DEPARTMENT OF COMMERCE

RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION

Washington, January 2, 1924—No. 81

CONTENTS.

ABBREVIATIONS.

The necessary corrections to the List of Radio Stations of the United States and to the International List of Radiotelegraph Stations, appearing in this bulletin under the heading "Alterations and corrections," are published after the stations affected in the following order:

Name = Name of station.
Loc = Geographical location. O = west longitude. N = north latitude. S = south latitude.
Call = Call letters assigned.
System = Radio system used and sparks per second.
Range = Normal range in nautical miles.
W. l. = Wave lengths assigned: Normal wave lengths in italics.
Service = Nature of service maintained.
PG = General public.
PR = Limited public.
RC = Radio compass station.
FS = Fog signal.
P = Private.
O = Government business exclusively.
Hours = Hours of operation:
N = Continuous service.
X = No regular hours.
m = a. m. (12 m = midday).
s = p. m. (12 s = midnight).
Rates = Ship or coast charges in cents: c. = cents. (The rates in the international list are given in francs and centimes.)
I. W. T. Co. = Independent Wireless Telegraph Co.
R. C. A. = Radio Corporation of America.
S. O. R. S. = Ship Owners' Radio Service.
C. w. = Continuous wave.
I. c. w. = Interrupted continuous wave.
V. t. = Vacuum tube.
FX = Fixed station.
U. S. L. = After operating company denotes that the change applies only to the List of Radio Stations of the United States.
Kc. = Kilocycles.
Fy. = Frequency.

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NEW STATIONS.

Commercial land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Butler, Pa.[1]	WBR	286, 1509	P	X	Pennsylvania State Police
Cedar Falls, Wash.[2]	KPR	1494	FX	X	City of Seattle, lighting department.
Minneapolis, Minn.[3]	WLB	1277, 1304	FX	X	University of Minnesota.

[1] Loc. (approximately) O, 79° 00′ 00″, N, 40° 10′ 00″; range, 100; system, Westinghouse v, t, telephone and telegraph.
[2] Loc. (approximately) O, 121° 48′ 00″, N 47° 25′ 00″; range, 100; system, composite v, t, telephone and telegraph.
[3] Loc. O, 93° 14′ 13″, N, 44° 59′ 21″; range, 100; system, composite v, t, telephone and telegraph.

Commercial ship stations, alphabetically by names of vessels.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Name of vessel.	Call signal.	Rates.	Service.	Hours.	Owner of vessel.	Station controlled by—
Carabobo	WCN	8	PG	N	Atlantic & Caribbean Steam Navigation Co.	R. C. A.
Lehore	KFMP	8	PG	X	Guaranty Trust Co.	
Tiger	KFMV				Charles A. D. Burk	Owner of vessel.

Commercial land and ship stations, alphabetically by call signals.

[b=ship station; c=land station.]

Call signal.	Name.	Call signal.	Name.
KFMP	Lehore.....b	WBR	Butler, Pa.....c
KFMV	Tiger.....b	WCN	Carabobo.....b
KPR	Cedar Falls, Wash.....c	WLB	Minneapolis, Minn.....c

Broadcasting stations, alphabetically by names of cities.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923.]

City.	Call signal.	City.	Call signal.
Duluth, Minn.	KFMS	Northfield, Minn.	KFMX
Fayetteville, Ark.	KFMQ	San Marcos, Tex.	KFMU
Houghton, Mich.	KFMW	Sioux City, Iowa.	KFMR

Stations broadcasting market or weather reports, music, concerts, lectures, etc., alphabetically by call letters.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923.]

Call signal.	Station operated and controlled by—	Location of station.	Power (watts).	Wave length.	Frequency (kilocycles).
KFMQ	University of Arkansas	Fayetteville, Ark	100	263	1,140
KFMR	Morningside College	Sioux City, Iowa	10	261	1,150
KFMS	Fremuth Department Store	Duluth, Minn	100	275	1,090
KFMT	George W. Young	Minneapolis, Minn., 2310 North Bryant Street.	5	231	1,300
KFMU	Stevens Bros	San Marcos, Tex	20	240	1,250
KFMW	M. G. Sateren	Houghton, Mich., 127 Blanche Street.	50	266	1,130
KFMX	Carleton College	Northfield, Minn	500	283	1,060
WABW	College of Wooster	Wooster, Ohio	20	234	1,280
WABX	Henry B. Joy	Mount Clemens, Mich. (near)	150	270	1,110
WFAT	New Columbus College	Sioux Falls, S. Dak	50	256	1,160

Government land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Tacotna, Alaska	WXV		O	X	U. S. Army.

