New Reinartz; 4-Circuit Set; See Offer Page 2

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SATURDAY, JUNE 2, 1923

## 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

CFCK Broadcasting Music EDMONTON, ALTA.—New license pa pers have been received from Ottawa for

the broadcasting station of the Royal George Hotel, operated by the Radio Sup-ply Company here. This station is work-ing 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

#### ZITHER MAKES DEBUT AT ATLANTA STATION

TLANTA, 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.

#### 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

### 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 twice daily on 600 meters.

The ship on patrol answers to call sisted of a code test, theory test and KFOG and gives information upon request. 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)

#### SPECIAL LICENSE TO BE ISSUED STATIONS

7ASHINGTON.-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 twentyfive 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 wno knelt for the prayers, stood to join in the hymns,

#### SUMMER PHOTOGRAPHS? EARN A DOLLAR—

UMMERTIME 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 climacteric 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 abla hadied

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

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. 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 morn-

Wednesday evening as on a Sunday morn-ing. 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 danceprogram 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 isomething of lated, 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)

CPCA, Toronto, Ont.			36 7	m 1 .	117 - da - ada	Thursday	Enidore	Saturday	Sunday
CFCR, Calgary, Alta. 440 CKAC, Montreal, Que. 430 CKAC, Montreal, Que.	Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday		<u>_</u>
CRC, Calcary, Alta	CFCA. Toronto, Ont	400	6:00- 7:00	6:00- 7:00		6:00- 7:00	6:00- 7:00		5:45- 6:45
CKAC, Montreal, Que         450         6:00-9:00         5:00-9:00					11:30-12:30				
RPAF, Denver, Colo.  860 10:00-12:00 9:00-10:00 10:00-12:00 10:00-12:00 9:00-10:00 9:00-									
KPDB, San Francisco, Calif. 560   10:00-12:00   9:00-1	KDKA, E. Pittsburgh, Pa	360	5:00- 9:00		5:00- 9:00				6:30- 7:30
KPI, Los Angeles, Calif. 409 9.09-1:00 9:00-1:				9:00-10:00		9:00-10:00		9:00-10:00	
KGW, Portland, Ore. 492   10:00 - 2:00   8:45 - 12:								0-00 1-00	
KHJ, Los Angeles, Calif. 305 K+3-12:00 K+3-12:00 K+5-12:00 K+0 C, San Francisco, Calif. 423 KSD, St. Louis, Mo. 546 KSD, St. Louis, Mo. 547 KSD, St. Louis, Mo. 547 KSD, St. Louis, Mo. 547 KSD, St. Louis, Mo. 548 KSD, St. L				9:00- 1:00		9:00- 1:00			
KPO, San Francisco, Calif.         423 KSD, St. Louis, Mo.         546 Sc. Louis, Mo.         547 Sc. Louis, Mo.         560-1030 Sc. Louis, Mo.						0.45 10.00			
KSD, St. Louis, Mo. 546 8:00-12:30 8:00-10:00 8:00-10:00 7:00-8:30 6:00-7:00 NYW, Chicago, III. 345 7:40 8:30 9:00-9:30 7:00-8:30 10:00-12:30 7:00-8:30 6:00-7:00 NAA, Radio, Va. 435 5:45-7:30 6:00-7:20 8:20-10:30 7:00-8:30 10:00-12:30 7:00-8:30 6:00-7:00 NAA, Radio, Va. 435 5:45-7:30 6:00-7:20 8:20-10:30 7:00-8:40 7:00-8:40 NWBAP, Fort Worth, Texas. 476 7:15-10:30 7:30-11:30 7:30-11			8:45-12:00		•		6;40-12.00		
NYV, Chicago, III. 345 7:00 8:30 9:00 9:30 7:00 8:30 10:00-12:00 7:00 8:00 10:00 PWX, Hayana, Cuba 435 5:45 7:30 6:05 7:20 6:25 8:40 5:45 7:40 7:00 8:40 7:00 8:00 10:30 8:00 10:30 8:00 10:30 8:00 8:00 6:30 8:00 8:30 8:00 6:30 8:00 8:30 8:00 6:30 8:00 8:30 8:00 8:30 8:30 8:30 8:30 8			0.00 40.00			10:00-12:00	6.00-19.30		
NAA, Radio, Va. 435 PWX, Havana, Cuba WBAP, Fort Worth, Texas 476 WBZ, Springfield, Mass. 337 WCX, Detroit, Mich. 517 WCA, Detroit, Mich. 517 WDAF, Kansas City, Mo. 411 WDAJ, College Park, Ga. 360 WDAR, Philadelphia, Pa. 395 WFAA, Dallas, Tex. 476 WFI, Philadelphia, Pa. 395 WGI, Medford, Mass. 360 WGM, Atlanta, Ga. 429 WGR, Buffilo, N. Y. 380 WHAS, Louisville, Ky. 400 WHAZ, Troy, N. Y. 380 WHAS, Collegeland, O. 360 WGM, Alanta, Ga. 429 WHAS, Cheveland, O. 360 WHAS, Chiceapo, Ill. 484 WMC, Memphis, Tenn. 500 WMAC, San Antonio, Texas. 476 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 476 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 476 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 476 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 476 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 477 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMC, Memphis, Tenn. 500 WMCA, San Antonio, Texas. 478 WMCA, San						7.00 8.30			6:00- 7:00
PWX, Havana, Cuba   400   WBAP, Fort Worth, Texas   476   7:15-10:30   7:30-11:30									
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WCX, Detroit, Mich. 517	WRZ Springfield Mass	237						6:30-8:00	
WDAF, Kansas City, Mo. WDAP, Chieago, III. 300	WCX. Detroit. Mich	517					7:00-10:00	l <i></i>	
WDAJ, College Park, Ga.         360         7:30-11:30         7:30-11:30         7:30-11:30         7:30-11:30         7:30-11:30         9:00-12:00           WDAR, Philadelphia, Pa.         395         5:30-9:00         5:30-6:00         5:30-9:00         5:30-6:00         5:30-9:00         5:30-6:30         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         8:30-12:00         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30				6:00- 1:00					
WDAP, Chicago, III.         390         10:00-2:00         10:00				7:30-11:30			7:30-11:30		
WEAF, New York, N. Y. 492 5:30 - 8:00 5:30 - 6:00 5:30 - 8:00 5:30 - 6:00 5:30 - 8:00 WFAA, Dallas, Tex. 476 8:30 - 9:30 8:30 - 12:00 8:30 - 12:00 8:30 - 12:00 8:30 - 12:00 8:30 - 12:00 8:30 - 12:00 8:30 - 12:00 9:30 - 10:30 WFI, Philadelphia, Pa 395 4:30 - 5:00 4:30 - 5:00 4:30 - 5:00 6:30 - 8:30 7:00 - 10:00 WGM, Atlanta, Ga 429 9:30 - 10:30 9:30 - 10:	WDAP, Chicago, Ill								
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WGM, Atlanta, Ga. 429 9:30-10:30									
WGM, Atlanta, Ga.         429         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         9:30-10:30         7:30-8:00           WGR, Buffalo, N. Y.         310         7:00-9:00         7:00-9:00         7:00-9:00         7:00-9:00         7:30-9:30         7:30-9:30         7:30-9:30			4:30-5:00				0:30- 0:30	7:00-10:00	
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WHB, Kansas City, Mo.         411         8:00-10:00         8:0	WHAT Troy N Y	380	7:15- 8:30						
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WMAC, Chicago, History (No. 141)   Stop   St	WLW, Cincinnati, U		7:00- 9:00					7:00-10:00	
WOCA, San Antonio, Texas.       400       9:30-10:30       7:30-8:30       9:30-10:30         WOC, Davenport, Ia.       484       7:00-8:30       10:00-11:00       7:00-8:30       9:30-10:30         WOO, Philadelphia, Pa.       509       5:50-10:00       5:55-6:30       7:00-8:30       9:30-10:30         WOR, Newark, N. J.       405       5:15-6:30       7:00-10:00       5:15-6:30       7:00-10:00       5:15-6:30         WOS, Jefferson City, Mo.       441       8:00-9:30       8:00-9:30       8:00-9:30       8:00-9:30         WSB, Atlanta, Ga.       420       10:45-12:00       10:45-12:00       10:45-12:00       10:45-12:00       10:45-12:00       10:45-12:00       7:30-8:30         WSY, Birmingham, Ala       360       8:00-8:45       8:00-8:45       8:00-8:45       7:30-8:30	WMAU, Chicago, III	1448	6.00-0.30						
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WOS, Jefferson City, Mo	WOR, Newark, N. J.				5:15-6:30				
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WSY, Birmingham, Ala 360 8:00-8:45 3	WSB, Atlanta, Ga	429		10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
		.  360	8:00- 8:45		8:00- 8:45		8:00- 8:45		
WWJ, Detroit, Mich 1911   0:00- 1:00   0:00- 1:00   0:00- 1:00   0:00- 1:00	WWJ, Detroit, Mich		6:00-7:30	6:00- 7:30	i 6:00- 7:30	1 0:00- 7:30	0:00- 7:30	1	1 4:00- 0:00

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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Radio Digest, Illustrated, Volume 5, Number 8, published Chicago, Illinois, June 2, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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## 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.

e 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

Newsstands Don't Always Have One Left WHEN YOU WANT

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 DIGEST READERS

TO GIVE PARTS FOR COU-PONS 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 pons 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 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin Copeland Sta Put Plug.

Class B Articles

For four consecutively numbered cou-

For four consecutively numbered coupons and sixty cents (\$0.60) any one of the following articles will be sent: 1 Carthe 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 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 SPST Knife Switch; 1 Martin-Copeland SPST Knife Switch; 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST 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 In-ductance 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 PUB-LIC 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.

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,

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.

"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

S PRINGFIELD, 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

TLANTA, 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.

## 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.

## 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

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.

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 "topside" 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.

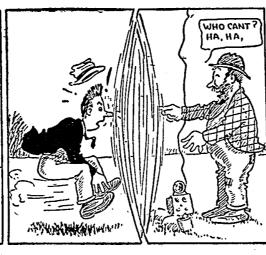
#### THE ANTENNA BROTHERS

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

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 particu-larly adapted from its situation literally at the top of the world.



