

RADIO INDEX

"THE TUNING BOOK"

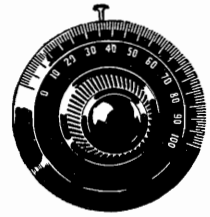


25^c

RADEX shows the wave length to which set is tuned as dials are turned, gives exact location of dials for any station in America and identifies programs received without announcement
For any dial and any set



RADIO INDEX



WINTER EDITION

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NOVEMBER, 1926

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One Dollar the Year

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TUNING BY WAVE LENGTH

Taking Out the Guess Work

By L. C. MARTIN

Tuning a radio instrument seems so simple a thing that most people do not realize that there is a science to it and are content merely to twirl their dials and take what they get. As a matter of fact there is more science in tuning a radio set than in tuning a piano. And like all things that are done right, there is a lot more satisfaction and enjoyment in tuning properly and methodically.

Everyone who has operated a radio set has found that as he turned his dials toward 100 he received the stations with the higher wave lengths while turning toward 0 brought in those on the lower waves. Now there is a relation between the numbers on the dials and the wave lengths and if this is known for any set, the dials can be put exactly for a station of any known frequency or wave length. Calculating this relation is known as calibrating the set. Ordinarily it is done by taking a sheet of paper ruled with a multitude of little squares and marking the wave lengths on one side of the paper and the dial numbers along the top or bottom. Putting a dot on the paper at the proper place for a station heard at any given dial numbers and of any certain wave length, permits a line to be drawn after a few stations have been heard. This will then indicate where all other stations should be heard upon this set.

RADEX does this in another way that is at once convenient, simple and most practical. In the Index by Wave Lengths the stations are arranged in classes according to their wave lengths and frequencies. Merely entering the dial readings for a few stations that are easily heard shows instantly where all the stations in between those heard should come. Thus if one hears a station of 580 kilocycles at 90 on the dials and one of 560 kilocycles at 88, it is obvious that to tune in a station with a frequency of 570 kilocycles, the dial must be set at 89. The use of this Index therefore permits the operator to set his dials exactly for any station he desires whether he has ever heard it or not and if it is on the air and within range of the set it will come in at the point shown for the set is then tuned to the wave length of the desired station.

Similarly the operator can identify the stations he hears without waiting for the announcement, merely by comparing his dial numbers with those he has entered in the Index by Wave Lengths.

Without RADEX one might as well try to tune in his stations blindfolded. With it one always knows exactly what he is doing. Properly used it will add immensely to the pleasure and value of a radio set.

* * *

If you like RADEX your friends would like it too. Show it to them and we'll all profit.

BUT WHAT MAKES IT TALK?

Another A B C Article on Radio

By CHARLES E. PHELPS

There is a yarn about a young amateur who tried to explain to his "sweetie" all about radio. He dilated upon radio and audio frequencies, upon resistances, upon induction and harmonics and what not, and then concluded, "Now do you understand it?" "Oh, yes," she replied, "but what makes it talk?"

There are a million people more or less like this young woman to whom radio is simply a mystery and who are merely confused by the average explanation of it. It is for these folk that this article is written so those who know all about it may as well turn a page.

If I were to pick a violin string even those with a simple ear for music could tell by the sound which string was vibrating. As an actual fact however sound does not travel any more than the fire in the grate does. Both sound and heat, however, vibrate the air and the waves travel. To make sound there must be a vibration. Every sound has a certain rate of vibration of its own so that the ear can tell from the pitch what causes the sound. If I tap upon a door there is a certain vibration and if I knock upon the door-jamb there is another. These different sounds or sound-waves, each with its own rate of vibration, impinge upon our ear-drums and we recognize the cause. So the human voice does not travel but merely sets up a vibration in the air which does the traveling.

When we were youngsters we used to build the simplest sort of telephone systems of our own by knotting the ends of a long resined string and running it through holes in the ends of tin cans. When the string was drawn taut we could talk in one can and the voice could be clearly heard and recognized through the other even at distances beyond the ordinary reach of the sound. What happened was that our voice caused the bottom of the transmitting can to vibrate as a diaphragm and the string carried this vibration to the other can and set up exactly the same vibration there which in turn reproduced the sound. Over any considerable distance of course this vibration would die out and the reproduction would be so faint as to be unrecognizable. It was only when the electric current was brought into play that this vibration could be carried far.

The telegraph was the first instrument for conveying messages to far distances although as a matter of fact it conveyed neither sound nor sound-waves. Samuel F. B. Morse discovered that the electrical circuit could be used to convey thought by drawing down a bar upon a magnet when the circuit was "made" and releasing it by a spring when the circuit was broken. Then by devising an alphabet of dots and dashes he was able to spell out words merely by depressing and releasing a key with his finger. Alexander Graham

(Continued on page 39)

RADIOTORIALS

By THE EDITOR

Too Much of a Good Thing

Some time ago the association of authors and composers endeavored to collect a prohibitive fee from broadcasting stations for the use of their copyrighted compositions. They claimed that instead of helping the sale of their songs and music, the constant repetition of a popular hit served rapidly to make it unpopular. There can be no doubt that there is ground for the complaint. Every listener-in has been wearied by hearing over and over again on every program tuned in, the current hit of the day. As a means of protecting both their audience and a good song therefore, the broadcasting stations ought to follow the example of WBBM. This station maintains a "restricted list" and when it is found that a number is being featured on nearly every program at nearly every station, the studio director puts it on the restricted list and it may thereafter be rendered not oftener than once a week at the Stewart-Warner station.

In the once-a-week class are now the following: "Could I?" "Slave Song," "That's Why I Love You" "Sweetheart of Sigma Chi." "Valencia," "I'm Looking at the World Through Rose Colored Glasses," "I'd Climb the Highest Mountain," "Doodle Dee Doo," "My Bundle of Love," "Song of Songs," "Just a Wearyin' for You," "Her Beaus are Only Rainbows," "Do you Believe in Dreams?" "Little Bit Bad," "Cryin' for the Moon" "I'm in Love with You," "That's Why" and "Six Feet of Papa." And the following are

not to be sung at all until by general disuse they have recovered from overwork: "Sweet Southern Breeze," "Bye, Bye, Blackbird," "Prisoner's Song," "Always," "Remember," "Sweet Onion Time," "At Peace With the World" and "Tami-ami Trail."

Here is a job the Broadcasters' Association could well take up which would make greatly for the favor of Radio. Let this association establish a program exchange and limit the number of times any selection may appear, not merely on a particular station's program but on any program. Do this and a host of listeners will rise up and give three cheers.

* * *

Radio is Better Off Without—

The fan who thinks he can make somebody else stop "squealing his set" if he "squeals" his own set savagely:

The announcer who continually points out to his ignorant listeners the good points of his station's broadcasting:

The radio serial story employed by some stations to fill unexpected gaps in their programs:

The radio gyp dealer who sells a "guaranteed coast-to-coast five-tube set" for \$17.50:

Listeners who ever allow their sets to "squeal" while tuning for nearby stations to which thousands are always listening in the immediate vicinity.

—*St. Louis Globe-Democrat*

SPEAKING OF THE SPEAKER

A Set is No Better Than Its Horn

By ELWOOD MANNING

Some cynic is responsible for the trite remark that "the first loud speaker was made from a rib bone." In any event it might be said that the modern speaker is made of every known material except bone. Stone, clay, wood, metal, paper and even sea shell are only a few of the many materials that have been used in an effort to find one that would reproduce voice and music faithfully and accurately. They have been made, too, in a multitude of shapes and sizes in the same endeavor. The problem is a most difficult one of achievement for the difficulties are many. The modern reproducing device has gone through a myriad experiments in recent years and those who recall the speaker of only a few years ago will admit that great progress has been made. But there is still a long way to travel before the perfect speaker will appear.

The phonograph went through the same process of evolution. The first horn on that instrument was a little eighteen-inch tin megaphone. The next was the great morning-glory affair that took up half a good-sized living room and was always being knocked off its tripod. At last it was built into the phonograph itself and there it remained without material change until within the last year or two when vast strides were made in its perfection as a result of the influence of radio.

There have been two schools in the development of the loud speaker. One of them endeavored to eliminate

vibration by using heavy materials with little or no resonance of their own. The other went to the extreme and followed the violin and piano idea using woods that did vibrate. The same differences had developed in the production of phonographs, one well known make using cast iron and others using wood and wood-pulp.

The first radio speakers were little more than an ear phone with a small horn connected to them while in recent years have come the cone type and other developments. The main fault with most speakers is not in the speaker at all! The horn can reproduce only what is put into it and too often the sound is distorted before it ever reaches the speaker. The first of these faults may occur in the broadcasting station. Unless the station is equipped with instruments so nearly perfect that they can transmit faithfully the music that is put into them, no receiver and no speaker can possibly give accurate and worthy reproduction. Notes in the human voice and in orchestral music vary from eight vibrations per second up to perhaps 10,000. It is a most difficult undertaking to build a transmitting mechanism capable of such a variation. Perhaps no station in existence today can do this and do it equally well in lower, middle and upper tones. Some of them do a fairly good job between 100 and 2,000 vibrations per second while their upper and lower notes

(Continued on page 40)

ON A LOWER WAVE

Lifted from Life

FIRST SALESMAN (with heat)—
“What did you mean by telling Mr. Jones that my radio set was no good?”

SECOND SALESMAN—“What did you mean by telling him it was?”

* * *

MR. PETERS—“At last the radio set is paid for and we are out of debt.”

MRS. PETERS—“Oh, goody. Now I can get credit again.”

* * *

MOTHER (as radio emits “Meditation” from Thais).—“Sonny, do you know what that is?”

SONNY—“Sure, Pittsburgh.”

* * *

“I hear you own a radio now.”

“Well, in partnership with the radio company.”

* * *

BOY—“I wonder who’s at the mike.”

GRANDMA—“Don’t say Mike, dear; it’s Michael.”

* * *

“How’s your radio?”

“Fine, wonderful. Last night I got a male quartette and tuned out the second tenor.”

* * *

“Papa, I wish you’d punish Willie. He’s been such a bad boy. He wouldn’t come in when I called him, he was impudent, he threw a stone through the cellar window, and he—”

“Oh, come, come! We mustn’t be

too hard on the boy. It’s just youthful spirits.”

“And he was fooling with the tubes in your radio set.”