Government ship stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave length.	Service.	Hours.	Station controlled by—
George H. Weeks	WYAI		O	X	U. S. Army.

Government land and ship stations, alphabetically by call signals.

[b=ship station: c=land station.]

Call signal.	Name of station.	Call signal.	Name of station.
WXV	Tacotna, Alaska.....c	WYAI	George H. Weeks.....b

Special land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1923.]

Station.	Call signal.	Station controlled by—
Aberdeen, Wash.	7XAE	Walter Hemrich (Grays Harbor Radio Co.).
Alameda, Calif.	6ZBH	James F. Brady, 2312 Pacific Avenue.
Anaheim, Calif.	6ZBL	R. Wayne Goodale, 320 South Los Angeles Street.
Ann Arbor, Mich.	8XBL	David R. Inglis, 1025 Baldwin Avenue.
Chicago, Ill.	9XN	Chicago Radio Laboratory, 332 South Michigan Avenue.
Connellsville, Pa.	8XBI	Thomas W. Scott, 401 East Cedar Avenue.
Dorchester, Mass.	1ZH	James W. Carter, 24 Auckland Street.
Fullerton, Calif.	6ZBK	Park Borden, Route 3.
Hartford, Conn.	1XW	F. H. Schnell, 282 Farm Street.
Houghton, Mich.	9XAY	M. G. Sateren, 127 Blanche Street.
Los Angeles, Calif.	6ZBI	Maurice E. McCreery, 628 West Forty-ninth Street.
Minneapolis, Minn.	9XAX	Donald C. Wallace, 54 Penn Avenue, North.
Natick, Mass.	1ZJ	Walter J. Klein, jr.
Newark, N. J.	2ZB	John G. Arsics, Sussex Avenue and Jay Street.
Oakland, Calif.	6ZBM	Alexander B. Stokes, 2812 Thirty-eighth Avenue.
Oberlin, Ohio	8ZE	Everett W. Thatcher, 203 Elm Street.
Riverbank, Calif.	6ZBN	Charles W. Park.
Rogers City, Mich.	8XBJ	Michigan Limestone & Chemical Co.
Salem, Oreg.	7ZY	Paul F. Peyton, 1000 South Commercial Street.
Santa Barbara, Calif.	6ZBJ	John C. Lewis, 110 West Carrillo Street.
Stanford University, Calif.	6XBM	Leland Stanford Junior University.
Stevensville, Mont. (near)	7XAF	Ashley C. Dixon & Son.
Wenatchee, Wash.	7ZI	Harold W. Winningham, 222 North Mission Street.
Wollaston, Mass.	1ZK	Marquis L. MacAdam, 150 Grandview Avenue.
Wyandotte, Mich.	8XBK	Wyandotte Transportation Co.

Special land stations, grouped by districts.

Call signal.	District and station.	Call signal.	District and station.
	First district:		Seventh district:
1XW	Hartford, Conn.	7XAE	Aberdeen, Wash.
1ZH	Dorchester, Mass.	7XAF	Stevensville, Mont. (near).
1ZJ	Natick, Mass.	7ZI	Wenatchee, Wash.
1ZK	Wollaston, Mass.	7ZY	Salem, Oreg.
	Second district:		Eighth district:
2ZB	Newark, N. J.	8XBI	Connellsville, Pa.
	Sixth district:	8XBJ	Rogers City, Mich.
6XBM	Stanford University, Calif.	8XBK	Wyandotte, Mich.
6ZBH	Alameda, Calif.	8XBL	Ann Arbor, Mich.
6ZBI	Los Angeles, Calif.	8ZE	Oberlin, Ohio.
6ZBJ	Santa Barbara, Calif.		Ninth district:
6ZBK	Fullerton, Calif.	9XN	Chicago, Ill.
6ZBL	Anaheim, Calif.	9XAX	Minneapolis, Minn.
6ZBM	Oakland, Calif.	9XAY	Houghton, Mich.
6ZBN	Riverbank, Calif.		