#### 30 Ohm Rheostat

Excellent results assured with use on New Type tubes.

#### UV199A UV201A

Using small filament current 6 ohm .....\$0.75 20 ohm ..... 1.00 30 ohm ..... 1.10

At your dealers. Otherwise sent postpaid on receipt of purchase price

Write for catalog illustrating and describing our entire line of quality apparatus. Territory Open for Jobbers

AEROVOX WIRELESS CORP. 208 W. 17th ST. **NEW YORK** 

### FANS HAVE QUEER **VISION OF CANADA**

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

ALTA.-Inter-communica-CALGARY. tion 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 Canada to compare favorable 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, Min-—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 Volutsis, 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

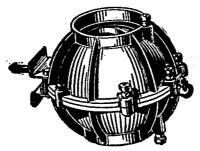
Dealers Communicate

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

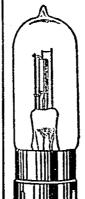
KELLOGG SWITCHBOARD & SUPPLY COMPANY **CHICAGO** 

#### | 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.



You Can Buy a Real 1½-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 11/2-Volt.

Detector—Amplifier

Absolutely Guaranteed

MAIL ORDERS FILLED PROMPTLY Cash or Money Order (No Stamps) Dealers write for Quantity Discount TRADING CO. TREXO

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 in-novation meets with approval of passengers it will be made permanent.

## Summer Static Overcome

'Good-bye Aerial"



## ANTENELLA

All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.

Merely plug Antenella 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

ANTENELLA formerly \$2.00

At your dealer's-otherwise send purchase price and you will be supplied postpaid.

has. Freshman (o. Inc. Radio Condenser Products 106 SEVENTH AVENUE, NEW YORK



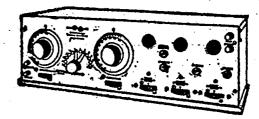


"He who is content, always has enough." -Lao Tzu.

Contentment, in radio, comes only with the possession of a Grebe Receiver.

Write for "Musings of Dr. Mu"

Licensed under Armstrong U. S. Pat. No. 1113149

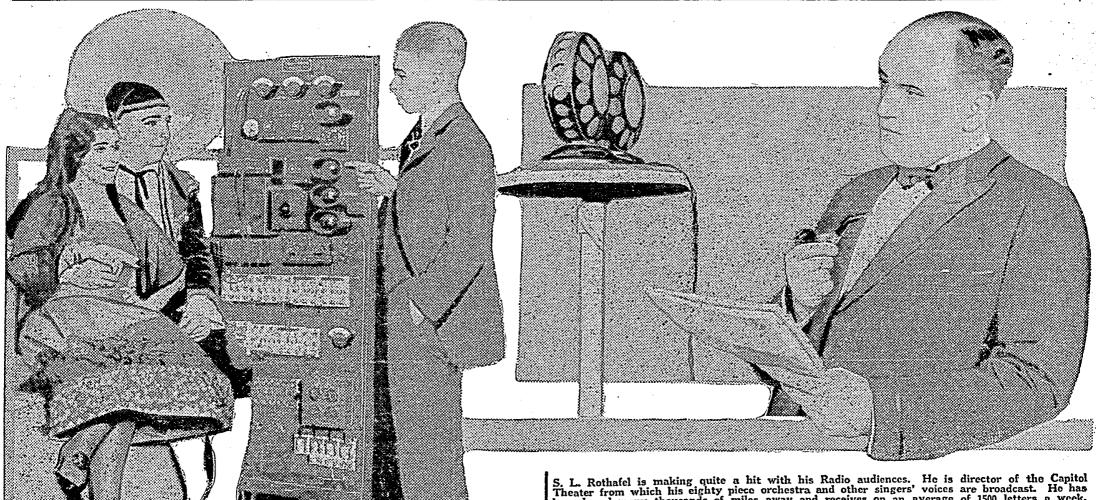


A. H. GREBE & CO., Inc.

Richmond Hill, N. Y.

Western Branch-451 East 3rd St., Los Angeles, Cal.

# 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 "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 worldevery Sunday evening at seven-thiry 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 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 re-quests 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 re-produced 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 service. It is compact equipment which studio. Dr. William Axt, whose services is hooked up to broadcasting station at the plane are one of the invaluable features of each week's program, is graph Co., New York City.

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 he 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 theatre 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 foom.

An interesting feature of this broad-

casting experiment is that the heavy expense is not borne by the theater. The equipment is installed by the broadcasting

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.

#### 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.

By placing this Resistance Unit in the Rheostat circuit, regular 6 ohm Rheostats will properly operate the new No. 201-A and No. 199 Tubes.

Code No. 15-A, 15 chm, for No. 201-A Tube...50c Code No. 25-A, 25 chm, for No. 199 Tube....50c Write for bulletins on this and other Carter products CARTER RADIO COMPANY 209 South State Street, Chicago

#### 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

#### -ATTENTION-COCKADAY COILS BANK WOUND

List Price \$225

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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.

gram; Lecture; "The Dependent Child," Geo. B. Eninger.
KHI (Pacific, 400), 12:30-1:15 P. M., Concert; 7:30 P. M., Musical numbers; 8:00-10:00 P. M., Program, "The Junior Cabaret," M. Theresa Bessler.
KSD (Central, 546), 8:00 P. M., Concert, West Presbyterian Sunday School Orchestra.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy Concert Dept; Wendell W. Hall, KYW's Music Maker, WBAP (Central, 476), 9:30-10:30 P. M., Concert, Hubb Diggs and Singers.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M., 1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-2:300 P. M., Song recital; 4:30-6:00 P. M., Talk on "Affairs of the Heart," Betsy Logan; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.

Nittle tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray; 8:30-9:30 P. M., Concert, Titche-Goettinger Company's Orchestra, Ashley Brewster, director; 11:00-12:00 P. M., Musical program, W. A. Green Company Orchestra and Choral Club.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra; 3:30-4:30 P. M., Musical program; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue; 8:00-9:55 P. M., Song recital and short talks; 10:00-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

Dance music, Meyer Davis Bellevue Stratford Orchestra.
WG1 (Eastern, 360), 3:90 P. M., Amrad Women's
Club; 8:30 P. M., Selections, Samuel Adams School
Orchestra: Ninety-third Tutts College Lecture.
WGY (Eastern, 380), 1:00 P. M., Address, "Safe Milk."
Grace S. Babcock; 7:35 P. M., Address, "Oysters,
America's Greatest Sea Crop," Russell Suter, N. Y.
State Conservation Commission; 7:45 P. M., Boy
Scout Program, Schencetady Boy Scouts of America.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary
Anderson Theater Orchestra: Roy C. Parks, Rialto
Theatre organist; 7:30-9:00 P. M., Lela Gunterman,
soprano; Myer Green, violinist; A. A. Brooks, baritone; Mary Blain, reader; Concert, Mary Anderson
Theater Orchestra: Mrs. Ida Asbury Wobbe, reader,
WIP (Eastern, Daylight Saving, 5:99), 1:00-2:00 P. M.,
Dinner music and song recital; 3:00-4:30 P. M., Short
talks and musical program; 6:00-7:30 P. M., Dinor
dance music; Bedtime stories, Unclo Wip; 8:00-12:00
P. M., Danco music, Charlio Kerr's L'Aiglon Cafe
Orchestra.
WJAX (Eastern, 390), 7:30 P. M., Concert arranged by

P. M., Danco music, Charilo Kerr's L'Aiglon Cafe Orchestra.

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

WLW (Eastern, 360), 10:00 P. M., Concert, Alpha Chapter of Delta Omicron Sorority, Cincinnati Conservatory of Music; Vocal concert, Delphi Quartet.

WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Bush Conservatory of Music; 7:00 P. M., Babson report; Stuart Barker Concert Party; 9:15 P. M., Concert, Mrs. Robertina Robertson, soprano; Mrs. Mabel Wrede Hunter, violinist.

WMC (Gentral, 500), 8:00 P. M., Musical program; Cleo Johnson, soprano; Martha Lahogue, reader; Marjorie Lamkin, singer; Hugh Sandidge, tenor; 11:06 P. M., Midnight Frolle.

WGC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon Music by Tea Room Orchestra; 4:45-5:00 P. M., Organ Recital; 7:30 P. M., Sports results and news dispatches.

dispatches.

(WI (Eastern, 580), 8:30 P. M., Concert, News Orchestra; Chamber Music, Society of Detroit; Louise
Law Cohn, planist; Marion Frances Cohn, violinist;
Dorothy Louise Cohn, cellist.

#### 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, 8:00-10:00 P. M., Memorial Day program, arranged by Harriet E. Chubble. KSD (Central, 546), 8:00 P. M., Concert, orchestra; musical specialties, Grand Central Theatre talent. KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Natalie Gilmartin, soprano; The Salvation Army Staff Band, Adj. J. Arthur Finn, conductor.

conductor. WBAP (Central, 476), 9:30-10:30 P. M., Concert,

WBAP (Gentral, 476), 9:30-10:30 P. M., Concert, Euterpean Club.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ Recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks and musical program; 4:30-6:00 P. M., Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-9:55 P. M., Song recital and short talks; 10:10-12:00 P. M., Dance music, Arcadia Cafe Concert Orchestra; Songs by Harry Glyn.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Living Epistics," Rev. Robt. A. Hunt, pastor First Methodist Church.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner music; Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue, Festern, 250), 6:15 P. M. Girls Hour, Camp.

Sue. WG1 (Eastern, 360), 6:45 P. M., Girls Hour, Camp Fire Girls, "Big Smoke." "The Conjuror," Amrad

Players.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary

Mary Contral, Mary

Anderson Theater Orchestra, Mildred Schirmen, Anderson Theater Orchestra, Mildred Schirmen, Anderson T. 30.

