MAY -7 1923 @CIB576636

Beginner's Series; Week's Advance Programs

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SATURDAY, MAY 5, 1923

NEW WAVES TO END QR



BOSTON, MASS.—Mae Murray, the motion picture star, had a special broadcast arranged for her by WNAC (Shepard Stores) on April 13, when she gave a Radio party in New York. She has been so pleased with WNAC programs that she made a request that the Colonial Orchestra play "Jazzmania" during her party.

TINY RECEIVER TUNES IN WNAC AND OTHERS

B OSTON, MASS.—Carlton Margeson, 171 King street, Dorchester, Mass., has built a tiny crystal Radio set that is only four inches long, seven and one-half inches wide, and one and one-half inches high. The tuner has 500 turns of Number 22 cotton covered wire, with 20 taps 25 turns apart. He gets Station WNAC quite clearly, and even WGI with this set. The total cost was \$1.35.

NEW ORLEANS, LA.—The record long distance range for the small current used is believed to have been achieved by WGV, broadcasting station of the Interstate Electric Co., this city.

The station radiates on one and seventenths amperes and recently received a report from Grand Prairie, Alberta, Canada, which arrived simultaneously with a verbal report from the Radio operator of the S. S. Broncho, who came ashore and told L. C. Parker, Jr., of the Interstate company that he had heard WGV programs while at sea off the Azores some weeks ago.

"A similar maximum range is claimed by a St. Louis station, but that record fails to approximate the New Orleans record since the St. Louis station uses a nine ampere current," Mr. Parker declares in an interview with a Digest representative.



EXCLUSIVE WAVE LENGTHS FOR BROADCASTERS

(Continued from page 1)

cities, with 21 other wave lengths reserved for future B plants not now in existence. Already a part of the plan has gone into effect; no broadcasters falling below the rigid qualifications set for Class B are being licensed for 360 meters, but are assigned wave lengths between 222 and 300 meters. These assignments are made by the district Radio supervisors who exercise their judgment to see that there will be no interference within their districts or with the districts adjacent.

the districts adjacent.

Listeners In Can Tune Better

The wave lengths assigned to the B stations in the various localities are in accordance with the plan of the conference and are based entirely on the willingness of the various stations to co-operate in putting them into effect. Every station so far has fallen in with the plan with enthusiasm because of the better broadcasting and general beneficial effect it will have on Radio. Listeners in will be able to select their station at will, and without bringing in several other plants they have no desire to hear.

It is understood that any station now operating on 360 meters will have the privilege of remaining on that wave length if it so desires. Such stations, now commonly known as Class A, if they remain on 360 meters will be in what will be called Class C. New Class A stations (having an input less than 500 watts in their antenna, a Class B requirement) will be assigned a wave between 222 and 286 meters.

Besides the elimination of the general

meters.

Besides the elimination of the general 400-meter wave, hereafter all government reports will be sent out by each station on its assigned wave, rather than on 485 meters, thus discontinuing use of this wave.

Exclusive Waves for Class B Plants
The thirty Cass B stations, now all on 400 meters, will be heard all over the country, once they obtain their new exclusive wave lengths, inasmuch as interference with other similar plants and small local stations has been their only barrier to this goal.

For the purpose of wave distribution without interference the country is divided into five zones. Assignments within these zones are for cities rather than for specific Class B stations, it will be noted. These follow:

ZONE 1		
		Wave
Fr	equency.	Length,
· K	ilocycles	Meters
Springfield and Wellsley Hills, Mass.	890	337
Schenectady and Troy, N. Y	790	380
New York City and Newark, N. J	740	405
THEN TOTA CITY WALL THE WALLY THE BELL	660	455
	610	492
Philadelphia	590	509
Fittiadelphia	760	395
Washington D C	690	435
Washington, D. CZONE 2	050	700
	920	326
Pittsburgh, Pa	670	448
Chicago, Ill		484
Davenport and Des Moines, 12	620	
Detroit and Dearborn, Mich	580	517
Cleveland and Toledo, O	770	390
Cincinnati, O. Madison, Wis., and Minneapolis,	970	309
Madison, Wis., and Minneapolis,		
Minn. ZONE 3	720	417
ZONE 3		
Atlanta, Ga	700	429
Louisville, Ky	750	400
Memphis, Tenn	600	500
St. Louis, Mo	550	546
ZONE 4		
Lincoln, Neb.	880	341
Kansas City, Mo	730	411
Jefferson City, Mo	680	443
Dallas and Fort Worth, Tex	630	476
San Antonio, Tex	780	385
Denver, Col. (reserved)	930	323
Denver, Col. (reserved)	570	527
Omaha, NebZONE 5	310	021
ZUNE 3	610	492
Seattle, Wash	660	455
Portland, Ore.		312
Salt Lake City, Utah	960	
San Francisco, Cal	590	509
	710	423
Los Angeles, Cal	760	395
	640	469
San Diego, Cal	560	536

Reserved wave lengths in the five zones, that is, wave lengths which will be held awaiting the the erection of anticipated plants capable of B ratings, are: Zone 1, 303, 319, 469, 357, and 288 meters, Zone 2, 294, 345 and 366 meters; Zone 3, 300, 316, 375, 462 and 333 meters; Zone 4, 361, 291 and 306 meters; Zone 5, 297, 330, 349 and 370 meters.

and 306 meters; Zone 5, 297, 330, 349 and 370 meters.

What "Kilocycle" Means

In the tabulation above, it is noted that frequency in "kilocycles" is made the basis of the assignment. Dividing the speed of Radio waves, 300,000,000 meters per second, by the wave length, gives the frequency in cycles. A kilocycle is 1,000 cycles. In Radiophony it has been found best to rate stations according to their kilocycles frequency, as it is the separation or difference in this frequency, one station to another, that will permit the listener in to tune in the one and tune out the other.

The difference between each locality assignment, it will be noted, is 50 kilocycles. Another technical reason for this separation is to prevent audible heterodyning, sometimes called "beat notes," as a result of one station's frequency being too close in number to anonher's. The beat note is audible to most people when below 18 kilocycles difference exists between stations.

Stations will be rigidly required to keep

18 kilocycles differentiations.

Stations will be rigidly required to keep within two kilocycles of their assigned waves. Constant check will be required to maintain accurate adjustments of the broadcast transmitters.

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

Kilocycles will supercede meters in designating the transmitting waves of all stations next year.

Similar somewhat to the plan for the Class B stations is that which has gone into effect for the Class A stations. District Radio supervisors are reassigning 533-kilocycle (360 meter) stations according to the plan, and all new Class A plants will receive "district-exclusive" wave frequencies and lengths, and whether quencies between 1050 and 1350 kilocycles, that is, 222 and 236 meters, to take effect at once. The reassigned Class A plants will not use their new waves until May 15.

From the schedule of wave lengths for Class A stations, printed below, it will be seen that at least 20 distinct waves lengths are available for distribution in each of the nine Radio districts by the supervisors. Three or four wave lengths in each district will be reserved for the best of the local stations of this class, these waves not being assigned to stations in the immediately adjoining districts.

This gives the better of the Class A broadcasters a partially exclusive transmitting wave. For example, the wave length 22 meters may be assigned to stations only in the 4th, 5th and 8th districts; similarly, the wave of 233 meters will be authorized for use only in the 2d, 5th and 7th districts, while waves 224, 226, 229, etc., will be allocated in every district. This plan, it is believed, will tend to prevent considerable local interference, and create virtually an "A-1" class of stations within the general A class.

Each of the Class A station allocation, wave in the districts of the class A proadcast by Radio, wave in the latter case the districts once. The districts wave frequencies and lengths, and wave frequencies.

Class A Wave Frequencies.

Class A wave Frequencies.

Class A broadcasting wave frequencies and lengths, and went frequencies.

Class A wave frequencies.

1,110-			K:110-		
cycles	Wave			Wave	
Fre-	Length.	Assigned	Fre-	Length.	Assigned
quency	Meters	Districts	quency	Meters	Districts
1350	222	4. 5. 8	1190	252	All
1340	224	All	1180	25£	AII
1330	226	Alī	1170	256	1. 3. 6
	227			258	
1310	229	All		261	
	231		1140	263	2. 5. 7
	233		1130	266	A17
1280	234	AlT		268	
	236				4. 7. 8
	238			273	
	240			275	
	242:		1080	278	1. 6. 8
	244			280	
	246		1060	283	All
	248			286	

will be authorized for use only in the 2d, 5th and 7th districts, while waves 224, 226, 229, etc., will be allocated in every district. This plan, it is believed, will tend to prevent considerable local interference, and create virtually an "A-1" class of stations within the general A class.

Each of the Class A station allocations, it will be noticed, is separated 10 kilocycles from the next. As in Class B allo-

CONTENTS

Radio Digest, Illustrated, Volume 5, Number 4, published Chicago, Illinois, May 5, 1923. Published weekly by Hadio 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.

ı			а
ı	"All the Live News of Radio"	to Z	ł
ı	Receiving Records	. 2	ł
ı	Radio Fools the Pollies	. 3	ı
ı	An Evening at Home with the Listener In.	. 4	ı
ŀ	WJZ Broadcasts School Lessons.		
ľ	Advanced Programs for May 1 to 7 Inclusive.		
ŀ	First Steps for Radio Beginners		
ı	Radiophone Broadcasting Station Directory, Part III		
ı	Book Reviews		
l	Editorials; Indigest; Condensed by Dielectric.		
ŀ	Simple Arrangement Add Step of R. F. and Other Kinks.		
l	Making a Three Tube Reflex De Luxe Receiver: Part I-Panel Layout and Hook-Up		
ı	Questions and Answers.		
ı	Radio Illustrated, a Page of Pictures.		8
Į			ı

Looking Ahead

Major General Mason M. Patrick, Chief of the U. S. Air Service, in the next issue will tell Digest readers how Radio is being applied in aviation. Of these two modern forces in war, Radio plays an important part in assisting the other, aviation. Read what Major General Patrick has to say.

The Hazeltine Neutrodyne Circuit—will be discussed in an article next issue by Harry J. Marx, technical editor of the Digest. Mr. Marx has some interesting disclosures to make regarding this, the latest addition to the rapidly growing field of Radio "hook-ups."

Radio Waves; How They Are Made; How They Travel—the subject of Chapter II of Thomas W. Benson's series of articles for Radio beginners. Are you a newcomer? Read the second chapter next issue.

The Three Tube Reflex De Luxe Set—description for the making of which starts with this issue, will be continued next week. This wonder set, built and described by H. J. Marx, accomplishes the work of six tubes, but uses only three. Read more about it next week.

E. T. Flewelling's One Condenser Flivver Super Set—Part II next week. Due to illness and need of rest, Mr. Flewelling was forced to postpone the article which was to have appeared this week, but assures us he will have many live hints on the new set to tell Digest readers next issue.

Advance Programs of the Big Broadcasters for the Week—and more stations represented than in any other source of similar information. Watch this exclusive Digest feature expand. Read it every week so you will know the best nights to listen in.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

SEND IN THE BLANK TODAY

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(Six.	Forel	enclose gn) for st, Illus	One	M. O. Year's	for Five Subscri	e Dollar iption 1
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Addres	s			• • • • •		
City				Sta	ıte	

RECEIVING RECORDS? SEND 'EM IN-

By the Contest Editor

ACK again this week with twelve new records and seventeen old ones beaten. Of these, S. S. Atwood of Esperance, Washington, wins honorable mention for submitting the most records and also the longest distance, which is 2500 miles. This is not being done every day. Send in your measured records.

Station Heard—Miles Away—Who Heard It CFAC—1750. Ted Lehman Ashland Ky

CFAC-1750, Ted Lehman, Ashland, Ky.
CHYC-2300, S. S. Atwood, Esperance, Wash.
KFDJ-2100, Ted Lehman, Ashland, Ky.
KGR-1795 Louis Prophice Chicago III
KGB-1725, Louis Bruchiss, Chicago, Ill. KGY-1925, Paul French, Oxford, Mich.
KJS-1150. W. F. Galloway, Vancouver, B. C., Can.
KOG-2450, H. F. Andrews, Albany, N. Y.
WWW 9250 C P Dishtmany, N. 1.
KWH-2350, C. R. Richtmeyer, Allentown, Pa. WAAS-1025, E. B. Miller, Plainview, Tex.
WBAI-1150, E. B. Miller, Plainview, Tex.
WBT-2250. Kenneth Curtis, Seattle, Wash.
WCAL 1700 A C France China Til
WCA!-1100, A. C. Flint, Chicago, III.
WCAL-1400, S. S. Atwood, Esperance, Wash.
WCN-1750, E. B. Miller, Plainview, Tex.
WDAU-1700, E. B. Miller, Plainview, Tex.
WFAN-1300. S. S. Atwood, Esperance, Wash.
WFAV-1350, S. S. Atwood, Esperance, Wash.
WGAB-1750, J. A. Bernier, Quebec, Can.
WIAO-1700, S. S. Atwood, Esperance, Wash.
WLAZ-2075, A. B. Butters, Los Angeles, WMAG-1325, R. T. Andrae, Cobalt, Ont., Can.
WMAG-1323, R. T. Andrae, Cobait, Ont., Can.
WMAH-1350, S. S. Atwood, Esperance, Wash.
WMAU-1400, W. W. Selden, Springfield, Mass.
WNAC-2500, S. S. Atwood, Esperance, Wash. WOAJ-1550, S. S. Atwood, Esperance, Wash.
WUAJ-1550. S. S. Atwood, Esperance, Wash.
WOAN-1100. H. M. Clark, Auburn, Me. WOAW-1325, H. M. Clark, Auburn, Me.
WUAW-1525, H. M. Clark, Auburn, Me.
WWAC-1550, Donald Wood, Waco, Tex.
WWAX-1700, Sydney Warner, Springfield, N. J.

\$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1

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many others, simple and elaborate, fully diagrammed and explained. Used continuously by thousands of Radio fans, both amateurs and professionals. The greatest book ever published for experimenting. Keep this valuable little book before you at all times. Send your check or momey-order for one dollar and the book will be mailed to you. Fifty hookups in the book—all different. Send your order today. The edition is limited.

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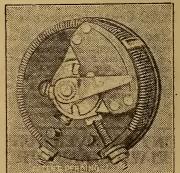
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BOOTLEGGERS FIND PROFITABLE FIELD

SMUGGLE "PEANUT TUBES" ACROSS BOUNDARY

Detroit Fans Make Purchases of Scarce Apparatus—Ask No Questions and Say Nothing

and Say Nothing

DETROIT.—A new kind of bootleggling has developed between Detroit and Windsor, Ont., just over the international boundary—sinuggling "peanut tubes" into the States. Just why a situation of this kind should exist is difficult to determine, although there are plenty of critics ready to offer explanations.