ALTERATIONS AND CORRECTIONS.

COMMERCIAL LAND STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

BENTON HARBOR, MICH.—Service, PG; rates, ship to shore service 10 cents per word.

BIG CREEK (CAMP 62), CALIF.—W. l., 1585, 1630, 1685.

BIG CREEK (CAMP 63), CALIF.—W. l., 1585, 1630, 1685.

DETROIT, MICH.—Loc. O. 83° 15′ 03″, N. 42° 19′ 40″.

LUDINGTON, MICH.—System, Marconi, 240.

NEW YORK, N. Y. (WHI).—Range, 300; w. l., 300, *600*, 1704; system, Federal arc, 1000 with chopper.

COMMERCIAL SHIP STATIONS ALPHABETICALLY BY NAMES OF VESSELS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

AGWILAKE.—W. l., add 450.
AGWISEA.—W. l., add 706.
ANNA E. MORSE.—Station operated and controlled by S. O. R. S.
ARYAN.—W. l., add 706.
ASHBEE.—W. l., 300, *600*.
ATLAS.—System, R. C. A., 1000; w. l., add 706.
BIRKENHEAD.—W. l., 300, 450, *600*, 706.
CARLTON.—Station operated and controlled by S. O. R. S.
CHALLAMBA.—System, Wireless Specialty Apparatus Co., 1000; w. l., 300, *600*, 706; station operated and controlled by R. C. A.
CITY OF BIRMINGHAM.—Range, 300; system, R. C. A., 1000; w. l., 300, 450, *600*, 706.
CITY OF PHILADELPHIA.—W. l., add 706; station operated and controlled by owner of vessel.
COALINGA.—Union Oil Co. owner of vessel.
COLIN H. LIVINGSTONE.—Station operated and controlled by R. C. A.
CRANFORD.—Station operated and controlled by S. O. R. S.
E. A. MORSE.—Range, 300; system, Navy, 1000; w. l., 300, 450, *600*, 706.
EDENTON.—Station operated and controlled by S. O. R. S.
EDGEMONT.—System, Navy, 1000; w. l., 300, 450, *600*, 706.
EDWARD L. DOHENY.—System, R. C. A., 1000; w. l., add 706.
EL SOL.—Range, 150; system, R. C. A., 1000; w. l., add 706.
EUGENE V. R. THAYER.—W. l., 300, 450, *600*, 706.
EVERETT (KUQR).—Chas. R. McCormick S. S. Co. owner of vessel.
F. H. HILLMAN.—W. l., 300, 450, *600*, 706.
FORTUNA.—Station operated and controlled by I. W. T. Co. (U. S. L.).
FRANKLIN.—W. l., add 706.
GEORGE WASHINGTON.—Station operated and controlled by I. W. T. Co.
GLYMONT.—Station operated and controlled by I. W. T. Co.
GREAT CANTON.—Station operated and controlled by I. W. T. Co.
GULF PRINCE.—W. l., 300, 450, *600*, 706.
HAGAN.—Station operated and controlled by I. W. T. Co.
HAMPTON ROADS.—W. l., add 706.
HARRY FARNUM.—Sinclair Navigation Co. owner of vessel.
H. C. FOLGER.—System, R. C. A., 1000; w. l., add 706.
H. M. STOREY.—W. l., 300, 450, *600*, 706.
HOMER.—Merritt-Chapman & Scott Corp. owner of vessel.
HOMESTEAD.—System, Navy, 1000.
HUGUENOT.—W. l., add 706.
HYADES.—System, R. C. A., 1000; w. l., add 706.
JACOB LUCKENBACH.—W. l., 300, 450, *600*, 706, 1800; hours, N.
JADDEN.—System, Navy-R. C. A., 1000; w. l., add 706.
J. E. O'NEIL.—W. l., add 450.
JOHN D. ARCHBOLD.—W. l., add 706.
JOHN W. BOARDMAN.—Range, 150; system, R. C. A., 1000; w. l., 300, *600*; rates, Great Lakes service, 2 cents per word; station operated and controlled by R. C. A.
JOMAR.—W. l., add 706.
JOSEPH M. CUDAHY.—Range, 300; system, R. C. A., 1000; w. l., 300, 450, *600*.
J. W. VAN DYKE.—System, R. C. A., 1000; w. l., add 706.
LA PLACENTIA.—W. l., add 706.
LATOUCHE.—W. l., 300, *600*; rates, 8 cents per word.
MAGUNKOOK.—Name changed to Carriso; w. l., add 706; Ocean S. S. Co. owner of vessel.
MAKIKI.—W. l., add 706.
MCKEESPORT.—System, Navy-R. C. A., 1000.
MERIDEN.—Named changed to El Capitan; w. l., 300, 450, *600*, 706.
NANKING.—Blyth, Witter & Co. owner of vessel.
RIPPLE (KFLF).—Station operated and controlled by R. C. A.
ROYAL ARROW.—System, R. C. A., 1000; w. l., add 706.
SAMUEL Q. BROWN.—W. l., add 706.
SANTA MARTA.—W. l., 300, 450, *600*, 706.
S. B. HUNT.—W. l., add 706.