WHAS (Gentral, 400), 4:50-5:00 P. M., Concert, Milly Anderson Theater Orchestra; Mildred Schirmer, pianist; Clifford Gorman, Rialto Theatre organ, 7:30-9:00 P. M., Concert, Lucile Schneider, Bernice Funk, Victoria Meagher, Marie Kochler, Mary Gordon, Mary Aubrey, Anna Blankenbaker, Katherine Plangemeir, Mary Arnes Ott, Virginia Woodson, Ethel Fisher, Ethel Hackmiller, Mrs. A. W. Ott, Mrs. J. P. Ferguson, sopranos; Mrs. William Herman, Mrs. Shirley Graves, Josephine Miller, Rubyé Moser, Ione Hoover, contraltos; Shirley Graves, saxophone. WHK (Eastern, 360), 8:00 P. M., Babson's Radio Release; Automobile report; Concert, WHK Trio. WIP (Eastern, Daylight Saving, 509), 10:00-11:30 A. M., Musical selections, 1:00-2:00 P. M., Dinner dance music; Bedtime stories, Uncle Wip. WLW (Eastern, 360), 8:00 P. M., Decoration Day program; "Grotto March," "Little Duchess," Pierce's, Band; "Songs My Mother Taught Me," "Machushla," Helen Hofer, soprano; "Tond Hearts," Pierce's, Band; Patriotte address, Major Norris Stayton; Ernest Daulton, planist; "Determination," "Victory Enl.," Pierce's Band; Helen Hofer, soprano; "Best Loved Southern Melodies," "Mary Flora," Pierce's Band; Ernest Daulton, planist; "Lastspiel," Band, MMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Cosmopolitan School of Music & Daylight Saving, 447, 4:35 P. M., Musical program, Cosmopolitan School of Music & Daylight Saving, 447, 4:35 P. M.,

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Georgene Faulkner; 9:15 P. M., Concert, Mrs. Lucille O'Brien, soprano; Mrs. Hilda Butler Farr, planist. WOG (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk, 8:00 P. M., Organ recital, E. John Richards, organist. Assisted by Jeanette Brewbaker, soprano; 10:00 P. M., Musical program, Ward Trio, Sterling,

III.
W00 (Eastern, Daylight Saving, 509), 7:30-7:45 P. M.,
Results of Sporting Events; 7:45-8:30 P. M., Dinner
music, Hotel Adelphia Orchestra; 8:30-10:50 P. M.,
Special Memorial Day Program.

Alchele Orchestra; Prologue from "Three Springs," Ladies' Trio, First Presbyterian Church, Harrison, Ohio; "Cansonetta," "Through the Snow," Mrs. Gantenberg, violinist; "Homing," Cora Abernathy, soprane; "The Joy of Spring," Mrs. E. A. Zimmerman, contralto; "Passage Birds' Farewell," Miss Abernethy, Mrs. Zimmerman; Radario Farce, "Somebody Else."

Else."
WMAQ (Central, Daylight Saving, 447), 4:35 P. M.,
Musical program, Pupils of Lyceum Arts Conservatory; 7:00 P. M., Talk, "Auto Trails," Rockwell

## What Time Is It?













Eastern Daylight

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

WWJ (Eastern, 580), 12:05 P. M., Concert, News Or-chestra; 8:30 P. M., News Orchestra; Musical pro-gram, furnished by members of Chas. A. Learned Post, American Legion.

#### 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.
KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; Lecture, "Character—The Basis of Bank Credit," Andrew Miller.
KHJ (Pacific, 400), 8:00-10:00 P. M., DeLuxe program, The Bay Nest of Orloles, Santa Monica, Calif., KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Elizabeth Jenks, soprano; Raymond A. Moroney, baritone; Ned F. Dunn, planist; The Roseland Trio; Jennie Gross, contraito; Adolph Gross, baritone; Thos. Liddell, tenor; Adale Wahlberg, accompanist.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, North Side High School Orchestra and Glec Club.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and plano selections; 4:30-6:00 P. M., Song recital and plano selections; 4:30-6:00 P. M., talks, "Affairs of the Heart." Betsy Logan; Stories, Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls.

girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address,

"Texns, the Republic," Judgo Chas, F. Greenwedd;
8:30-9:30 P. M., Musical program, Emmett B. Peck,
violinist: 1:00-12:00 P. M., Recital, Bush & Gerts

violinist;1:00-12:00 P. M., Recttat, Bush & Gerts
Piano Company.

WF1 (Eastern, Daylight Saving, 395), 1:00-2:00 P. M.,
Dinner dance music, Meyer Davis Bellevue Stratford
Orchestra; 3:00-4:00 P. M., Musical program; 6:007:30 P. M., Dinner dance music, Meyer Davis Bellevue
Stratford Orchestra; Stories, Cousin Suc; 8:0012:00 P. M. Song recital and musical program;
Dance music, Meyer Davis Bellevue Stratford Orchestra.

chestra.

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales,"
Uncle David; 6:15 P. M., "General Conditions in the
Shoe and Leather Industry," New England Shoe and
Leather Assn.; 9:30 P. M., "Romance of the Shoe,"
Harry M. Wood; Concert, Amrad Choral and Glee
Clubs.

Clubs.
VGY (Eastern, 380), 1:00 P. M., Address, "Foods for Growth—Vegetables and Fruits," Mary G. McCormick, Supervisor of Nutrition, N. Y. State Dept. of Health: 7:45 P. M., Radlo drama, "The Copperhead," WGY

7:45 P. M., Radio drama, "The Copperhead, WG1 Players.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; Roy C. Parks, organist; 7:30-9:00 P. M., Concert, Chas, Myers orchestra.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Song and plano recital; 6:00-7:30 P. M., Dinner dance music, Redtime stories, Uncle Wip; 8:00-12:00 P. M., Song recital; Dance music, Charlie Kerr's Cafe L'Aiglon orchestra.

recital; Dance Music, Charle Ret's Cate Projection orchestra.

WJAX (Enstern, 390), 8:00 P. M., Organ recital, Edwin A. Kraft, organist: "Twilight Falls," "Julia's Garden," "Take Joy Home," "A Birthday," Helen M. Kraus, singer,

WLW (Eastern, 360), 10:00 P. M., Musical program;
"If You Tried," "Old Fashioned Days," "Thelma,"

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and the grade of the last of the

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

WMC (Central, 500), 8:00 P. M., Concert, Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Voct; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital; 7:30-8:00 P. M., Sports results and news dispatches.

WWJ (Eastern, 520), 12:05 P. M., Concert, News Orchestra; 8:30 P. M., Concert, News Orchestra; Cathedral Malo Quartet.

#### Friday, June 1

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; 7:00-7:30 P. M., University of Oregon, Lecture; 8:00-8:15 P. M., Mrs. Fred L. Olson, vocalist; 8:15-9:00 P. M., George Olsen's Metropolitan Orchestra; 11:12:00 P. M., "Hoot Owis."

ICHJ (Pacific, 400), 8:00-10:00 P. M., DeLuxe program, Chamber of Commerce, Oxnard, Calif.; "Sugar Beet" Program.

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

KSD (Central, 546), 6:00 P. M., Opera, "Naughty Marietta," Municipal Opera Theater.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, The Inland Electric Co.; Wendell W. Hall, KYW's Music Maker; 10:00-1:00 A. M., Midnight Revue,

WBAA (Central, 360), 7:15 P. M., Educational lecture, "Certification of Seed Wheat." W. A. Ostrander.

WBAP (Central, 476), 9:30-10:00 P. M., Fifty Year Jubileo Parcant program.

WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafo Orchestra; 2:00-3:00 P. M., Song recital and short talks; 4:30-6:00 P. M., Talk, on "Affairs of the Heart," Betsy Logan; Stories for little tots, Dream Daddy; 7:30-8:00 P. M., Dream Daddy with the boys and girls; 8:00-12:00 P. M., Dance music, Arcadia Cafo Orchestra; Songs by Harry Glyn.

WFAA (Central, 476), 12:30-1:00 P. M., Address, WFAA (Central, 476), 12:30-1:00 P. M.,

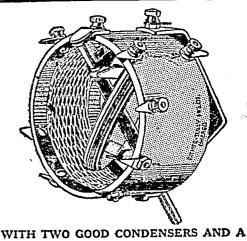
Dance music, Arcadia Cafe Orchestra; Songs by Harry Glym.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Jeremiah, the Prophet of Courage," Dr. Robt, St.wart Hyer: 8:30-9:30 P. M., Musical program, Methodist Episcopal Church Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevud Stratford Orchestra; 3:00-4:00 P. M., Song rectal; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevud Stratford Orchestra; Stories, Cousin Suc.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; Address, Miss D. H., Goodwin; 5:00 P. M., Girls Story Hour, Irene H. Veno; 9:30 P. M., "Silversmith-Series," David M. Cheney; Concert, Amrad Quartet;

(Continued on page 9)



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			Asterloid 3 Coil	.22 .18
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Cotoco	2.95 4 05	.14	CABINETS (In White)	
Atwater Kent	.95	.îô	CADIMETS (III ITIME)	90
Sleeper	1.95	.10	7x10	.20 .25
			7x14	.30
DETECTORS	4.05	10	7-10	.40
Glass Enclosed	1.25	.12 .10	7991	.45
Duratek	2.00		7x24	.50
SWITCHES			BATTERY CHARGERS	
S. P. D. T	35	.12	Home Chargers De Luxe A C13.95	.85
		.08	Ward Leonard D. C11.95	.65
D. P. D. T. D. P. D. T. Panel Mounted.	50	.12 .12	Waid Leonard D. C	
D. P. D. T. Panel Mounted	1.00	.12	LIGHTNING ARRESTERS	*^
MISCELLANEOUS			Argus, Outdoor or Indoor	.12
Trustmomotors	49	.08	DIALS	
		.15	2-inch (Bakelite)	.06
Wave Trap Single Phonograph Attachment	5.95	.20 .06	2-inch (Bakelite)	.08
Single Phonograph Attachment			3-Inch (Bullette)	-1
Sand the for the "RADIO REVI	EW"-a:	month	ly magazine, giving the latest radio news-	-aiso
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	-	-		

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# How to Make One Condenser Flivver Super Set

Part V—Operating Kinks; Troubles; Conclusion

By E. T. Flewelling

R. 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.

N 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 two of super that we have disof 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

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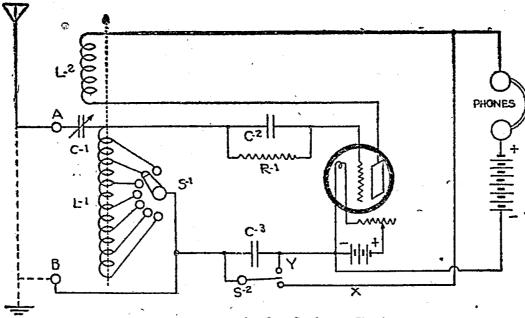
B-Metal Refining Co. 3134 Trumbull Ave. Detroit, Mich.

ductance that we are using in this set, how-ever, 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.

