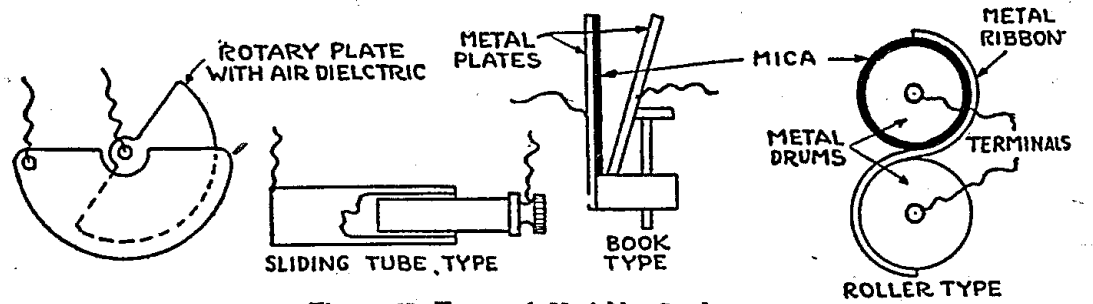


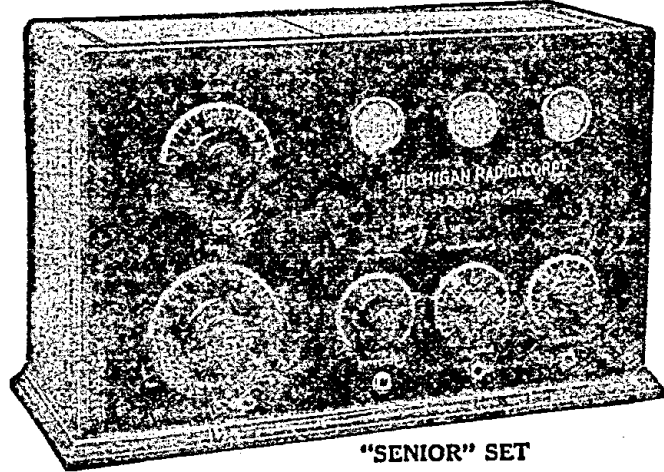
Figure 17—Types of Variable Condensers

equilibrium is established. And so with the condenser, when the switch is closed the current rushes to the other plate, but due to the inductance it overreaches itself so to speak and charges the condenser in the opposite way, only to discharge back again.

The length of time it takes for each oscillation of the circuit depends upon the amount of current in the condenser and the impedance of the circuit. With an increase in the size or capacity of the condenser it will be clear that it takes a longer time for the oscillation to take place. We know from a previous article

duces a negative charge on the opposite (Continued on page 14)

AMPERITE
AUTOMATIC FILAMENT CURRENT ADJUSTER FOR EVERY STANDARD TUBE
ELIMINATES RHEOSTATS
EXPELS ALL TUBE TROUBLES
FROM YOUR DEALER OR RADIAL COMPANY \$1.00 WITH MOUNTING
634 GRAND AVE., NEW HAVEN, CONN.



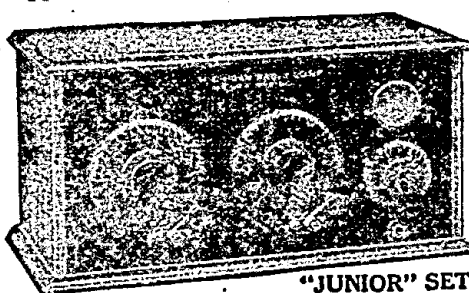
"SENIOR" SET

WONDERFUL!

That one word appears in nearly every one of the hundreds of letters written to us by happy owners of

MICHIGAN "SENIOR" and "JUNIOR" Regenerative Receivers

They tell us how stations two or three thousand miles away come in so clear that they can scarcely believe their ears when the announcer tells his location. How our patented Split Hair Vernier Dial Control enables them to tune in to almost any station, on which they had made previous record of dial-positions. How the tone-quality and volume they get through their Loudspeaker (with the Michigan Senior Receiver) approaches that of headphone reception on ordinary sets.



"JUNIOR" SET

Regeneration—or feeding the output of the detector tube back into the same tube instead of into a second tube; gives an enormous increase in the sensitivity of the detector. This invention by Armstrong made modern radio telephony what it is.

"Michigan" Receivers are licensed under Armstrong's U. S. Patent No. 1,113,149, and pending letters patent No. 807,388.

MICHIGAN RADIO CORPORATION

GRAND RAPIDS, MICHIGAN

Reinartz Tuner Hook-Up Gets Results

Reception Better with Less Filament Current

After reading of C. K. Beebe's improvement of the Reinartz tuner I decided to try a little experimenting myself. To say that I got results would be putting

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

it very mild. I secured the best results with the arrangement as shown in the accompanying sketch. The rotary plates of the condenser should be connected to the switch lever in order to reduce body capacity.

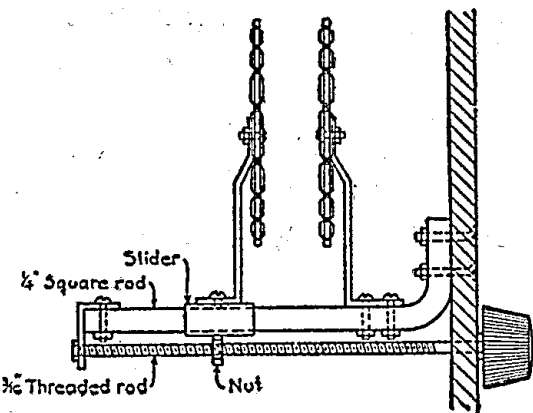
The greatest improvement in this hook-up is that the filament current in the detector tube can be reduced about 10 or 15 per cent and the reception will be much louder.