“WHAT? Where is that boy? I’ll fix him.”

* * *

Standing By

The telephone rang in the radio store and was answered by the clerk.

“Will you please send your man to fix my radio? I can’t get anything on it.”

“The reason for your trouble, madam, is that there is an SOS on the air.”

“SOS? Why, what does that mean?”
“Ship in distress.”

“Dear me, isn’t that too bad? Well, if I can be of any assistance, let me know.”

* * *

That’s Odd

A lady telephoned in to the broadcasting station of WTAM one evening and asked why they were not broadcasting. When informed that a program was then being given, she replied, “That’s mighty queer; my tubes don’t light.”

* * *

Times Change

An old dictionary defines “static” as “still, at rest, passive, without motion.” Today static is everything else but.

* * *

Inventions Badly Needed

Maxim silencers for loud speakers.

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

202.6 meters 1480 kilocycles

KFXB 500 Big Bear Lake, Cal.
 KGBY 10 Shelby, Mont.
 WEHS 10 Chicago, Ill.
 WIBS 10 Elizabeth, N. J.

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Bertram O. Heller
 Albert C. Dunning
 Oliver G. Fordham
 Lieut. Thos. F. Hunter

203.9 meters 1470 kilocycles

WABB 10 Harrisburg, Pa.

--	--	--

Harrisburg Radio Co.

205.4 meters 1460 kilocycles

KFVD 50 Venice, Calif.
 KFXY 50 Flagstaff, Ariz.
 WFRL 100 Brooklyn, N. Y.
 WPDQ 50 Buffalo, N. Y.

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W. J. & C. I. McWhinnie
 Mary M. Costigan
 Flatbush Radio Laboratories
 Hiram L. Turner

206.8 meters 1450 kilocycles

KGTT 50 San Francisco, Cal.
 WABW 50 Wooster, O.
 WJBA 50 Joliet, Ill.

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Glad Tidings Tabernacle
 College of Wooster
 D. H. Lentz, Jr.

208.2 meters 1440 kilocycles

KNRC 500 Los Angeles, Cal.

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Clarence B. Juneau

209.7 meters 1430 kilocycles

KFYO 10 Texarkana, Tex.
 KGCN 50 Concordia, Kan.
 KSMR 100 Santa Maria, Cal.
 WCBR 100 Providence, R. I.
 WCWS 100 Providence, R. I.
 WIBH 30 New Bedford, Mass.
 WKBA 200 Chicago, Ill.

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Buchanan-Vaughan Co.
 Alva E. Smith
 Santa Maria Valley R. R. Co.
 Chas H. Messter
 Chas. W. Selen
 Elite Radio Stores
 Arrow Battery Co.

211.1 meters 1420 kilocycles

KFWO 250 Avalon, Cal.
 WJBU 100 Lewisburg, Pa.

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Lawrence Mott
 Bucknell University

212.6 meters 1410 kilocycles

KFWV 50 Portland, Ore.
 WMAL 100 Washington, D. C.

--	--	--

Wilbur Jerman, Inc.
 M. A. Leese Optical Co.

214.2 meters 1400 kilocycles

KFWF 250 St. Louis, Mo.
 KFYP 10 Oxnard, Cal.
 KFXR 15 Oklahoma City
 WCLS 150 Joliet, Ill.

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St. Louis Truth Center
 Carl's Radio Den
 Classen Film Finishing Co.
 Harold M. Couch

215.7 meters 1390 kilocycles

KFBC 50 San Diego, Cal.
 KFQW 50 North Bend, Wash.
 KFXJ 15 Denver, Colo.
 KPJM* 15 Prescott, Ariz.
 WBBZ 50 Chicago, Ill.
 WHBL 50 Chicago, Ill.
 WHBM 20 Chicago, Ill.
 WHBW 100 Philadelphia, Pa.
 WIBJ 50 Chicago, Ill.
 WIBM 10 Chicago, Ill.
 WKBG 100 Chicago, Ill.
 WKBM 23 Newburgh, N. Y.

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W. K. Azbill
 Carl F. Knierim
 R. G. Howell
 Wilburn Radio Service
 C. L. Carrell
 James H. Slusser
 C. L. Carrell
 D. R. Kienzle
 C. L. Carrell
 Billy Maine
 C. L. Carrell
 John Wilbur Jones

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WPRC 100 Harrisburg, Pa.
WRST 250 Bay Shore, N. Y.

217.3 meters 1380 kilocycles

KFAF 50 San Jose, Cal.
WFKB 500 Chicago, Ill.
WOK 5000 Chicago, Ill.

218.8 meters 1370 kilocycles

KFJC 10 Junction City, Kan.
KFRW 50 Olympia, Wash.
WHBU 10 Anderson, Ind.
WIBI 50 Flushing, N. Y.
WJBI 250 Red Bank, N. J.
WSVS 50 Buffalo, N. Y.

220.4 meters 1360 kilocycles

KFUU 50 Oakland, Cal.
WIBW 100 Logansport, Ind.
WKBI 50 Chicago, Ill.
WQAA 500 Parkesburg, Pa.

222.1 meters 1350 kilocycles

WBBW 50 Norfolk, Va.
WBES 100 Takoma Park, Md.
WCOA 500 Pensacola, Fla.
WHBD 20 Bellefontaine, O.
WHBF 100 Rock Island, Ill.
WIBG 50 Elkins Park, Pa.
WIBU 20 Poynette, Wis.

223.7 meters 1340 kilocycles

KFBL 100 Everett, Wash.
KFQP 10 Iowa City, Ia.
KFUR 100 Ogden, Utah
KFVS 50 Cape Girardeau, Mo.
WKAV 50 Laconia, N. H.
WNRC 10 Greensboro, N. C.
WRAF 100 La Porte, Ind.

225.4 meters 1330 kilocycles

KFGQ 10 Boone, Iowa
KFKZ 10 Kirksville, Mo.
KFOB 50 Burlingame, Cal.
KFOR 100 David City, Neb.
KFQZ 50 Hollywood, Cal.
KFWI 500 S. San Francisco
WAGM 50 Royal Oak, Mich.
WBBM 1500 Chicago, Ill.
WDAD 150 Nashville, Tenn.
WEBL 100 U. S. (Portable)
WEBQ 10 Harrisburg, Ill.
WFBE 10 Seymour, Ind.
WIBO 1000 Chicago, Ill.
WKBC* 50 Birmingham, Ala.

227.1 meters 1320 kilocycles

KFQD 100 Anchorage, Alaska
KFVN 50 Fairmont, Minn.
KGBS 10000 Seattle, Wash.

Wilson Printing & Radio Co.
Radiotel Mfg. Co.

Alfred E. Fowler
Francis K. Bridgman, Inc.
Neutrowound Radio Mfg. Co.

Episcopal Church
Western Broadcasting Co.
Riviera Theatre
Frederick B. Zittell, Jr.
Robert S. Johnson
Seneca Vocational School

Colburn & Mathewson
Dr. L. L. Dill
Fred L. Schoenwolf
Horace A. Beale, Jr.

Ruffner Junior High School
Bliss Electrical School
City of Pensacola
Chamber of Commerce
Beardsley Specialty Co.
St. Paul's Prot. Epis. Church
The Electric Farm

Leese Bros.
George S. Carson, Jr.
Peery Building Co.
Hirsch Battery & Radio Co.
Laconia Radio Club
Wayne M. Nelson
The Radio Club, Inc.

Boone Biblical College
Chamber of Commerce
KFOB, Inc.
David City Tire & Electric Co.
Taft Products Co.
Radio Entertainments, Inc.
Robert L. Miller
Atlas Investment Co.
Dad's Auto Accessories, Inc.
Radio Corporation of America
Tate Radio Co.
Van de Walle Music & Radio Co.
Nelson Brothers
H. L. Ansley

Chavin Supply Co.
Carl F. Bagley
A. C. Dailey

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WDBK 100 Cleveland, O.
 WJBR 50 Omro, Wis.
 WOWO 500 Fort Wayne, Ind.

228.9 meters 1310 kilocycles

KFLV 200 Rockford, Ill.
 KGBU 500 Ketchikan, Alaska
 KMMJ 1000 Clay Center, Neb.
 KPPC 50 Pasadena, Cal.
 WAIT 10 Taunton, Mass.
 WBBL 100 Richmond, Va.
 WCBM 50 Baltimore, Md.
 WDBJ 50 Roanoke, Va.
 WFCI* 100 Pawtucket, R. I.
 WGBR 10 Marshfield, Wis.
 WSAJ 250 Grove City, Pa.
 WSAN 100 Allentown, Pa.
 WSAU 10 Chesham, N. H.

230.6 meters 1300 kilocycles

KFDX 100 Shreveport, La.
 KFDZ 10 Minneapolis, Minn.
 KFOT 50 Wichita, Kan.
 KFPR 500 Los Angeles, Cal.
 KFQU 100 Holy City, Cal.
 KGCL 10 Seattle, Wash.
 KUT 500 Austin, Tex.
 WBRE 100 Wilkes-Barre, Pa.
 WCLO 50 Camp Lake, Wis.
 WHBG 20 Harrisburg, Pa.
 WIBZ 10 Montgomery, Ala.
 WTAX 50 Streator, Ill.

232.4 meters 1290 kilocycles

KFON 500 Long Beach, Cal.
 WDBZ 10 Kingston, N. Y.
 WHBQ 50 Memphis, Tenn.
 WJBK 10 Ypsilanti, Mich.
 WOKO 50 Peekskill, N. Y.

234.2 meters 1280 kilocycles

KFUP 50 Denver, Colo.
 KGCG 100 Newark, Ark.
 KMJ 50 Fresno, Cal.
 WAAT 10 Jersey City, N. J.
 WCWK 250 Fort Wayne, Ind.
 WDFD 100 Flint, Mich.
 WGBX 500 Orono, Me.
 WIBX 150 Utica, N. Y.
 WJBC 100 La Salle, Ill.
 WQAC 100 Amarillo, Tex.
 WRAH* 150 Providence, R. I.
 2LR* 50 Habana, Cuba

236.1 meters 1270 kilocycles

KFOO 250 Salt Lake City, Utah
 KFGV 15 Independence, Kan.
 KWKC 100 Kansas City, Mo.
 WBOQ 500 Richmond Hill, N. Y.

Stanley J. Broz
 Gensch & Stearns
 Main Auto Supply Co.