SEEKONK.—W. l., add 706.
SUNBEAM.—System, Navy–R. C. A., 1000; w. l., add 450.
SWIFTLIGHT.—System, I. W. T. Co., 1000; w. l., add 706; station operated and controlled by I. W. T. Co.
S. V. HARKNESS.—W. l., add 706.
SYLVAN ARROW.—W. l., add 706; hours, N.
VICKSBURG.—Range, 300; system, R. C. A., 1000; w. l., 300, *600*, 1110; station operated and controlled by owner of vessel.
VIRGINIA.—W. l., add 706; rates, 8 cents per word.
VIRGINIA OLSON.—Name changed to Sierra; E. K. Wood Lumber Co. owner of vessel.
TOMALVA.—System, R. C. A., 1000; w. l., add 706.
TRI MOUNTAIN.—B. L. Shipbuilding Co. owner of vessel.
UNITED STATES.—Rates, 8 cents per word.
W. B. KEENE.—W. l., add 706.
WESTERN WORLD.—Station operated and controlled by I. W. T. Co.
WEST MONTOP.—Station operated and controlled by S. O. R. S. (U. S. L.)
WEST O'ROWA.—W. l., 300, 450, *600*, 706.
WILLFARO.—Corporation Trust Co. of America owner of vessel.
WM. G. WARDEN.—W. l., add 706.
Strike out all particulars of the following-named vessels: Amphion, Anahuac, Barstow, Black Arrow, Bluffton, Boy Scout, Brevard, Briarcliffe, Brockton, Carib (KJIU), C. A. Smith, Champlain, City of Brockton, City of Puebla, Commissioner, Dawn, Delivery No. 5, Fearless, Fidus, Geo. L. Harvey, Grand Haven, Greenwood, Milwaukee, Ozama, Pan-American, Pisco, Rowena, Salaverry, Tecomate, Thorobred, Trinity, Von Steuben, Wasagya, and Wicasta.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

KFHM, *read* Sierra; KILP, *read* El Capitan; WJUO, *read* Carriso; strike out all particulars following the call signals, KDBI, KDCK, KDET, KDHZ, KDRA, KDST, KDXB, KDYG, KEKZ, KEPJ, KEPK, KEQV, KEQX, KEXR, KEXS, KFCR, KFDN, KIJG, KIJR, KJIU, KNH, KOGZ, KOPN, KOXP, KUT, KUZL, KXO, KYZ, WEL, WGQ, WJS, WLL, WLN, and WRX.

BROADCASTING STATIONS BY CALL SIGNALS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923.]