The choke coil in the input side of the transformer consists of about 150 turns of No. 26 S.C.C. wire wound on the core of an old telegraph relay. This tends to reduce howling which is the result of untuned waves. I find this much superior to the phone condenser.—C. T. Hanavan, Little Rock, Ark.

Vernier for Spider Web Coils

Users of spider web coils will agree that the finer adjustment the better. The mounting here described was designed with that feature in mind and it is equal to a vernier adjustment, requiring about 32 turns of the knob to move the coil 1 inch.

A little study of the illustration will



show how the arrangement works, the parts for which can all be secured from your Radio dealer or your scrap box. A slider riding on a length of square brass rod moves by turning the threaded shaft which passes through the nut soldered to the under side of the slider. Most sliders

GOLD-GRAIN CRYSTAL DETECTORS

DEALERS—New List Attractive Discounts

HUDSON-ROSS
123 W. Madison St. Chicago

Delicate Soldering

THE POST SOLDERING IRON

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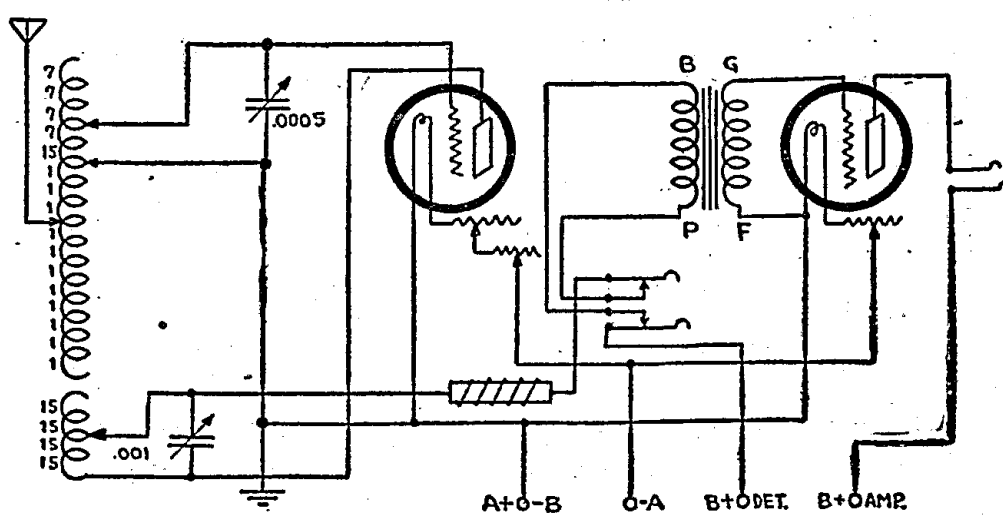


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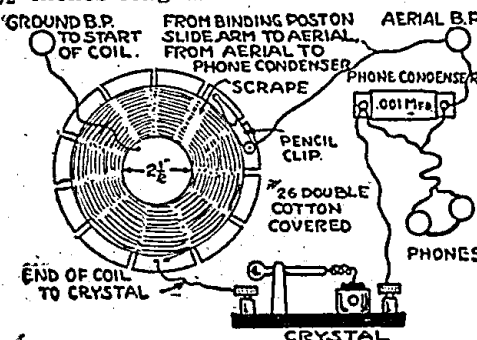
CHANGES IN REINARTZ CIRCUIT



have a small threaded hole for the little knob which can be used to fasten the piece of brass strip which carries the movable coil. A piece of brass strip bolted to the end of the square rod keeps the shaft from pulling out and the knob prevents the movement the other way.—Ralph Miller, Harrisburg, Pa.

Crystal Set Tuner

The tuner for this crystal set is wound spider web style with Number 26 dcc. wire. The insulation is scraped off on one section as shown. An arm made of a piece of flat stock about 1/4 inch wide and 1 1/2 inches long is used for the slider. A



fountain pen clasp ball is attached for sliding over the wires.

This 6-inch spider web can be mounted flat on a small board by putting a screw in the center of the coil and a thick washer under the coil to keep it up from the board. This little set is very cheap to build and it is one of the best sets I

have used. I hear WGY at Schenectady every night and all local stuff is as loud as a one bulb set.—John J. Earley, Providence, R. I.

Cat Whiskers

The cat whisker of a crystal set should not be too long. Two inches of steel violin E string is about the proper length and kind. The spring should rest very lightly on the crystal. If the spring is longer than two inches external vibration or jarring will cause the spring to change position and jump off the crystal.

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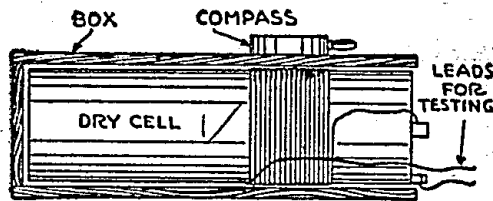
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Having trouble with my outfit at first and having nothing to test with for grounds or shorts I made a simple testing set in the following manner: I took an old dry cell too weak to light the filament in my peanut tube and wound about twenty turns of wire around it connecting in series with the cell. I then made a neatly fitting box with one end open for the wires to the leads. I laid this on a flat surface so that it stood in a position of the length east and west and placed a pocket compass on the box directly over the wire.

I found this a first class testing set and

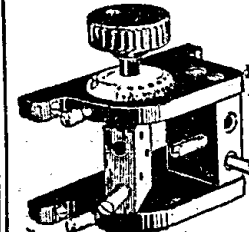


discovered a short in my condensers at once. I am having very good success with this outfit using only one peanut tube and have picked up signals from New York to Florida and Los Angeles with it.—H. W. Davis, Hearst, Ontario.

Long distance stations ordinarily cannot be heard with a crystal detector set.