Swedish Evang. Mission Church
 Roy R. Thornton
 M. M. Johnson Co.
 Pasadena Presbyterian Church
 A. H. Waite & Co.
 Grace Covenant Presby. Church
 Hotel Chateau
 Richardson-Wayland Elecl. Corp'n.
 Frank Crook, Inc.
 George S. Ives
 Grove City College
 Allentown Call
 Camp Marienfeld

First Baptist Church
 Harry O. Iverson
 College Hill Radio Club
 Los Angeles County Forestry Dept.
 W. E. Riker
 Louis Wasmer
 University of Texas
 Baltimore Radio Exchange
 C. E. Whitmore
 John S. Skane
 A. D. Trum
 Williams Hardware Co.

Nichols & Warriner, Inc.
 Kingston Radio Club
 St. John's M. E. Church
 Ernest F. Goodwin
 Harold E. Smith

Fitzsimons General Hospital
 Moore Motor Co.
 Fresno Bee
 Frank V. Bremer
 Chester W. Keen
 Frank D. Fallain
 University of Maine
 WIBX, Inc.
 Hummer Furniture Co.
 Gish Radio Service
 Stanley N. Read
 Jose Lara

Latter Day Saints University
 First M. E. Church
 Wilson Duncan Studios
 A. H. Grebe & Co.

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WCAM 250 Camden, N. J.
 WFBJ 100 Collegeville, Minn.
 WGBF 500 Evansville, Ind.
 WGMU 100 Richmond Hill, N. Y.
 WIBA 100 Madison, Wis.
 WRMU 100 Richmond Hill, N. Y.
 WTAD 50 Carthage, Ill.

City of Camden
 St. John's University
 Finke Furniture Co.
 A. H. Grebe & Co.
 Capital Times Studio
 A. H. Grebe & Co.
 Robert E. Compton

237.9 meters 1260 kilocycles

KFBS 15 Trinidad, Colo.
 KFBC 125 Phoenix, Ariz.
 KFWU 100 Pineville, La.
 KFYY 10 Houston, Tex.
 KMTR 500 Hollywood, Cal.
 WBBP 200 Petoskey, Mich.
 WHBN 10 St. Petersburg, Fla.
 WHT 3500 Chicago, Ill.
 WJBT 500 Chicago, Ill.
 WRAW 10 Reading, Pa.

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School District No. 1
 Nielsen Radio Supply Co.
 Louisiana College
 Houston Chronicle
 Echophone Mfg. Co.
 Petoskey High School
 First Avenue Methodist Church
 Radiophone Broadcasting Corpn.
 John S. Boyd
 Avenue Radio & Electric Shop

239.9 meters 1250 kilocycles

KFHL 10 Oskaloosa, Iowa
 KFLX 10 Galveston, Tex.
 KFUM 100 Colorado Springs, Colo.
 KFVE 5000 St. Louis, Mo.
 KGCI 15 San Antonio, Tex.
 KZM 100 Oakland, Cal.
 WABI 100 Bangor, Me.
 WCAT 50 Rapid City, S. D.
 WDBO 500 Winter Park, Fla.
 WGBI 100 Scranton, Pa.
 WOAX 500 Trenton, N. J.
 WSMH 20 Owosso, Mich.
 WTRC 50 New York City

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Penn College
 George R. Clough
 W. D. Corley
 Benson Broadcasting Corpn.
 International Radio Co.
 Western Radio Institute
 First Methodist Church
 State School of Mines
 Rollins College
 Scranton Broadcasters, Inc.
 Franklyn J. Wolff
 Shattuck Music House
 20th Dist. Republican Club

241.8 meters 1240 kilocycles

KFFP 50 Moberly, Mo.
 KFXH 50 El Paso, Tex.
 KSO 500 Clarinda, Iowa
 WABY 50 Philadelphia, Pa.
 WBAW 100 Nashville, Tenn.
 WCBH 50 Oxford, Miss.
 WCBS* 250 Providence, R. I.
 WEBC 100 Superior, Wis.
 WOOD 500 Grand Rapids, Mich.
 WWAE 5000 Plainfield, Ill.

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First Baptist Church
 Bledsoe Radio Co.
 A. A. Berry Seed Co.
 John Magaldi, Jr.
 Braid Electric Co.
 University of Mississippi
 Dewing and Messter
 Superior Telegram
 Grand Rapids Radio Co.
 Electric Park.

243.8 meters 1230 kilocycles

KFVR 50 Denver, Colo.
 KGAR 100 Tucson, Ariz.
 KUOM 500 Missoula, Mont.
 WAMD 1000 Minneapolis, Minn.
 WATT 100 Boston, Mass.
 WEBR 100 Buffalo, N. Y.
 WGBB 100 Freeport, N. Y.
 WKBF* 100 Indianapolis, Ind.
 WNAX 100 Yankton, S. D.
 WRAM 100 Galesburg, Ill.
 WSAZ 50 Pomeroy, O.

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Eugene Rossi
 Tucson Citizen
 University of Montana
 Radisson Radio Corporation
 Edison Electric Illuminating Co.
 H. H. Howell
 Harry H. Carman
 Noble B. Watson
 Dakota Radio Apparatus Co.
 Lombard College
 Chase Electrical Shop

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

245.8 meters 1220 kilocycles

KDYL 50 Salt Lake City, Utah
 KFJY 50 Fort Dodge, Ia.
 KFSD 1000 San Diego, Cal.
 WABX 500 Mt. Clemens, Mich.
 WBAL 5000 Baltimore, Md.
 WCAZ 50 Carthage, Ill.
 WIBR 50 Steubenville, O.
 WQAE 50 Springfield, Vt.
 WRR 500 Dallas, Tex.
 WSOE 500 Milwaukee, Wis.

Newhouse Hotel
 Tunwall Radio Co.
 Airfan Radio Corporation
 Henry B. Joy
 Consolidated Gas, Light & Power Co.
 Carthage College
 Tri-State Radio Co.
 Moore Radio News Station
 City of Dallas
 School of Engineering

247.8 meters 1210 kilocycles

CJCF 25 Kitchener, Ont.
 KFEC 50 Portland, Ore.
 KFIF 100 Portland, Ore.
 KFJB 10 Marshalltown, Ia.
 KFOX 100 Omaha, Neb.
 KFRB 250 Beeville, Tex.
 KFYR 10 Bismarck, N. D.
 KWG 50 Stockton, Cal.
 WBRC 50 Birmingham, Ala.
 WCSO 100 Springfield, O.
 WGAL 10 Lancaster, Pa.
 WIOD 1000 Miami Beach, Fla.
 WMAY 100 St. Louis, Mo.
 WNBH 100 New Bedford, Mass.

O. Rumpel
 Meier & Frank Co.
 Benson Polytechnic Institute
 Marshall Electric Co.
 Technical High School
 Hall Brothers
 Hoskins-Meyer, Inc.
 Portable Wireless Telephone Co.
 Birmingham Broadcasting Corp.
 Wittenberg College
 Electric Supply & Construction Co.
 Carl G. Fisher Co.
 Kingshighway Presbyterian Church
 New Bedford Hotel

249.9 meters 1200 kilocycles

KFVY 10 Albuquerque, N. M.
 KFXX 500 Colorado Springs, Colo.
 KLS 250 Oakland, Cal.
 KMO 500 Tacoma, Wash.
 WBBC 100 Brooklyn, N. Y.
 WFBC 50 Knoxville, Tenn.
 WGES 500 Chicago, Ill.
 WHBA 10 Oil City, Pa.
 WHBY 50 West De Pere, Wis.
 WIAD 100 Philadelphia, Pa.
 WKBH 500 La Crosse, Wis.
 WLAL 100 Tulsa, Okla.
 WMBB 500 Chicago, Ill.
 WNAT 100 Philadelphia, Pa.
 WQAN 100 Scranton, Pa.
 8BY 100 Santiago, Cuba

Radio Supply Co.
 Pikes Peak Broadcasting Co.
 Warner Bros. Radio Supplies Co.
 KMO, Inc.
 Peter J. Testan
 First Baptist Church
 Oak Leaves Bdcstg. Corp.
 Shaffer Music House
 St. Norbert's College
 Howard R. Miller
 Callaway Music Co.
 First Christian Church
 American Bond & Mortgage Co.
 Lenning Bros. Co.
 Scranton Times
 Alberto Ravelo

251.9 meters 1190 kilocycles

KFHA 50 Gunnison, Colo.
 KFOY 50 St. Paul, Minn.
 KFVB 500 Hollywood, Cal.
 KGCR 50 Brookings, S. D.
 KOCW 200 Chickasha, Okla.
 KWUC 50 Le Mars, Iowa
 WBBS 50 New Orleans, La.
 WCAX 100 Burlington, Vt.
 WFBL 100 Syracuse, N. Y.
 WGCP 500 Newark, N. J.
 WKBL 15 Monroe, Mich.

Western State College of Colo.
 Beacon Radio Service
 Warner Bros. Pictures, Inc.
 Cutler's Radio Service
 Oklahoma College for Women
 Western Union College
 First Baptist Church
 University of Vermont
 Onondaga Hotel Co.
 May Radio Broadcast Corpn.
 Monrona Mfg. Co.

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WNJ 150 Newark, N. J.
 WRCO 100 Raleigh, N. C.
 WRHM 50 Minneapolis, Minn.
 WSR0 100 Hamilton, O.
 WTAL 10 Toledo, O.

Radio Shop of Newark
 Wynne Radio Co.
 Rosedale Hospital
 Radio Company
 Toledo Radio & Electric Co.

254.1 meters 1180 kilocycles

KFEL 50 Denver, Colo.
 KFJZ 50 Fort Worth, Tex.
 KFLR 100 Albuquerque, N. M.
 KFWH 100 Eureka, Cal.
 WABC 20 Asheville, N. C.
 WCAJ 500 University Place, Neb.
 WCBA 15 Allentown, Pa.
 WEAI 500 Ithaca, N. Y.
 WFBR 100 Baltimore, Md.
 WFBZ 20 Galesburg, Ill.
 WHBC 10 Canton, O.
 WIAS 100 Burlington, Ia.
 WJAK 100 Kokomo, Ind.
 WNAD 500 Norman, Okla.
 WSAR 100 Fall River, Mass.
 WTAQ 100 Eau Claire, Wis.