However, the stealthy traffic here is a surprise to a great many people. Many are asking the question, "Is it because the North American market is controlled or divided? Is it made easy for the consumer to buy what the interests wish to sell it, but not at all easy for the public to buy what it wishes when it wishes?"

Can Get It Across the River

It is extremely difficult here to buy much of certain kinds of Radio equipment that the people are after. This comes in at infrequent intervals and even then one must have his order filed several days in advance before he can get it. However, it does not seem to be just the same across the Detroit river, a mile from the center of the city. There is little trouble over there it is said getting the very equipment that cannot be obtained here. Many, however, are not stopping to ask questions but make their purchases, put them away securely and say nothing.

JEK of WOR Has New Test Given Aspirants

Hears Violinist Over Phone Before Giving O. K.

NEWARK, N. J.—You know, or perhaps you don't know, that every one who broadcasts from WOR must submit to a test being made of his voice, or playing. When JEK, program director, made this rule, some of the other station managers thought that she would not be able to make artists come all the way to Newark for tests, especially since Radio programs are not paid for. But artists realize the publicity value in Radio, so they are willing to go to a little trouble to get on a program. Every day from 4 to 5 p. m. there is a steady stream of applicants, to make "try-outs." A novel one was made the other day, however. A very busy young violinist from New York had requested the privilege to broadcast and had been given the usual reply—that he would have to make a try-out. So he called up WOR and asked JEK if it would be possible to play without being herrd by her beforehand.

"No," said JEK, "I'm sorry, but I must hear you play before I give you permission to play for the vast audience."

"But I can't possibly get over to make the try-out, as I am leaving on a concert tour in two weeks and I want to play over the Radio before that time."

JEK put on her thinking cap—it's a cap she wears nowadays, more than her other hats, too.

"Till tell you what to do," said she.

she wears nowadays, more than her other hats, too.

"I'll tell you what to do," said she.
"Play a piece for me over the telephone.
That would be so like the Radio that 1 can judge how you would come over the air."

air"."
"It's a go," sald the young man, and played beautifully! And he played for the Radiophans, on Friday, April 13th, at 8:30 p. m.—Lindsley Lindy, who has given concerts in London, Paris and Berlin, and who plays on a real "Strad."

Some big-hearted New Yorker anonymously contributed \$100 for the purchase of a radio outfit for the leper colony in Porto Rico.

WOO CONCERT HEARD THROUGH PARIS LOOP

PHILADELPHIA, PA.—Station WOO has received a letter from Andre A. Marle, Electrical engineer, 4 Rue Richepanse recording the remarkable fact that Station WOO's transatiantic concert, broadcast March 15 with Marcel Dupre, organist of Notre Dame Cathedral at the grand organ, was heard in Paris on a loop aerial. This concert was heard simultaneously across America and across the Atlantic ocean.

YOUNG BROADCASTER HAS NEIGHBOR TALENT

HOUSTON, TEX.—Fred Mahaffey, Jr., 15-year-old high school student, claims to be the youngest broadcasting station operator in the world. He has regular programs dally except Sunday at 7:30 to 8 p. m. with his own violin selections, plano solos by neighbors and vocal numbers. Mahafey's station is KFCV, 360 meters. He uses 10 watts antenna input and is heard all over the Southwest.

RADIO FOOLS THE POLLIES



Miss Marion Merle, pretty vaudeville girl, fooled her trained troop of macaws, cockatoos and parrots with a Radio instrument. The set she carries is made from an old newspaper camera box, but it works just as good as the best of them and the tropical talking birds got the thrill of their young lives trying to learn the source of the mysterious chatter © International

American Legion Station Closed for Summer, April 1

Both stations went out on different wave lengths, and the double broadcasting proved quite popular among the Radiophans.

OMAHA, NEBR.—April 1 marked the close of the American Legion Station, WGAT. The station will not be opened again before early in the fall.

One of the features of WGAT has been simultaneous broadcasting in co-operation with Station WJAB. This was done by using a line and line amplifiers, which connected WJAB with the Legion studio.

Bequeaths Radio Set

The first case on record of a Radio receiving set being specified in a will was probated in New York. He bequeathed a using a line and line amplifiers, which connected WJAB with the Legion studio.

ENGLISH STATIONS RELAY BROADCAST

SIMILAR WAVE LENGTHS HAMPER TEST

Success of Experiment Opens Big Possibilities for British Broadcasting Company's Stations

MANCHESTER, ENGLAND.—A highly interesting experiment in Radio broadcasting procedure was carried out recently at the Manchester station of the British Broadcasting Company. For some time past the station has been relaying the Paris time signals, which are sent out on a wave length of 2,600 meters, then the officials endeavored to pick up and relay the London and Birmingham broadcasting stations.

the London and Birmingham broadcasting stations.

This they did, part of the children's "talk" from London and the "talk" and orchestral program from Birmingham being received on a special aerial, which is set some short distance away from the normal transmitting aerial on which the items were re-radiated to the Manchester area listeners-in. The great difficulty lies in the fact that the wave lengths of the stations are so similar—Manchester is 385 meters, London 369 meters, and Birmingham 420 meters,—so that a particularly selective circuit is necessary to avoid jamming by the re-radiated signals.

This is the first time a direct Radio relay has been accomplished on the British Broadcasting Company's stations, and it naturally opens up big possibilities. If, as seems quite likely, the development becomes a thoroughly result in there being one big central broadcasting station only, say in London, where the best of the leading musical and vocal talent could be engaged, while in other parts of the country the auxiliary stations would merely relay the program for the private listeners-in in their areas.

PHONOFILM GIVES **VOICE TO MOVIES**

New Device Invented by Dr. De Forest Given First Public Showing

Showing

NEW YORK.—The first public showing of Dr. Lee de Forest's latest invention, the phonofilm, was given at the Rivoli Theater recently. Many so-called "talking pictures" have been exploited in the past in which a phonograph supplies the sound, but this will be the first showing of a film that literally talks and supplies music.

The phonofilm, as the name implies, is a combination upon the same film of picture and voice or music. The sound waves are photographed on the film at the same time the pictures are taken, thus insuring at all times perfect synchronization. In reproducing these sound waves are transformed into telephonic electric currents. By the use of Audion amplifier these currents are amplified 100.000 times and finally turned back into sound again through "loud speakers" located behind the motion picture screen.

A most astonishing result is accomplished: a dancer appears on the screen keeping perfect time with the music supplied by the film; a singer appears from whose moving lips comes every note in perfect tone and synchronism; the bow of a cello player holds the fascinated attention of the audience, as every stroke brings forth the mellow strains of the instrument.

Frisco Entertains New Orleans

NEW ORLEANS, LA.—At a recent meeting held by the New Orleans Chapter, American Association of Engineers, a Radio program by the San Francisco chapter of their oraginzation was the chief feature of entertainment. Motion pictures of Louisiana bird life followed the ether program.

THE ANTENNA BROTHERS

Spir L. and Lew P.

E. T. Flewelling, of Course!











WSY, BIRMINGHAM, GÉTS TRADE MARK

Dick Johnson, Designer of Emblem, to Be Heard on Broadcast



By George H. Watson

BIRMINGHAM, ALA.—WSY, broadcasting station of the Alabama Power Company, has what it believes is something new. It is a trade mark which appears on all literature sent out by the station. Thousands are already familiar with the three strokes of the anvil which ring before the michrophone of WSY and in the phones and loud speakers over the continent.

The trade mark, just protected is and thunder, striking shafts of lighting from an anvil. The iron is symbolic of the iron and steel working center of the south, the bars of lightning are the artist's conception of WSY's service. The ancient thunder gives a touch of the supernatural still associated with the Radiophone. WSY's slogan "Service From the Heart of Dixie" underlies the figure.

Dick Johnston, announcer for WSY, has just mailed out 5,000 letters announcing that the artist from Tuskegee Institute who made the design will be heard soon on the WSY program. Each letter shows the new trade mark.

Decree Issued to Cover Cuban Radio

Divide Stations into Five Classes and Assign to Each a Set Wave Length

Wave Length

WASHINGTON, D. C.—Pending the passage of a law to cover the use of Radio telegraph in Cuba, a presidential decree has been issued defining the various classes of non-governmental Radio stations and prescribing certain general rules for their operation, says Acting Commercial Attache P. L. Edwards in a report to the Department of Commerce. Up to the present time there has been no law or regulation covering the construction or operation of Radio stations in Cuba.

Under the decree, non-governmental

Under the decree, non-governmental Radio stations are divided into five classes, A, B, C, D and E, to each of which is assigned a wave length and a maximum power. No sets of any of these classes will be used for commercial purposes.

will be used for commercial purposes.

Owners Must Register
All owners of stations coming within any of these five classes were registered with the Director General of Communication before March 16, 1923. After that date no station could be used unless the proper permit had been issued by the office mentioned. The permits are for a term of one year in the case of classes A, B and C, and for five years in the other two classes. Applicants must pass an elementary examination, but it is not believed that this requirement will in any way hamper the issuance of licenses.

Can Not Use S. O. S.

hamper the issuance of licenses.

Can Not Use S. O. S.

The decree further provides that the Government may, under specified circumstances, require transmitting stations of any of the five classes to cease operation without their claiming indemnity from the Government. Transmitting stations of any class are made subject to the regulations of the International Radio Convention signed in London in 1912. The decree also prohibits the transmitting of the international distress call, S. O. S., either as a special signal or in the course of any general text. Penalties are provided for the disclosure of any public or Government message intercepted by any station. Only apparatus capable of transmitting a pure, continuous wave may be used.

TWO SUPERSENSITIVE CIRCUITS

My Highly Improved Reinartz hrings in all imporant stations on both coasts and Mexican horder, boud, clear and without distortion. We dance to nusic from Atlanta received on one loud Baldwin nit. Build one of these wenderful sets from my heprints and specifications, price 50c. or with a erfect and complete double wound spiderweh coil, 3.00 by mail. No other windings used. Photo of y set on a glass pauel with every order.

This copyrighted circuit is the most successful of my Reinartz modification yet produced, and is imitted the most. Thousands are in use.

At the complete definition of the full value of that little tube as not dearly on one tube. This et is small, complete, portable. For the man who rishes the highest efficiency, this is the set to build, rice of blueprint and specifications, 50c, or with omplete and perfect windings, \$3.00. Photo of set fith every order.

is easy to build, easy to operate. Everything clearly shown.

These high quality silk insulated coils are machine wound on fiber forms. I wind colls to your specifications in lots of 100 or more. Write for prices.

S. A. TWITCHELL

1925 Western Ave. Minneapolis, Minn.

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

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta	440			11:30-12:30			11:30-12:30	
CKAC, Montreal, Que	430		6:00-10:30		6:00-10:30		6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00		6:00- 9:00		3:45- 5:00
KFAF, Denver, Colo KFDB, San Francisco, Calif.	360 400	9:00-10:00 10:00-12:00	9:00-10:00	10:00-12:00	7:30- 8:15	9:00-10:00 10:00-12:00	9:00-10:00	9:00- 9:30
KFI, Los Angeles, Calif	400	9:00- 1:00	9:00- 1:00		9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00-12:00
KGW, Portland, Ore	400	10:00- 2:00		10:00-11:00		10:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif	400	8:45-11:30		8:45-11:30	8:45-11:30	8:45-11:30		12:00- 1:00
KPO, San Francisco, Calif	400		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo KYW, Chicago, Ill	400	8:00-12:30 8:00- 9:30	8:00-10:00 8:00- 9:30	8:00-10:00	11;30-12:30	8:00-11:30 11:30- 1:00	8:00-10:00 8:00- 9:30	
NAA, Radio, Va	710	5:45- 7:30	6:05- 7:40	6:25- 8:40		7:00- 8:40	8:00- 9:30	7:00- 8:00
PWX, Havana, Cuba	400	0.10	0.00 1110	8:00-10:30		7100 0110	6:30- 6:45	
WBAP, Fort Worth, Texas.	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	
WBZ, Springfield, Mass	422	6:30- 8:00	6:30- 8:00	6:30- 8:00		6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich	400	7:00-10:00	7:00-10:00	7:00-10:00 6:00- 1:00	7:00-10:00 6:00- 1:00		6.00 1.00	4:00- 5:00
WDAF, Kansas City, Mo WDAJ, College Park, Ga	400 360	6:00- 1:00 7:30-11:30	6:00- 1:00 7:30-11:30	7:30-11:30	7:30-11:30	6:00- 1:00 7:30-11:30	7:30-11:30	11:45- 1:00 7:30-11:30
WDAP, Chicago, Ill	360	7.50-11.50	10:00- 2:00	7.00-11.00	10:00- 2:00		10:00- 2:00	9:00-12:00
WEAF, New York, N. Y	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	
WFAA, Dallas, Tex	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa	400	5:30- 6:00		7:00- 9:30	5:30- 6:00			6.66 45.65
WGI, Medford, Mass	360 400	9:30-10:30	7:30- 9:00 9:30-10:30	5:45- 7:30 9:30-10:30	8:30-10:00 9:30-10:30		7:30- 9:00 9:30-10:30	8:30-10:00
WGM, Atlanta, Ga	400	7:00- 9:00	9.30-10.30	7:00- 9:00	9:00-10:00	7:00- 9:00		7:30- 8:00
WGR, Buffalo, N. Y WGY, Schenectady, N. Y	370	6:45- 9:00	6:45- 9:00	1100- 0100	6:45- 9:00	6:45-11:00		6:30- 7:30
WHA, Madison, Wis	400	7:00- 9:00		7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
	360		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y WHB, Kansas City, Mo	400	7:15- 8:30	8:00-10:00		0.00 40.00			
WHE, Kansas City, Mo	360	5:00- 5:30	5:00-10:00	7:00- 8:45	8:00-10:00 5:00- 5:30	5:00- 5:30	5:00- 5:30	8:00-10:00 7:00- 8:45
WIP, Philadelphia, Pa	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30			7:00- 8:40
WJAX, Cleveland, O	360	0.00	6:00- 7:30		7:15- 9:30	0.00- 0.00	0.10-11.00	
WJZ, Newark, N. J	360	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R	360	12.72.11.22			7:30- 9:30		7:30- 9:30	
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30 10:00-12:00	6:00- 7:30 8:00-10:00	9:15-10:30 10:00-12:00	6:00- 7:30	8:30-10:30	
WLW, Cincinnati, O	360 400	8:00-10:00	7:00-12:00	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	
WMAQ, Chicago, Ill WMC, Memphis, Tenn	400	8:00- 9:30		7.00-10.00	8:00- 9:30	8:00- 9:30	8:00- 9:30	
WOAL San Antonio, Texas.	400		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia	400	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa	400	6:50-11:00	7.00 10 00	F.15 0 00	6:50- 9:10			
WOR, Newark, N. J	400	5:15- 6:30	7:00-10:00 10:45-12:00			7:00-10:00	5:15- 6:30 10:45-12:00	7.20 0.00
	360	8:00- 8:45		8:00- 8:45	10.40-12:00		10:45-12:00	7:30- 9:00 7:30- 8:30
	400	0.005 0.40	6:00- 9:00		6:00- 9:00	6:00- 9:00		6:30- 7:30
	77.						1.0. 1	1 (7)

(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. Thus the use is very simple.)