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3 Plate Variable; value, \$1.75.....	\$1.05
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23 Plate Variable; value, \$3.50.....	1.35
43 Plate Variable; value, \$4.50.....	1.85
13 Plate VERNIER; value, \$5.50.....	3.75
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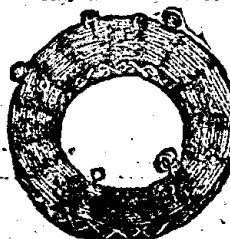
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Characteristics of Some New Vacuum Tubes

Part I—Laboratory Tests Show Interesting Facts

By H. J. Marx

WITH the introduction of so many new types of vacuum tubes on the market, the amateur is at loss in deciding which one to use, how to apply it to his circuit, what special additional apparatus is necessary, the voltage necessary and what to expect of the tubes.

It is not generally known that the characteristics of tubes vary considerably and that this variation is the cause for the inconsistent operation of many cir-

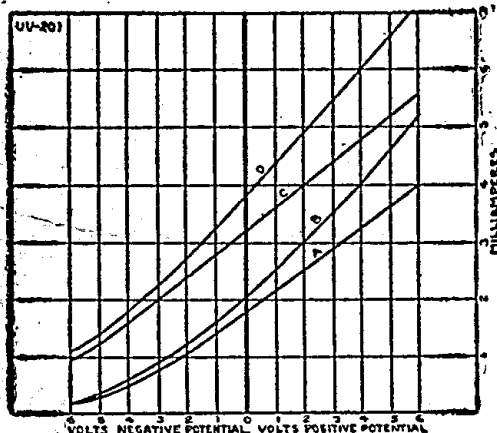


Figure 1

cuts. It is not unusual to find one fan getting good results consistently and another cannot even claim efficient reception of local broadcasts. Many a good circuit and also good receiving set has been condemned when the blame should have been placed on the tubes used, or often on how the fan uses the tube.

This variation in tube efficiency has made it a difficult matter to judge impartially the relative merits of tubes. Where unusual curves were discovered, at least three tubes from average dealer stock were tested. If the curves were fairly consistent the average is given. In case where the variation was considerable the two with maximum and minimum values are illustrated.

Amateur Unprotected

Since the space available is limited, only part of the curves are given, more will be presented in the next issue and as new tubes are placed on the market their curves and descriptions will be given. Unfortunately, efficiency tests of this kind do not always receive the approval of the manufacturer. Of course, by a peculiar combination of circumstances, the tubes tested may be very poor when compared to any selected by the manufacturer. But doesn't the amateur and fan take just this same chance when he buys the tube from the dealer?

The only test that the majority of the dealers offer is to show that the filament lights. Going back still further, the dealer and even the distributor rarely can be assured of even that test. Yet some manufacturers state that defective tubes should be returned for laboratory test. Why wait till the purchaser has taken it home and freed it? Why not show the operation of the tube to the purchaser before he takes it home?

Theory of Operation

It isn't sufficient to know that the filament voltage should be so much and that

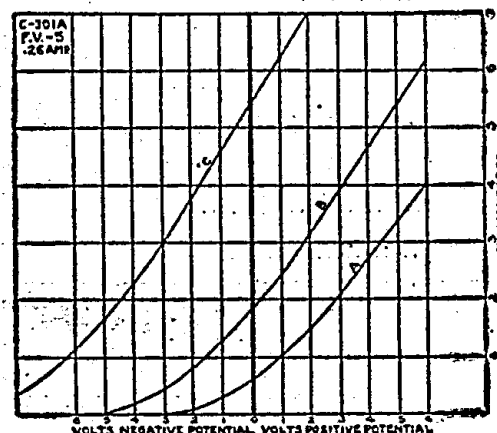


Figure 2

the tube only consumes so many amperes. Some manufacturers state that the plate current is so many milliamperes. As can be seen later, a tube may have a plate flow of 10 milliamperes, another only 5, yet the second not only may save B batteries, but at the same time give considerably more volume.

In order to describe the method of judging the performance of vacuum tubes it will be necessary to refer back to the theory of grid control.

Most fans know that the electrons flow from the filament to the plate and that the grid is the "traffic cop" that controls the passage of these electrons. When the grid becomes positively charged, it helps pull the electrons from the filament to the plate—the greater this positive charge the more is the assistance rendered. When the negative side of the battery is connected to the grid—then the grid becomes negative in charge and starts holding up the amount of traffic between the filament

and the plate. This blocking action is increased as the negative charge on the grid is intensified.

In the actual receiving set, the incoming Radio frequency currents are alternating, and their effect is impressed on the grid. If the grid has a neutral charge—that is having no positive or negative condition, it has no effect on the electron flow. This alternating current, when led to the grid makes it positive and negative corresponding to the alternations in the antenna current. The effect of this variation on the electron flow is to vary the milliamperes flow in the plate circuit.

Plate Flow for Given Grid Charge

It is this variation in plate current that vibrates the diaphragms of the receivers or loud speaker. Then the greater the variation in plate flow, the stronger will be the volume of reception.

Under actual operation in a receiving set this variation of grid charge, called grid potential, is very small. Obviously, the greater the variation of plate flow for the least change of grid potential or charge, the louder will be the reception from that tube. This helps make it clear that high plate current is valueless unless accompanied with maximum variation through grid control.