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Eugene P. O'Fallon, Inc.
 W. E. Branch
 University of New Mexico
 F. Wellington Morse, Jr.
 Asheville Battery Co.
 Nebraska Wesleyan University
 Queen City Radio Station
 Cornell University
 5th Infantry, M. N. G.
 Knox College
 Rev. E. P. Graham
 Home Electric Co.
 Kokomo Tribune
 University of Oklahoma
 Doughty & Welch Electrical Co.
 C. S. Van Gorden

256.3 meters 1170 kilocycles

KFIQ 100 Yakima, Wash.
 KFUS 50 Oakland, Cal.
 KRE 150 Berkeley, Cal.
 WBAX 100 Wilkes-Barre, Pa.
 WBDC 500 Grand Rapids, Mich.
 WCSH 500 Portland, Me.
 WDOD 500 Chattanooga, Tenn.
 WHBP 100 Johnstown, Pa.
 WMBC 100 Detroit, Mich.
 WRAK 100 Escanaba, Mich.
 WRHF 50 Washington, D. C.
 WRVA 1000 Richmond, Va.

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Dr. I. M. Miller
 The Gospel Radio
 Berkeley Daily Gazette
 John H. Stenger, Jr.
 Baxter Laundry Co.
 Congress Square Hotel Co.
 Chattanooga Radio Co.
 Johnstown Automobile Co.
 Michigan Broadcasting Co., Inc.
 Economy Light Co.
 Washington Radio Hospital Fund
 Larus & Bro. Co.

258.5 meters 1160 kilocycles

KFPW 20 Cartersville, Mo.
 KFUL 50 Galveston, Tex.
 KOCH 250 Omaha, Neb.
 WAAD 25 Cincinnati, O.
 WADC 500 Akron, O.
 WCMA 100 Culver, Ind.
 WHEC 100 Rochester, N. Y.
 WIL 250 St. Louis, Mo.
 WHFC 150 Chicago, Ill.
 WKJC 50 Lancaster, Pa.
 WLTS 250 Chicago, Ill.
 WNAL 50 Omaha, Neb.
 WPCC 500 Chicago, Ill.
 WWRL 100 Woodside, N. Y.

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St. John's M. E. Church, South
 Thos. Goggan & Bros. Music Co.
 Omaha Central High School
 Ohio Mechanics Institute
 Allen Theatre
 Culver Military Academy
 Hickson Electric Co.
 St. Louis Star-Benson Radio Co.
 Hotel Flanders
 Kirk Johnson & Co.
 Lane Technical High School
 R. J. Rockwell
 North Shore Congregational Church
 Woodside Radio Laboratory

260.7 meters 1150 kilocycles

KFJF 500 Oklahoma City
 KFMR 100 Sioux City, Ia.
 KFUT 100 Salt Lake City, Utah
 WABQ 100 Haverford, Pa.

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National Radio Mfg. Co.
 Morningside College
 University of Utah
 Haverford College Radio Club

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WARC 100 Medford Hillside, Mass.
 WDAY 50 Fargo, N. D.
 WEAM 250 North Plainfield, N. J.
 WKAF 500 Milwaukee, Wis.
 WMAZ 500 Macon, Ga.
 WPSC 500 State College, Pa.
 WSKC 100 Bay City, Mich.
 WSSH 100 Boston, Mass.
 WTAR 100 Norfolk, Va.
 WTAZ 15 Lambertville, N. J.
 6BY* 200 Cienfuegos, Cuba

263 meters 1140 kilocycles

KFJR 50 Portland, Ore.
 KFQB 1000 Fort Worth, Tex.
 KTBR 50 Portland, Ore.
 WABR 50 Toledo, O.
 WBPI 500 Newark, N. J.
 WCAD 250 Canton, N. Y.
 WCAR 1000 San Antonio, Tex.
 WDAG 100 Amarillo, Tex.
 WDGY 500 Minneapolis, Minn.
 WEBZ 50 Savannah, Ga.
 WRAV 100 Yellow Springs, O.
 WSDA 250 New York City

265.3 meters 1130 kilocycles

KLZ 250 Denver, Colo.
 WBCN 500 Chicago, Ill.
 WCAH 50 Columbus, Ohio
 WDEL 100 Wilmington, Del.
 WENR 1000 Chicago, Ill.
 WGHB 500 Clearwater, Fla.
 WKBP* 50 Battle Creek, Mich.
 WMAK 500 Lockport, N. Y.
 WTAB 100 Fall River, Mass.

267.7 meters 1120 kilocycles

CFMC 20 Kingston, Ont.
 CFRC 500 Kingston, Ont.
 CHLC 25 Summerside, P. E. I.
 CJOC 50 Lethbridge, Alta.
 KFEQ 500 Oak, Neb.
 KFH 500 Wichita, Kan.
 KFRC 50 San Francisco, Cal.
 WBBY 10 Charleston, S. C.
 WCFT 10 Tullahoma, Tenn.
 WDAH 50 El Paso, Tex.
 WDRG 100 New Haven, Conn.
 WEBW 500 Beloit, Wis.
 WFBM 250 Indianapolis, Ind.
 WJAM 100 Cedar Rapids, Ia.
 WJBO 100 New Orleans, La.
 WNOX 100 Knoxville, Tenn.
 WRAX 500 Philadelphia, Pa.
 WSAX 100 Chicago, Ill.

270.1 meters 1110 kilocycles

KGU 500 Honolulu, Hawaii
 WBAO 100 Decatur, Ill.

The Amrad Corporation
 Radio Equipment Corporation
 Borough of North Plainfield
 WKAF Broadcasting Corporation
 Mercer University
 Pennsylvania State College
 World's Star Knitting Co.
 Tremont Temple Baptist Church
 Reliance Electric Co.
 Thomas J. McGuire
 Jose Ganduxe

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Ashley C. Dixon & Son
 Searchlight Publishing Co.
 M. E. Brown
 Scott High School
 I. R. Nelson
 St. Lawrence University
 Southern Radio Corpn. of Texas
 J. Laurence Martin
 Dr. George W. Young
 Savannah Radio Corporation
 Antioch College
 The City Temple

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Reynolds Radio Co.
 Southtown Economist
 Entrekin Electric Co.
 Wilmington Electrical Specialty Co.
 All-American Radio Corporation
 Fort Harrison Hotel
 Enquirer & News
 Norton Laboratories
 Fall River Daily Herald

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Monarch Battery Co.
 Queen's University
 R. T. Holman, Ltd.
 J. E. Palmer
 Scroggin & Co. Bank
 Hotel Lassen
 City of Paris Dry Goods Co.
 Washington Light Infantry
 Knights of Pythias Home
 Trinity Methodist Church
 Doolittle Radio Corporation
 Beloit College
 Merchants Heat & Light Co.
 D. M. Perham
 Valdemar Jensen
 Peoples Telephone & Telegraph Co.
 Berachah Church
 Zenith Radio Corporation

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Marion A. Mulrony
 James Millikin University

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WDBE 100 Atlanta, Ga.
 WGHP 1500 Detroit, Mich.
 WGST 500 Atlanta, Ga.
 WJBL 500 Decatur, Ill.
 WJBY 30 Gadsden, Ala.
 WKBE 100 Webster, Mass.
 WOI 750 Ames, Iowa
 WRK 100 Hamilton, O.
 WTAW 500 College Station, Tex.

J. M. High Co.
 George H. Phelps, Inc.
 Georgia School of Technology
 William Gushard Dry Goods Co.
 Electric Construction Co.
 K. & B. Electric Co.
 Iowa State College
 Doron Bros. Electrical Co.
 Agricultural & Mechanical College

272.6 meters 1100 kilocycles

KFAD 100 Phoenix, Ariz.
 KFIO 100 Spokane, Wash.
 KFIZ 100 Fond du Lac, Wis.
 KFKA 50 Greeley, Colo.
 KFPY* 100 Spokane, Wash.
 KICK 100 Anita, Iowa
 WBAA 250 West Lafayette, Ind.
 WDAE 250 Tampa, Fla.
 WEBJ 500 New York City
 WFAM 10 St. Cloud, Minn.
 WFBH 500 New York City
 WHK 1000 Cleveland, O.
 WRM 500 Urbana, Ill.
 WSBF 250 St. Louis, Mo.

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Electrical Equipment Co.
 North Central High School
 Daily Commonwealth
 State Teachers College
 Symons Investment Co.
 Atlantic Automobile Co.
 Purdue University
 Tampa Daily Times
 Third Avenue Railway Co.
 Times Publishing Co.
 Concourse Radio Corporation
 Radio Air Service Corporation
 University of Illinois
 Stix, Baer & Fuller

275.1 meters 1090 kilocycles

CYB 500 Mexico City
 KFBB 50 Havre, Mont.
 KFDD 50 Boise, Ida.
 KFKO 500 Lawrence, Kan.
 KFSG 500 Los Angeles, Cal.
 KQV 500 Pittsburgh, Pa.
 WABZ 50 New Orleans, La.
 WAFD 500 Port Huron, Mich.
 WBAK 500 Harrisburg, Pa.
 WBT 250 Charlotte, N. C.
 WCAC 500 Mansfield, Conn.
 WCAO 100 Baltimore, Md.
 WEAU 100 Sioux City, Ia.
 WFAV 500 Lincoln, Neb.
 WHAD 500 Milwaukee, Wis.
 WHAR 500 Atlantic City, N. J.
 WJAS 500 Pittsburgh, Pa.
 WKY 100 Oklahoma City
 WLAP 20 Louisville, Ky.
 WMAC 100 Cazenovia, N. Y.
 WOCL 15 Jamestown, N. Y.
 WORD 5000 Batavia, Ill.
 WPAK 50 Fargo, N. D.
 WSBT 250 South Bend, Ind.
 WSMK 500 Dayton, Ohio
 WSWS 1000 Wooddale, Ill.
 WWL 100 New Orleans, La.
 6JK 100 Santa Clara, Cuba

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El Buen Tono
 F. A. Buttrey Co.
 St. Michaels Cathedral
 University of Kansas
 Angeles Temple
 Doubleday-Hill Electric Co.
 Coliseum Place Baptist Church
 Albert B. Parfet Co.
 Pennsylvania State Police
 Chamber of Commerce
 State Agricultural College
 Albert & Stanley Barger
 Davidson Bros. Co.
 University of Nebraska
 Marquette University
 Seaside Hotel
 Pittsburgh Radio Supply House
 E. C. Hull & H. S. Richards
 Virginia Avenue Baptist Church
 Clive B. Meredith
 A. E. Newton
 Peoples Pulpit Association
 State Agricultural College
 South Bend Tribune
 S. M. K. Radio Corporation
 Illinois Broadcasting Corporation
 Loyola University
 Frank H. Jones

277.6 meters 1080 kilocycles

KFJM 100 Grand Forks, N. D.
 KGY 50 Lacey, Wash.
 KUSD 100 Vermillion, S. D.