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

Variable Tuning Condenser stations and enters into the scheme of things in direct proportion as such difcondenser connected in series with the ficulties as lack of energy collector, static,

Selectivity



Wiring Diagram for One Condenser Circuit

inductance and the energy collector, as distance or other obstacles present themthe ground or antenna when they are used. 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

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

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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 intion without knowing that it is there, 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 A statement that the Flewelling circuit that there is at least the possibility of 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 set correctly. Of course, things are considerably easier if the set is working on an antenna or a ground. In such a set of the set is working on an antenna or a ground. In such a set of the set is working on an antenna or a ground. In such a set of the set of the set is working on an antenna or a ground. In such a set of the set 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 (THE END.)

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AGG. Canton, O. 425 meters, 500 ml, Hidgirs, 135th, Field Artillery O. N. G. Wed, Fri, music, Sun, church services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 4:305-539 pm, music, Sun, Artinology Theorems, 200 ml, U. S. Supply Co. Daily ex Sun, 2:305-539 pm, music, Sun, Artinology Theorems, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, U. S. Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Supply Co. Daily ex Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Unit, or Market Sun, 12:309 pm, suscending the services, Eastern, 200 ml, Suscending the services, 200 ml, Suscending the servic cont Co. Mon, Wed, Sun night, music, entertainment.

GFGF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconl Co. Daily ex Sun, 1-1:30 pm. Monday. Wed, Fri, 7:30-9 pm. Eastern.

GFGH, Iroquois Falls, Ont., Can. 400 meters. 200 mi. Abitibl Power & Paper Co. Ltd. Daily, 8 pm. weather and stock reports. Experimental station. Eastern.

GFGK, Edmonton, Alta., Can. 410 meters. Radio Supply Co. Daily ex Sun, 3-8:30 pm, music. Sun, 3:30-4:30 pm, Concert. Mountain.

GFGK, Calgary, Alta., Can. 275, 440 meters, 1,500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm. dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

GFGK, London, Ont., Can. The London Advertiser.

GFPG, Fort Frances, Ont., Can. International Radio Develop. Co. CfTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.

GFYC, Vancouver, B. C., Can, Victor Wentworth Odlum.

CHRC Calgary, Alta., Can. 410 meters. 1,000 mi. W.

Licensod only.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co. No regular program.

CHCE, Toronto, Can. Marconi Co. No regular program.

GHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

GHCS, London, Ont., Can. London Radio Shoppe.

GHCS, London, Ont., Can. London Radio Shoppe.

GHCS, Motreal, Que., Can. B. L. Silver.

GHCC, Montreal, Que., Can. Northern Elec. Co.

GHCC, Ottawa, Ont., Can. 450 meters. 50 ml. J. R.

Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.

GJGA, Gontreal, Que., Can. 420 meters. 75 ml. Dupuis-Freres. Wed, Fri, 9-10 pm. music. Eastern.

GJGA, Edmonton, Alta., Can. 450 meters. 1,000 ml.

Edmonton Journal, Ltd. Dally ex Sun. 12:30 pm.

weather, markets, 7:30-8 pm, Children's half hour.

8:30-9:30 pm, concert, reports. Mountain.

GJGB, Nelson, B. C., Can. 400 meters. 100 ml. James

Gordon Bennett. Dally, 8-9 pm, music, news, reports. Pacific.

GJCD, Toronto, Canada. 410 meters. 200 ml. T. Eaton

Co., No regular program.

GJCE, Vancouver, B. C., Can. 420 meters. 150 ml.

Vancouver Sun. Dally ex Sun, 8-10, music, news.

Pacific.

GJCH, Toronto, Ont., Can. United Farmers of Ontarlo.

Pacific.
CICH, Toronto, Ont., Can. United Farmers of Ontario.
CICH, Toronto, Ont., Can. 400 meters. 75 mi. McLean. Holt & Co., Ltd. Daily, 8-9 pm, music, news,
weather. Eastern.
CICN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only. CJCS, Hallfax, N. S., Can. Eastern Telephone & Tele-

GICS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
GICY, Calgary, Alta., Can. Edmund Taylor,
GIGG, London, Ont., Can. 430 meters. 800 mi. London Free Press, Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
GINC, Winnipeg, Man., Can. 400 meters., 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Trues, 8-10 pm. Thurs, 7-8 pm, Fri, 8-10. Alternate Sun, 8:30-10 pm. Central.
GISC, Toronto, Ont., Can. Evening Telegram. Licensed only.

Sun, 8:30-10 pm. Central.

CISC, Toronto, Ont., Can. Evening Telegram. Licensed only.

CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily ex Sun, 2 pm, 3:30, weather, news, markets. 5-5:15, music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-10 concert, Sun 4-5:30 pm, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd. CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co. CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music: 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9 concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 meters. 75 ml. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert. reports. Eastern.

CKCC, Hamilton, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.

CKOC, Hamilton, Ont., Can. 410 meters. 100 ml. Wentworth Radio Supply Co., Ltd. Licensed only.

CKOC, London, Ont., Can. 410 meters. 500 ml. Radio Supply Co. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.

CKYC, Winnipeg, Man., Can. 450 meters. 500 ml. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKY, Winnipeg, Man., Can. 450 meters. 500 ml. Manitoba Tel. Co. Daily, ex Sun, 12:30-1:30 pm, news, music; 1:45-2:00 pm, markets. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert. CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co. DD5, Denver, Cold. 360 meters. 1,500 ml. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Montain.

Gen. Hospital. Mon. Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 360 meters. 1,500 mi. U. S. Mountain.

DM4, San Antonio, Tex. 360 meters. 1,500 mi. U. S. Army. Kelly Field. No regular schedule.

DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 3:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDKA, E. Pittsburgh, Pa. 360 meters. 2,000 mi. Westinghouse Elec. & Mig. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern. KDN, San Francisco, Calif. 360 meters. 500 mi. Leo J. Mcyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDW, New York, N. Y. S.S. America. Home port is New York.

is New York. KDPM, Cleveland, O. 270 meters. Westinghouse Elec.

& Mig. Co.

KDPT, San Diego, Calif. 360 meters. 500 mi. Southern Elec. Co. Daily ex Sun. 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm.

ern Licc. Co. Daily ex Sun. 1-7:30 pm. news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.

KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Tdegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Dieso, Calif. 360 meters. Savoy Theater.

KDYQ, Portland, Orc. 360 meters. 200 mi. Oregon Institute of Technology. Tues, 9-10 pm, educational lectures, music. Pacific.

KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Huches & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. II., Hawali. 360 meters. 500 mi. Honolulu Star-Bulletin Co.. Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services.

\*\*RDZB, Bakersfield, Calif. 360 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred. program, irregular. Pacific.

KDZE, Seattle, Wash. 360 meters. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed. 8-9 pm, concert. Pacific.

KDZF, Los Angeles. Calif. 360 meters. Automobile Club of Southern California.

KDZG, San Francisco, Calif. 360 meters. Cyrus Pierce & Co.

taln.

KFAN, Môscow, Ida. 360 meters. 200 ml. The Electric Shop. Tues, Thurs, Sat. 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. 360 meters. Standard Pub. Co. KFAP, San Jose, Calif. 360 meters. City of San Jose. KFAR, Hollywood, Calif. 360 meters. Studio Lighting Sarvice Co.

KFAR, Hollywood, Calif. 300 meters. Season Service Co.

KFAT, Eugene, Ore, 360 meters, 100 ml. Pac. Radio Co. Mon, Wed, Sat. 8-9 pm, lectures, music. Sun, 8:30-9:16 pm, church service. Pacific.

KFAU, Bolse, Ida. 360 meters. 200 ml. Bolse H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.

KFAV, Venice, Calif. 360 meters. 50 ml. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

music. Pacific.

KFAW, Santa Ana, Calif. 360 meters. 100 mi. Radio Den. Daily ex Sun. 4-4:30 pm, news, reports, music. Mon. Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Mcdford, Orc. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.

KFAZ, Recdley, Calif. 360 meters. 200 ml. C. H. T. Weatherill. Daily ex Sun. 9-9:15 pm, reports, news. Pacific.

Church, Brookings, S. D. 360 meters, S. D. State College of Agri. & Mech. Arts.

KFDZ, Minneapolls, Minn. 360 meters. Harry O. Iver-

KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.
KFEB, Tatt. Calif., 360 meters. 200 mi. City of Taft.
Mon. Wed. Fri, 6:15-7 pm, music, news. Pacific.
KFEC, Portland, Ore. 360 meters. 25 ml. Meter &
Frank Co. Inc. Daily ex Sun, 12 m, weather, reports;
4-5 pm, music; 6:30 pm, markets, reports. Thurs,
9-10 pm, concert. Sat, 11 am 12 m, children's hour.
Pacific.
KFEI, Tacoma, Wash. 360 meters. Guy Greason.
KFEL, Denver, Colo. 360 meters. Winner Radio Corp.
Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4
pm, music. Mon. Fri, 9-10 pm, 12-1 am, concerts.
Sun, 9-10 am, church services. Mountain.
KFEP, Denver, Colo. 240 meters. Radio Equipment Co.
KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.
KFER, Fort Dodgo, Ia. 231 meters. Auto Electric
Service Co.
KFEV, Douglas, Wyo. 360 meters. 250 ml. Felix
Thompson Radio Elec. Shop. Weather reports and
special warnings. Mountain.
KFEX, Minneapolis, Minn. 261 meters. Augsburg
Seminary.