Where Large Variation Occurs

It will be found that this maximum plate variation may occur when the grid is positive, neutral or even negative. The effect of the alternating current on either a positively or negatively charged grid, is to increase and decrease this charged condition. The initial potential of a grid in

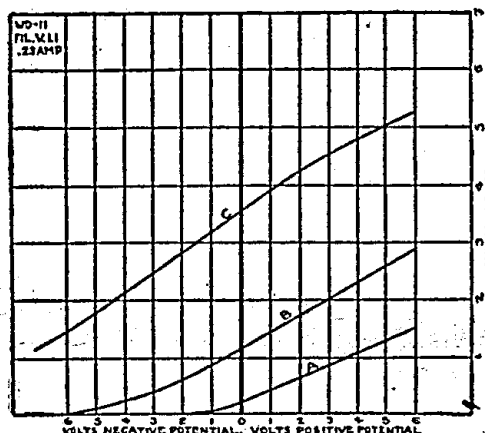


Figure 3

an actual receiving set can be adjusted for the best point of grid efficiency for the particular tube used. This is what a potentiometer is used for, or as is often the case, a C or biasing battery is inserted to give the required initial charge.

Knowing all the details of the tube—then the amateur can adjust his set so the tube will do its best.

In judging a tube, determine the maximum variation for a change of one or two volts grid potential. The potential at which this change is greatest naturally is the best operating point. A quicker determination of efficiency is to discover which tube has the steepest grid potential—plate current curve.

Test of a UV-201

The manufacturers of the UV-201 tube are replacing it with the UV-201A because of the decreased current consumption of the latter. This tube uses the familiar form of 6-ohm rheostat. It is used chiefly as an amplifier tube and lacks sensitivity for use as a good detector.

In Figure 1, the curve A is taken at a

filament voltage of 5, current consumption 1.0 ampere and 45 volts plate potential.

Curve C was developed with 67½ volts plate potential.

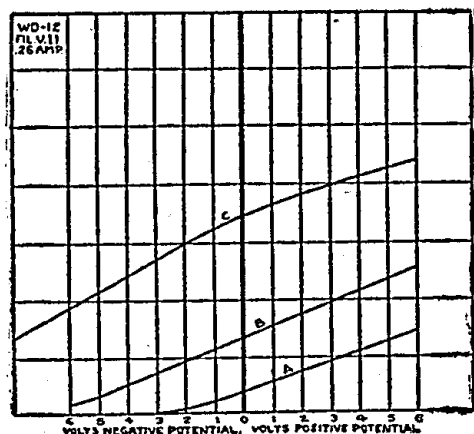


Figure 4

The filament voltage was then increased to 6, the amperage then rose to 1.15, with 45 volts on the plate the curve B was plate. When increased to 67½ the curve D was developed.

Test of C-301-A

This tube is one of the low consumers of battery current. A 20-ohm rheostat is recommended for use in controlling this tube. No form of biasing battery is necessary. Except for tubes of this type having unusual curves, potentiometer control helps but little. See Figure 2.

All three curves were plotted at a filament voltage of 5 as recommended by the manufacturers. The current consumption was found to be .26 amperes. Curve

A gives values at 22½ volts plate battery, B at 45 and C at 88 volts.

Test of WD-11

The WD-11 tube is one of the first of the peanut tubes that was put on quantity production. Because of the different base used it requires a special socket or an adapter for use in a standard socket. A dry cell is most convenient for lighting the filament. The usual 6-ohm rheostat is sufficient for controlling the filament current. Figure 3 gives the curves for the WD-11.

All tests on this tube were conducted with the filament voltage at 1.1 as recommended by the manufacturers. The filament current consumption was .23 amperes. Curves A, B and C were plotted with plate potentials of 22½, 45 and 88 volts, respectively.

Test of WD-12

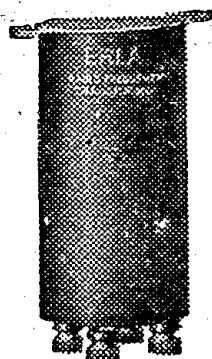
This tube is the same as the WD-11, but manufactured with a standard base, thus eliminating the necessity of a special socket. As with the previous tube (WD-11) no special rheostat is required.

The tests on this tube were conducted under the same conditions as for the WD-11. The current consumption was .26 amperes. In Figure 4 the curves A, B and C were plotted at plate voltages of 22½, 45 and 88, respectively. There is but little variation in the characteristic curves of the two tubes, and this is no more than will be found in any tubes of the same type and manufacture.

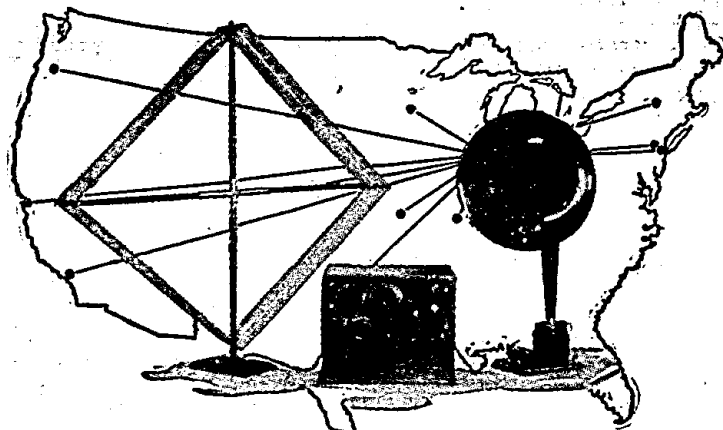
(TO BE CONTINUED.)

A triode tube should not take the place of electric lights for illumination. Burn them as low as you can and still get good results.