Wife vs. Husband and Airphone Set

Albert H. Waitt, Millionaire Owner and Operator of Station 1AOV, Sued for Divorce

NEWTON, MASS.—A mania for Radio is given as one of the grounds for the divorce suit institute by Mrs. Lillian B. Waitt of this city against her millionaire husband, Albert H. Waitt, in an interview recently. "He is obsessed with Radio," declared Mrs. Waitt of her errant husband. "Not only did he have a receiving set, but he had a powerful transmitting apparatus, by special license of the United States government. It was a registered station, with the call IAOV.

Husband Locks Up and Leaves

"Night after night, with a hired Radio operator, he would go to the Radio room at the top of the house and spend hour after hour there, leaving me alone. I think any jury will consider that gross neglect and cruelty.

"When I recurred from a visit to New

neglect and cruelty.

"When I returned from a visit to New York, and found him gone, after publishing in the local newspapers and telling the servants and friends that he was going to South America, I went up to the Radio room and found it padlocked, with a printed sign on the door reading: 'Radio Station IAOV Closed!' That's how far he carried his obsession.

"I had the padlock smashed, after con-

"As valuable to your radio set as RADIO is valuable to the world"

ARTHUR PUDLIN'S Variable High Resistance Leak

Eliminates the hissing and all disagreeable noises. Enables you to hear all stations clearly.

Endorsed by Flewelling, Rosenblum and other leading Radio engineers.

Price with .00025 Mica Condenser\$1.00 Price without Condenser .75

For sale at all good dealers. If your neighborhood dealer hasn't them in stock, send us purchase price and we will mail you immediately the Arthur Pudlin Variable High Resistance Leak. Also send dealer's name.

Arthur Pudlin Engineering Co. 1540 Broadway, New York,

WASHINGTON, D. C.—Successful experiments in high speed Radio transmission between the Army Message Center in the Munitions building here have just been completed. With new commercial apparatus, capable of sending mechanically from a perforated tape up to a speed of 100 words a minute and recording the messages in a caw-toothed ink line on a tape, a reception speed of 65 words a minute has been achieved. After a little practice, signal corps experts say, their operators will be able to mechanically copy the received messages visually as well as by ear, and in this way a great saving of time will be made in clearing traffic.

SPEED TRANSMISSION

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100 Words a Minute Is Achieved

by New Apparatus



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

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sulting an attorney, thinking he might have hidden my jewelry there, but I did not find them."

Mrs. Waitt, in a statement, also declared that her husband was displeased with her trip to New York and broadcast the fact from his sending station. When she asked him why he did it, he answered that he wished to let her friends know that she was coming.

When figuring on the wave length of your aerial, remember the lead-in counts.

It is written:

"The cure of ignorance is study." The wise man carefully investigates, — then buys a Grebe Receiver.



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WJZ BROADCASTS SCHOOL LESSONS



CUBAN PLANT PWX GIVES FANS OPERA

PRIZES OFFERED HEARERS BY DIRECTOR GALLO

San Carlo Grand Opera Company to Remain Three Weeks—Plan Other Broadcasts

HAVANA, CUBA.—Opera across the sea carried the message of friendship from Cuba to the United States on Tuesday night, April 24th, when the San Carlo Grand Opera Company opened its season in the Theatro Nacional here. The entire opera, "The Barber of Seville," with Titta Ruffo, Tito Schipa, Josephine Lucchese, and others in the cast, was broadcast.

Beginning at 9:00 P. M., Eastern time, the broadcasting was done by the Havana station, PWX, arrangement with The Cuban Telephone Company, which transmitted the performance from a microphone in the theater to the sending plant. This enterprise had the official stamp of the Cuban government through arrangement by General Crowder, U. S. A., with the President was in attendance at the opera and preceded the broadcasting of the music with a speech through the Radio to those listening in this country.

Award Prizes to Listeners In

Award Prizes to Listeners In

Fortune Gallo, director of the San Carlo Grand Opera, will give prizes to those Radiophans who send in the best written accounts of what they heard on Tuesday night. These reports should be addressed to Fortune Gallo, Aeolian Building, New York City. The prizes will consist of boxes and seats for performances of The San Carlo Company on its tour of America next season, 1923-1924. The prize winner will determine the time and

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New York City

PHANTOM-CIRCUIT

"Sun Dodgers" Give Radio Sets to Crippled Children

CHICAGO, ILL.—Thousands of crippled children in Chicago will soon be "tuning in" their own Radio receiving sets to jokes, musical entertainments and bedtime stories.

The Board of Trade Radio station, WDAP, located on the Drake hotel, has recently organized a "Sun Dodgers" club for this purpose. Membership is \$5 and this sum will purchase a crystal set for one crippled child. Nearly 700 Radiophans have responded to the "via the air" call for volunteers.

Boy Securts will make the installation

Boy Scouts will make the installation and show the children how to manipulate the knobs and dials.

place where he will attend the opera next season as he will be given seats at a performance in a city nearest to his home town on the San Carlo itinerary.

town on the San Carlo itinerary.

The San Carlo organization will remain in Havana for three weeks and in its casts will appear Giovanni Martinelli, Lucresia Bori, Mari Kouznezova, Anna Fitziu, Marie Rappold, Sophia Charlebois Stella De Mette, Manuel Salazar, Marie Valle, and others, with Carlo Peroni and Giacomo Spadoni, conductors, and The Pavley Oukrainsky Russian Ballet. Other broadcasts are planned.

President Harding to Speak on WJZ

NEW YORK, N. Y.—President Harding's voice will undoubtedly vibrate through the ether from Station WJZ, when he speaks before the Volunteers of America in New York on May 10. Definite arrangements have not been made relative to the hall in which the address will be given, but it is expected that the microphone will pick up the President's voice from either the Metropolitan Opera House or the Hippodrome.

Such handenstip

The rates of Swedish coast stations were recently reduced to 30 centimes per word, minimum 3 francs per Radiogram.

Broadcast Enables Nation's Leader to Speak to Largest Audience Reached by Any President

drome.

Such broadcasting will give President Harding the distinction of addressing the largest audience of any President in the history of the United States. The waves of WJZ have sufficient power to carry their message to every state in the Union, so when this station places its microphone before the President, his voice will be heard in thousands of homes.

Côtogríp This little beauty was approved by our engineers only when convinced that they had pro-duced the one socket that com-bines all the essential features of a good socket. otoco Positive Cotogrip Contacts, Hard Rubber Insulation, Rugged Construction. Compact Design. Concealed Mounting. TUBE SOCKE It is impossible to show the unique mechanical action of Cotogrip contacts in a photograph. It is different from any other socket you have ever seen. This socket will interest you in You ought to have one.

COTO-COIL CO. PROVIDENCE

Club Discusses Radio Frequency

MILWAUKEE, WIS.—Radio frequency amplification has been the topic of interest and discussion at the last several meetings of the Milwaukee Radio Amateur's Club, Inc. I. H. Strassman, 9AHO, A. R. R. L. City Manager, awakened the members' interest with his talk entitled, "Radio Frequency Intervalve Transformers."

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Silk Wound Wire 2.45
2-inch Bakelite Dials
3-inch Bakelite Dials
\$ 1.00 Freshman Variable Grid Leak and
\$25.00 Giblin crystal set. 7.95 5.50 Triple coil mounting 3.95 Solderall, Tube 2.25 \$12.00 Amplitone, Nickel Horn. 4.95 25.00 Aerex Crystal Set. 9.95 DURATEK Permanent Crystal Detector 2.00 W.D11 Adapter 4.95 \$1.50 Argus Lightning Arrester, Indoor and Outdoor Type 5.50—1.80 Degree Varicocupler on Bakelite, Silk Wound Wire 2.45 2-inch Eakelite Dials 2.25 4-inch Electros Dials 3.55 4-inch Bakelite Dials 3.55 3-inch Bakelite Dials 3.55 3-inch Bakelite Dials 5.50 Diageners Combined 7.50 1.00 Eakelite Socket 5.50 5.00 W. D. 12 Audio Frequency trans- 5.00 Condenser Combined 5.50 5.00 Treshman Variable Grid Leak and 7.50 5.00 Treshman Variable Grid Leak 3.55
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former
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8.00 Daytoo Variocoupler 5.45
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The Week's Advance Broadcast Programs

Tuesday, May 1

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Medical Sv.: Concert, Junior Music Clubs of Southern Callf.; 8:00-9:30 P. M., Concert, Egan School; 10:304-13:30 P. M., Reading, Dr. Frank Nagel of Hollywood Opera Reading Club; Programs of Matines Musical Club, MacDowell Club and Los An-

party given by Uncie John.
(YW (Gentral, 400), 8:00-8:58 P. M., Rosine Leonard,
Vyw (Gentral, 400), 8:00-8:58 P. M., Rosine Leonard,
Soprano; Robert Lindt, Accompanist; Ralph F. Elliott,
Tenor: Hariet Weeber, Accompanist; Mary Agnes
Doyle, Beader; Wendell W. Hall, Music Maker.

Benj. Carswell, Tenor; Virginia Burch, Contraito.
WOAR (Eastern, 400), 12:02:100 P. M., Organ rectial,
Stanley Theatre; Concert, Arcadia Cafe Orchestra;
3:00-3:30 P. M., Vocal and piano solos; 4:15-445
P. M., Talk, Betsy Logan, "Affairs of the Heart,"
Musical recital; 5:45-6:50 P. M., Dream Daddy with
httle tots; 7:30-7:30 P. M., Dream Daddy with boys

12:00 P. M., Musical program under auspices of Leeter Gunst Co.

VF1 (Eastern, 400), 1:15-2:300 P. M., Meyer Davis, Bellevue-Stratford Concert Orchestra; 3:30-4:15 P. M., Neille G. Abbott, violinist, Philadelphia Women's Symphony Orchestra; 6:30-7:200 P. M., Popular Music, 9:00 P. M., Musical program.

Get (Eastern, 360), 300 P. M., Amrad Women's Club, Modern Priscilla talk, Ruth E. Newman; 5:00 P. M., "Torn Trade Review"; 8:30 P. M., Business Report, Roger W. Babson; Entertainer, Nelson Warfing, Planist.

Get (Eastern, 400), 3:00 P. M., Music; 4:00 P. M., Ampico Recital; 7:30 P. M., Digest of Day's News; 7:45 P. M., Topics of Scientific Interest prepared by Scientific American.

"Furnishing the Summer Porch." 7:40 P. M., Address, "New York's Fresh Water Fishertes," Justin T. Mishoney, New York's Fresh Water Fishertes," Justin T. Mishoney, New York Superintendent of Inland Fisheries; 7:45 P. M., Musical program, "Non e ver," Howard H. Wheeler, cornetist," "Crooning Water." Lois B. Hardesty, soprano; "Nocturne in C Minor," Itene Cooley, pianist, "Ammerer's Song," from "Robin Hood," Edmund Witherwax, bass; "In Autumn," Howard H. Wheeler, "The Spring," "To You," Lois B. Hardesty; Address, "The Moral Influence of the Drama," Rabbi Goodman Liphind, "Etude in E Minor," (Chopin), Irene Cooley; "Asleep in the Deep," Edmund Witherwax; "Yens Wattz," Howard H. Wheeler; "Within My Heart a Song," "Good Might," Lois B. Hardesty; "The Bass Viol, 'Edmund Witherwax; First Movement, "Allegro Moderato," from the Concerto in A Minor (Grieg), Irene Cooley, Kitty Mienhold, planists of 5:00 P. M., Organ recital, Howard Concerto in A Minor (Grieg), Irene Cooley, May Greene, accompanist; Piano selections, Miss Mary Greene, accompanist; Piano selections, Mrs. Theodore Beust, Karl Keursteiner, Chas. Gardner, Mrs. Theodore Beust, Coronpanist; Peading, "An Interesting Historical Episode." [P (Eastern, 400), 1:00-1:15 P. M., Business talk;

Rari Reussens:
Beust, accompanist: Beading, "An Interesting activated Poisode."

19 (Eastern, 400), 1:00-1:15 P. M., Business talk; 2:00-3:00 P. M., Artist Recital; 6:00-6:30 P. M., Dinner Dance Music; 7:00-7:30 P. M., Uncle Wip's Bedtime stories; 10:10 P. M., Dance music, Charlie Kerr and orchestra from Cafe L'Aiglon.

IAX (Eastern, 360), 8:00 P. M., Concert arranged by Cleveland News; Dance music, Joe Smith-Martha Lee Clinb Orchestra; Negro Spirituals, Mozart Club of Cleveland; Chorus, Lutheran Choir.

LW (Central, 360), 10:00 P. M., Concert, Alpha Chapter of Delta Omicron Sorority, Cincinnati Conservatory of Music.

Lee Cinb Orchestra; Negro Spirituals, Mozart Club of Clereland; Chorus, Lutheran Choir.

*Lee Central.** 360, 10:00 P. M., Concert, Alpha Chapter of Delta Omicron Sorority, Cincinnati Conservatory of Music.

*MAQ (Central.** 400), 4:35 P. M., Program arranged by Bush Conservatory of Music; 7:00 P. M., Babson report; W. I. Lyon talks on "Bird-banding;" Clarence Hansen talks on "The Power of the Small Town;" 9:15 P. M., Vocal music, Miss Grace George; David Rees Jones, planist.