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University of North Dakota
 St. Martins College
 University of South Dakota

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

KWCR 500 Cedar Rapids, Iowa
KWWG 500 Brownsville, Tex.
WAAF 200 Chicago, Ill.
WABO 100 Rochester, N. Y.
WCAU 500 Philadelphia, Pa.
WDZ 100 Tuscola, Ill.
WFBG 100 Altoona, Pa.
WGBC 10 Memphis, Tenn.
WGBU 500 Fulford-by-Sea, Fla.
WHAM 100 Rochester, N. Y.
WHDI 500 Minneapolis, Minn.
WLB 500 Minneapolis, Minn.
WLBL 500 Stevens Point, Wis.
WMAN 50 Columbus, O.
WOQ 1000 Kansas City, Mo.
WRBC 500 Valparaiso, Ind.

Harry F. Paar
 Chamber of Commerce
 Daily Drivers Journal
 Lake Avenue Baptist Church
 Universal Broadcasting Co.
 James L. Bush
 William F. Gable Co.
 First Baptist Church
 Chamber of Commerce
 University of Rochester
 William Hood Dunwoody Indust'l Inst.
 University of Minnesota
 State Department of Markets
 First Baptist Church
 Unity School of Christianity
 Immanuel Lutheran Church

280.2 meters 1070 kilocycles

KFAU 750 Boise, Idaho
KFQA 1500 St. Louis, Mo.
KGCA 15 Decorah, Ia.
KMOX 1500 St. Louis, Mo.
KOAC 500 Corvallis, Ore.
WJBX* 100 Osterville, Mass.
WKBJ* 250 St. Petersburg, Fla.
WNAB 100 Boston, Mass.

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Independent School District
 The Principia
 Charles Walter Greenley
 Voice of St. Louis, Inc.
 Oregon Agricultural College
 Henderson & Ross
 Gospel Tabernacle, Inc.
 Shepard Stores

282.8 meters 1060 kilocycles

KGBW 250 Joplin, Mo.
WKBB 100 Joliet, Ill.
WOAN 500 Lawrenceburg, Tenn.
WSM 1000 Nashville, Tenn.

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Martin Brotherson
 Sanders Bros.
 James D. Vaughn
 National Life & Accident Ins. Co.

285.5 meters 1050 kilocycles

KOWW* 500 Walla Walla, Wash.
WEMC 5000 Berrien Springs, Mich.
WKAR 1000 East Lansing, Mich.
WQAM 100 Miami, Fla.
WREO 500 Lansing, Mich.

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Frank A. Moore
 Emmanuel Missionary College
 State Agricultural College
 Electrical Equipment Co.
 Reo Motor Car Co.

288.3 meters 1040 kilocycles

KFKX 5000 Hastings, Neb.
WLWL 5000 New York City
WMBI 500 Chicago, Ill.
WSBC 1000 Chicago, Ill.

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Westinghouse Elec. & Mfg. Co.
 Missionary Society of St. Paul
 Moody Bible Institute
 World Battery Co.

291.1 meters 1030 kilocycles

CJBC 500 Toronto, Ont.
CJCI 50 Toronto, Ont.
CJCQ 1000 Town of King, Ont.
CJOR 50 Sea Island, B. C.
CJYC 500 Scarboro Station, Ont.
CKCX 500 Toronto, Ont.
CNRV 500 Vancouver, B. C.

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Jarvis St. Baptist Church
 Loyal Order of Moose
 Standard Radio Mfg. Corp., Ltd.
 G. C. Chandler
 Universal Radio of Canada, Ltd.
 Internatl. Bible Students Assn.
 Canadian National Railways

293.9 meters 1020 kilocycles

KTBI 750 Los Angeles, Cal.
WAIU 500 Columbus, O.
WEAO 750 Columbus, O.

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Bible Institute of L. A.
 American Insurance Union
 Ohio State University

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

296.9 meters 1010 kilocycles

CFGC 50 Brantford, Ont.
 CFLC 50 Prescott, Ont.
 CJRM 50 Moose Jaw, Sask.
 KPRC 500 Houston, Tex.

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Brant Radio Supply Co., Ltd.
 Radio Association of Prescott
 James Richardson & Sons, Ltd.
 Post-Dispatch

299.8 meters 1000 kilocycles

CYA 500 Mexico City
 KSL 1000 Salt Lake City, Utah
 KUOA 750 Fayetteville, Ark.
 WPG 500 Atlantic City, N. J.
 2OL 100 Habana, Cuba

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Elfiran R. Gomez
 Radio Service Corp. of Utah
 University of Arkansas
 Municipality of Atlantic City
 Columbia Radio & Cycle Co.

302.8 meters 990 kilocycles

KTAB 1000 Oakland, Cal.
 WGN 1000 Chicago, Ill.
 WLIB 4000 Chicago, Ill.
 WMSG 500 New York City

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Associated Broadcasters
 The Chicago Tribune
 Liberty Magazine
 Madison Square Garden

305.9 meters 980 kilocycles

KFDY 100 Brookings, S. D.
 KOIL 500 Council Bluffs, Ia.
 KOMO 1000 Seattle, Wash.

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State College of Agri. & Mech. Arts
 Mona Motor Oil Co.
 American Radio Telephone Co.

309.1 meters 970 kilocycles

KDKA 1000 E. Pittsburgh, Pa.
 WKBO 200 Jersey City, N. J.

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Westinghouse Elec. & Mfg. Co.
 Camith Corporation

312.3 meters 960 kilocycles

CFCY 50 Charlottetown, P. E. I.
 CKCK 500 Regina, Sask.
 CKSH 50 St. Hyacinthe, Que.
 CNRR 500 Regina, Sask.
 CYU 100 Puebla, Mex.
 KSBA* 50 Kennonwood, La.
 KWKH 500 Shreveport, La.

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The Island Radio Co.
 Leader Publishing Co., Ltd.
 City of St. Hyacinthe
 Canadian National Railways
 Augustin del P. Zaenz
 W. G. Patterson
 W. K. Henderson Supply Co.

315.6 meters 950 kilocycles

KFDM 500 Beaumont, Tex.
 KPSN 1000 Pasadena, Cal.
 WAHG 500 Richmond Hill, N. Y.
 WGBS 500 New York City
 WSBT 250 South Bend, Ind.

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Magnolia Petroleum Co.
 Pasadena Star-News
 A. H. Grebe & Co.
 Gimbel Brothers
 South Bend Tribune

319 meters 940 kilocycles

KOIN 1000 Portland, Ore.
 WGR 750 Buffalo, N. Y.
 WSMB 500 New Orleans, La.

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KOIN, Inc.
 Federal Radio Corporation
 Saenger Amusement Co.

322.4 meters 930 kilocycles

CHNS 100 Halifax, N. S.
 CNRA 500 Moncton, N. B.
 CYQ 100 Tampico, Mex.
 KOA 5000 Denver, Colo.
 WBNY 500 New York City

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Northern Electric Co., Ltd.
 Canadian National Railways
 Cipriano Sagaon S. on C.
 General Electric Co.
 B. A. Ruchome Corpn.

325.9 meters 920 kilocycles

CYX 500 Mexico City
 CZF 250 Chihuahua, Mex.

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El Excelsior-Parker
 Telephone Company

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

KFWM 250 Oakland, Cal.
 WKRC 1000 Cincinnati, O.
 WSAI 5000 Cincinnati, O.

Oakland Education Society
 Kodel Radio Corporation
 U. S. Playing Card Co.

329.5 meters 910 kilocycles

CFCT 500 Victoria, B. C.
 CFQC 500 Saskatoon, Sask.
 CHUC 500 Saskatoon, Sask.
 CJGC 500 London, Ont.
 CJWC 250 Saskatoon, Sask.
 CKCW 5000 Burketon Jct., Ont.
 CNRS 500 Saskatoon, Sask.
 KGCB* 50 Oklahoma City
 WJAZ 1500 Chicago, Ill.

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G. W. Deaville
 The Electric Shop, Ltd.
 International Bible Students Assn.
 Free Press Printing Co., Ltd.
 Wheaton Electric Co., Ltd.
 Canadian Broadcasting Corpn.
 Canadian National Railways
 Wallace Radio Institute
 Zenith Radio Corpn.

333.1 meters 900 kilocycles

KGBZ 100 York, Neb.
 KQW 500 San Jose, Cal.
 KTNT 1000 Muscatine, Ia.
 WBZ 2000 Springfield, Mass.
 WBZA 250 Boston, Mass.

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Federal Live Stock Remedy Co.
 First Baptist Church
 Tangley Calliaphone Co.
 Westinghouse Elec. & Mfg. Co.
 Westinghouse Elec. & Mfg. Co.

336.9 meters 890 kilocycles

KFMX 500 Northfield, Minn.
 KNX 1000 Los Angeles, Cal.
 WCAL 500 Northfield, Minn.
 WJAX 1000 Jacksonville, Fla.

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Carleton College
 Evening Express
 St. Olaf College
 City of Jacksonville

340.7 meters 880 kilocycles

CHCS 10 Hamilton, Ont.
 CKCV 50 Quebec, Que.
 CKOC 50 Hamilton, Ont.
 KFAB 1000 Lincoln, Neb.
 KSAC 500 Manhattan, Kan.
 WJBW 30 New Orleans, La.
 WKAQ 500 San Juan, P. R.
 WMCA 500 New York City
 6KW 100 Santa Clara, Cuba

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Hamilton Spectator
 G. A. Vandry
 Wentworth Radio Supply Co., Ltd.
 Nebraska Buick Auto Co.
 State Agricultural College
 C. Carlson, Jr.
 Radio Corporation of P. R.
 Hotel McAlpin
 Frank H. Jones

344.6 meters 870 kilocycles

WCBD 5000 Zion, Ill.
 WLS 5000 Chicago, Ill.