Keit Carlot Wash. 224 meters. 200 ml. Yaldma Valley Rainmasting Assn. Slovan, "The Station That Wally Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Frl. 8-9 pm, concert. Packet. Rev. Yakima, Wash. 360 meters. 250 ml. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Frl. 8-9 pm. Pacific. KFZ. Spokane, Wash. 360 meters. 300 ml. Doerr-Mitchell Elec. Co. Tues, Frl. 7:30-9 pm, music, Sun, 6-7 pm. Pacific. KGB. Tacoma. Wash. 360 meters. 200 ml. Tacoma Daily Ledger.—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-1:30 pm, entertainment. Pacific. KGB. Tacoma. Vash. 360 meters. 500 ml. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment. 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific. KGN. Portland, Orc. 360 meters. 100 ml. Northwestern Radio Mfg. Co. Irregular schedule. KGU. Honolulu, Hawail. 360 meters. 150 ml. Northwestern Radio Lab. No regular schedule. KGU. Honolulu, Hawail. 360 meters. 150 ml. The Honolulu Advertiser. Daily 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.) 492 meters. 1:500 ml. Orcsonian Pub. Co. Daily ex Sun, 11:30 am, weather. 3:30-4 pm, woman's program; 7:30, weather. Mon. Wo. Kr. Fr. 17-7:30 pm, lecture. Sun, 7-8 pm, Honolulu Advertiser. Daily 7:30-9 pm, news, concert, lecture, bedtime story. Pacific.
KHJ. Los Angeles, Califf. 395 meters. 2,000 ml. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm. 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific. KHJ, Sunnyvale. Califf. 360 meters. 500 ml. Radio. The Light Man. Daily ex Sun, 1:30-1:15 pm. 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific. KHJ, Sunnyvale. Califf. 360 meters. 500 ml. Radio. The Light Man. Daily ex Sun, 1:30-1:15 pm. 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Fri, 8-9 pm. Sun, 2:30-9:30 pm. Pacific. KHJ, Sunnyvale. Califf. 360 meters. 500 ml. Radio. Inc. Angeles. Califf. 360 meters. 500 ml. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm. Fri, 8-9 pm. concert. Music. Pacific.

continued.

KNN. Los Angeles, Calif. 360 meters. 100 mt. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 263 meters. 600 mt. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert Pacific.

cert. Pacific, KNV, Los Angeles, Calif. 360 meters. Radio Supply KNX. Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.

KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Aris. Daily 11:55-12 m. 9:55-10 pm. time, reports. Mon, Wed, Fri, 7:30-8:30 pm. concert. Mountain.

KOP. Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

Police Dept.

1 pm, 6:30, reports, police information, carriers
Eastern.

KPO, San Francisco, Calif. 423 meters. 1,500 mi.
Hale Bros., Inc. Tues, Thurs, Sat. 8-10 pm, concert,
lectures. Sat. 3-4:30 pm. Sun, 11-12:30 pm, church
services. Pacific.

KQI, Berkeley, Calif. 360 meters. Univ. of Calif.

KQP, Hood River, Orc. 360 meters. Apple City Radio
Club.

Club.

KQV. Pittaburgh, Pa. 360 meters. 300 ml. Doubleday—
Hill Elec. Co. Daily ex Sun. 12-12:30 pm; 4:30-5, music. Mon. Wed. Fri. 10-10:55 pm, concert. Fri. 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose. Calif. 360 meters. 500 ml. Chas. D. Herrold. Daily ex Sun. 1-1:30 pm. Wed. 8-9 pm, concert. Pacific.

KRE, Berkeley, Calif. 360 meters. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert, Pacific.

KSD, St. Louis, Mo. 546 meters. 1.500 ml. St. Louis Post Dispatch: Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Fri, 11:30 pm, concerts. Cen-

KSL, San Francisco, Calif. 360 meters. 50 mi, The Emporium. Temporarily discontinued. KSS, Long Beach, Calif. 360 meters. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 360 meters. 500 ml. First. Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 360 meters. 1,500 ml. San Francisco Examiner. Dally ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 m, 6:45 pm, weather reports. Sun, 9-10 am, 5-6, news. Pacific.

KUS, Ios Angeles, Calif. 360 meters. 300 mt. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am. setting up exercises; 12-12:30 pm, concert, time. Mon. Thurs, Fri. 2-2:30 pm, features. Tues. Fri. 4-430 pm, code practice. Wed, Fri, 6-6:45 pm, concert, Pacific.

cert. Pacific.

KUY, El Monte, Calif. 360 meters. 500 ml. Coast
Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Calif. 1,500 ml. Portable Wireless
Telephone Co. Dally ex Sun, 4-5 pm, news, concert.
markets. Tues and Frl, 8-9 pm, concert. Sun, 2-3
pm, concert. Pacific.

KWH, Los Angeles, Calif. 360 meters. 250 ml. Examiner. Dally ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15,
8:20-9, reports, entertainment. Sun, 8:30-9 pm,
church service. Pacific.

KXD, Modesto, Calif. 360 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific. KYI, Bakersfield, Calif. 360 meters. Bakersfield Cali-KYQ, Honolulu, Hawali, 360 meters. Electric Shop. No definite schedule.

KFHI, Wichita, Kans. 224 meters. Charles V. Dixon. KFHJ, Santa Barbara, Calif. 360 meters. Fallon (NOTE—The second part of the station schedule list will appear next week.)

## Serially Continuously—

HE 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. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

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

KFBC, San Diego, Calif. 360 meters. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

Pacific.

KFBD, Hanford, Calif. 360 meters. 200 ml. Clarence
V. Welch. Mon, Wed. 3-4 pm. 7:30-8:30, news,
muste. agriograms, Tues, Thurs, Sat. 6-7 pm. music.
Fri, 3-4 pm. 9-10, news, music. Sun, 7-8 pm. church
services. Pacific.

KFBE, San Luis Obispo, Calif. 360 meters. 50 ml.
R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri,
7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. 360 meters. First Presbyterian
Church.

KFBH. Marshfield. Org. 360 meters. Thomas Musical

KFBH, Marshfield, Orc. 360 meters. Thomas Musical

Co.
KFBK, Sacramento, Calif. 360 meters. 300 mi, Kimball-Upson Co. Daily ox Sun, 6-6:45 pm, concert, news, codes. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.
KFBL, Everett, Wash. 360 meters. Leesee Bros.
KFBS, Trinidad. Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. 360 meters. Bishop N. S. Thomas. Thomas.

KFGB, Phoenix, Ariz. 360 meters. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFGD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFGF, Walla Walla, Wash. 360 meters. Frank A.

Moore, Walla Walla, Wash. Moore, Moore, Moore, Moore, Moore, KFGH, Billings, Mont. 360 meters. 500 ml. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. 360 meters. Colorado Springs Radio Co.

KFGL, Los Angeles, Calif. 360 meters. 1,500 ml. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am., 12-12:30 pm, 4-4:30, 8-8:20, live stock reports.

Angeles Union Stock Yards. Daily ex Sun. 10-10:30 am. 12-12:30 pm. 4-4:30, 8-8:20, live stock reports. Pacific.

KFGM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Daily ex Sun. 1-2 pm. music. Tues. Fri. 8-9 pm. music. Pacific.

KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare. KFCP, Casper, Wyo. 360 meters. Motor Service Stn. KFCV, Houston, Tex. 360 meters. 300 mi. Fred Mahaffey, Jr. Daily ex Sun. Mon. 7:30-8 pm. markets, entertainment. Sun. 2-3 pm. church services. Central.

KFGY, Le Mars. Ia. 360 meters. 300 mi. Western Union College. Fri. 8-9 pm. music, educational. Central.

Union College. Fri. 8-9 pm, music, educational, Central.
KFGZ, Omaha, Neb. 360 meters. Omaha Central H. S.
KFGA, Baker, Ore. 360 meters. 25 ml. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFOB, San Francisco, Calif. 509 meters. 1,500 ml, Mercantilo Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon. Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories. Pacific.
KFDC, Spokane, Wash, 360 meters. 25 ml. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.
KFDD, Boiso, Idaho. 360 meters. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.
KFEZ, St. Louis, Mo. 360 meters. American Society of Mech. Engrs.
KFFA, San Diero, Calif. 242 meters. 200 ml. Dr. R. O. Shelton. Dally, 6-7 pm, entertainment. Pacific. KFFB, Boise, Ida. 360 meters. 70 ml. Jenkins Furn. Co. (Owyhee Hotel). Dally, 8-9 pm, concert. Mountain tain.
KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern
Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music.

KFFE, Pendicton, Urc. 360 meters. 230-9:30 pm, music. Pacific.

Ore. Radio Co. Dally ex Sun, 8:30-9:30 pm, music. Pacific.

KFFO, Hillsboro, Ore. 360 meters. Dr. E. H. Smith. KFFO, Moberly, Mo. 275 meters. First Baptist Church. KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Marksheffel Motor Co. Dally, 8:15 am, weather: 4-5 pm, concert. Mon, Wed, Frl, 8-9:30 pm, special program. Mountain.

KFFR, Sparks, Nev. 360 meters. Jim Kirk, KFFV, Lamoni, Ia. 360 meters. Graccland College. KFFV, Comaha, Nebr. 278 meters. The McGraw Co. KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.

phy, Inc.
KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes
Amusement Co.
KFGB, Pueblo, Colo. 360 meters. Lowenthal Bros.
KFGG, Baton Rouge, La. 254 meters. Louisiana State
University, No regular schedule.
KFGD, Chickasha, Okia. 360 meters, Chickasha Radio
& Elec Co.

& Elec. Co.

KFGF, Mt. Vernon, Wash. 360 meters. 50 ml. Buchanan, Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm. music. Tues, Thurs, Sat, 7-8 pm. music. Sun, 2-3 pm. Pacific. KFGH, Stanford Univ., Calif., 360 meters. 500 mi Loland Stanford Junior University. No regular schedule. schedule. KFGJ. St. Louis, Mo. 266 meters. National Guards MISSOURI. KFGL. Arlington, Ore. 234 meters. Arlington Garage KFGM, Abilenc, Tex. 233 meters. Abilenc Daily Re-

porter. KFGP, Cheney, Kans. 229 meters. Cheney Radio Co. KFGQ, Boone, Ia. 226 meters. Crary Hardware Co. KFGV, Utica, Nebr. 224 meters. Reidbreder Radio Supply Co.