Rees Jones, pianist. OC (Central, 400), 12:00 M., Chimes Concert; 3:30 P. M., Educational talk by F. C. Walker; 5:45 P. M.,

Chimes Concert.
00 (Eastern, 400), 11:00-11:30 A. M., Grand organ recital; 5:00 P. M., Grand organ recital and trum-

pets.
W! (Eastern, 400), 9:30 A. M., Music; 3:00 P. M.,
The Detroit News Orchestra; 7:00 P. M., "The Town
Crier," Detroit News Orchestra, program by Healy

Wednesday, May 2

CFCN (Mountain, 440), 10:30-12 P. M., Dance program, Imperial Orchestra, Plaza Cabaret, KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Nick Harris Detective Stories from Pantages Theater Bidg.; Concert, Junior Music Clubs of Southern Calif.; 10:30-11:00 P. M., Program, Wa-Wan Club; Vocal selections, Radio Girls Quartet; Program, Musical Options

tions, Radio Giris quinting Radio Giris and P. M., Old Timers W (Pacific, 400), 8:00-9:00 P. M., Old Timers Party. KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 8:45-7:30 P. M., Children's Hour, Concert and Bedtime

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Story by 'Uncle John;' 8:00-10:00 P. M., Soldier's Program, Post War Service League of Hollywood. KYW (Central, 400), 8:00-8:58 P. M., Musical Program courtesy of Lyon & Healy Concert & Artist Department; Wendell W. Hall, KYW's Music Maker. WBAP (Central, 400), 7:15-8:00 P. M., Concert, Mrs. Prigmore, O. Webster, with other artists; 9:30-10:30 P. M., Concert, European Club of Fort Worth. WOAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theater, concert, Arcadia Cafe Orchestra; 3:00-3:30 P. M., Fashion talk, Betsy Logan; Recital; 4:15-4:45 P. M., Talk, "Affairs of the Heart," Betsy Logan; Musical program; 5:45-6:00 P. M., Dream Daddy with the little tots; 7:30-7:50 P. M., Dream Daddy with the boys and girls.
WFAA (Central, 400), 12:30-1:00 P. M., Meyer Davis Dance Orchestra, 3:30-4:15 P. M., Musical program; 6:30-7:00 P. M., 10:30-1:200 P. M., Meyer Davis Dance Orchestra, 3:30-4:15 P. M., Musical program; 6:30-7:00 P. M., 10:30-1:200 P. M., Meyer Davis Bellevue Stratford Dance Orchestra.
WGi (Eastern, 360), 5:00 P. M., "Twillight Tales," Uncle David; 6:45 P. M., "Camp Fire Girls," Cancle L Randall; Concert, Emma Ainslee contralto, and pupils; Health talk, Henry Copley Greene, American Red Cross; Talk on Farm, Garden and Lawn, Breck's; Concert, Emma Ainslee and pupils. WGR (Eastern, 360), 2:00 P. M., 3:00 P. M., Music; 4:00 P. M., Ampico recital; 7:00 P. M., Digest of Day's News; 8:00 P. M., Churverity of Buffalo quartette, W. E. Davis, director; H. M. Parker, violinist, WHAS (Central, 360), 4:00-5:00 P. M., Digest of Music, Robert Nall Thompson, director, planists, Katherine Pedigo, Geraldime McNeely, Evelyn Railser, Marie Bornwasser, Marie Whiteside, Clarice Thompson, Midred Strehler, Dorothy Adams; Readines, Marie Bornwasser, Marie Whiteside, Clarice Thompson, Midred Strehler, Dorothy Adams; Readines, Marie Bornwasser, Marie Whiteside, Clarice Thompson, Midred Strehler, Dorothy Adams; Readines, Marie Bornwasser, Marie Whiteside, Clarice Thompson, Midred Strehler, Dorothy Adams; Readines, Marie Bor

Orchestra, 400), 2:00-3:60 P. M., Popular musical program: 6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wip's Bedtime Stories.

WLW (Central, 360), 8:00 P. M., Children'a entertainment, Willis Music Company; Original poems, T. C. O'Donnell, editor of Writer's Digest; Radario, "Trader Turned Gentlemen;" Concert, Casino Conductor

"Trader Turned Gentlemen;" Concert, Casino Orchestra.

WMAQ (Gentral, 400), 4:35 P. M., Program by Cosmopolitan School of Music and Dramatic Art; "Stories for the children" Miss Georgene Faulkner; 9:15 P. M., Musical Program by Mr. & Mrs. Clarence Eddy.

WOC (Gentral, 400), 12:00 noon, Chimes Concert; 3:30 P. M., Edneational Talk, D. K. Kirk; 6:35 P. M., Sandman's Visit; 7:00 P. M., Pipe Organ Concert, E. John Richards, organist, Edna Sonneville, soloist; 8:00 P. M., Lecture, "Americanism." auspices Masonic Service Association; 10:00 P. M., Musical Program, Erwin Swindyll, director.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ

Recital; 11:30-11:55 A. M., Grand Organ Recital and trumpets; 9:55 P. M., Wy (Central, 360), 8:00 P. M., Musical program, "Sy (Central, 360), 8:00 P. M., Musical program, "On The King's Highway," Male Choir; "The Bird of the Wilderness," Mrs. Lucile R. Brooks, soprano; "Crucifix," Brown Bates, bass, J. D. McGill, tenor; Praise God In His Hollness," Quartet, "Rose of My Heart," Brown Bates; "Trovatore," Mrs. Kimball Morrison, pianist; "His Way Is Mine," Male Choir, "Farewell," Mrs. H. T. Burnett, contralto; T. Will Magnify Thee," Double Quartet; "Whispering Hope," Mrs. Lucile R. Brooks, Mrs. H. T. Burnett; "Martha." Mrs. Kimball Morrison; "The River of Life," Male Choir.
"WJ (Eastern, 400), 3:30 P. M., News Orchestra; 7:00 P. M., The Town Crier, News Orchestra; Mrs. Meta Goebel Owen, mezzo soprano; Miss Julia Wenzel, pianist.

Thursday, May 3

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Program, Y. M. C. A.; 8:90-9:00 P. M., Concert, Sherwood Music School; 10:00-11:00 P. M., Concert, Sherwood Music School; 10:00-11:00 P. M., Vocal selections, Hollywood Girls Quartetie; Los Angeles Chartenes, S.; First Congregational Church Cholr; Instrumental music, Geo. J. Birkel Co. KGW (Pacific, 400), 7:00-7:20 P. M., Lecture, University of Oregon Extension Course; 8:00-8:15 P. M., Yocal selections, Helen Drain, contratt); 8:15-9:00 P. M., Concert, George Olsen and orchestra; 11:00-12:00 P. M., Hoot Owls.
KHJ (Pacific, 400), 12:30 to 1:15 P. M., Concert, 6:45-7:30 P. M., Childrens' Hour; 8:00-10:00, DeLaue Program featuring Frank J. Steiner, 'cellist and J. J. Gilbert, Innist.
KYW (Central, 400), 8:00-8:58 P. M., Musical Program, Edison Symphony Orchestra; Wendell W. Hall, KYW'S Music Maker; 9:25 P. M., Reading, Rev. C. J. Pernir, S. J., Head of English, Loyola University.
WBAP (Central, 400), 7:15-8:00 P. M., Concert, Roscoe Carnrike, negro dialect songs; 9:30-10:30 P. M.,

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Billy Meck, dialect stories; J. S. Magee, violinist.

(Continued on page 12)

(Continued on page 12)

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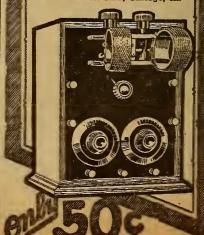
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Chapter I—Laws of Electricity Used in Radiophony

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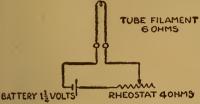
Benson very helpful in learning the rudiments of the popular science of Radiophony. His articles yet to appear

A THOROUGH understanding of Radio phenomena demands a knowledge of the laws of electricity. Radio being but a special application of this useful servant of man depends thereon for its fundamental units and laws. Athough having symbols and terms distinctly its own, Radio phenomena will be more clearly understood in the light of the paragraphs to follow.

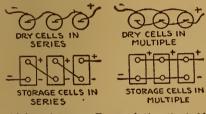
understood in the right of the follow.

Electromotive Force

In order that electricity might flow in a wire of circuit it is necessary that a difference of potential or electrical pressure exist between two points connected by a conductor. To measure this potential



Whenever a circuit is completed the material or conductor through which the current flows offers a certain resistance or tends to hold back the current. This effect is measured in ohms, the unit of resistance. Going back to our illustration we find we have a very fine wire in the tube and also a rheostat made of wire that has



a high resistance. By regulating the holding back effect of the circuit we can control the amount of current or amperes flowing. Thus by turning the rheostat handle so there is less resistance for the voltage to overcome the current through the filament increases and it gets hot.

Ohm's Law

The law of current flow is known as Ohm's Law, the most fundamental law of electricity, and also, the most simple. Put into words, the current in a circuit varies directly as the voltage and inversely as the resistance. Put in the form of a formula we have:

E I =-

That is, the current in amperes (I) is equal to the voltage (E) divided by the resistance (R) in Ohms.

Let us see how this works out. When resistances are connected in series their total resistance is equal to the sum. In

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Chapter XII—Reflex Circuit Operation.

RHEOSTAT 40HM9
or electromotive force (E.M.F.) we make use of the volt which is then the unit of pressure so to speak. Thus we find that a dry cell has a voltage of 1½, that is, the pressure at the terminals of a battery tending to make a current flow in any circuit connected to it, is 1½ volts. There is no fixed unit of voltage but is arrived at by other means.

Now when we connect an electrical device to the dry cell, let us say the filament of a WDI-11 tube with a rheostat ment of a WDI-11 tube with a rheostat in series as shown in Figure 1, a current will flow. The amount of current flowing is measured in amperes which is the quantity of current.

It should be made very clear that the voltage is forcing the current around through the rheostat and filament but the amperes is the amount of current flowing.

Resistance

Resistance

Chapter XIII—About Headsets and Loud Speakers.

C

For instance, the UV 200 takes 1 ampere filament current at 5 volts. To determine its resistance divide voltage, 5, by current 1, and we find its resistance is 5 ohms.

Going one step further it will be clear that the product of the current and resistance should equal voltage. We can express this as $E=I\times R$.

Resistance in Series

It has been stated that when resistances are in series that is when the current must flow through one after the other the total resistance is equal to their sum. However, when they are connected in parallel or so

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R (total resistance)= R+RThat is, their product divided by their sum. When more than two unlikes are in parallel the formula becomes:

R (total resistance) = -

Which can be readily solved. The reader may doubt the value of these formulae to the experimenter but their value will be apparent when one wishes to build up say a given grid leak from a number of smaller or larger leaks.

Standard of Register.

smaller or larger leaks.

Standard of Resistance

The standard of resistance being an ohm, it is advisable when high resistances are used to use other units. Thus the megohm is used for one million ohms. A half-megohm leak then has a resistance of half of one million or 500,000 ohms.

The resistance of a conductor varies as its length, diameter and material. Increasing the length of a wire will increase its resistance and vice versa. Increasing the size of wire reduces its resistance and increases the current carrying capacity. The use of special materials, such as German silver, nichrome and constantan, gives wires having high resistances.

Units of Energy and Power

gives wires having high resistances.

Units of Energy and Power
Having obtained an idea of the relationship between the units of pressure, current and resistance, we can go on to a consideration of the units of energy and power. We have seen that a certain voltage is required to force the current through the circuit, and since the current through the circuit, and since the current could be seen that a certain voltage and amperage in determining the energy expanded in the circuit to do work.

(Continued on Page 14)

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Porto Rico: Ensenada, WGAD San Juan, WKAQ

Ensenada, WGAD
San Juan, WKAQ
Canada:
Calgary, CHBC, CFAC,
CFCN, CJCY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS,
CJGC, CKQC
Montreal, CFCF, CHCX,
CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC,
CHCB, CHVC, CJCD,
CJCH, CJCN, CJSC,
CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC,
CHCA, CJCE
Winnipeg, CHCF, CKCB,
CKZC, CJNC
Cuba:

Cuba: Havana, PWX

(NOTE.—The third and last part of the schedule

list appears below. Next week the first part will appear.)

WLAW, New York, N. Y. New York Police Dept. WLAW, Greencastle. Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co. WLAZ, Warren, O. 100 mi. Hutton & Jones Elec. Co. Wed. 8-9:15 pm. classical concert. Sat. 10:30-11:30 pm. mueic, eports. Sun, 7:30-8:30 pm., church services. Eastern.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12:12:30 pm., 7:30-7:50. Central.

WLK, Indianapolis, Ind. 485 aleo. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11:130 am. 12:12:30 pm., 5-5:30, reporte. Tues, Thur, 8:30-10 pm, concert. Sun, 8:30-10. Central.

WLW, Cincinnati, O. 2:000 mi. Crosley Mfg. Co. Daily ex Sun, 10:30 am. 1:30 pm., 34, reports. Mon. Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat. 2 pm. special. Sun, 11 am. church eervices. Eastern.

ices. Eastern.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply
Co. Mon, Wed, Thurs, 8:30-8:30 pm, concert. Cen-

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Mon, Wed, Thurs, 8:30-9:30 pm, concert. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun. 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 500 ml. General Supply Co. Daily ex Sun. 2:15 pm, music, news. Mon, Fri, 10 m music. Central.

WMAH, Kanasa City, Mo. 485 only. 600 mi. Kanasa City Daily Drovers Telegram. Daily ex Sun. 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAH, Lockport, N. Y. 485 also, 1.500 mi. Norton Labs. Tues, 8-9:30 pm, music. Eastern.

WMAH, Tenton, N. J. 100 mi. Trenton Hdwe. Co. Mon. Thur, 7:30-9 pm, music, lecture. Eastern.

Co. W. AN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Cen-

Stin., 10:30-12 in., 7:30-9 pm, Cutett Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, 9:15-10. Wed, Fri Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central. WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tuee, Fri, 8-9:30 pm, concert. Central.

WMAV. Auburn, Ala. Ala. Polytechnic Inst.
WMAW, Wahpeton, N. D. &6 mi. Wahpeton Elec.
Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply.
Co.

tral.

WMAY, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Loule, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm. church eervices. Central.

WMAZ, Macon. Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm., 7-7:30, 8:30-9:30, music. Tues, WMG, Mauplie 19-11 am chapel. Eastern.

WMG, Mauplie 19-11 mc chapel. Eastern of the Commercial Appeal. Daily ex Sun, 9:30 am, 12 m, 3 pm. weather, markets; 12:30-2 pm. concert; 8. mucic. Wed night silent. Tues, Fri, 11 pm. Midnight Frolic. Central.

WMH, Chichmati, O. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec, Co. Daily, 4:30 pm. concert, sports. Thure, 8.9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores, Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm.; Wh. 4-5 pm, dance music. Tues, Thur, 7-8:30 pm.; Wh. 4-5 pm, dance music. Tues, Thur, 7-8:30 pm.; Wh. A. San, 2:30-4 pm. 6:30-8:30 pm. church services. Eastern.