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Wilbur Glenn Voliva
 Sears, Roebuck & Co.

348.6 meters 860 kilocycles

CZE* 500 Mexico City
 KGBX* 30 St. Joseph, Mo.
 KOB 1000 State College, N. M.
 KWSC 500 Pullman, Wash.
 WEEI 500 Boston, Mass.

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Departamento de Educacion
 Julius B. Abercrombie
 College of Agri. & Mech. Arts
 State College of Washington
 Edison Electric Illuminating Co.

352.7 meters 850 kilocycles

WJAD 500 Waco, Tex.
 WWJ 1000 Detroit, Mich.
 2EP* 400 Habana, Cuba

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Frank P. Jackson
 Detroit News
 El Pais

356.9 meters 840 kilocycles

CFCA 500 Toronto, Ont.
 CHIC 500 Toronto, Ont.
 CHNC 500 Toronto, Ont.
 CJBC 500 Toronto, Ont.

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Star Publishing Co.
 Northern Electric Co., Ltd.
 Toronto Radio Research Society
 Jarvis St. Baptist Church

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

CJSC 500 Toronto, Ont.
 CKCL 500 Toronto, Ont.
 CKNC 500 Toronto, Ont.
 CNRT 500 Toronto, Ont.

360 meters 833 kilocycles.

WEW 1000 St. Louis, Mo.
 WKBN 50 Youngstown, Ohio
 WPAP 100 New York City
 WQAO 100 New York City

361.2 meters 830 kilocycles

KGO 4000 Oakland, Cal.
 WHN 500 New York City

365.6 meters 820 kilocycles

WBRI* 500 Tilton, N. H.
 WDAF 1000 Kansas City, Mo.
 WEAN* 500 Providence, R. I.
 WHB 500 Kansas City, Mo.

370.2 meters 810 kilocycles

WEBH 2000 Chicago, Ill.
 WJJD 1000 Mooseheart, Ill.

374.8 meters 800 kilocycles

KFBU 500 Laramie, Wyo.
 KTHS 1000 Hot Springs, Ark.
 KVOO 1000 Bristow, Okla.
 WRNY 500 New York City

379.5 meters 790 kilocycles

KFBC* 50 San Diego, Calif.
 WGY 5000 Schenectady, N. Y.
 WHAZ 1000 Troy, N. Y.
 WJAG 200 Norfolk, Neb.

384.4 meters 780 kilocycles

CKY 500 Winnipeg, Man.
 CNRW 500 Winnipeg, Man.
 KJR 1000 Seattle, Wash.
 WAAW 500 Omaha, Neb.
 WMBF 500 Miami Beach, Fla.

389.4 meters 770 kilocycles

WEAR 750 Cleveland, O.
 WODA* 250 Paterson, N. J.
 WTAM 3500 Cleveland, O.

394.5 meters 760 kilocycles

KHQ 1000 Spokane, Wash.
 WBRS* 100 Brooklyn, N. Y.
 WFI 500 Philadelphia, Pa.
 WLIT 500 Philadelphia, Pa.
 WOAI 2000 San Antonio, Tex.

399.8 meters 750 kilocycles

CYL 500 Mexico City
 PWX 500 Habana, Cuba

Evening Telegram
 Dominion Battery Co., Ltd.
 Canadian National Carbon Co., Ltd.
 Canadian National Railways

St. Louis University
 Radio Electric Service Co.
 Palisades Amusement Park
 Calvary Baptist Church

General Electric Co.
 Loew's State Broadcasting Station

Booth Radio Laboratories
 Kansas City Star
 Shepard Company
 Sweeney School

Edgewater Beach Hotel Co.
 Loyal Order of Moose

St. Matthews Cathedral
 New Arlington Hotel Co.
 Voice of Oklahoma, Inc.
 Experimenter Publishing Co.

W. K. Azbill
 General Electric Co.
 Rensselaer Polytechnic Institute
 Norfolk Daily News

Manitoba Telephone System
 Canadian National Railways
 Northwest Radio Service Co.
 Omaha Grain Exchange
 Fleetwood Hotel

Willard Storage Battery Co.
 O'Dea Temple of Music
 Willard Storage Battery Co.

Louis Wasmer
 Universal Radio Mfg. Co.
 Strawbridge & Clothier
 Lit Brothers
 Southern Equipment Co.

Universal Casa del Radio
 Cuban Telephone Co.

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

WHAS 500 Louisville, Ky.
 WHT 750 Chicago, Ill.
 WJAF* 50 Ferndale, Mich.

405.2 meters 740 kilocycles

KHJ 500 Los Angeles, Cal.
 WJY 5000 New York City
 WOR 500 Newark, N. J.

410.7 meters 730 kilocycles

2-3 CFCE 1650 Montreal, Que.
 CFYC 500 Burnaby, B. C.
 CHYC 750 Montreal, Que.
 5-5 CKAC 1200 Montreal, Que.
 CKCD 1000 Vancouver, B. C.
 CKFC 50 Vancouver, B. C.
 CNRM 1000 Montreal, Que.

416.4 meters 720 kilocycles

WBBR 500 Rossville, N. Y.
 WCCO 5000 Minneapolis-St. Paul
 WCRW 50 Chicago, Ill.

422.3 meters 710 kilocycles

WKRC 1000 Cincinnati, O.
 WLW 5000 Cincinnati, O.

428.3 meters 700 kilocycles

CYO* 100 Mexico City
 KPO 1000 San Francisco, Cal.
 WHAP* 500 New York City
 WKDR 10 Kenosha, Wis.
 WNAC* 500 Boston, Mass.
 WSB 1000 Atlanta, Ga.

434.5 meters 690 kilocycles

CFAC 500 Calgary, Alta.
 CFCN 1800 Calgary, Alta.
 CHXC 250 Ottawa, Ont.
 CKCO 100 Ottawa, Ont.
 CNRC 500 Calgary, Alta.
 CNRO 500 Ottawa, Ont.
 NAA 1000 Arlington, Va.

440.9 meters 680 kilocycles

KLDS 1000 Independence, Mo.
 KMJP 1000 Kansas City, Mo.
 WDWF 500 Cranston, R. I.
 WLSI 500 Providence, R. I.
 WMAF 1000 Dartmouth, Mass.
 WOS 500 Jefferson City, Mo.

447.5 meters 670 kilocycles

KGCH* 500 Wayne, Neb.
 WMAQ 1000 Chicago, Ill.
 WQJ 500 Chicago, Ill.

454.3 meters 660 kilocycles

5-2 KFOA 1000 Seattle, Wash.
 KTW 1500 Seattle, Wash.
 WJZ Var. New York City

Courier-Journal & Louisville Times
 Radiophone Broadcasting Corp.
 J. A. Fenburg Radio Co.

Times-Mirror Co.
 Radio Corporation of America
 L. Bamberger & Co.

Canadian Marconi Co.
 International Bible Students Assn.
 Northern Electric Co., Ltd.
 La Presse Publishing Co., Ltd.
 Vancouver Daily Province
 United Churches of Canada
 Canadian National Railways

Peoples Pulpit Association
 Washburn-Crosby Co.
 Clinton R. White

Kodel Radio Corporation
 Crosley Radio Corporation

Martinez y Zetina
 Hale Brothers
 Wm. H. Taylor Finance Corp.
 Edward A. Dato
 Shepard Stores
 Atlanta Journal

Calgary Herald
 W. W. Grant, Ltd.
 J. R. Booth
 Dr. G. M. Geldert
 Canadian National Railways
 Canadian National Railways
 United States Navy Dept.

Church of Latter Day Saints
 Kansas City Journal-Post
 Dutee W. Flint
 Lincoln Studios
 Round Hills Radio Corpn.
 State Marketing Bureau

Wayne Hospital
 Chicago Daily News
 Calumet Rainbo Broadcasting Co.

Rhodes Department Store
 First Presbyterian Church
 Radio Corporation of America

INDEX BY WAVE LENGTHS AND DIAL NUMBERS

461.3 meters 650 kilocycles

KFNF 1000 Shenandoah, Ia.
 KMA 500 Shenandoah, Ia.
 WAPI 1000 Auburn, Ala.
 WCAE 500 Pittsburgh, Pa.

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Henry Field Seed Co.
 May Seed & Nursery Co.
 Alabama Polytechnic Institute
 Kaufmann & Baer Co.

468.5 meters 640 kilocycles

KFI* 4000 Los Angeles, Cal.
 WJBV* 100 Woodhaven, N. Y.
 WRC 1000 Washington, D. C.

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Earl C. Anthony, Inc.
 Union Course Laboratories
 Radio Corporation of America

475.9 meters 630 kilocycles

WBAP 1500 Fort Worth, Tex.
 WFAA 500 Dallas, Tex.
 WTIC 500 Hartford, Conn.

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Star-Telegram
 Dallas News & Dallas Journal
 Travelers Insurance Co.

483.6 meters 620 kilocycles

WJAR* 500 Providence, R. I.
 WOC 5000 Davenport, Ia.
 WSUI 500 Iowa City, Ia.

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The Outlet Co.
 Palmer School of Chiropractic
 State University of Iowa

491.5 meters 610 kilocycles

FAM 1000 Guadalajara, Mex.
 KGW 1000 Portland, Ore.
 WCFL 100 Chicago, Ill.
 WEAF 5000 New York City

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Federal Military Command
 Morning Oregonian
 Chicago Federation of Labor
 Broadcasting Co. of America, Inc.

499.7 meters 600 kilocycles

CFCH 250 Iroquois Falls, Ont.
 KFRU 500 Columbia, Mo.
 WMC 500 Memphis, Tenn.

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Abitibi Power & Paper Co., Ltd.
 Stephens College
 Commercial-Appeal

508.2 meters 590 kilocycles

KLX 500 Oakland, Cal.
 WIP 500 Philadelphia, Pa.
 WOO 500 Philadelphia, Pa.

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Oakland Tribune
 Gimbel Bros.
 John Wanamaker

516.9 meters 580 kilocycles

CFCK 50 Edmonton, Alta.
 CHCY 250 Edmonton, Alta.
 CJCA 500 Edmonton, Alta.
 CNRE 500 Edmonton, Alta.
 WCX 5000 Detroit, Mich.
 WJR 5000 Pontiac, Mich.
 WJUG 250 New York City

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Radio Supply Co.
 International Bible Students Assn.
 Edmonton Journal, Ltd.
 Canadian National Railways
 Detroit Free Press
 Jewett Radio & Phonograph Co.
 Uda Benjamin Ross

526 meters 570 kilocycles

WHO 5000 Des Moines, Ia.
 WNYC 1000 New York City
 WOAW 1000 Omaha, Neb.