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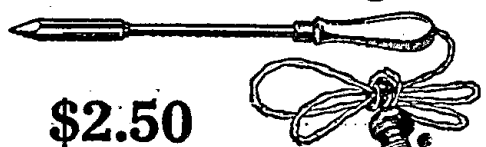
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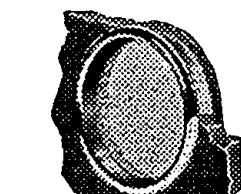


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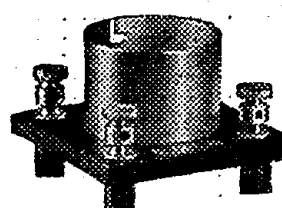
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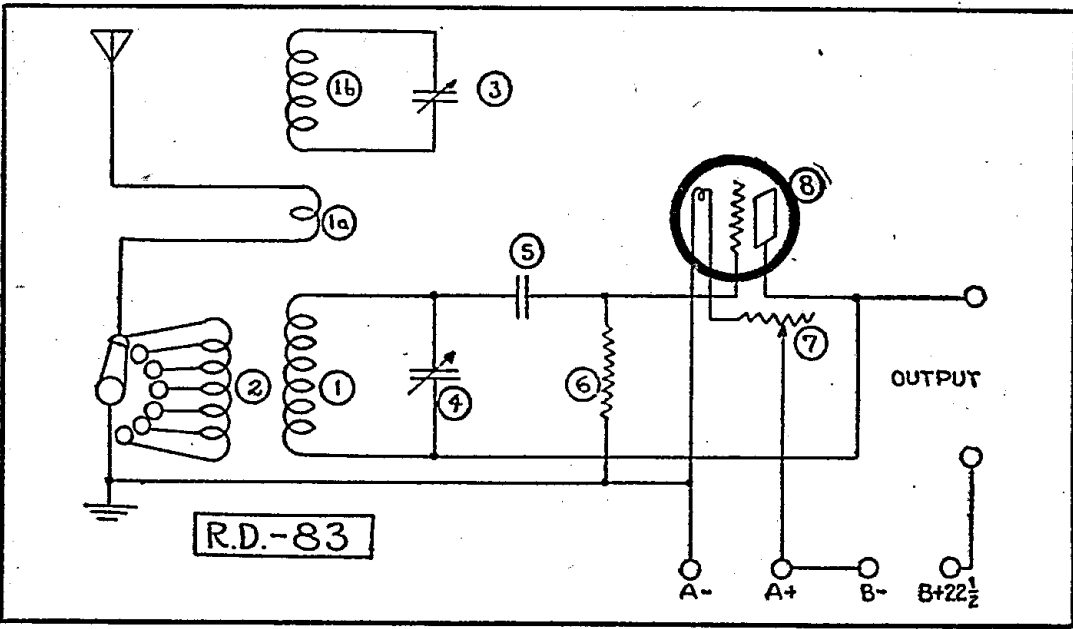
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THIS four-circuit is one of the popular ones at the present time. It has exceptionally good selective qualities although the volume is not as good as derived from many of the circuits. Audio frequency amplification can be added in the usual manner following the standard hook-ups.

Care should be taken in constructing the tuning units.

Radio frequency amplification has not been tried out very successfully on this circuit so no data is available. Its good selective properties help make it a long distance receiver provided sufficient audio frequency amplification is added.

The apparatus indicated by numbers in the hook-up diagram can be identified in the detailed list that follows:

1.—This is the tuning unit consisting of three sets of windings on a tube 3 3/4 inches in diameter and 5 1/4 inches long. Winding No. 1 consists of 65 turns of

No. 18 S.C.C. wound in a single layer about 3 inches long. Then leave a space of 1/8 inch and start the winding No. 1b, which has 34 turns of No. 18 S.C.C. This winding will be just a little over 1 1/2 inches long, leaving about 3/8 inch at each end of the tube uncovered. Winding No. 1a consists of a single turn over the winding No. 1b and can be made with the wire used for leads in connecting the antenna post to the coil No. 2.

2.—This is a winding on a separate tube 3 1/4 inches in diameter and 1 1/2 inches long, and is not inductively coupled to the other tuning unit. It consists of 43 turns, double bank wound and tapped at the beginning, the 7th, 13th, 21st, 31st and 43rd turns.

3 and 4.—Variable condensers of .0005 mfd. capacity with vernier plates.

5.—Grid condenser, .00025 mfd. capacity.

6.—Grid Leak, 1.5 megohms resistance.

7.—Rheostat, vernier preferred.

8.—Vacuum Tube, soft.

FIRST STEPS IN RADIO

(Continued from page 11)

plate by attraction and repels the positive charge that was formerly combined with the negative to give equilibrium. This is shown by the positive sign and the arrow. When the original positive charge attracted the negative it repelled an equal positive charge and to all intents and purposes the repelled charge acts the same as if the original charge was allowed to flow without a condenser being inserted in the circuit.

But it must be remembered that this repulsion flow takes place only while the left plate is charging, hence with direct current the repulsed flow would only be an instantaneous surge on the closing of the circuit and no more current would flow. However, with Radio frequency current with their high frequencies the plate is being charged thousands of times a second and the current flow is practically constant and the Radio frequency current passes freely through the condenser.

Capacity Action

The capacity of the condenser enters into the problem in that with a larger capacity more current flows at audio frequencies therefore the capacity should be made of such a size as to pass the Radio frequency currents readily but too small to pass an appreciable amount at audio or lower frequencies

It is often desirable to connect several condensers in such a manner as to build up a given capacity. When condensers are connected in parallel or multiple the resulting capacity is the sum of the individual capacities. When equal capacities are connected in series the resultant capacity is equal to the capacity of one condenser divided by the number of condensers in series. In the first case a parallel connection is equivalent to increasing the area of the plates so the

capacity increases. In the latter connection is the same as increasing the distance between the plates with a decrease in capacity. When unlike condensers are connected in series we must make use of a formula similar to that used for unlike resistances in parallel, namely:

$$\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} \text{ etc.}$$

Fixed condensers, or those in which the capacity is not variable, take many forms and for best operation care should be exercised in selecting condensers. There are on the market a host of paper wrapped condensers, that is, made by wrapping tinfoil and paraffine paper around a strip of fiber. These should never be used where the capacity is at all important. The reason for this is that when a charge is impressed upon the plates of the condenser they have a tendency to attract each other and if loosely wrapped they

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move closer together thus changing the capacity. The better way is to use a condenser in which the conducting plates are rigidly held and cannot move. For that reason a condenser using mica or glass is to be preferred, but highest efficiency is obtained with a condenser using air as the dielectric.