KFGX. Orango, Tex. 250 meters. First Presbyterian
Church. Sun, 11 am, 7:30 pm, church services. Church, Sun, 11 am, 7:30 pm, church services. Central. KFGY, Baudette, Minn, 224 meters. Gjelhaug's Radio Shop. Sprien Springs, Mich. 268 meters. Emanuel Missionary College.
KFHA, Gunnison, Colo. 360 meters. Colorado State KFHB, Hood River, Oro. 280 meters. P. L. Boardwell.

well. Normal School, KFHG, Norman, Okla, 254 meters. Univ. of Oklahoma,
KFHD, St. Joseph, Mo. 226 meters. Utz Electric Co.
Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat. 8-9:30
pm. concert. Central.
KFHF, Shreveport, La. 266 meters. Central Christian Church.
KFHH, Neah Bay, Wash, 283 meters. Ambrose A.
McCue.

KFHL, Oskalcosa, Ia. 227 meters. Penn College.

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#### ADVANCE PROGRAMS

Continued from page 6)

Concert, Vreeland Mandolin Orchestra.

WGY (Eastern, 380), 5:30 P. M., Special children's program, "The Kewple Doll," Anita and Jean Williams; "The Family Plenic," Jean Williams; "Sunny Jim," Jean and Anita Williams; "The Ginger Bread Man," Jean and Anita Williams; "The Ginger Bread Man," Jean Williams; 7:45 P. M., Musical program, "Invictus," "On the Water," MacGreger Male Chorus; "Forgetting," Marion Fraisier, tenor; "Their Only Child," Mrs. Frank Benford, reader; "Macushia," "Barcarolle," Male Chorus; "The Bitterness of Love," Eleanore L. Hillebrand, soprano; "Light," John Morris, baritone; "He Found It," "Lament in A Flat," Male Octette; "Dream Longing," Edward Vines, tenor; "Swing Along," "Deep River," "Mother o' Mine," James A. Loug; "Macurley Headed Baby," "The Little Damozel," Eleanore Hillebrand; "Gypsy Trail," "Ford Song," "Heward Balch and Chorus; "Surprising Eliza," Mrs. Frank Benford, reader; "My Lady," George Raymond, tenor; "Old Black Joe," "The Rosary," "The Cossack," "17se Gwine Back to Dite," Chorus; 10:30 P. M., Musical program, "Le Rossignol," Earl Rice, planist; "The Star," Clara Habel; contraite, "Minuet," Carael Hobel, contraite, "Minuet," "American Trio; "So Was I," "Helen Zander; "From the Canebrake," Edward A. Rice, violinist; "Mighty Lak a Rose," Clara Habel; "Romance," American Trio; "Descended from Christofo Colombo," Helen Zander; "Chanson Sans Paroles," WGY Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatro Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Victor Rudolph Orchestra.

WIP (Eastern, Daylight Saving, Soop, 1:00-2:00 P. M., Dinner musics, 3:00-4:00 P. M., musical program; (Continued from page 6)

ist; 7:30-9:00 P. M., Concert, Victor Rudolph Orchestra, 17:30-9:00 P. M., Concert, Victor Rudolph Orchestra, 200-4:00 P. M., musical program; 6:00-7:30 P. M., dinner dance music; Bedtime stories by Uncle Wip.

WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Pupils of Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Marx E. Oberndorfer; Children's Stories, Marie Spears; 9:15 P. M., Musical program, Leo Decer, tenor.

WMC (Central, 500), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gaspar Pappalardo, director; 11:00 P. M., Müdnight Frolic.

WDC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., 2435-5:00 P. M., Organ recital and trumpets; 7:30-8:00 P. M., Sports results and news dispatches; 8:00-9:00 P. M., WOO Orchestra, Robert E. Golden, director and violin soloist; 9:00-10:00 P. M., Organ recital, Clarence E. Bawden, organist; 10:00-10:55 P. M., Dance music, Hotel Adelphia Dance Orchestra.

WMJ (Eastern, 580), 12:05 P. M., Orchestra; 7:00 P. M., Orchestra; 7:00 P. M., Orchestra; Sporano; Mildred Seeman, planist.

#### Saturday, June 2

KSD (Central, 546), 3:00 P. M., Concert, Dorothy Corkins, vocalist and reader; W. J. Forestel, Jr., reader; Esther Portman, planist; 8:00 P. M., Concert, orchestra; Solos, Missouri Theatre talent; 11:30 P. M., Organ recital, Stuart Barrie.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Helen Engelke, soprano; Henry E. Nieman, accompanist; Mildred Bragdon, reader; Paula and Polly, Parrot Act; Robert G. Ball, baritone; Gertrude Grosscup Perkins, accompanist.

WBAP (Gentral, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum, First Methodist Church, WDAR (Eastern, Daylight Saving, 395), 11:00 A. M., 1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with the boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clydo Eagleton; 8:30-9:30 P. M., Musical program, James G. Bennett, basso; Mrs. James G. Bennett, contralto; Dr. J. J. Simmons, reader; 11:00-12:00 P. M., Violin and plano recital, Walter J. Fried, Mrs. W. J. Fried, Paul Van Katwijk, of Southern Methodist University department of music.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:30 P. M., Musical program and song rocital; 6:00-7:30 P. M., Dinner dance music Meyer Davis Bellevue Stratford Orchestra; Safety talks, Stanley Cowman; 8:00-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, 360), 8:00 P. M., Talk, "New Encland Problems," New England Business Magazine; Music; Comedy-drama, "Barbara Makes Her Splash," Amrad Players.

WGY (Eastern, 380), 7:00 P. M., Clarke, U. S. Supreme

Players. WGY (Eastern, 380), 7:00 P. M., Address, "League of Nations," Justice John H. Clarke, U. S. Supreme

Court.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary
Anderson Theater Orchestra; Roy C. Parks, organist;
7:30-9:00 P. M., Concert, Mime, Cara Sapin in charge,
WIP (Eastern, Daylight Saving, 509), 10:20-11:00 A. M.,
Short talks; 1:00-2:00 P. M., Dinner Music; 3:00-4:00
P. M., Short talks and musical program; 6:00-7:30
P. M., Dinner music; Bedtime stories, Uncle Wip;
8:00-12:00 P. M., Musical program, Charlie Kerr's
Cafe I/Aiglon Orchestra.
WMAQ (Central, Daylight Saving, 447), 7:00 P. M.,
Musical program, Sackett-Ryan Concert Company;
9:15 P. M., Band concert.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M.,
Musical program, Sackett-Ryan Concert Company;
9:15 P. M., Band concert.
WMC (Central, 500), 8:00 P. M., Concert arranged by
Woodmen of the World.
WOC (Central, 484), 3:30 P. M., Educational talk, C. C.
Hall; 5:45 P. M., Chimes concert; 9:30-10:30 P. M.,
Dance program, P. S. C. Orchestra.
WOO (Castern, Daylight Saving, 509), 11:00-11:30 A. M.,
Organ recital, Mary E. Vogt; 12:00-12:55 P. M.,
Luncheon music, Wanamaker Tea Room Orchestra;
4:45-5:00 P. M., Organ recital; 7:30-8:00 P. M.,
Baseball scores and news dispatches.
WWJ (Eastern, 580), 12:05 P. M., News Orchestra.

#### Sunday, June 3

KPO (Pacific, 423), 11:00-12:15 P. M., Organ recital, Gladys Salisbury; Readings for shut-ins; Talk by local clergyman.

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WBAP (Central, 476), 11:00 A. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor, Will Foster, organist.
WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. Wm. M. Anderson, Jr., First Prosbyterian Church; 9:30-10:30 P. M., Recital, Sacred music, singers from Gaston Avenue Baptist Church Choir; 10:00-11:00, Dizzy Four Orchestra.
WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Church services, Arch Street Presbyterian Church; Sermon, Reverend Clarence E. Macartney; Organ recital, Alton K. Dougherty, organist; 9:30 P. M., Organ recital, WGI (Eastern, 360), 4:00 P. M., "Adventure Hour," Youth's Companion; Concert, The Walter Francis Vreland Mandolin Orchestra: Selections, C. Fay Fleetwood, pianist; 8:30 P. M., Federation Church Service; 9:00 P. M., Concert, Henry R. Boardman, W. D. Strong, pianists.
WGY (Eastern, 380), 10:00 A. M., Church services, St. George Episcopal Church, Schenectady, N. Y.; Sermon, "Do Christians Really Know Christ?" Rev. B. W. R. Tayler, D.D., 6:30 P. M., Church services, St. George Episcopal Church; Sermon, "The One Who Knows Us." Rev. B. W. R. Tayler, D.D., 6:30 P. M., Church services, St. George Episcopal Church; Sermon, "The One Who Knows Us." Rev. B. W. R. Tayler, D.D., 6:30 P. M., Church services, St. George Episcopal Church; Sermon, "The One Who Knows Us." Rev. B. W. R. Tayler, B. W. R. Tayler, D.D., 6:30 P. M., Concent, Mrs. Newton G. Crawford, soprano; Mrs. Virginia Shafer Herrick, contralto; H. Archer Culmer, tenor; Peter Schilicht, bartione; 4:00-5:00 P. M., Concert, Mrs. Jane Webster Murrell; Lucile Schneider, Bernice Funk, Mrs. William Herman, Mrs. A. W. Ott. sopranos; Misses Josephine Miller, Ione Hoover, contraltos; Albert Peterson, tenor; Mary Agness Ott, violinist. wildinist.
WHK (Eastern, 360), 8:00 P. M., Concert, WHK Or-

WHK (Eastern, 360), 8:00 P. M., Concert, WHR Orchestra.
WIP (Eastern, Baylight Saving, 509), 11:00 A. M.,
Church services, Holy Trinity Memorial Chapel, B.
Janney Rudderow, minister; Ernest Felix Potter,
organist and choir leader, chorus of male voices;
2:00-3:20 P. M., Musical program.
WLW (Eastern, 360), 11:00 A. M., Church services,
Church of the Covenant.
WJ (Eastern, 580), 11:00 A. M., Church services, St.
Paul's Cathedral; 4:00 P. M., News Orchestra.