WNAG, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

tral.
WNAK, Manhattan, Kans. Manhattan Radio Supply

WOAL, Manhattan, Rains, Manhattan Radio Supply
WOAL, Omaha, Neb. B. J. Reckwell,
WNAM, Evansville, Ind. 200 mi. 485 also. Ideal.
Apparatus Co., Inc. Mon, Wed, Fri Sat, 10-11 am,
music, reports; 3-4 pm, 7-8, entertainment. Sun,
3-4 pm, music. Central.
WNAN, Syracuse, N. Y. 1,000 mi, Syracuse Radio
Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert,
agriograms, etc. Eastern,
WNAQ, Charleston, S. C. Charleston Radio Elec, Co.
WNAP, Springfield, O. 200 mi. Wittenberg College,
WNAR, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAY, Polladelphia, Pa. 500 mi, Lennig Bros. Co.
Daily ex Sun. 12:15-1 pm. Wed. Sat. 7:30-9:30 pm.
Sun. 2:30 pm. 4:30, church services.
Eastern.
WNAV. Knowille, Tenn P. Pople's Eastern.
WNAV. Knowille, Tenne P. Pople's Eastern.
WNAW. Fortress Monce, Va. Henry Kumann.
WNAX. Yankton, S. D. Dakota Radio Appartue Co.
WNAY, Baltimore, Md. Shipowners Radio Service.
WNJ, Albany, N. Y. 60 ml. Shotton Radio Mfg. Co.,

Inc. Daily or Sun, 16-10-15 am, market reports, Wod, 8:15 pm, concert. Eastern.

Wod, 8:16 pm, concert. Eastern.

Wod, 9:16 pm, concert. Eastern.

Wod, 9:16 pm, concert. Pm, concert. Eastern.

Wod, 9:16 pm, concert. Pm, c

STATION SCHEDULES

(Continued from page 8)

WPAU. Moorhead, Minn. Concordia College.

WPAV. Laurium, Mich. Tinetti & Sons.

WPAW. Wilmington, Del. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, S-10:30 pm, music. Eastern.

WPAX. Thomasrille, Ga. 25 ml. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music.

Mon. Wed. Fri. 8:30-0:30 pm, music. Sat. 10-11

am. codes. Sun, 1:30 am-12:30, 8:30 pm-9:30, church service. Eastern.

WPAX. Hangor, Me. Rangor Radio Lab.

WPAX. Charleston, W. Va. Dr. John R. Koch.

WPAX. The Maximum Co. 485 also 1.500 mi. Nushawg

POultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, uarkets Mon. Fri. 8-9:45 pm, music, farm program. Central.

Charled Pa. Elec. Supply Co.
Clear Mon. 8 pm. concert. Eastern.
Washington, D. C. 200 mi. Thos. J. Williams.
tWashington, D. C. 200 mi. Thos. J. Williams.
tWashington Dally News.) Daily ex Sun, 12:30
news. Mun. 8 pm. concert. Eastern.
A. Parkesburg, Pa. 1,500 ml. Horace A. Beale,
Dally, 10:30 pm. Eastern.
3. Springfield, Mo. Southwest Missouri State
thers Collège.

Scolings Conn. E. B. Gish. Materbury, Conn. 310 only, 30 ml. The Elec. Co. Mon. Wed, Fri. 6:30-7:45 pm. Boy Scott news. Wed, 8:30-9:30 pm, con-

WQAF, Sandusky, O. Sandusky Register, WQAH, Lexington, Ky. Brock-Anderson Elect. Eng.

WQAI, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, ia. Appel-Highey Elec. Co.
WQAL, Mattoon, III. 100 ml. Coles County Tel. &
Tels. Co. Tues, Thurs, 9-11 pm, music, lectures.
Central.

Miami, Fia. 500 ml. Electrical Equip. Co. ex Sun, 5:15-5:45 pm, uews, stocks, weather; pm, music. Sun, 9:11 pm, nusic. Eastern, ew York City, N. Y. 300 ml, Calvary Bapturch. Sun, 11:15-12:15 am, S:30-9:30 pm, services, Eastern, lincoln, Nebr. Am, Radio Co.

services, Eastern. Lincoin, Nebr. Am. Radio Co. Muncie, Ind. Press Pub. Co. Richmond, Va. 200 ml. Radio Equipment Daily ex Sun. 2-5:15 pm. music. Sun. 3-5.

Eastern.
QAV. Greenville, S. C. 75 mi. Huntington & Guerry,
Inc. Tues, Thurs. 7:30-8:30 pm, music. Sat. 7:30-8
pm, music. Eastern.
QAV. Washington, D. C. Catholic University of

America.

MQAZ. Greensboro, N. C. Greensboro Daily News.

MQAX. Peoria, Ili. Radio Equipment Co.

WRAA, Houston, Tex. 400 ml, Rice Institute. Mon,
8-9 pm, concert, college activities. Sun, 4:30 pm.

WRAB, Savannah, Ga. Savannah Board of Public Edu-

cation.

WRAD, Mayville, N. D. State Normal School.

WRAD, Marion, Kans. Taylor Radio Shop.

WRAF, Winter Park, Fla, Winter Park Electric Construction Co.

WRAH, Providence, R. I. Stanley N. Read.

WRAK, Escanaba, Mich, Economy Light Co.

WRAL, St. Croix Falls, Wis. Northern States Power

WRAL. St. Croix Falls, Wis. Northern States Power Co.

WRAM, Galesburg, III. 200 mi. Lomhard College. Wed. 7:30-9 pm, college activities, announcements. Schedule irregular. Central.

WRAN Waterloo, I.a. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pp, 5:30, concert, news. Mon. Fri. 8:30-9:15 pm, concert. St., 11:15, church waterloo, I.b. Radio Supply Co.

WRAM, David City, Nebr., 100 mi. Jacoh C. Thomas. Tues, Fri. 7-9 pm. Central.

WRAM, David City, Nebr., 100 mi. Jacoh C. Thomas. Tues, Fri. 7-9 pm. Central.

WRAM, Marillo, Tex. 50 mi. Amarillo Daily News. Tues, Thurs, 7:30-8:30 pm, music. Central.

WRAY, Yellow Spring, O. Antioch College.

WRAY, Seranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 2: 7, heddime stories, music. Wed. 8:13-9:45 pm, music. Sat, 8:15, 10:30 pm, music. Sun, 4 pm, fuspel Corp.

wRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm. music, lecture, Sun, 10:30 am. church service. Central.
wRK, Schenectady, N. Y. Union College Radio Club, WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm. 9-9:30, Univ. news, talks, music. Cen

WRM. Urbana, III. 300 ml. Univ. of III. Mon. Thurs. 8:30-8:50 pm. 9-9:30, Univ. news. talks, music. Central.

WRR. amden. N. J. 250 ml. Federal Inst. of Radio Teg. Daily ex Sat. Sun. 10-10:45 pm. music. news. 18:20 pm. 20:20 p

Norfolk, Va. 100 mi. Shipownera Radio Service Mon, Wed. Sat. 8:15-9:30 pm. concert. East-

Birmingham, Ala. 2,000 mi. Alabama Power Daily ex Sun, 9:30 am, 3 pm, 3:30, news ther. Mon, Wed. Frl. 8 pm, nusic. Tues, rburs m, entertainment. Sun, 11 am, 7:30 pm, church (ees. Central.

services. Central.
WTAC. Johnston, Pa. Penn Traffic Co.
WTAU. Tecumseh, Neh. Ruegy Battery & Elec. Co.

AERIOLA SR. STYLE TUNER UNIT Green silk on Bakellte Tubes with diagram, \$5.65, REINARTZ ULTRA CIR. SET PARTS, \$29.90 Ultra Reinartz Tuner Unit & Diag., \$5.95, wound to the specifications of March 24 Radio Digest. Ruby Mica-Copper-Bakellte mounted Condensers N. P. hind-

GOVT RADIO STORAGE BATTERIES
Signal Corps Edison 3 cell type BB-4, \$4.50; \$ HI-POWER AMPLIFYING TRANSFORMERS

Best! Loudest! No burn-outs \$2.65 with special

GENUINE PEANUT TUBES

Tonderful Det. and Amplifer. Smallest tube made aeroplane style). 1 V., ¼ amp. ½" dla. x 2¼" long. FLEWELLING. 006 COND'RS & PARTS dolder coils, green silk on Bakeltte, \$1.75 ea.

NEW SPECIALS

O GHM BHEO. for 201-A or W. D.-11 tubes, \$1.00. ariable grid leaks, 1/10 to 5 Megohms, 75c. HIGROWER LOUD SPEAKER AND PR. BALDWIN HONES, \$10.90. Variable grid. Cond., 00025 or .0005 at., 45c. Vernier Attachment for any Var. 0005 at., 45c. Vernier attachment for any Var. QUALITY RADIO SHOP, RICHMOND, IND.

Reviews of Books

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

Getting Acquainted With Radio Re-ceivers. By Paul Godley. Describes the necessary parts. How to put an acrial, uning, regeneration, loud speakers, dry cell tubes, connecting the receiver, opera-ion, faults and their remedies. Price, 25c.

Radio Simplified. By Kendall and Koeher. New developments of Radio described in non-technical terms. The latest and nost efficient hook-ups. Tells about acutim tube, loose couplers, variocoupers, variometers and everything necesary for those who aim to get the best esults in building or operating a Radio utfit. Price, \$1.00.

Amateur Radio Call Book. In this book there will be found a complete list of all amateur, special amateur and Radiophone broadcasting stations. Just the book to have near you when listening in on stations and new call letters are heard. There is a large two-color map included, also how to construct and operate a honeycomb coil set, detector and two stage amplifier. Price, \$1.00.

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Price, \$1.00.

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. Porstage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, III.

WTAW, College Station, Tex. 200 ml. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services.

Central. Tianhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code).

GENUINE

WD 12 Tubes \$6.50 The same as WD 11 with Standard hase. UV 199 Tubes......\$6.50
Consumes only .06 of an ampere.

UV 199 Sockets.....\$0.75 UV 199 Adapters \$1.25

Also WD 11 and 201 A Tubes in Storial Prices to Dealers on All Radio ENGINEERING SERVICE BUREAU
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Ritter Loop Aerial \$1



Ritter Grand \$2.50

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4 VOLT FILAMENT, 7 AMPERE. FORMALLY EQUIPPED IN AERIOLA GRANDS. FITS WD-11 SOCKET, OR STANDARD SOCKET WITH ADAPTOR.
WR-21 DETECTOR\$3.95
WR-21 AMPLIFIER
THESE TUBES WILL OPERATE ON 6 VOLT STORAGE BATTERY
Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) \$11.90
FREUND'S WONDER CIRCUIT \$13.20
COMPLETE PARTS FOR REINARTZ SETS \$11.45
COMPLETE PARTS FOR 2 STEP AMPLIFIER \$12.45

WD-12 TUBES.....\$6
The Genuine WD-11 Tube Equipped with Standard Base to Fit Standard Socket ADAPTORS FOR WD-11 AND WR-21 TUBES......50c Moulded Variometers \$3.45
180° Moulded Variocouplers \$3.45
Mahogany Variometers \$1.95
180° Bakelite Variocouplers \$1.75
Freshman Variahle Grid Leak and Condenser 75c
CRL Adjustable Grid Leak and Duhilier Condenser \$1.35
Master Baldwin Type C Units with Cord \$3.95
 Master Baldwin Type C. Head Sets.
 \$6.95

 Brandes Superior Headset.
 \$5.75

 Antenella Aerial Plug.
 \$1.15

 3 Coil Honeycomb Mounting
 \$3.45

 2 Coil Honeycomb Mounting
 \$2.60

 WD-11 Bakelite Sockets
 50c

 Barcbass Coils
 \$1.95

 Firth Cord Tip Plugs
 60c

 Thordarson Amplifying Transformers
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Radio Corporation of America New and Improved Radiotron Tube.

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Amplifier
Operates on 3 Volts (2 Dry Cells); Consumes A6 (1/16) Ampere. Same Characteristics for Sensitiveness and Loudness as UV-201.

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\$4.30 Value, 43 Plate, now	
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\$2.70 Value. 3 Plate. now	
\$7.00 Value, 43 Plate Vernier Variable Condenser	\$3.95
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as listed in Radio Digest..... Radiotron UV-201-A Tubes, 6 Volt Filament, .25 (¼) Ampere. \$6.50

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Each Phone Cap is covered with soft ruhber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete \$9.95 with silk cord and headhand. Special at. Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. \$4.65 Special

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Spon	ge Rubb	er Ear	Caps.	Pair	50c
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	al Corps				
	crophone				
Solid	Copper	Aerial	Wire,	100 ft	35с

 150 Turns
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 100 Turns
 50

 75 Turns
 40

 50 Turns
 40

 35 and 25 Turns
 40

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,	9x10½" by 5½" deep	. 2.95
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Vol. V

Chicago, Saturday, May 5, 1923

Two Circuit Sets Best

When Making a Set Make a Good One

I T IS just as easy for the amateur, working from a diagram if necessary, to build a two-circuit set and be assured when he finishes the job that he has something that will give him long distant reception. Let us stick to the hook-ups that get the most of Radio impulses to the receiver rather than urging or even suggesting something that is far inferior in performance under slightly unfavorable conditions.

Hook-ups, diagammatically, at least, are the cheapest part of the set and the parts required for a two-circuit hook-up are little more than that for a single-circuit set, all things considered.

all things considered.

It is quite necessary to guard against capacity effect in the single circuit, much more than in the two-circuit set, therefore the former is much harder to handle, and there is more internal and external capacity effects that are going to interfere and selectivity is not, it is generally conceded, as easily obtained as with the two-circuit set.

There is rarely a week free from complaint from single circuit users about interference. The logical means to an end is to build a two-circuit set or if you have a single circuit change to a two-circuit.

World's News by Air

Great Demand for Information Is Now Supplied

D EMAND for information is being satisfied by Radio. That this demand is greater than it has ever been in the history of mankind is attested to by librarians, who point to the large number of scientific works being read today. It is part of the great progress made in scientific development in the last quarter century.

Radio has not been in the least progressive in this development. In fact, with the development of Radio, all other sciences are being aided. For Radio is being used as a means by which knowledge of the other sciences is

as a means by which knowledge of the other sciences is being spread.

Tune in on any broadcasting station and you will just as likely hear a lecture on the fundamental principles of the Einstein theory as you will on the latest developments in the cure of cancer. Universities throughout the United States have enrolled their faculties toward the dissemination of information under their auspices. Regular courses in certain subjects are being broadcast, and more are being planned.

Concerts are giving Radio listeners a wider knowledge.

being planned.

Concerts are giving Radio listeners a wider knowledge and greater appreciation of music. Plays, classic and modern, also help advance the education of the public by Radio. Health lectures are regular events for Radiophans. So are lectures on child care, and on various other topics now and then are broadcasted.

Growth of the Industry

Almost Three Million Fans Now Have Sets

O LD established manufacturers of Radio apparatus of a year ago were wondering how they would dispose of their stock. Many dealers were just making a bare living at selling Radio apparatus. Just about three hundred thousand Radio amateurs scattered throughout the United States constituted the field for sales of Radio grades and apparatus. goods and apparatus.
Since then a great change has taken place.

ratus, instruments manufactured under patents fifteen years old, ordinary double slide coil crystal sets were becoming immediately popular. Now there are more than six hundred incorporated manufacturers of Radio apparatus in the United States. It is impossible to estimate the number of dealers. There are almost three million fans who have bought and installed Radio receiving

These sets receive music and other broadcast matter from some five hundred or more broadcasting stations located in every state in the Union. Every state but one has one or more stations, and some have as many as

twenty. With the establishment of more solid Radio regulations, with the advent of fair competition and intelligent manufacture of Radio apparatus of good design Radio will still grow.