KDYM (San Diego, Calif.).—W. l., 280, frequency, kc. 1070.
KFAF (Denver, Colo.).—Power, 50.
KFBC (San Diego, Calif.).—Power, 10.
KFBS (Trinidad, Colo.).—Power, 10.
KFDY (Brookings, S. Dak.).—Station operated and controlled by South Dakota State College.
KFDZ (Minneapolis, Minn.).—W. l., 231, frequency, kc. 1300.
KFEV (Douglas, Wyo.).—Changed to Casper, Wyo., station operated and controlled by Felix Thompson Radio Shop; power, 250.
KFHH (Neah Bay, Wash.).—W. l., 261, frequency, kc. 1150.
KFHR (Seattle, Wash.).—Power, 50; w. l., 283, frequency, kc. 1060.
KFHX (Hutchinson, Kans.).—Power, 150.
KFIQ (Yakima, Wash.).—W. l., 242, frequency, kc. 1240.
KMJ (Fresno, Calif.).—Power, 50.
KQV (Pittsburgh, Pa.).—Power, 250.
KXD (Modesto, Calif.).—Power, 5.
WABE (Washington, D. C.).—Power, 100.
WABG (Jacksonville, Fla.).—W. l., 275, frequency, kc. 1090.
WABN (La Crosse, Wis.).—Station operated and controlled by Ott Radio (Inc.).
WCAL (Northfield, Minn.).—Power, 500.
WCAT (Rapid City, S. Dak.).—Power, 100.
WCBA (Allentown, Pa.).—Power, 10.
WDAH (El Paso, Tex.).—Power, 50.
WEAA (Flint, Mich.).—Power, 10.
WEAH (Wichita, Kans.).—W. l., 280; frequency, kc. 1070.
WEAS (Washington, D. C.).—Power, 100.

WHAH (Joplin, Mo.).—W. l., 283; frequency, kc. 1060.
WJAG (Norfolk, Nebr.).—Power, 250; w. l., 283; frequency, kc. 1060.
WJAR (Providence R. I.).—Power, 500.
WLAH (Syracuse, N. Y.).—Power, 100.
WLAK (Bellows Falls, Vt.).—Power, 100.
WLB (Minneapolis, Minn.).—Power, 5.
WMAP (Easton, Pa.).—Power, 150.
WMAQ (Chicago, Ill.).—Power, 500.
WPAB (State College, Pa.).—W. l., 283; frequency, kc. 1060.
WPAL (Columbus, Ohio).—Station operated and controlled by Avery & Loeb Electric Co., 114 North Third Street.
WSAJ (Grove City, Pa.).—Power, 250.
WWAD (Philadelphia, Pa.)—Power, 100.
Strike out all particulars of the following-named stations: KDYS, Great Falls, Mont.; KDZK, Reno, Neb.; KDZT, Seattle, Wash.; KFAP, Butte, Mont.; KFEP, Denver, Colo.; KFHQ, Los Gatos, Calif.; KFHU, Mayville, N. Dak.; KFIV, Pittsburg, Kans.; KFJA, Grand Island, Nebr.; KFJH, Selma, Calif.; KFJJ, Carrollton, Mo.; KFJU, Kearney, Nebr.; KHI, Los Angeles, Calif.; KLN, Monterey, Calif.; KQI, Berkeley, Calif.; WAAK, Milwaukee, Wis.; WABF, Mount Vernon, Ill.; WCE, Minneapolis, Minn.; WDAL, Jacksonville, Fla.; WDM, Washington, D. C.; WDT, New York, N. Y.; WFAT, Sioux Falls, S. Dak.; WHAC, Waterloo, Iowa; WHAI, Davenport, Iowa; WIAH, Newton, Iowa; WIAT, Tarkio, Mo.; WKAS, Springfield, Mo.; WMH, Cincinnati, Ohio; WNAM, Evansville, Ind.; WOAA, Ardmore, Okla.; WOAQ, Portsmouth, Va.; WPAD, Chicago, Ill.; WPAR, Beloit, Kans.; WSAP, New York, N. Y.; WTAD, Carthage, Ill.

GOVERNMENT LAND STATIONS, ALAPHETICALLY BY NAMES OF STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

DULUTH RANGE LIGHT STATION, MICH.—*Read* Duluth Range Rear Light Station, Mich.; loc. 0.92° 05′ 30″, N. 46° 46′ 44″.
GALVESTON, TEX.—Service, 0.
MARQUETTE LIGHT STATION, MICH.—Loc. 0. 87° 22′ 43″, N. 46° 32′ 11″.
RELIEF LIGHT VESSEL No. 76.—Service, 0; hours, X.
RELIEF LIGHT VESSEL No. 92.—Service, 0; hours, X.
RELIEF LIGHT VESSEL No. 78.—Service, 0; hours, X.
RELIEF LIGHT VESSEL No. 90.—Service, 0; hours, X.
RELIEF LIGHT VESSEL No. 109.—Service 0; hours, X.
STANNARD ROCK LIGHT STATION, MICH.—Loc. 0. 87° 13′ 30″, N. 47° 10′ 59″.
SUPERIOR ENTRY LIGHT STATION, WIS.—Loc. 0. 92° 00′ 21″, N. 46° 42′ 37″.
Strike out all particulars of the following-named stations: Fort Dade, Fla.; Laramie, Wyo.; McGrath, Alaska; Medicine Bow Peak, Wyo.