#### 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

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Orchestra.

WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Short talks; Musical selections; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with the boys and Girls; 8:00-12:00 P. M., Musical program; Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Aleyer Davis Bellevue Stratford Concert Orchestra; 3:00-4:30 P. M., Short talks and song recital; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Suc.

WGY (Festern, 380), 7:45 P. M., Musical program;

Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Musical program; "Hyl," WGY Instrumental Quartet; "Trick versus Trick," Mrs. Ralph A. Garrison, reader; "Fancy," WGY Quartet; "A Birthday," Sadle Gingold, soprano; Address, "Drug Addiction—An International Menace," James A. Hamilton, Secretary of State of New York; "Allegro," String Trio; "Mary Cary," Mrs. Ralph A. Garrison; "To a Wild Rose," Ernest Burleigh, cellist; "When Song Is Sweet," Sadle Gingold; "Mr. Brown Has His Halr Cut," Mrs. Ralph Garrison; "My Heart at Thy Sweet Volce," Sadle Gingold; "Cuban Dance," WGY Quartet,
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; Roy C. Parls, Rialto Theatro Organist.

WHAS (Century, Anderson Theatre Orchestra; May C. Anderson Theatre Organist. Theatre Organist. WIP (Eastern, Daylight Saving, 509), 10:00-11:00 A. M., Short talks; 1:00-2:00 P. M., Dinner music; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner dance music; Bedtime stories,

4:30 P. M., Short talks and musical program; 6:307:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip.

WLW (Eastern, 360), 8:00 P. M., Musical program, "The Ambassador," "Magnolla Blossom," Mount, Auburn School Orchestra, A. R. Kratz, director; Duct, Lockwood Doench, Ruby Doench, violinists; "An Hish Love Song," "A Thought," "Spring Fancy," Mrs. Noil Wright, soprano; "Desert Caravan," "Autumnal Days," "Orchestra; S. A. I. Trlo, Lucy R. McKeever, violinist, Corrine Sammet, saxophonist, Francis Bejach, planist; "Burlesca," Olive Terry, planist; "Souvenir," "Guitarrero," Lucy R. McKeever, violinist, Compositions by Burleigh, Lucy R. McKeever, violinist; S. A. I. Trlo. Chopin group, Olive Terry, planist; Compositions by Burleigh, Lucy R. McKeever, violinist; S. A. I. Trlo.
WMC (Central, 500), 8:00 P. M., Concert, Washington Syncopators, H. H. Guinett, director.
WOO (Eastern, Daylight Saving, 509), (1:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital; 7:30-7:45 P. M., Sports results and news dispatches; 7:45-8:45 P. M., Concert, John Wanamaker Commercial Instituto Band, Arthur A. Rosander, conductor; 8:45-9:30 P. M., Musical program; 9:30-10:55 P. M., Organ recital, Charence Bawden, organist.

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Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio stu-dents 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. Packer 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. Marz, 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 most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, \$2.00.

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. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

(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 rheo-

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 burket. The charge slowly finds its way to the ground instead of going through the receiving apparatus.

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

Hazoltine Neutrodyne

Glibbons Ultra Audion

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Single Tube Reflex

Three Tube Reflex

Flevelling Fliver

These helpful prints designed by a Member of the Institute of Radio Engineers. All ten matled prepaid for five dollars (\$5) or single prints at 75c apiece. Send money order or check (no stamps).

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THE LARGEST RADIO STORE IN AMERICA

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THE LARGEST RADIO STORE IN AMERICA

\$11.45

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

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Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. \$4.65 \$5.95 LOOP AERIALS .....

HONEYCOMB COIL

COMPLETE PARTS FOR REINARTZ SETS .....

VARIABLE CONDENSERS

**JACKS** 

CABINETS-MAHOGANY AND WALNUT Transmitters 2.45 Solid Copper Aerial Wire, 100 ft. 35

FORMICA PANEL, Black or Brown, cut while you wait, SQ. IN......1 1/2 c We guarantee all merchandise purchased of us. Mail orders receive immediate attention.

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

**58** PUBLISHED WEEKLY

SUBSCRIPTION RATES ....\$5.00 | Foreign... Single Copies, 10 Cents

Vol. V

Chicago, Saturday, June 2, 1923 No. 8

Secret Communication

Machine Reception Beats the Human Ear B IG BUSINESS and other organizations will soon be sending their messages through the air with greater 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

A S A RULE everything goes along happily with the
new Radio set until the near expert friend horns 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

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 HETHER 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 correspond-ing 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 oors 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 appartus 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 \$000,000,000,000,000,19 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—GFT 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 couse 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 Ningra 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 \$50.04 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

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 accidently tuned in KOP and one of them must of smelled my breath, because I'm writing from the jail.

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?

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. changing the season.

#### Your Dollar Was Excepted

Dear Indi: Your ishu 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 Radioknuts. 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.

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 INDIGEST 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

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.

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 ossess capacity or the power to store an ectric 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 be-tween the plates has a great effect upon

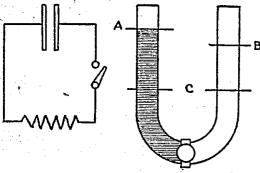


Figure 14—How a Condenser Oscillates when It Is Discharged

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 sub-stance, the following table giving the more common insulators and their inductive capacity:

Plate Glass ..... Window Glass ..... 5 Paraffin Wax ...... 2 Shellac ..... 3 Sulphur ..... 3

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

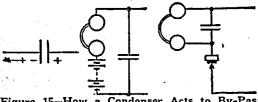


Figure 15-How a Condenser Acts to By-Pass Radio Frequency Currents

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 prac-tical unit is the microfarad or one thou-



## Crystal Fans Wake Up

"The Vacuum Tube's Only Rival" Lasts Indefinitely

50c by Mail, Tribune, Radio World

Make your set sound

RADIO CORPORATION OF AMERICA OPERA-TIVES use the L. D. R. Crystal as detector in conjunction with one or more stages of amplifica-tion. Satisfaction Guaranteed or money refunded. FREE. The Jaynxon Multipped 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 New York City 57 Dey St.

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.—Tuncrs and How to Tune
Your Set.

Chapter VI.—About Crystal Detectors.

Chapter X.—Audio Frequency Amplification.

Chapter XI.—How Super Regeneration Is Accomplished.

to mfd. The condensers used in Radio

work are rated then in decimal parts of

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

Analogy of Condenser

denser 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

WRAPPED FIXED

CONDENSER

PREFERRED FORM

OF CONDENSER

Referring to Figure 14 we have a con-

**GLASS OR MICA** 

PLATE

of a condenser in an oscillating circuit.

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

Chapter VII—Tube Detector Theory Chapter XII—Reflex Circuit Operation.

Chapter VIII—The Regenerative Detector.

Chapter IX—Radio plification.

Chapter IX—Radio Frequency Amplification.

Chapter XIV—Batteries Used in Radiophony.

sandths of a farad. This is abbreviated action will continue for a short while but

that the frequency of a current falls off as the wave length increases. Therefore when we increase the capacity of a con-denser 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

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 bypass condensers and also a simple condenser to explain their operation. When each time the water does not rise as high, a positive charge is impressed upon one. finally coming to rest at a level C where plate, as shown in the illustration, it in-

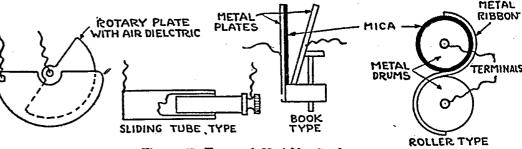


Figure 17-Types of Variable Condensers

equilibrium is established. And so with iduces a negative charge on the opposite 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 (Continued on page 14)



#### TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both consts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wenderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coll, \$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. II 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.

with every order. Either set is easy to build, easy to operate. Every-

Either set is easy to duite, easy to operate thing 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.

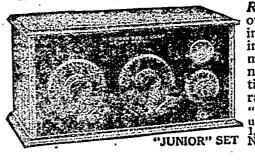
S. A. TWITCHELL

1925 Western Ave. Minneapolis, Minn.

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



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 Gilghman & Meadow Sts. Allentown, La.



approaches that of headphone reception on ordinary sets. 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 sensitive-ness 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.

GRAND RAPIDS, MICHIGAN

previous record of dial-positions. How the tone-quality and volume they get through their Loudspeaker (with the Michigan Senior Receiver)

# 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-

HERE 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. Padio Digest is worker that 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.

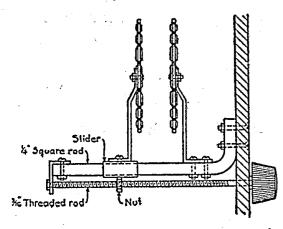
it very mild. I secured the best results with the arrangement as shown in the accompanying sketch. The rotary plates of the condenser should be connected to the switch lever in order to reduce body

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

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

A little study of the illustration will



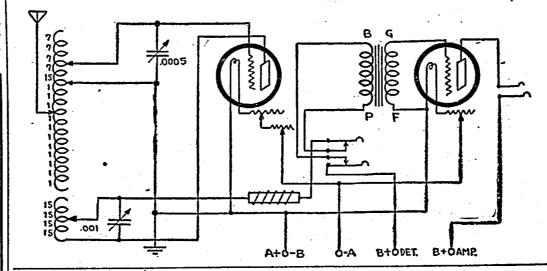
show how the arrangement works, the parts for which can all be secured from your Radio dealer or your scrap box. A slider riding on a length of square brass rod moves by turning the threaded shaft which passes through the nut soldered to the under side of the slider. Most sliders

## GOLD-GRAIN CRYSTAL DETECTORS

DEALERS-New List Discounts

W. Madison St. Chicago

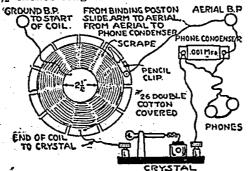
## CHANGES IN REINARTZ CIRCUIT



dence, R. I.

have a small threaded hole for the little have used. I hear WGY at Schenectady knob which can be used to fasten the piece every night and all local stuff is as loud of brass strip which carries the movable as a one bulb set.—John J. Earley, Proviknob which can be used to fasten the piece 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 14 inch wide and 11/2 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 coll 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



An attractive piece of furniture designed and so constructed to accommodate the Radio set and its entire equipment. With it you make a neat installation of Radio in the home. Its many advantages and moderate cost make it almost indispensable.