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Bankers Life Co.
 City of New York
 Woodmen of the World

535.4 meters 560 kilocycles

KFBK 100 Sacramento, Calif.
 KYW 3500 Chicago, Ill.
 WHA 750 Madison, Wis.

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Sacramento Bee
 Westinghouse Elec. & Mfg. Co.
 University of Wisconsin

545.1 meters 550 kilocycles

KFUO 500 St. Louis, Mo.
 KSD 500 St. Louis, Mo.
 WTAG 500 Worcester, Mass.

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Concordia Seminary
 St. Louis Post-Dispatch
 Worcester Telegram

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CFCF	410.7	51	23		CJOC	267.7			
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CFCH	499.7				CJOR	291.1			
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CFCN	434.5				CJSC	356.9			
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	WLW	422.3
	WSAI	325.9
Cleveland F-22-a	WDBK	227.1
	WEAR	389.4
	WHK	272.6
	WTAM	389.4
Columbus G-21-b	WAIU	293.9
	WCAH	265.3
	WEAO	293.9
	WMAN	277.6
Dayton G-21-e	WSMK	275.1
Hamilton G-20-d	WRK	270.1
	WSRO	251.9
Pomeroy G-22-b	WSAZ	243.8
Springfield G-21-c	WCSS	247.8
Steubenville F-22	WIBR	245.8
Toledo F-21-a	WABR	263
	WTAL	251.9
Wooster F-22-c	WABW	206.8
Yellow Springs G-21-d	WRAV	263
Youngstown F-22	WKBN	360

OKLAHOMA

Bristow I-14-a	KVOO	374.8
Chickasha J-14-b	KOCV	251.9
Norman J-14-a	WNAD	254.1
Oklahoma City I-14-b	KFJF	260.7
	KFXR	214.2
	KGCB	331
	WKY	275.1
Tulsa I-15	WLAL	249.9

OREGON

Astoria C-1-a	KFJI	245.8
Corvallis D-1	KOAC	280.2
Portland C-1-b	KFEC	247.8
	KFIF	247.8
	KFJR	263
	KFWV	212.6
	KGW	491.5
	KOIN	319
	KTBR	263

PENNSYLVANIA

Allentown F-25-c	WCBA	254.1
	WSAN	228.9
Altoona F-24-c	WFBG	277.6
Elkins Park G-25-c	WIBG	222.1
Grove City F-23-b	WSAJ	228.9

Harrisburg F-24-d	WABB	203.9
	WBAK	275.1
	WHBG	230.6
	WPRC	215.7
Haverford G-25-b	WABQ	260.7
Jeannette G-23	WGM	372
Johnstown F-23-d	WHBP	256.3
Lancaster G-25-a	WGAL	247.8
	WKJC	258.5
Lewisburg F-24-b	WJBU	211.1
Oil City F-23-a	WHBA	249.9
Parkesburg G-25-e	WQAA	220.4
Philadelphia G-25-d	WABY	241.8
	WCAU	277.6
	WFI	394.5
	WHBW	215.7
	WIAD	249.9
	WIP	508.2
	WLIT	394.5
	WNAT	249.9
	WOO	508.2
	WRAX	267.7
Pittsburgh F-23-c	KDKA	309.1
	KOV	275.1
	WCAE	461.3
	WJAS	275.1
Reading F-25-d	WRAW	237.9
Scranton F-25-a	WGBI	239.9
	WQAN	249.9
State College F-24-a	WPSC	260.7
Wilkes-Barre F-25-b	WBAX	256.3
	WBRE	230.6

PHILIPPINES

Baguio	KZUY	360
Manila	KZIB	249.9
	KZKZ	270.1
	KZRQ	222

PORTO RICO

San Juan	WKAQ	340.7
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RHODE ISLAND

Cranston F-27-a	WDWF	440.9
Pawtucket E-27	WFCI	229
Providence E-27-h	WCBR	209.7
	WCBS	242
	WCWS	209.7
	WEAN	367
	WJAR	485.1
	WLSI	440.9
	WRAH	235

SOUTH CAROLINA

Charleston K-23	WBBY	267.7
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SOUTH DAKOTA			VERMONT		
Brookings D-14	KFDY	305.9	Burlington D-26-a	WCAX	251.9
	KGCR	252.0	Springfield D-26-b	WQAE	245.8
Rapid City D-11	WCAT	239.9	VIRGINIA		
Vermillion E-14-b	KUSD	277.6	Arlington G-24-d	NAA	434.5
Yankton E-14-a	WNAX	243.8	Norfolk I-24	WBBW	222.1
TENNESSEE			Richmond H-24	WTAR	260.7
Chattanooga J-20	WDOD	256.3		WBBL	228.9
Knoxville I-20	WFBC	249.9	Roanoke H-23	WRVA	256.3
	WNOX	267.7		WDBJ	228.9
Lawrenceburg J-19	WOAN	282.8	WASHINGTON		
Memphis J-18-a	WGBC	277.6	Everett A-2	KFBL	223.7
	WHBQ	232.4	Lacey B-2-b	KGY	277.6
	WMC	499.7	North Bend B-2-c	KFQW	215.7
Nashville I-19	WBWA	241.8	Olympia B-1-b	KFRW	218.8
	WDAD	225.4	Pullman B-4	KWSC	348.6
	WSM	282.8	Seattle B-2-a	KFOA	454.3
Tulahoma J-20	WCFT	267.7		KGCL	230.6
TEXAS				KGBS	227.1
Amarillo J-12	WDAG	263		KJR	384.4
	WQAC	234.2	Spokane A-4	KOMO	305.9
Austin L-14-b	KUT	230.6		KTW	454.3
Beaumont M-16	KFDM	315.6		KFPI	272.6
Beeville M-14-b	KFRB	247.8		KFPY	273
Brownsville O-14-b	KWVG	277.6	Tacoma B-1-a	KHQ	394.5
College Station M-13	WTAW	270.1	Walla Walla C-4	KMO	249.9
Dallas L-15-a	WFAA	475.9	Yakima B-3	KOWW	285
	WRR	245.8		KFIQ	256.3
Dublin K-14	KFPL	251.9	WISCONSIN		
El Paso L-10	KFXH	241.8	Beloit E-18-b	WEBW	267.7
	WDAH	267.7	Camp Lake E-19-b	WCLO	230.6
Fort Worth L-14-a	KFJZ	254.1	Eau Claire D-17	WTAQ	254.1
	KFQB	263	Fond du Lac D-18-d	KFIZ	272.6
	WBAP	475.9	Kenosha E-19	WKDR	428.3
Galveston M-15-b	KFLX	239.9	La Crosse E-17	WKBH	249.9
	KFUL	258.5	Madison E-18-a	WHA	535.4
Greenville K-15	KFPM	241.8		WIBA	236.1
Houston M-15-a	KFVI	239.9	Marshfield D-18-a	WGBR	229
	KFYJ	237.9	Milwaukee E-19-a	WHAD	275.1
	KPRC	296.9		WKAF	260.7
	KTUE	265		WSOE	245.8
San Antonio M-14-a	KGCI	239.9	Omro D-18-c	WJBR	227.1
	KGCM	263	Poynette D-18-e	WIBU	222.1
	WCAR	263	Stevens Point D-18-b	WLBL	277.6
	WOAI	394.5	Superior B-17	WBEC	241.8
San Benito O-14-a	KFLU	236.1	West De Pere D-19	WHBY	249.9
Texarkana K-16	KFYO	209.7	WYOMING		
Waco L-15-b	WJAD	352.7	Laramie F-10	KFBU	374.8
UTAH			UNITED STATES		
Logan F-7-a	KFXD	205.4	Portable	WEBL	225.4
Ogden F-7-b	KFUR	223.7			
Salt Lake City F-7-c	KDYL	245.8			
	KFOO	236.1			
	KFUT	260.7			
	KSL	299.8			

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CANADA			Toronto, Ont.	CFCA	356.9
Brantford, Ont.	CFGC	296.9		CHIC	356.9
Burketon Jct., Ont.	KCKW	329.5		CHNC	356.9
Burnaby, B. C.	CFVC	410.7		CJBC	291.1
Calgary, Alta.	CFAC	434.5		CJBG	356.9
	CFCN	434.5		CJCI	291.1
	CNRC	434.5		CJSC	356.9
Charlottetown, P. E. I.	CFCY	312.3		CKCL	356.9
Cobalt, Ont.	CKMC	247.8		CKCX	291.1
Edmonton, Alta.	CFCK	516.9		CKNC	356.9
	CHCY	516.9	Vancouver, B. C.	CNRT	356.9
	CJCA	516.9		CFCQ	410.7
	CNRE	516.9		CFDC	410.7
Halifax, N. S.	CHNS	322.4		CKCD	410.7
Hamilton, Ont.	CHCS	340.7		CKFC	410.7
	CKOC	340.7	Victoria, B. C.	CNRY	291.1
Huntsville, Ont.	CHCO	247.8	Winnipeg, Man.	CFCT	329.5
Iroquois Falls, Ont.	CFCH	499.7		CKY	384.4
Kamloops, B. C.	CFJC	267.7		CNRW	384.4
King, Ont.	CJCQ	291.1	CUBA		
Kingston, Ont.	CFMC	267.7	Cienfuegos	6BY	260
	CFRC	267.7	Habana	PWX	399.8
Kitchener, Ont.	CJCF	247.8		2BB	255
Lethbridge, Alta.	CJOC	267.7		2CX	319
London, Ont.	CJGC	329.5		2EP	355
Moncton, N. B.	CNRA	322.4		2LR	235
Montreal, Que.	CFCF	410.7		2MG	280.2
	CHYC	410.7		2OL	299.8
	CKAC	410.7		2RK	310
	CNRM	410.7		2TW	230.6
Moose Jaw, Sask.	CJRM	296.9	Santa Clara	2UF	265
Ottawa, Ont.	CHXC	434.5		6JK	275.1
	CKCO	434.5		6KW	340.7
	CNRO	434.5	Santiago	8BY	249.9
Prescott, Ont.	CFLC	296.9	MEXICO		
Preston, Ont.	CKPC	247.8	Chihuahua	CZF	325.9
Quebec, Que.	CHRC	340.7	Guadalajara	FAM.	491.5
	CKCV	340.7	Mazatlan	CYR	475.9
Regina, Sask.	CHWC	312.3	Mexico City	CYA	299.8
	CKCK	312.3		CYB	275.1
	CNRR	312.3		CYH	374.8
Saskatoon, Sask.	CFQC	329.5		CYL	399.8
	CHUC	329.5		CYO	425
	CJWC	329.5		CYX	325.9
	CNRS	329.5	Monterey	CZE	350
Scarboro, Ont.	CJYC	291.1	Oaxaca	CYM	275.1
Sea Island, B. C.	CJOR	291.1	Puebla	CYF	265
St. Hyacinthe, Que.	CKSH	312.3	Tampico	CYU	312.3
Summerside, P. E. I.	CHLC	267.7	Yucatan	CYQ	322.4
				CYY	548

57 9Bm
church 80 w c x

48 2 x a g

BUT WHAT MAKES IT TALK?