RADIO INDI-GEST

Here we are in our new home! How do you like us over in the center column? That is what we want to know. Do you Radioknuts want a whole column of Indigest or do you like it better as we vere? It will all depend on your say so whether or not we stay here or move back to the right hand column under Al Brown. Personally we like it better here but we leare it up to you, so write in and tell us what you think of it.—Indi.

INDIGEST SCOOPS WORLD ON STEBBINS' DEGENERATIVE SET

BULLETIN

Squedunk, Minn.—In an interview with Indigest Stebbins says, "Gol darn, if it ain't the dad blamest shame the way most inventors hold onto they circuits. I intend to give the Sooper Degenerative to everybuddy that's got the nerve to use it."

By Slatherty Simpson

Armstrong, Logwood and Flewelling—and now comes Stebbins. The Radio Indigest has scooped the Radio world on one of the most deficient sets ever invented. It is with pride that we announce the series of articles "written exclusive for INDIGEST" by Lem Stebbins, inventor, postmaster, and constabule, of Squedunk, Minn., on his latest circuit "The Stebbins Souper Degenerative Set." Article I begins next issue with Mr. Stebbin's exclusive drawing of the set in INDIGEST. Watch for it!

A Radio Shock
One night, as the storm beat and blustered,
I sat at my Radio set,
And listened to lectures and concerts and talks,
By guys I never had met.

I had just heard a concert that came From Los Angeles over the wire; It was followed a few monments after, By a clergyman preaching "Hell Fire."

I followed as closely as may be, But my senses would lag and shirk, And I drowsed as the clergyman ended, And then came to with a jerk.

He had preached on sinners and sinning, And I felt like a blooming toff; But he ended his lecture and then inquired, "How do you shut the d-n thing off?" -J. FOSTER MOORE.

QUESTIONS and ANSWERS

Q. & A. Department, Indigest—Dear Sir: Can you tell me whether I can buy, and who makes, the super-ultra panel stretcher? I have a 7x18 panel that I would like to stretch to a 10x20. Thank you horribly.—Lillian G. A.—It is against the policy of Indigest to advertise any Radioknut apparatus. Sorry. However you might try to borrow one from Al Brown he has one that he stretches his cartoons with.

Q. & A. Deparment, Indigest, Dear Sir; Will you kindly tell me what are the present circulation figures of your asteamed paper Thanks for the answer,—Jimsie. A—At present we are the leading paper in the field and are now running 000,000,000,007 more copies than our nearest competitor, the radio digest.

READERS' VIEWS

We Shall Ask Arthur—We Shall

Indi: Hah, Hah! Shhh! Not so loud. In looking over Mr. Mohaupt's article last issue of radio digest (April 28), page 11, I noted the title "Storage Batteries and Their Care," and then.....whatcha think? In the first column I note a cut of a glass arrangement with a rubber nipple attached. Ha, Hah! Very clever of that fellow Mohaupt. Yes, yes. Is he married?

—WOR Listener In.

-WOR Listener In.

EDITORIALS

The music publishers of a certain society demand pay for their copyrighted material. Is this a mercinary motive or fair?—We think so too.

INDIGEST has taken its stand and we feel that we are founded on the sound principles of Being Right. WE WILL NOT publish any copyrighted music of the authors, composers and music pub. assn. in our unfliched column, as we are founded on non-money-making principles and do not believe in grasping extortion (unless the assn. should wish at any time to pay us for doing the same). Until such time we ask that the Radioknuts, and all INDIGEST followers, stand by us in our just and honest views and refrain from whistling any and all songs published by the assn. Their latest number is "My Manmie Was Born in Ireland and Lives in Dixie Land—So That's Why I'm the Sheik of Scheneetady." DON'T sing or whistle it!!!!

INDIGEST KINKS? SEND A DOLLAR-

THERE are many little Indigest kinks worked out in the home that would hamper your fellow Radio-knut and cause him much worry. Indigest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.

INDIGEST KINKS DEPARTMENT

Deer Endi—i bot a radeeo set and my muther-in law wuz allus trying to listen in, sew i hooked the hed set to her dome during a thunder storm and now the old dame aint botherin me no more. This kink will wurk providing youre luky but you stand to loose a good set by having same burnt out. Enclose pleze find my dollur.

—eZra HechT.

Looking Ahead

Indigest has scooped the world on the Stebbin's Sooper Degenerative Circuit. It is with pride that we announce the series of articles, to begin in INDIGEST, written exclusively for INDIGEST by the inventor. Reserve your copy of INDIGEST at your favorite news-dealer—10c.



Condensed

By DIELECTRIC

One's mental condition at the time of illness really has much to do with the rapadity of recovery. That may be according to Coné; if it is, don't belittle it on that account. A young lady is doing very well in the Montreal General Hospital in spite of having suffered a broken back and this is largely due to being able to listen in to concerts and other entertaining features over the Radio.

The usual procedure of broadcasting from a college was reversed when the authorities at Haverford College, Pa., used their receiving set a short time ago to bring a lecture to the student body. Lord Robert Cecil's lecture delivered in Philadelphia was broadcast through Station WFI and it was desired to have the students take notes on it. This is likely the first time that a class has been addressed by Radio with the "prof" in another town.

A church without a pastor need not necessarily be a church without preaching. If the members will purchase a receiving set and amplifier they may utilize the services of a minister supported by others. The Belmont Methodist Episcopal Church, of Belmont, Mass., installed just these things and when their regular pastor was away they carried on the services by employing the aid of Radio. Instead of closing a weak church it might be made to thrive by this means.

When Station WEAF sent out the songs of the college glee club contesting at Caruegie Hall, New York, we were asked to pass upon the merits of each and pick the winner. The singing by each of these clubs displayed careful training and excellent ensemble. Dartmouth received the first prize, Princeton second and Yale third. I'm glad the decision did not rest with me, because I was lost in the beauty of their combined voices.

Radio is fast becoming an economic asset to various fields of endeavor. I shall mention only one instance at this time. Where a large force of foresters were formerly needed to patrol a certain district in the neighborhood of Spokaue that work is accomplished by one airplane. Patrolling these one million acres of timberland requires but two and one-half hours daily, whereas the former system required constant attention. The secret of it lies in the fact of the plane being equipped with Radio. You see Radio is an economizer, whether so used or in place of six seats at a concert hall.

Radio is one of the best publicity agencies available. The use for this purpose is coming to be more extensively recognized both in this country and in Canada. There it is being used by the Calgary Board of Trade to reach probable tourists from every State in the Union and every province in Canada. Calgary and its environs will be extolled as exceedingly attractive points to visit with Radio broadcasting as the medium setting forth this information. CHCG is being used for this purpose and since it has been heard all over the United States the Canadians are expecting notable results.

This is for the pessimist who views Radiophony as a plaything and of but passing interest. When blizzards and cyclones destroyed means of communicating with adjacent territory by putting the telephone and telegraph lines out of commission, what was done? Why they waited until those lines were repaired. During the recent blizzard in the Middle West, which wrought havoc with the telegraph lines, what was done? Well, KYW got busy with their RADIO transmitting station and relayed whatever news was of importance to receiving sets tuned to their station. Without Radio this could not have been done, but with it the storm's damage was mitigated.

Simple Arrangement Adds Step of R.F.

Radio Frequency Permits Loop Aerial to Be Used

It is a very simple matter to add a step of Radio Frequency amplification using the system shown by the accompanying diagram. The simplicity of the arrange-

WORKSHOP KINKS? EARN A DOLLAR-

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

RADIO KINKS DEPARTMENT, Radio Digest

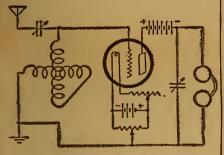
123 West Madison St., Cbicago, Ill.

ment is exceeded only by its efficiency and very few parts are needed to construct the amplifier.

The antenna connection is arranged so that either a loop or outdoor antenna may be used. For a loop, shunt the antenna binding post marked No. 2 to the ground post and connect any standard loop without condenser.

For an outdoor antenna, use the antenna binding post marked No. 1 so that the condenser in the set will not be connected. The other details of the set are standard parts, variometer, tube and socket with proper batteries according to the tube, a 3-plate and a 23-plate variable condenser, a 200 to 400-ohm potentiometer and a filament rheostat.

With this outfit it is unnecessary to have direct connection between the Radio



frequency amplifier and the primary circuit of the tuning unit. Instead, if found to be too harsb for local stations, attach the ends of a coil of about 25 turns of an oatmeal box with a No. 25 wire to the output of the Radio frequency amplifier unit and place the coil near the tuning unit, about 3 or 4 inches from the primary coil.—L. W. Martin, Houston, Texas.

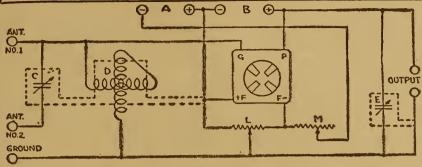
Moving Coil Speaker

The best-known loud speaker is composed of a metallic horn connected to what is actually a telephone receiver of large size. The permanent magnet is energized by an external source of current, and the diaphragm is actuated by a coil of wire suspended between the pole pieces of the electromagnet. The actuating current passes through the suspended coil.



KELLOGG SWITCHBOARD SUPPLY COMPANY

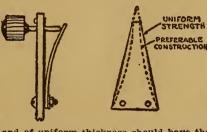
RADIO AMPLIFICATION HOOK-UP



Shape for Resistance Spring

When laying out the phosphor bronze contact piece for the Flewelling variable leak care should be taken to have this piece of the proper shape. This is to make the change of resistance gradual.

It is quite evident to students of mechanics that a beam supported at one end



and of uniform thickness should have the shape of a triangle, if the stress is to be uniform. Furthermore, it is best to go one step further and make the contact piece so that the end nearest the adjusting screw will be raised from contact with the resistance unit before the supporting end is raised.—Carl Schindler, West Allis, Wis.



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Line Switch on Battery Saves Charge and Tubes

Practically all filament rhcostats are constructed with a zero point or "off" position which scrves the purpose of a switch between the vacuum tube and the storage or A battery. However, it oftentimes happens that in the hurry of cutting off for the night, the rheostats are not turned completely off. Under these circumstances, the filament battery is left connected in the circuit discharging all night long through the resistance.

To prevent this, it is advisable to connect a separate battery line switch, which through practice and force of habit, should be opened first before the filament rheostats are turned back to zero. Then, if the latter operation is not performed, the battery circuit will be opened anyway by means of the line switch.—P. J. M. Clute, Schenectady, N. Y.

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Variable Grid Leak

Many Radiophans have old rheostats ly-ing around whose resistance wire is either loose or broken. It is possible to make a variable grid leak out of one of these.

Pry out the fiber ring on which the wire is wound and remove the wire. Then replace the fiber ring and glue it back into place.

Next take a very fine file and make the surface of the fiber, where the contact lever touches, very smooth. Mark this surface all the way around with a pencil. Connect one end of this marking to a binding post. It will then be seen that resistance can be varied by just turning the knob located on the other side of the panel.

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

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RADIO (ORPORAVIION

GRAND RAPIDS, MICHIGAN

ADVANCE PROGRAMS

(Continued from page 6)

WGI (Eastern, 380) 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 As'n: 9:30 P. M., "Romanco of the
and Harry M. Wood; Concert, Crescent Gardens
Orthestra

Prchestra. GR (Eastern, 400), 2:00 P. M., Music; 3:00 P. M., fusic; 4:00 P. M., Ampico recital; 7:30 P. M., Digest

Muslc: 4:00 P. M., Ampico recital; 7:30 P. M., Discool Day's News, of Day's News, of Day's News, of Mr. Mislc and address, "Using Colored Olicloth", 7:45 P. M., Radio drama, "The Fortune Hunter;" Instrumental selection, excerpts from "Tumble In," WGY Orchestra. WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theater Organ; Biographical sketch of Old Testament charactetts "Resume of the History," Margaret Moore, Bainbridge, Ga; Erelyn Campbell, soprano, Dorothy Adams, accompanist; Dorothy Adams, planist, "Just Among Home Folks," Courier-Journal; 7:30-9:00 P. M., Mrs. Ellmer Graham, soprano; Mrs. Chas, Nicholson, accompanist; Joe

Dorothy "Adams, pianist, "Yust Among Home Folks." Courier-Journal; 7309-900 P. M., Mrs. Elmer Graham, soprano; Mrs. Chas. Nicholson, accompanist; Joe Eisenbeis, tenor; Duet, Mrs. Graham. soprano; Mrs. Elsenbeis, tenor; Buet, Mrs. Graham. soprano; Mr. Elsenbeis, tenor; Beading, Elizabeth Somers Stelger, Robert Muth; Mrs. Chas. K. Leslie, Soprano; Chas. K. Leslie, baritone; Bobert Muth; Mrs. Chas. K. Leslie, soprano, Mr. Chas. K. Leslie, baritone; Reading, "An Interesting Historical Episode." [P. (Eastern, 400), 1:00-1:15 P. M., Short talk; 2:00-83.00 P. M., Artist recital; 6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wij's Bedtime Stories. IAX (Eastern, 360), 8:00 P. M., Concert, Singer's Club, Dixie Howell, Soprano, LW (Gentral, 360), 10:00 P. M., Musical program, Sigma Alpha Iota Sorority, Beta Chapter, College of Music, "Scottish Airs," "Valse," Frances Rejach, pianist; "From the Land of the Sky Blue Water." Waltz," Eleanor W., Mackey, soprano; "A Little Love, a Little Kiss," "Red Moon," Lucile R. McKeever, violinist; Corrine Sammet, Saxophonist; Frances Bejach, pianist; Vocal selection, S. A. I. Sextette; Violin solo, Lucile R. McKeever, Vocal duet, Eleanore Mackay, Amy Hattersley; "Bohemlan Dance," Margaret Q. Finny, pianis, Program by the MAQ (Central, 400), 4:35 P. M., Persam by the Voceum Arts Conservatory, 7:00 P. M., Rockwell Stephens, Auto Editor Dalis, News, gives 2nd Occurrent of talks on auto trails: "Worlds in the Making," Arthur Carpenter; Gilbert W. Butler will talk to Boy Scouts; 9:15 P. M., Helen Leefelt, pianist; Geo. Simons, bartions.

mons, baritone.