Variable Condensers

There are a number of forms of variable condensers. All possess some advantages and some disadvantages. The most common type is that made with interleaving plates, the variation of capacity being obtained by varying the area of the interleaving plates. When purchasing a variable condenser it is always advisable to buy one made by a reliable house for many of the cheap condensers on the market are but a source of annoyance from plates sagging and shorting or poor contact at the pivots. A vernier attachment on variable condensers is advisable for close tuning.

A much similar type not used to any great extent now has two tubes sliding into each other, a contact being made to each tube. This condenser is limited in capacity and for that reason is suitable only for vernier work.

The book type of condenser acts to vary the capacity by bringing the plates close together or spreading them by means of a cam. This type is rugged and efficient but is rather critical near its maximum capacity. This is no disadvantage, however, for it can be overcome by using more inductance as we shall see in the treatment of inductances.

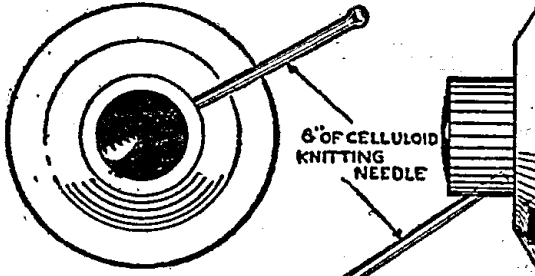
A novel form of variable is now being marketed in which a metal ribbon is wound from a metal drum onto another metal drum covered with a thin insulator. Condensers have changed but little in de-

sign since the early days of Radio telegraphy and it is not unlikely that some ingenious radiophan will devise a simpler instrument for the purpose and eliminate many of the evils of the present day condensers.

(TO BE CONTINUED.)

Eliminating Body Capacity

I have eliminated the body capacity effect on my set in tuning by using an 8-inch length of a celluloid knitting needle



placed in a 5/32-inch hole drilled in the knob of my dials in the manner illustrated. It is easy to turn the knob in this manner and there is no body capacity. —John L. Sobey, Highland Park, Ill.

Mounting Vacuum Tubes

Be sure to mount all vacuum tubes upright. Filament wires stretch when heated and if bulbs are mounted horizontal, that is parallel to the base of the set, the wires may sag and short-circuit against the grid.

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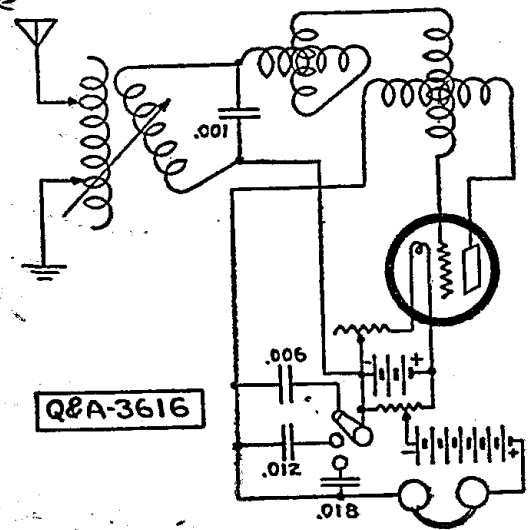
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Questions and Answers

Higher Wave Lengths

(3616) J.G., Ft. Smith, Ark.
 Find enclosed a hook-up (shown in illustration) of my own invention with which I have heard over ninety-five stations broadcast. From Havana, Cuba, Everett, Washington, and Los Angeles, Calif. Please answer the following questions concerning same. How can I raise the wave length from 250 to about 900 meters? It is now from 150 to 485 meters.
 A.—Noting sketch we are advising that circuit shown should have a higher than four hundred and eighty-five meters wave length since it has three inductances in series and a high capacity condenser



across one of them. All that is necessary is the addition of a thirty-five turn honeycomb coil or an equal inductance in the antenna circuit.

Ultra-Reinartz

(3321) W.F.M., Chicago, Ill.
 I have made the tuning unit for Ultra Reinartz Receiver, as shown in Radio Digest, March 24, and wish to use same on detector only. Can you give me the hook-up for this set? Is it necessary to mount all instruments on panel as shown in March 31 number? Could they be mounted any way convenient or is there a definite location for each part? When I tin the taps on coils I cannot avoid burning the cotton insulation. This spoils the appearance of the coil, and would like to know if I could use anything to color these parts without injury to insulation.
 A.—Answering your inquiry with reference to Ultra Reinartz circuit appearing in Radio Digest, we are advising that it cannot be used with less than one stage of amplification, and we could not furnish diagram requested.
 Apparatus may be mounted in any convenient way according to personal taste.
 For better appearance of the coil scrape the burnt part off. Orange shellac should cover the effect. With care you should be able to make the coil look very well.

Reinartz Circuit

(2541) W.F.S., Endicott, N. Y.
 Will you kindly answer the following questions relative to the Reinartz circuit?
 Why does my set go dead after connecting on a phone condenser? What can I do to eliminate body interference?
 Would it be possible to connect a second Reinartz spider web coil for long distance code work?

RITTER LOOP AERIAL \$1

All parts supplied; can be assembled in 10 minutes. We guarantee that the Ritter Loop will eliminate lightning troubles. Reduces static, interference and noises from your neighbors' regenerative sets. Come and see the Ritter Loop Assembled. By mail 10c extra.
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CRYSTAL RECTIFIER
MULTIPOINT (Patent Pending)
 A Synthetic CRYSTAL DETECTOR sensitive over its entire surface. Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages Only. Join the ever increasing Rusonite fans.
 Price mounted, Sensitivity guaranteed..... 50c
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 Order from your dealer or direct from us.
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 19 Park Row, N. Y.