GOVERNMENT SHIP STATIONS, ALPHABETICALLY BY NAMES OF VESSELS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

S. P. 1161 (Francis B. Hackett).—*Read* S. P. 1161 (Choptank).
Strike our all particulars of the following-named vessels: Captain Charles W. Rowell, General J. M. Brannan, and General S. M. Mills.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

NTD, *read* S. P. 1161 (Choptank); WWAK, *read* Duluth Range Rear Light Station, Mich.; strike out all particulars following the call signals, WWD, WWF, WXV (McGrath, Alaska), WYAB, WYAI, WZK, and WZV.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1923.]

ABILENE, TEX. (5ZAX).—Station operated and controlled by Thomas E. Williams, 139 Cypress Street.
BUTTE, MONT. (7XM).—Station operated and controlled by Montana Power Co.
CLEVELAND, OHIO (8YAJ).—Disregard notice of deletion published in Bulletin

GUNNISON, COLO. (9YAH).—Station operated and controlled by Western State College of Colorado.
HOLLYWOOD, CALIF. (6XAV).—Address, 2306½ Beeckwood Drive.
LOS ANGELES, CALIF. (6XQ).—*Read* Los Angeles, Calif. (portable).
MARION, MASS. (1XAL).—*Read* Mattapoisett, Mass., 24 Vermilya Street.
MARION, MASS. (1ZE).—*Read* Mattapoisett, Mass.
PASADENA, CALIF. (6ZAA).—Read Los Angeles, Calif., 637 Hope Street.
RAINBOW, MONT. (7XO).—Station operated and controlled by Montana Power Co.
SAN DIEGO, CALIF. (6XN).—Address, 722 Electric Building.
SAN FRANCISCO, CALIF. (6XBB).—Address, 119 Twenty-sixth Avenue.
SAN DIEGO, CALIF. (6XZ).—*Read* Los Angeles, Calif. (portable), 209 Brockman Building.
THOMPSON FALLS, MONT. (7XN).—Station operated and controlled by Montana Power Co.
Strike out all particulars of the following-named stations: Bloomington, Ind. (9YAG); Bloomington, Ill. (9YS); Boise, Idaho (7ZI); Boise, Idaho (7ZN); Brunswick, Me. (1ZA); Chicago, Ill. (9XAV); Chicago, Ill. (9XB); Chicago, Ill. (9XN); Cincinnati, Ohio (8ZH); Cleveland, Ohio (8YL); Elk, Wyo. (7ZE); Golden, Colo. (9XAI); New York, N. Y. (2XAX); Redlands, Calif. (6ZJ); Staunton, Va. (3YE); Sunnyvale, Calif. (6ZAD); Swissvale, Pa. (8ZE); Tacoma, Wash. (7YO); University, Va. (3YV); Vancouver, Wash. (7ZK); Wailuku, Hawaii (6ZAC).

MISCELLANEOUS.

List of broadcasting stations of Canada, alphabetically by call signal.

[November 1, 1923.]