6 (Central, 400). 12:00 M., Chimes concert; 3:30

M. Talk, Karl G. Stephan; 5:45 P. M., Chimes
necrt; 6:35 P. M., Sandman's Visit; 7:00 P. M.,
lsical program; 8:00 P. M., Lecture, "Yosemittonal Park," James V. Lloyd, National Park

ger. (Eastern, 400), 11:00-11:30 A. M., Grand Organ tal; 11:30-11:35 A. M., Grand organ recital and appets; 7:50-9:00 P. M., WOO Orchestra, Robert Golden; 9:00-9:55 P. M., Organ Recital, Mary E. t at the console.

the console.

stern, 400), 3:00 P. M., News Orchestra; 7:00
The Town Crier, News Orchestra; Mrs. Marie
contralto; Fred Walters, baritone.

Friday, May 4

KF1 (Pacific, 400), 6:45.7:30 P. M., Peter Rabhit; Concert, Junior Music Clubs of Southern Calif.: 10:00.11:00 P. M., Program, Public School Music Teachers Ass'n; Male chorus, 100 voices, Orpheus Club; Dominant Club; California Federation of Music Clubs KF1 (Pacific, 400), 6:45-30 P. M., Peter Rabbit; Concert, Junior Music Clubs of Southern Calif.: 10:00.11:00 P. M., Program, Public School Music Teachers Ass'n.: Male chorus, 100 voices, Orpheus Club; Dominant Club; California Federation of Music Clubs, KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe Program.
KYW (Central, 400), 8:00-8:58 P. M., Nita Obrassova Soprano; Margaret Carlisle, Accompanist; Milan Lusk, Violinist, Elioise Bodlan, Pianist, Accompanist; Wendell W. Hall Music Meiser, 20:55-68.

o; Margaret Carlisle, Accompanist; Milan Violinist, Elioise Bodlan, Pianist, Accompanist; Il W. Hall, Music Maker; 9:05-9:25 P. M., Book , Llewellyn Jones, Literary Editor Chicago g Post; 10:00 P. M.-1:00 A. M., Midnight

ieview. AP (Central, 400), 7:15-8:00 P. M., Concert, Grace Villiams' Orchestra; 9:30-10:30 P. M., Concert, Col-ego of Industrial Arts Girls' Orchestra of Gainesville,

lege of Industrial Arts Girls' Orchestra of Gamesvine, Texas (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stamley Theatre: Concert, Arcadia Cafe Orchestra recital; 3:00-3:30 P. M., Betsy Logan's Household Hints; Musical program; 4:15-4:45 P. M., Talk, "Affairs of the Heart," Betsy Logan; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M.; Dream Daddy with boys and girls; 7:50-8:00 P. M., Songs; 8:00-9:50 P. M., Musical program.
FAA (Central, 400), 12:30-1:00 P. M., Address, "The Sunday School Lesson," Dr. Robert S. Hyer, Southern Methodist University; 8:00-9:30 P. M., Musical program.

FAÄ (Central, 400), 12:30-1:00 P. M., Address, "The Sunday School Lesson," Dr. Robert S. Hyer, Southern Methodist University; 8:00-9:30 P. M., Musical program, G. M. Wallace and mixed quartet. FI (Eastern, 400), 1:14-2:00 P. M., Meyer Davis Bellevue-Stratford Concert Orchestra: Strawbridge and Ciother Male Quartette:6:30-7:00 P. M., Concert Orchestra: Strawbridge and Ciother Male Quartette:6:30-7:00 P. M., Amrad Women's Club, Address, Miss D. H. Goodwin; 5:00 P. M., Girl's story hour, Eunice L. Randali; 9:30 P. M., Tavelogue, David M. Cheney: Concert, Somerville Quartet.

gest; 8:00 P. M., Vocal concert, direction W. H. F.

(Eastern, 370), 1:00 P. M., Music and needlerive talk, "The Demure Dotted Muslins,"
(Eastern, 370), 1:00 P. M., Music and needlerive talk, "The Demure Dotted Muslins,"
(Courtey Modern Priscilla; 7:45 P. M., Concert, "Swance
alles," WGY Instrumental Quartet; "Cittle House
Dreams," Arthur A. Gayne, baritone; "Lullaby
altz," Quartet; "Grand Opera Strains," James H.
hnstone, maudolinist; Baseball talk, "Prospects of
28 Baseball Season," "Daniel," sport writer for
28 Baseball Season," "Daniel," sport writer for
28 Raseball Season," "Daniel," sport writer for
28 Raseball Season, "Daniel," sport writer for
28 Raseball Season, "The Raasey at the Bat," Arthur A. Gayne; "Aggravating
ag," James H. Johnstone; Address, "The Racotric Co.; "Panama Twilight," Quartet; "Nailo,"
thur A. Gayne: "Lights Out," "Frolic of the
22008, "James H. Johnstone; "Japaloma," Quartet;
30 P. M., Musical program, "Song of Steel,
nion College Glee Club, "Severnade, "John Burnham,
olinist; "Rashmir, Song," "Longing Dest.
Union College One Naw Sawan W. W. Dreits



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Hub, IAS (Central, 360), 4:00-5:00 P. M., Organ recital Heyde C. Conrad, Alamo Theatre organ; Biographica Levels of Old Testament Characters, "Resume of the

"6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wily'a Bedtime Stories.

WMAQ (Central, 400), 4:35 P. M., Program arranged by Columbis School of Music; 7:00 P. M., "Talks on music of Mrs. H. H. A. Beach, Marx E. Obern-dorfer, assisted by Mrs. Cora Thorne-Birt, soprano; 9:15 P. M., The Shrine Chanters, Choral.

WOC (Central, 400), 12:00 neon, Chimes Concert: 3:30 P. M., Talk, C. C. Flanagan; 5:45 P. M., Chimes Concert: 6:35 P. M., Sandman's Visit: 7:00 P. M., Musical Program, P. S. C. Orchestra; 8:00 P. M., Educational Lecture by Col. Geo. W. Harris, Inf. U. S. A.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ Recital; 11:30-11:55 P. M., Grand Organ Recital and trumpels.

Rectal; 11:30-11:55 P. M., Grand Organ Recital and trumpels.

WSY (Gentral, 360), 8:00 P. M., Musical program, "Steal a Little Kiss," Maurer's Orchestra; "Light of the World We Hail Thee," Ned Maurer, cornetist, "Roaming in the Gloaming," Scottle Suart; "Lovely Lucarine," Maurer's Orchestra; "Selected," Percey Rosenberger, reader; "Moon River," Preston Matthews, saxophonist; "Am I to Blame," "Wonderful Land of Dreams," "You're Got to See Your Mamma Every Night or You Can't See Your Mamma at All," Maurer's Orchestra, 100 P. M., The Town Crier, News Poet; News Orchestra; Louise H. Campbell, Michigan Agricultural College speaker; Cockburn Brospopular songs.

Saturday, May 5

CFCN (Mountain, 440), 10:30-12:00 P. M., Dance selections, Imperial Dance Orchestra, Plaza Cabaret.
KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Dental Sy; Concert, Junior Music Clubs of Southern Calif.; 8:00-9:00 P. M., Program, University of Southern Calif.; 8:00-9:00 P. M., Program, University of Southern Calif.; 10:00-11:100 P. M., Vocal selections, Packard Radio Club, Harry Coe, Ben McLaughlin, Leonard Van Berg.
KGW (Pacific, 400), 3:30-4:00 P. M., Children's program, pupils of Mrs. Marie Johns; Stories, Aunt Nell.
KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe Program.
KYW (Gentral, 400), 8:00-8:53 P. M., Musical Program courtesy W. W. Kimball Co.; Wendell W. Hall, Music Maker; 9:00-9:25, Under the Evening Lamp Sketches, Youth's Companion.
WBAP (Central, 300), 7:00-7:20 P. M., Sunday school lesson, Mrs. W. F. Barnum, leader of Barnum Bible Class of First Methodist Church.
WDAP (Central, 390), 10:30 P. M., E. E., Harder, clarinetist; Harmony Four; W. G. Kassing, tenor, older artists of First Methodist Church.
Stanley Theatre: Concert, Arcadia Cafe Orchestra: 3:00-3:30 P. M., Tenor and piano solos and short talk; 4:15-4:45 P. M., Dance music; 5:45-5:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 400), 12:30-1:30 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Dream Daddy with bittle tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.
WFAA (Central, 400), 1:15-2:00 P. M., Meyer Davis Bellevue Stratford Concert Orchestra; James Wilson Public School Orchestra; 6:30-7:00 P. M., Meyer Davis Concert Orchestra; 6:30-8:15 P. M., Talk for boys, Dr. William Barnes Lower; 8:15-9:00 P. M., Cantoresau Cymraig (Ladies Weish Choir).
WG1 (Eastern, 360), 6:15 P. M., Condition of Massachusetts Highways, Automobile Legal Ass'n.; 7:00 P. M., Talk or New England Dusiness men; Drama, "The Thirteenth Chair," Amrad Players, W. Eugene Hammett, Chair, Catter Schole, 100

director.
WGY (Eastern, 370), 8:00 P. M., Dance music, Cain's Castle Orchestra, WHAS (Central, 360), 4:00-5:00 P. M., Organ Recital, Heyde C. Conrad, Alamo Theatre organ; Concert,

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in place and pre-vents the coil from being thrown out of adjustment once station is tuned in,

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WMAQ (Central, 400), 7:00 P. M., "Custer Battlefield Highway." Wm. D. Fisher; 9:15 P. M., "The Paul Revere Club Blue Square Follies."

WOC (Central, 400), 12:00 noon, Chimes Concert; 3:30 P. M., Talk, C. C. Hall; 5:45 P. M., Chimes Concert; 6:35 P. M., Sandman's Visit; 7:00 P. M., Musical Frogram; 9:30 P. M., Dance Program, P. S. C.

Program: 9130 P., Ornestra. W00 (Eastern, 400), II:00-II:30 A. M., Grand Organ Recital: 4:45-5:00 P. M., Grand Organ Recital and Recital: 4:45-5:00 P. M., Grand Organ Recital and Trumpets. WWJ (Eastern, 400), 3:00 P. M., News Orchestra.

Sunday, May 6

KFI (Pacific, 400), 10:30-11:30 A. M., Church service for all denominations, Church Federation: 4:00-5:00 P. M., Musical vesper service, Natl. Federation of Music Clubs; Industrial chorus, Antonette R. Sabel, director; 8:00-10:30 P. M., Concert, Packard Girls' Concert Club; 10:00-11:30 P. M., Concert, Bennett's

P. M., Musical vesper service, Nata retrained Music Clubs; Industrial chorus, Antonette R. Sabel, director; 8:00-10:00 P. M., Concert, Peachard Girls Concert Club; 10:00-11:00 P. M., Concert, Bennett's Packard Six Orchestra.

WBAP (Gentral, 400, 11 A. M.-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor, will Foster, organist; 3:00-4:30 P. M., Concert, UDAI instruction, 15:15 P. M., Theodora Bileding, Packard Six Orchestra.

WFAA (Gentral, 390), 9:15 P. M., Theodora Bileding, and Drake Concert Ensemble planist, Henry Selinger and Drake Concert Ensemble planist, Physical Program; 9:30-10:00 P. M., William M. Anderson, Jr., pastor of First Presbyterian Church, musical program; 9:30-10:00 P. M., William M. Anderson, Jr., pastor of First Presbyterian Church, musical program; 9:30-10:00 P. M., Misical program, Choristers of Central Christian Church, 10:00-11:00 P. M., Concert, Bob Harris' Orchestra.

WFI (Eastern, 400), 4:00 P. M., Chapel services; 7:30 P. M., Services from Arch Street Presbyterian Church, Phila; 9:30 P. M., Organ recital.

WG1 (Eastern, 300), 4:00 P. M., Concert, L. Doersam, baritone, Florence Doersam, accompanist; "Adventure Hour," Youth's Companion; 3:30 P. M., Church services, Ylassachusetts Federation of Churches.

WGY (Eastern, 370), 9:30 P. M., Church services, First Presbyterian Church, Albany, N. Y., Prelude, "Andantina," Harold W., Thompson; 3:40 P. M., Concert, Medania, "Harold W. Thompson; 3:40 P. M., Wm., Albany, N. Y., Prayer, Hymn, "My Faith Looks Up There in the Cord," Symphony Orchestra, Leo Kliwen, conductor; "Cortest "Turkish March," from "Ruins of Athens," WGY Symphony Orchestra, Leo Kliwen, conductor; "Cortest "Prologue," from "I Pagliacel," William A. Fay: "Invictus," "How Many Dreams," William A. Fay: "Invictus," "How Many Dreams," William A. Fay:

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Thompson.

HAS (Central, 360), 9:57 A. M., Organ recital;
10:00 A. M., Church services, Fourth Avenue Pres-byterian Church, Rev. Dr. Chas, W. Welch, pastor;
Wm. E. Cohen, organist and choir director; 4:005:500
P. M., Coucert, Special Double Quartet, New Albany,

WIP (Eastern, 400), II:00 A. M., Church services, Holy Trinity Memorial Chapel, B. Janney Rudderow, (Continued on page 14)

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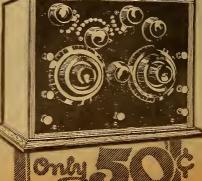
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Radio Digest





Making a Three Tube Reflex De Luxe Receiver

Part I—Panel Layout and Hook-Up

By H. J. Marx

A FTER three months of research work and experimentation, there is a considerable degree of satisfaction in presenting a circuit that accomplishes a little more than what has been done before. Experience teaches us that rarely can we get that all-around combination of advantages continually sought, but seldom attained. Some circuits have the advantage of their good distance reception; others have volume; then again others have the disadvantage of requiring too many tubes; or, again, tuning may be complicated and difficult.

In working on this circuit, it has been

In working on this circult, it has been the alm of the author to eliminate un-



necessary controls, reduce so far as possible not only the quantity of apparatus but also the number of necessary adjustments. After the circuit development was completed, then arose the problem of compact assembly on the panel and in the cabinet. This required time and patience, but was worth the effort.

AMPLIFIER COUPLING 7/16" DRILL & 5/32 DRILL SECONDARY CONDENSER PRIMARY CONDENSER 5/32" DRILL & (IZ HOLES)

but also the number of necessary adjustments. After the circuit development was completed, then arose the problem of compact assembly on the panel and in the cabinet. This required time and patience, but was worth the effort.

Not Low-Priced Outfit

The Reflex De Luxe cannot be considered a low-priced outfit, but its cost is low when its possibilities are considered. The



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ak, 1 23-plate .0005 MFD, variable condenser, 1 Vernier rhoostat, 1 tube socket, 8 binding posts.
feet bue bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM,
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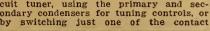




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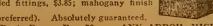
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calers or postpaid (C. O. D. if preferred). Absolutely guaranteed.