For sale by first class Radio and Furniture Dealers or write

#### Robbins Woodworking Co.

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#### Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular constructed. Delicate Soldering ticular purpose.

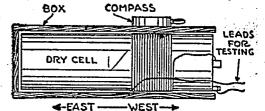
#### THE POST SOLDERING IRON



#### Testing Instrument for **Grounds and Shorts**

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

I found this a first class testing set and

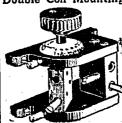


discovered a short in my condensers at once. I am having very good success with this outfit using only one peanut tube and have picked up signals from New York to Florida and Los Angeles with it.—H. W. Davis, Hearst, Ontario.

Long distance stations ordinarily can-not be heard with a crystal detector set.

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Triple Coil Mounting.....\$5.00



A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in. Equipped with a silver finished cali-brated dial.

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## WILLARD RADIO COMPANY

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New York City "The Best for Less'

Cat Whiskers

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 jarr-

ing will cause the spring to change posi-

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tion and jump off the crystal.

The cat whisker of a crystal set should

1 Reinartz wound coll, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1-13-plate .00025 MFD. variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel ALBEADY DRILLED AS PER DIAGRAM feet bus bar wire, I high-grade panel ALREADY DRILLED AS PER DIAGRAM
d complete instructions.

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—\$11.00

ļ			CONI	DENS	ERS
	13 23	Plate Plate Plate Plate	Variable; Variable;	value, value,	\$1.75\$1.05 \$2.50\$1.20 \$3.50\$1.35 \$4.50\$1.85
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VARIOCOUPLER—Celeron Condensite and Litz Wire Wound Secondary; Value \$4.50. Special ......\$2.95

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2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3, 006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate 0005 MFD, variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM.

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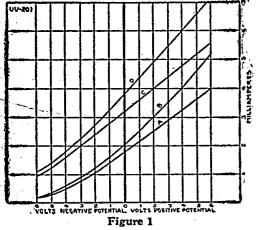
# Characteristics of Some New Vacuum Tubes

## Part I—Laboratory Tests Show Interesting Facts

By H. J. Marx

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-



cuits. 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.

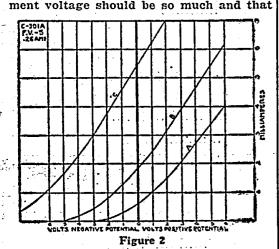
This variation in tube efficiency has made it a difficult matter to judge impartially the relative merits of tubes. Where unusual curves were discovered, at least three tubes from average dealer stock were tested. If the curves were fairly consistent the average is given. In case where the variation 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 com-pared to any selected by the manufac-turer. 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 fila-



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 con-

In order to describe the method of judg-

siderably more volume.

ing 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 flament

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 correspond-ing to the alternations in the antenna current. The effect of this variation on the electron flow is to vary the milliampere flow in the plate circuit.

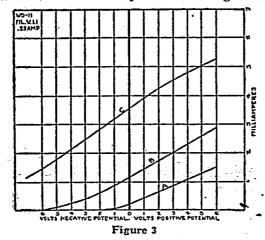
Plate Flow for Given Grid Charge

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



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 tubethen 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 de-termination 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

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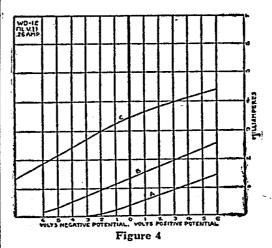
FORBES RADIO CO.

127 North Dearborn Street, CHICAGO



TITH the introduction of so many and the plate. This blocking action is filament voltage of 5, current consumption A gives values at 22½ volts plate battery, new types of vaccum tubes on the increased as the negative charge on the 1.0 ampere and 45 volts plate potential. B at 45 and C at 88 volts. Curve C was developed with 67 1/2 volts

plate potential.



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 fila-

ment voltage of 5 as recommended by the manufacturers. The current consumption was found to be .26 amperes. Curve results.

#### 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

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 221/2, 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

# Range, Volume, Portability With a Single Tube!



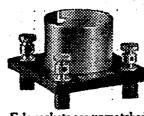
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Erla Bezels, in 1" and 13" sizes, are finished in polenamel. Telescoping rim fits any 18" to 14" panel. List, 20c

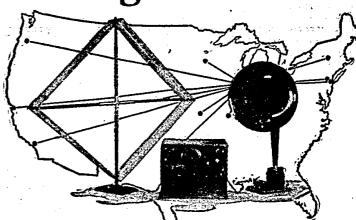


Erla fixed condensers reveal markedly superior accuracy, being exactly calibrated and individually tested. Made in eleven sizes, 35c to \$1 each



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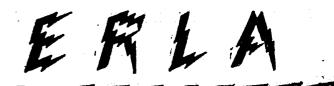
Vacation time holds new and untold pleasure, when you tune in with Duo-Reflex, the most powerful single-tube circuit ever built.

Through a loud speaker, it brings in all but the most distant stations; and with headphones it ranges from coast to coast. Its light weight, less than fifty pounds, with dry cells, makes it ideal for camping trips or week-end tours.

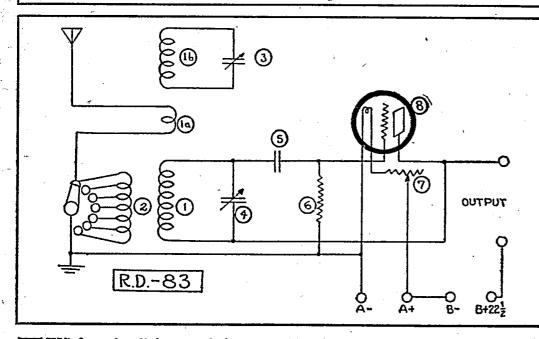
Interference and static disturbance are conspicuously absent. Even in hottest weather, clear and perfect reception is assured.

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> Electrical Research Laboratories Dept. A 2515 Michigan Ave., Chicago



### SELECTIVE FOUR-CIRCUIT TUNER



lar 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 3¼ inches in diameter and 5¼ inches long. Winding No. 1 consists of 65 turns of

HIS four-circuit is one of the popu- No. 18 S.C.C. wound in a single layer about 3 inches long. Then leave a space of % 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 1½ inches long, leaving about is 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.

-This is a winding on a separate tube 34 inches in diameter and 14 inches long, and is not inductively coupled to the other tuning unit. It consists of 43 turns, double bank wound and tapped at the be-ginning, the 7th, 13th, 21st, 31st and 43rd

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 at tracted 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 con-

#### 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 in-dividual 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

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amp., 4-6 volts, 16-221/2 plate voltage. Never be-
fore have you been able to purchase tubes at this price.
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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:

> $\frac{1}{C_1}\!+\!\frac{1}{C_2}\!+\!\frac{1}{C_3}\!+\!\frac{1}{C_4}$ — 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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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. 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, how-ever, 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-

Flewelling, Reinartz, Super-Regenerative and other diagrams will be brought to you immediately in our new 32-page booklet. Information about tubes, hints on construc-tion of sets and other valuable and in-structive data for everyone interested in Radio is included.

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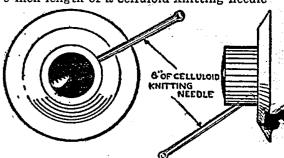
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move closer together thus changing the sign since the carly days of Radio telegraphy and it is not unlikely that some ingenious radiophan will devise a simpler instrument for the purpose and eliminate many of the evils of the present day condensers

(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



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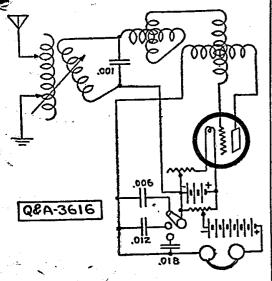
# Questions and Answers

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 pries 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 only may convenient or in these a definition. ed any way convenient or is there a defi-nite 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.

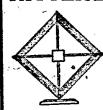
#### Reinartz Circuit

(2541) W.F.S., Endicott, N. Y
Will you kindly answer the following questions relative to the Reinartz cir-

Why does my set go dead after connecting on a phone condenser? What can 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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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 time under two hundred meters, which would enable you to receive code signals

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

#### RD-65

(2574) AS., Oak Park, III.

Kindly publish in your Question and
Answer Column the values of all variable and fixed condensers shown in your di-

agram 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) AHF, Boston, Mass.

I would appreciate very much the following infromation regarding RD-78. (The simple form of three-tube reflex.)

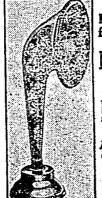
What is the wave length of such on hook-up? Is it selective? Is it advisable to shield the set and just what parts have to be shielded? In shielding, are the loop terminals soldered on to the copper shield or just what is done?

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



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These same Willards can be adapted to deliver 8 volts for pure D. C. for C. W. Transmitters. Better than a generator because no filter is necessary. Much less expensive.

In lots of 40 (320 volts) .\$160.00 (Better prices on larger quantity) Specify dry or charged when ordering.

Chicago Radio ApparatusCo. 415 S.Dearborn St., Chicago, III

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

Justed.

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 ½-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

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?

IDEAL CONTROL

ALL TUBES

Especially U. V. 199's and all dry cell tubes, because it is the only

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adjustment necessary at

To Break

Nothing to .... chip. Resis-tance ele-

ment so finely di-yided

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critical operat-

ing point.

No Discs

Is it necessary to add an extra B battery for each stage of impedance-coupled R. F. amplification? If not give me 2 hook-up using one stage of amplification. Is a variable grid condenser an advantage?

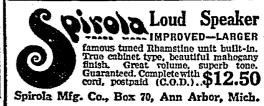
How does a variable in the plate circuit produce regeneration?

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 wavelengths 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.





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.

## 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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