(Continued from page 3)

Bell reached the conclusion that if two diaphragms were connected into this circuit and one of them vibrated by the human voice, the other would vibrate in sympathy and would reproduce the same sounds exactly as in the case of our resined string and tin can. Out of this discovery came the great telephone systems of today.

The Phonograph

Thomas A. Edison in his turn experimented with the telephone and it is said that one day a sharp edge on the diaphragm pricked his finger when his voice was vibrating it. This led him to believe that if the vibrations of the diaphragm could be impressed upon some substance which would retain them, it would be possible to reproduce the sounds long after the cause had ceased by merely passing another diaphragm over them. He took common lead foil and wrapped it around a cylinder which he turned with a small crank. He attached a needle point to a diaphragm and spoke into it. He then retraced the path and miraculously it seemed, the diaphragm repeated the words he had spoken. This of course was the first phonograph and the father of the Edison wax cylinder machine which was used for so many years. The present day disc record is familiar to everyone. If we could cut one of these records in two exactly in the center of one of the grooves and immensely magnify the track of the needle we would find it composed of millions of tiny hills and valleys of varying heights and depths and with no single inch of the contour similar to any other except where the same letter or musical note had been

sounded. It is the number of these hills to the inch and their height which "sets the pitch" or reproduces the sound.

Radio Develops

Radio then is merely a step in the long path of carrying the vibrations of the human voice. It is built upon principles which were learned in the telephone, the telegraph and the phonograph. We have seen that it is only necessary to find a medium of transmitting waves in order to transmit sounds.

Many men had a hand in the development of transmitting radio waves. The discoveries upon which the present system is based go back far more than a hundred years. Among these men were the Italian Marconi and our own De Forest. It was finally found that if vibrations could be set up at a frequency far above the ability of our poor ears to hear them, they would carry for long distances. At first this discovery was used, like the electric current had been, to transmit only dots and dashes but with the development of various devices particularly the present day tube, it was found that this high-frequency wave could be vibrated by the human voice and would, like the telephone, vibrate another diaphragm at a distance in sympathy.

The broadcasting station is a highly complicated electrical apparatus which has the power of sending out vibrations into the ether. These are called the carrier wave and you often hear it when a station first begins a program and before the voice of the announcer comes. To each broadcasting station is assigned a certain rate of vibration called frequency. The carrier wave with no

sounds vibrating the diaphragm or microphone can best be represented by the following diagram.



Each complete vibration is called a cycle and a thousand such vibrations are a kilocycle. The carrier waves of the different stations are the same in diagram except as to the number of cycles to the second or to the inch. As soon as the voice begins to vibrate the diaphragm this carrier wave is "modulated" exactly as the bottom of the tiny furrow on the phonograph record was and this modulation vibrates the diaphragm of your radio instrument and reproduces the sounds put into the microphone far away. The carrier wave thus modulated might be represented as follows:



Thus we see how it is possible for you to reproduce instantaneously in your home on ranch or farm, in the mountains or on the sea, the music and talks sent into the microphone of the broadcasting stations though they may be a thousand miles away. It is necessary merely that you tune your instrument to the frequency of the particular station you desire and your diaphragm in ear-phones or loud speaker then vibrates in sympathy with that of the station you are hearing. Just how it is possible for you to do this and thus pick the desired station from hundreds of others will be explained in a later article.

SPEAKING OF THE SPEAKER

(Continued from page 5)

are far from perfect. This must result in some distortion and this distortion is reproduced unpleasantly even by the very best sets and speakers. As a result a violin may sound like a flute or a piano like bells or chimes.

Cheap audio transformers are inevitably poorly made and this part of the radio set is responsible for much of the imperfect reproduction that the horn may be blamed for. Let us examine for a moment, therefore, the part this device plays in radio. Audio frequencies are those vibrations which are within the limits of the human ear. Our ears are capable of detecting only a limited range of sounds. This range is usually from about 30 per second to 10,000 per second. Any vibrations below 30 we feel rather than hear as in the very lowest notes of the pipe organ. Some insects give forth notes above 10,000 vibrations per second and these are beyond the ability of our ears to transmit to our brains. Beyond these still are the radio frequencies of which the lowest in the broadcasting band is 550,000. If it were possible for us to hear these radio frequencies we would only have to connect a pair of headphones to the aerial and ground and we would be our own receiving sets. As this is not possible it is necessary for us to "step down" the radio frequencies to a rate of vibration that our ears can hear and our brain receive. The audio frequency transformer then, is a unit which transforms electrical vibrations into those within the limits

of our hearing. In other words, audio transformers are devices which must receive electrical vibrations of from 550,000 per second to 1,480,000 per second and "slow them down" as it were to from 30 per second to 10,000. This is a huge task for a single instrument to undertake. Some transformers do the job very well in the lower frequencies and others in the higher ones but few transformers are capable of doing an equally good job on all frequencies within the broadcasting range.

If a transformer amplifies the higher notes of music to a greater extent than the lower notes, distortion is the result. Some transformers amplify two or three octaves in the middle of the piano range perfectly, but the higher notes are amplified to a much greater extent than the bass notes at the lower end of the piano. Other transformers amplify the lower notes to a greater extent than the high notes. It is a very hard problem to design one which will perform equally over the entire musical range. What chance therefore has a transformer made to sell for a dollar or two? As a rule the more you pay for your audio transformer the truer will be your reproduction.

Then both the transmitting stations and the receiving sets are often overloaded. With the station this results in spurious tones which are not in the original sound and which produce the "rattle" in the loud speaker. In the receiving sets this overloading may take place in the detector, in the transformers or in the amplifying tubes. This also results in the production of tones not inherent in the original sound and produces hissing and rattling

noises in the horn. Added to these difficulties is the matter of acoustics in the studio and again in the room in your home in which the speaker is operated.

An attempt to get too much volume will almost always result in distortion and rattling. Who has not heard the raucous screeching of the horn projecting from the front of a radio shop and sending forth its din for a block in every direction? How many thousands have said to themselves, "If that is radio, I want none of it?" Neither the last tube, the transformer nor the speaker is capable of such overloading if harmony is desired. Far better moderately low harmony than such strident volume.

As for the speaker itself its name is legion. It is made in all sorts of variation of a horn; it is made to look like a picture hung on the wall; it is made in the form of an open book for the mantel; it is even made in the form of a fruit basket for the dining table and of a lamp for the library. It is made of materials that cannot vibrate and it is made of materials that ensure vibration. One device is built to fasten to the back of the piano using the sounding-board of that instrument to reproduce the tones. There are attachments galore to fit on the phonograph in the place of the reproducer, utilizing the horn. One speaker is built to resemble a violin while another is made along the lines of the human throat and mouth. The latter not only has no horn but is actually smaller at the opening than elsewhere, depending upon the reflection of the sound waves to produce amplification.

(To be Concluded)

Can't Fool "Mike"

"While it is possible to fool the human ear, it is folly to attempt to trick the microphone," is the expert opinion of Godfrey Ludlow, who has charge of all acoustical effects in the studio of station WJZ.

"Here is an example: Suppose you went to a movie and a picture of a moving locomotive were thrown on the screen. A man in the orchestra rang a bell, blew a whistle and rubbed two pieces of sandpaper together. The illusion is complete. You have the picture of the train and the sound which accompanies it is realistic. But if you were blind and could not see the picture of the locomotive, when you heard the ringing of the bell, the blowing of the whistle and the scrape of the sandpaper, you would probably ask your neighbor what all the noise was about.

"When you were told that it was a railroad locomotive, your mental comment would be, 'That bell sounds like a dinner bell and that whistle sounds like a ferry boat, and that other noise sounds like pieces of sandpaper being rubbed together—that's no locomotive.'

"I remember recently," continued Ludlow, "when the Pennsylvania railroad first broadcast from WJZ they wanted to create the illusion that the radio audience was joining with their entertainers on a railroad trip. It was up to me to make a noise like a railroad train. The job seemed simple. I got a bell and a whistle and had someone sound them before the microphone while I listened at a loud speaker in another room.

"The bell sounded so much like a dinner gong that my mouth watered.

The whistle sounded like one of New York's finest calling his mate. I tried more bells and more whistles—at one time I had fifty-seven bells and twenty-nine whistles in the studio—but I was no nearer to a railroad train in sound than I was when I started.

"Finally I had to have the railroad take a bell off one of their spare locomotives, mount it on wheels and send it up here. It is in the studio now if you care to see it. We had a locomotive whistle fitted to a compressed air blower and used that. I thought the effect was right. The sound was genuinely made by the real things. But after the first broadcast we received several letters from the radio audience complaining that our bell and whistle didn't seem realistic.

* * *

Excuse It, Please!

The truth of Kipling's observation that "though love is blind, the world at large has ears" was demonstrated by a queer radio mix-up that occurred recently in England. A station in Sheffield was broadcasting a sermon from a London church, and set owners were listening to it devoutly, when suddenly the preacher's voice faded from their loud speakers and was replaced by the voices of a man and woman engaged in a rather personal conversation.

It was discovered later that a telephone operator in a London exchange had inadvertently crossed the wires carrying the radio sermon with those carrying the talk of a married couple, the husband being in London and the wife in Sheffield. It was probably the first time people enjoyed a "wrong number."

—From *Radio News Magazine*.