ADVANCE PROGRAMS

(Continued from page 12)
inister; 2:90-3:00 P. M., Musical program, Arcadia
afo Concert Orchestra, Fery Sarkozi, director,
7) (Eastern, 400), Church services from St. Paul's
athedral: 2:00 P. M., News Orchestra; Leo Robiilio, Cyril Wezmael, duets.

Monday, May 7

(Pacific, 400), 6:45-7:30 P. M., Peter Rahbit

Calk, Los Angeles Chamber of Commerce: Concert, unior Music Clubs of Southern Calk: 10:00-11:00 and Program, Gaumut Club: Female chorus, Coman's Lyric Club of Los Angeles; Program, Holly-cood Chamber of Commerce.

AP (Central, 400), 7:15-8:00 P. M., Concert, Mrs. mmet Davidson, other artists of Mineral Wells, exas; 9:30-10:30 P. M., Coucert, noreity numbers. e Molay Orchestra of Fort Worth.

AR (Eastern, 400), 1:202-100 P. M., Organ restra; 3:00-3:30 P. M., violin and soprano solos; lik; 4:15-4:45 P. M., Betsy Logan's "Affairs of the eart": Musical tea time program; 5:45-6:00 P. M., ream Daddy with little tots; 7:30-7:50 P. M., Dream addy with boys and girls.

I (Eastern, 400), 1:15-2:00 P. M.

ialki, 4:15.4:35 P. M., Besy, and the control of th

tions, Mrs. C. C. Harne, soprano, Mary Thompson, accompanist; Address, "Give Your Car a Home," J. W. Zimmerman; "Just Among Home Folks," Courier-Journal.

VIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner Dance Music; 7:00-7:30 P. M., Uncle Wip's hedtime stories.

VIO (Eastern, 400), 11:00-11:30 A. M., Organ Recital, Mary Vogt at the console; 4:45-5:00 P. M., Organ recital and trumpets; 7:50 P. M., Orchestra and organ recital and J.W.C.I. Band; 10:10 P. M.-12:00 P. M., Dance music.

Keep Dust Out of Set

A small brush should be a part of the equipment of every receiving set. Keep the dust from collecting between the terminals, contact points, on the plates of the variable condensers. Dust the set each day. Radio instruments are delicate, and require care and attention similar to a watch if they are to function with efficiency.

FIRST STEPS IN RADIO

FIRST STEPS IN RADIO

(Continued from page 7)

The unit of energy is the watt and is defined as the amount of power in a circuit when the instantaneous values of voltage and current are both unity or one. Which follows that the wattage in a circuit is the product of the voltage and amperage. This is not a measure of power unless a time element is considered, for the watt denotes the rate at which energy is being expended but when we state a time such as a watt-hour, we then have a measure of power. The majority of electrical devices are rated in watts and from the above data it is easy to determine the current consumed in amperes.

Consider a step down transformer rated at 60 watts. Since the wattage is the product of the voltage and amperage it holds that dividing the watts by the volts will give the amperes. Therefore we divide the input of the transformer in watts by the voltage of the line and get the current consumption in amperes.

Kilowatt Hour and Ampere Hour

The usual unit in calculating the cost of electricity is the kilowatt hour. Kilo meaning 1000, this unit denotes 1000 watt hours.

Storage batteries are rated in ampere hours which is the product of the current flowing and the length of time in hours. Thus a battery rated at 60 ampere hours will deliver 3 amperes for 20 hours or 2 amperes for 30 hours and so on theoretically. Practically there is a slight diversion from these figures but they are close enough for most purposes.

From this, one can readily determine the length of time their battery will operate the tube before recharging is necessary. Consider a three-tube set which consumes nearly three amperes it will be seen that a 120-ampere hour battery will operate this set 120 divided by 3, or 40 hours.

It is practically impossible to put any ampere hour rating on a dry cell for its

seen that a 120-ampere hour battery will operate this set 120 divided by 3, or 40 hours.

It is practically impossible to put any ampere hour rating on a dry cell for its life will be determined not only by the amount of current drawn but the frequency and length of time such withdrawal takes. As a rule the life of a dry cell, either of the large ignition or B battery type, is increased by use in a number of short stretches rather than one long one and allowing time for recuperation between periods of use.

Connecting Cells; Series and Parallel In connecting cells together they can be connected in either series or parallel. When cells are connected in series, that is, the carbon or positive to the negative or zinc, the resulting voltage will be the sum of the voltages of each cell. Thus two dry cells give 3 volts, three cells 4½ volts and so on. Where storage cells are used each cell in series adds 2 volts. When connected in parallel or multiple the voltage is the same as one cell but the avail-

THREE TUBE REFLEX

THREE TUBE REFLEX

(Continued from page 13)

porate every improvement possible. The condenser values have been determined by experiment and should be adhered to as closely as possible. The constructor is strongly urged to consider only the use of good quality apparatus. For example; paper dielectric condensers vary so much in capacity and are usually so poor in quality that their use is absolutely out of the question.

The assembly of the apparatus on both the panel and the sub panel, which will be taken up in the next article, is such as to avoid as far as possible all inductive reactions. This arrangement has been tested and should be followed accurately. Unnecessarily long leads must be avoided. Changes in the circuit or in the apparatus are apt to materially effect the efficiency of operation. Successful operation cannot be assured if any alterations are made.

In any form of tube circuit, consideration must be given to the type of tube used. While there may be an advantage in substituting dry batteries in place of storage cells, the fact must not be overlooked that economy is sometimes accomplished only at the expense of the output. As previously stated, the peanut tubes have not been found very satisfactory for reflex work.

In the circuit diagram all the units of apparatus have been keyed and these key numbers are explained in the list, "Parts Required." The variocoupler should have both rough and fine taps. In the one used there were six rough and also six fine or single turn taps. The contact or inductance switches had fifteen contact points. To avoid dead or open points, 1 and 2 are connected together leading to the first tap, likewise 3 and 4 to the second, and so on, until 11, 12, 13, and 14 are all connected to the last tap. Contact point 15 is connected to the one secondary terminal. This same arrangement holds true for the other contact, thus saving a waste of time in trying to tune without the circuit in operation.

The Radio frequency transformers used were of a reflex design. Two of the audio

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able current is equal to the sum of the current ratings of each individual cell. Thus we see the advantage of using two or more dry cells in multiple on WD-11 tubes. The voltage is not raised but the desired to make connection to the binding tubes. The voltage is not raised but the drain on each cell is less, and two cells so connected will last more than twice as long as one cell used in the circuit at one time.

Milliamperes

When dealing with currents in the plate circuit is asserted an ampere. This small unit is necessary as the current in the plate circuit is so small, usually in the neighborhood of 5 milliamperes which means 5/1000 of an ampere.

The relationship between the various electrical units shown above will enable a clearer understanding of what is to follow, We shall next treat of Radio waves and their propagation through space.

(TO BE CONTINUED)

THREE TUBE REFLEX

The sum of the phones. In addition, an open circuit jack is added so that the open can be placed in it it is not desired to make connection to the binding ports with the two variable condensers are mounted desired to make connection to the binding of the two variable condensers are mounted to make connection to the binding of the two variable condensers are mounted desired to make connection to the binding of the two variable condensers are mounted in the two variable condensers are mounted to make connection to the binding of the two variable condensers are mounted story the desired to make connection to the binding of the two lower corners of the panel. The two rehostats and potentiometer in the place from the two lower corners of the extreme right and left hand sides. Job and is sto had the extreme right and left hand sides. Job and is story to make connection to the binding to the connection to the binding for the two variable condensers are mounted to make type and the extreme right and left hand sides. Job and is story the two lower corners of the met wo lower corners of the panel. The two lower corners of the two lower corne

should be, especially on account of its use in conjunction with the loop aerial.

The by-pass condensers C3, 4 and 5 should be of the mica dielectric type with accurate capacity range.

The crystal detector CD can be of the fixed adjustment or variation type, although the fixed adjustment avoids the necessity of constantly setting for sensitive contact. Eight binding posts will be required for connections on the sub panel. The layout for the sub panel will be taken up in the next article. Details of the cabinet construction will be covered later. Itkewise, the wiring routine will be given.

The panel layout shown in Figure 2 indicates not merely the location holes for mounting the instruments, but also shows the dials on the front of the panel, and suggestions for engraving or name plates that can be incorporated on the panel. All instruments are symmetrically arranged about the vertical centerline.

The coupler is located at the top center with the tap switches on each side. The

Western Army Stores Genuine FROST Head Set \$3.98 2,000 OHM \$5 Value Grewold Detector This well-known crystal detector, \$2.00 value, special at \$1.49 "BRIGHT STAR" B BATTERIES 22½-volt, large size, furlish stored with stand-come early. \$8.50 value "BRIGHT STAR" B BATTERIES 22½-volt, large size, furlish stored with stand-come early. \$8.50 value "BRIGHT STAR" B BATTERIES 22½-volt, large size, furlish stored store





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Questions and Answers

Loose Coupler

(2429) CK, Marvel, N. D.

In a loose coupler, is the secondary and primary coil connected together in any way by wire? What is the use of the rods that the secondary coil slides on? Are they necessary? How do you tune in a station on a crystal set using a loose coupler? I live 15 miles from a sending station. Will a 75-ohm receiver be all right to use? Are the vacuum tubes known as the W-11 the tubes that are used with dry cells.

A.—Answering your inquiry, will advise that primary and secondary of loose coupler are not connected in any way.

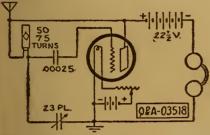
Rods are merely used to support the secondary coil, although sometimes the wires from the secondary coil are connected to them for appearance sake. Not necessarily, however.

Tuning is accomplished by experimentation until receiving wave length of broadcasting station desired. It is largely a matter of patience and practice till accomplished.

A seventy-five ohm headset is not very efficient. Better have a three thousand ohm set if possible.

WD11 tubes are used with dry cells, as suggested.

Ultra Audion Hook-Up (3518) IMA, New Orleans, La. Please give me the ultra audion hook-up. I believe it is the same one certain pub-lications are misnaming the "Gibbons"



and names of other so-called inventors who do not deserve the credit.

A.—Hook-up.is given herewith. Dr Lee DeForest is responsible for the discovery of the ultra audion circuit and to him all credit belongs. You are right in saying the other "inventors" do not deserve falsely claimed credit.

Night and Day Reception

Night and Day Reception

(2362) NG, Philadelphia, Pa.

I am using Radio frequency amplification with various types of transformers and receiving throughout the whole day long distance fine, but as soon as night gets on a terrible static is dropping in my receivers and the noise is so great that I cannot receive any distant station except city stuff. I'm using three steps of R. F. and detector three steps of A. F. amplification. Please help me settle my problem. I'm using about 100 ft. single wire aerial 30 ft. high.

A.—Noting difficulties experienced in night reception will advise that this is contrary to theory and precedent. Reception should far excel that obtained during daytime. It is indicated that there is disturbance occasioned by electrical apparatus in your proximity. Possibly a faulty arc light adjacent to your set. It is not a static disturbance, as suggested. Your antenna construction is good.

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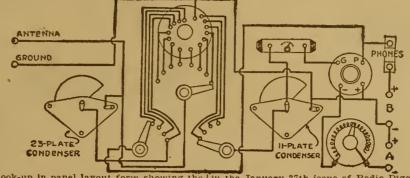
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Reinartz Hook-Up (3571) SHL. San Bernadino, Calif. Some few issues back you printed a photo-diagram of the Reinartz with a



hook-up in panel layout form showing the instruments connected on a panel. Can you repeat this hook-up?

A.—The hook-up was given in the issue of January 13 and is repeated again here-

Choke Coils and Transformers
(2318) EAL. Plymouth, Ill.
I would like to ask a few questions regarding the Reflex circuit No. 3 of the January 27th issue. Could I get as good results by using an R. F. transformer in place of the choke coil and high resistance? What tubes would be best for this circuit. Could the W. E. 216A tubes be used? If so what plate voltage should they require? Would it be possible to light the filament and furnish the plate voltage off the 60 cycle A. C.? What is the wavelength range?

A.—In reference to the Reflex circuit would advise that Radio frequency transformer may be used effectively in place of the choke coil and high resistance.

U V 201 tubes will serve satisfactorily in this circuit. W E 216A tubes may be used with about ninety volts plate potential.

It is possible to light filament from

It is possible to light filament from A C supply by employment of rectifiers and transformers.

The wave length range is about one hundred and ninety to six hundred meters.

Squeals and Howis

(2867) RLB, New York City.

In your issue of January 27, on page 13 you published a hook up figure 2. I have built this set, and am writing you to see if you can give me some information as to the tuning of it. The local stations come in very fair (although not as good as a 3 bulb set that I have) and I have only been able to get WDAP Chicago for distance. I get any amount of squeals,

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howls, etc. I have followed directions diagram showing method. January 20 very carefully and checked up on them, not once but several times.

A.—The figure two diagram appearing secured, unless exhausted, at ten cereary and the control of the con

in the January 27th issue of Radio Digest is correct and has given splendid results. It is indicated that a discrepancy exists, possibly inefficient apparatus, since you do not experience the satisfaction afforded

do not experience the satisfaction to others.

It is difficult to suggest the source of limitation without a personal inspection of set, but having assured you of its possibilities we trust you will not be discouraged before you locate your trouble.

Reflex without Crystal

Reflex without Crystal (2940) FW, New York City, N. Y.

I have made your one tube Reflex. All local stations come in clear and loud on an indoor aerial. I can also receive these stations very faint when I disengage the cat whisker. What is the cause of this?

Can a third R. F. transformer be used in the three tube Reflex? If so where is the best position for it? These two sets were published in the December 30th, 1922 issue.

Do you sell old issues of the Radio Digest, and what is the price? What numbers contain Reflex circuits?

A.—With reference to Reflex circuit will advise that action of same when cat whisker is disengaged is due to inductance between various parts and does not interfere with operation.

For addition of a third Radio frequency transformer in this circuit we are directing your attention to page thirteen of the January 27th issue of Radio Digest for

January 20th

Resistances
(2852) WGG, Chicago, Ill.

I desire to build the Reflex circuit as described in your January 27th issue, page 13, figu. 2 1. Please tell me how or where to purchase the 50,000 ohm resistances as described and how to make them? I find it almost impossible to secure these resistances. I wish to use three Federal R. F. and two Atwater Kent 9 to 1 ratio A. F. transformers. Will these high resistances be of any advantage in this set? Am I using good judgment in selecting high ratio transformers? Do you consider circuit No. 3 better than No. 1?

I do not quite understand why a jack such as described in this circuit on the second A. F. is used.

A.—Resistances employed may be secured through any responsible dealer.

Would advise the use of lower ratio audio frequency transformers than the 9 to 1 cited. Three and one-half or four to one.

Personally, circuit number one is pre-

Personally, circuit number one is pre-

If your reference is to jack used on second stage of audio frequency on number three, this is error. Base of jack should be connected to first prong.



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