Would one stage of amplification help bring in distant stations when using head phones or what could I use for increasing signal strength?

A.—It is indicated that fone condenser is short circuited in that you experience action cited.

Shielding of panel and grounding shield is the only method of eliminating body capacity effect. This consists of lining panel with tinfoil and grounding same. This decreases the efficiency of set to some extent.

Your present coil in the circuit should tune under two hundred meters, which would enable you to receive code signals as desired.

Amplification, as suggested, would increase signal strength of distant stations and is desirable.

RD-65

(2574) AS., Oak Park, Ill.
 Kindly publish in your Question and Answer Column the values of all variable and fixed condensers shown in your diagram RD-65, page 14, December 9th, 1922.

A.—Answering your inquiry with reference to RD-65 in December 9 issue of Radio Digest will advise that the antenna series condenser is .001 mfd, primary parallel is .0005 mfd. The two fixed condensers are of .0005 mfd. All others are marked on diagram in question.

RD-78

(3305) A.H.F., Boston, Mass.
 I would appreciate very much the following information regarding RD-78. (The simple form of three-tube reflex.)

What is the wave length of such on hook-up? Is it selective? Is it advisable to shield the set and just what parts have to be shielded? In shielding, are the loop terminals soldered on to the copper shield or just what is done?

If a 2-foot loop is used how should it be made? If a 4-foot loop is used how should it be made? Is there any advantage in using an outdoor antenna?

Would a 14-tap variocoupler be suitable for the additional tuning element, and if same is used is it necessary to cut the coil of 42 turns?

Is it best to use all three tubes alike and which tube manufactured today is best. Would WD-11's using a special type of transformer adapted to it be all right?

Should the audio transformers have the same ratio in each? Should the Radio transformers have the same ratio in each? No grid leak is shown. I take it for granted that a grid leak fixed or stationary is not necessary. What distance could be covered under ordinary conditions? Will it work a loud speaker as satisfactory as a regular two-stage audio?

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LOUD SPEAKER
 GENUINE WOOD FIBRE HORN
 10-inch Bell with Standard Attachment; Complete. Height 24 inches. Colors, Black, Mahogany and Olive Green.
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Standard, threaded rubber, Willard's specially adapted for use with WD-11 Tubes. Supply current at 2 volts to one WD-11 Tube for 210 hours on a single charge. Rechargeable. Brand new, size 4x5 1/2 x 7 inches—Chi-Rad guaranteed.
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 In lots of 40 (320 volts) . \$160.00
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 Specify dry or charged when ordering.

Chicago Radio Apparatus Co.
 415 S. Dearborn St., Chicago, Ill.

If a crystal (galena) is used of the fixed type for rectification I take it for granted that it can be permanently adjusted.

A.—The wave-length accomplished by circuit in question is from two hundred to six hundred meters. It is a selective circuit. Panel should be shielded by lining back with tin foil and grounding shield for elimination of body capacity effect. No other shielding is required.

A 2-foot loop is rather small. We would advise using a 3-foot square frame with ten turns of wire spaced 1/2-inch apart. If a 4-foot loop is used eight turns are sufficient. An out-of-door antenna will afford much greater range and volume.

The variocoupler suggested would be necessary if an out-of-door antenna, but would be of no advantage if loop were used.

We would advise the use of standard six volt tubes as WD-11's are not suitable for best results.

Audio frequency transformer should have a ratio of three or four to one. Radio frequency transformers should each have the same ratio and should be shielded. No grid leak is necessary. The range approximates fifteen hundred miles. Loud speaker may be used effectively.

Fixed type of crystal detector or the new Diode tube may be used.

180° Variocoupler

(2298) J. B., Minnesota City, Minn.
 I am building a 180 degree variocoupler. The primary winding space is 2 inches long on a tube 4 inches in diameter. I want the instrument to respond to wave lengths from 180 up to 550 meters without a variable condenser. How many turns of wire must be used on the primary and secondary and what size?

Is it necessary to add an extra B battery for each stage of impedance-coupled R. F. amplification? If not give me a hook-up using one stage of amplification. Is a variable grid condenser an advantage?

How does a variable in the plate circuit produce regeneration?

A.—Answering your inquiries with reference to winding of variocoupler would advise you that fifty turns of number twenty-two C.C. wire on primary, and thirty-six of number twenty-six on the secondary will be sufficient for wave-lengths from one hundred and eighty to five hundred and fifty meters.

It is not necessary to employ an extra B battery for each stage of impedance coupled Radio frequency amplification. Would refer you to page 14 of November 18 issue for the diagram of this circuit.

In this case a variable grid condenser is not of particular advantage. Usually the tube is not critical and will function without noticeable difference with any grid capacity between .00025 and .0006.

A variometer produces regeneration by virtue of resonance established between the plate and grid circuits, causing some of the variation in plate voltage in the plate circuit to be transferred back to grid circuit whereby a greater variation in the potential of the grid produces a greater variation in the voltage of the plate circuit.

Spirola Loud Speaker
 IMPROVED—LARGER
 famous tuned Rhamstine unit built-in. True cabinet type, beautiful mahogany finish. Great volume, superb tone. Guaranteed. Complete with cord, postpaid (C.O.D.)... \$12.50
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IDEAL CONTROL ALL TUBES
 Especially U. V. 199's and all dry cell tubes, because it is the only instrument permitting accurate and superfine adjustment necessary at critical operating point.

Best By Test—
 Laboratory tests prove the Fil-Ko-Stat to have a fine adjustment area (which means ability to control filament heat and electronic flow) eighteen times greater than that of the wire rheostat and several times that of the next best filament control.