Call signal.	Owner of station.	Location of station.	Wave length.
CFAC	Calgary Herald	Calgary, Alberta	430
CFCA	Star Publishing and Printing Co.	Toronto, Ontario, 18 King St., W	400
CFCF	Marconi Wireless Telegraph Co. of Canada.	Montreal, Quebec, Canada Cement Bldg.	440
CFCH	Abitibi Power and Paper Co.	Iroquois Falls, Ontario	400
CFCJ	La Cie de L'Evenement	Quebec, Quebec, 30 Fabrique St.	410
CFCK	Radio Supply Co.	Edmonton, Alberta, 10229 101st St.	410
CFCL	Centennial Methodist Church	Victoria, British Columbia	400
CFCN	W. W. Grant Radio (Ltd.)	Calgary, Alberta, 511 Lougheed Bldg.	440
CFCO	Semmelhaack-Dickson (Ltd.)	Bellevue, Quebec	450
CFCQ	Radio Specialties (Ltd.)	Vancouver, British Columbia, 791 Dunsmuir St.	429
CFCR	Laurentide Air Service	Sudbury, Ontario, Nickle Range Hotel.	410
CFCW	The Radio Shop	London, Ontario, 77 Dundas St.	430
CFDC	Sparks Co.	Nanaimo, British Columbia, Wallace and Fitzwilliam Sts.	430
CFQC	The Electric Shop (Ltd.)	Sasakatoon, Saskatchewan, 144 Second Ave., N.	400
CFRC	Queens University	Kingston, Ontario	450
CFUC	University of Montreal	Montreal, Quebec, 185 St. Denis St.	400
CHAC	Radio Engineers	Halifax, Nova Scotia	400
CHBC	Albertan Publishing Co.	Calgary, Alberta, 229 8th Ave., W	410
CHCD	Canadian Wireless and Electric Co.	Quebec, Quebec, 30 Fabrique St	410
CHCE	Western Canada Radio Supply (Ltd.)	Victoria, British Columbia, 919 Fort St.	400
CHCL	Vancouver Merchants Exchange	Vancouver, British Columbia	440
CHYC	Northern Electric Co.	Montreal, Quebec, 121 Shearer St.	410
CJCA	Edmonton Journal	Edmonton, Alberta, Journal Bldg.	450
CJGC	London Free Press Printing Co.	London, Ontario, 439 Richmond St.	420
CJCD	T. Eaton Co.	Toronto, Ontario, James & Alberts Sts.	410
CJCE	Sprott-Shaw Radio Co.	Vancouver, British Columbia, 1604 Tower Bldg.	429
CJCI	Maritime Radio Corp.	St. John, New Brunswick, 543 Albion St.	400
CJCN	Simons Agnew & Co.	Toronto, Ontario, 19 Melinda St.	410
CJCX	Percival Wesley Shackleton	Olds, Alberta	400
CJSC	Evening Telegram	Toronto, Ontario	430
CKAC	La Presse Publishing Co.	Montreal, Quebec, St. James St. and St. Lawrence Boulevard.	430
CKCD	Vancouver Daily Province	Vancouver, British Columbia	410
CKCE	Canadian Independent Telephone Co.	Toronto, Ontario, Wallace Ave. and Ward St.	450
CKCK	Leader Publishing Co.	Regina, Saskatchewan	420
CKOC	Wentworth Radio Supply Co.	Hamilton, Ontario, 31 John St., N.	410

BROADCASTING STATIONS IN SOUTH AFRICA.

Experiments in wireless broadcasting were made by newspaper companies in Cape Town and Johannesburg, but no regular service has been maintained.

CHANGES IN RADIO FOG SIGNALS.

Radio fog signals on the San Francisco Light Vessel and the Blunts Reef Light Vessel sound the station characteristic on 1,000 meters when there is fog or thick haze within approximately 10 miles from the light vessel. The signal may be heard for a distance of 25 miles or more. The fog signal of these vessels will be sounded upon request of a vessel desiring to test or calibrate its radio compass or to check its position.

At about 8 a. m., 12 noon, and 8 p. m., daily, each light vessel will broadcast on 600 meters weather reports pertaining to existing weather conditions in the immediate vicinity of the light vessel and will furnish such reports at other times to vessels requesting them. The reports cover only actual weather conditions and forecasts can not be furnished.

Beginning January 1, this year, the radio fog signal on the Blunts Reef Light Vessel will be operated during clear weather for the first fifteen minutes of each even hour between 10 p. m. and 6 a. m.

Beginning January 1, this year, the Nantucket Shoals Light Vessel will stand watch for the first 15 minutes of every hour between 8 a. m. and 10 p. m. for the purpose of answering requests from vessel to transmit fog signals. For the first fifteen minutes of every hour between 11 p. m. and 7 a. m. the fog signal will be operated and during thick, foggy, or misty weather this signal will be operated continuously.

The hours of operation on all other light vessels, unless otherwise stated in this publication, are between 8 a. m. and 8.15 p. m., first 15 minutes of each hour.

Masters of vessels making use of the radio fog signals of light vessels are requested to advise the Commissioner of Lighthouses, Washington, D. C., by letter if the increased service is of value to them and if they desire to have such service continued to cover more frequent periods.