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 Nothing to chip. Resistance element so finely divided further division is impossible.

With the Fil-Ko-Stat you bring in the weak stations strong and clear.
 The Fil-Ko-Stat will increase your set's range. It will permit you to select other stations on similar wave lengths, tune one in and the other out with a slight turn of the knob without otherwise changing any of the tuning units. It is non-microphonic and operates silently.
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 The Fil-Ko-Stat's perfect and gradual increase of filament heat insures longer life to your tubes.
 Replace your present so-called Filament Controls and rheostats with the new Fil-Ko-Stat and improve your set. Occupies little space on panel. No redrilling necessary.

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The filament kontrol of infinite adjustment
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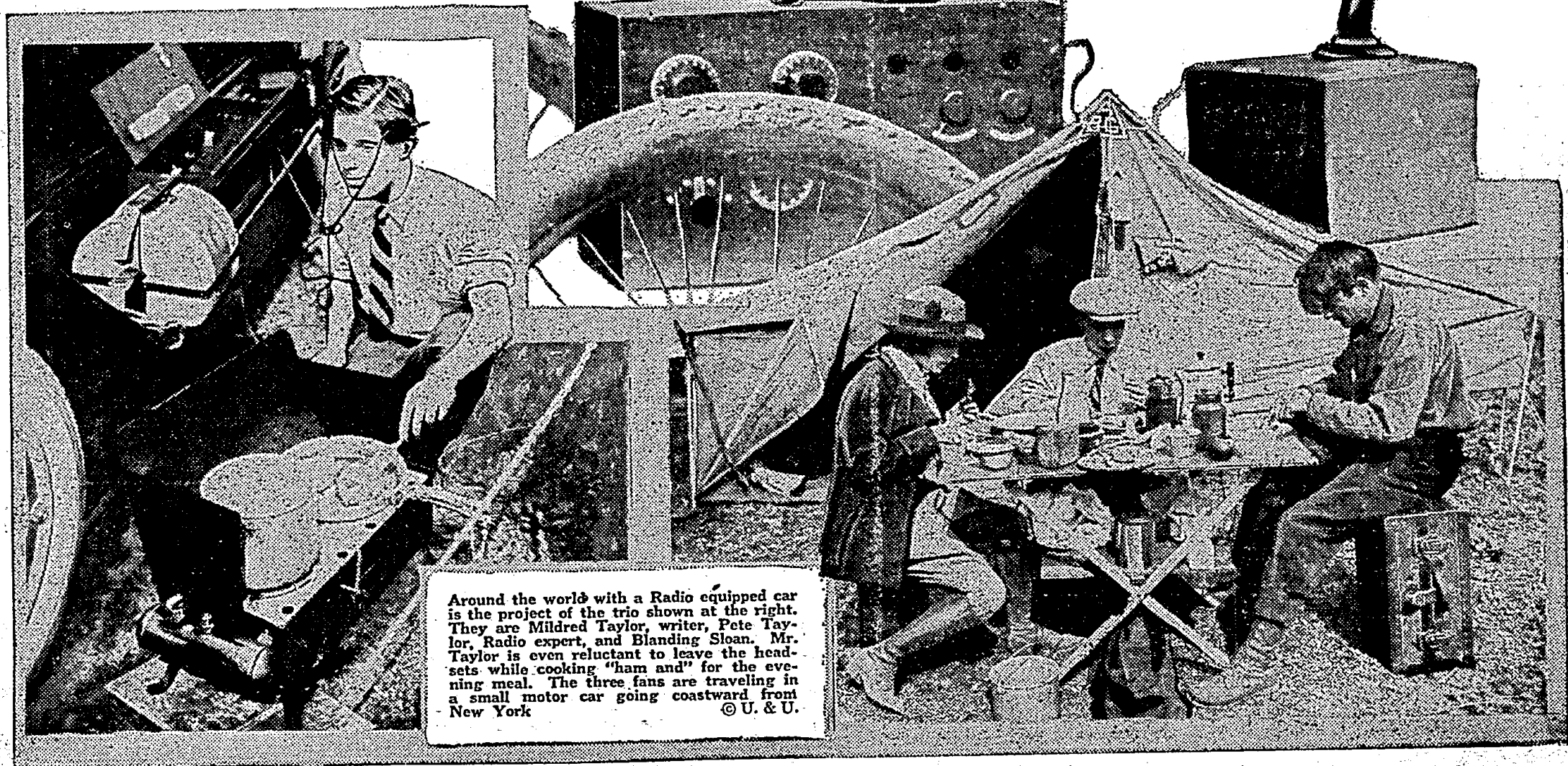
GUARANTEED by the maker that it will be replaced if broken within one year.
INSTRUMENT CO. Makers



Illustrated

The small regenerative set shown above is another claim to the title, "Smallest Set in the World." It is 3½ by 3¼ inches overall and has picked up stations more than 800 miles away. The set is the work of a Niagara Falls Radiophan, Roslyn Russel. This novelty is equipped with a peanut tube and has dial controls. The rheostat knob on the left of the cabinet is only ⅜ inch in diameter and is homemade. There is a spider web coil in the set made of No. 32 enameled wire with the tickler wound inside of the main inductance. The grid condenser is at the left of the tube. This set has a wave length of from 200 to 600 meters © Int.

Miss Andrea Anson takes advantage of the music broadcast from Station KFI to rehearse some new steps she is to use in her dancing in the movies. Miss Anson said, "The trouble is they change from jazz to classics too quickly" © Wide World



Around the world with a Radio equipped car is the project of the trio shown at the right. They are Mildred Taylor, writer, Pete Taylor, Radio expert, and Blanding Sloan. Mr. Taylor is even reluctant to leave the headsets while cooking "ham and" for the evening meal. The three fans are traveling in a small motor car going coastward from New York © U. & U.