COMPASS STATION AT VANCOUVER ISLAND.

At Pachena Point, southwest coast of Vancouver Island, Canada, there has been established a radio compass station to be operated during the present winter for experimental purposes. If advisable the station will be continued. Call letters VAD, wave length 800 meters.

COMPASS STATION ESTABLISHED AT CAP D'AGDE, FRANCE.

A new station which has been established at the above-named place, call letters FEC, works on 450, 600, and 800 meters. The geographical location is lat. 43° 16′ 55″ N., long. 3° 30′ 40″ E. and the range is 120 miles.—*Admiralty Notice to Mariners, No. 1952, London, December 8, 1923.*

COMPASS STATION ESTABLISHED AT ST. PAUL ISLAND, CANADA.

The above-named station which is located in lat. 47° 12′ 15″ N., long. 60° 08′ 45″ W. maintains continuous watch on 800 meters. Call letters, VAT.—*Admiralty Notice to Mariners, No. 1802, London, November 14, 1923.*

CHANGE IN STATION OF LEAFIELD-OXFORD, ENGLAND.

The bureau has been advised by the United States Shipping Board that beginning November 1, last, the Leafield radio station located at Oxford, England, discontinued the practice of transmitting messages during one period and repeating them during the succeeding period. A new arrangement has been introduced whereas the second transmission is transmitted immediately following the first.

A number of complaints have been received by the British authorities from vessels engaged in eastern routes as to the difficulty of reception of radiograms at 0620 G. M. T., consequently the ships on the eastern routes are now granted priority for the period from 0100 to 0150 G. M. T. and messages for these vessels

In accordance with the new arrangements messages received after 0150 G. M. T. for vessels in eastern waters will no longer be transmitted during the period commencing at 0620 G. M. T. but will be held over until 0100 G. M. T. on the following day. For the purpose of classification ships which are bound to or from the Near East, Middle East, India, Straits Settlements, Australasia, and the Far East will be regarded as engaged in eastern routes. The period commencing at 0620 will be used only if traffic on hand for ships engaged in other than eastern routes can not be disposed of during the period from 0100 to 0150 G. M. T.

NEW STATION AT BEIRUT, SYRIA, AND LEBANON.

The Radio-Orient Co., of 79 Boulevard Hausemann, Paris, and Rue Chefik-el-Mouayard, Beirut, opened a station at Khalde (Beirut TSF) which will be in operation from 0600 to 1000 and from 1200 to1600 G. M. T., daily on 600 meters. The call letters of the station are FFD and the range is 800 miles. Coast charge, 60 centimes per word. Messages addressed to ships at sea will be received at the company's offices at Beirut or at any office in Syria and Lebanon. Telegrams sent from ships at sea to European countries via Beirut will be charged at the rate of 1 franc 30 centimes per word. The United States Shipping Board advises that this station will be of great assistance to vessels bound to Beirut which have been compelled to forward the traffic through the Port Said station.

RADIO STATIONS IN SOUTH AMERICA.

The Government wireless station at Guatemala City, Guatemala, which has been out of commission for about two years is expected to resume operating in the near future. The United Fruit Co. has secured a concession from the Government for the construction at Puerto Barrios of a station. A new station is contemplated for the city of Quezaltenango.

STANDARD FREQUENCY STATIONS.

Measurements of radio-station frequencies by the Bureau of Standards show that there are some transmitting stations which maintain a sufficiently constant frequency to serve as frequency standards. If every radio-transmitting station maintained exactly the frequency assigned to it, there would be available a standard frequency signal every time any station was in operation. That is, the frequency of the waves transmitted from such stations could be depended upon and used to standardize wave meters and other apparatus. Unless special precautions are taken in a transmitting station, however, the frequency is not likely to remain highly constant. The mere use of the proper taps or settings on the tuning and coupling elements of the transmitting set is not sufficient. The effects of temperature, supply voltage, antenna conditions, and many other factors introduce variations into the frequency produced. A station which incorporates the best mechanical features in its antenna system and which strictly observes a policy of allowing no tampering with the transmitting circuit may maintain a fairly constant frequency. It is, however, very desirable that some form of frequency indicator be used. Without this device the frequency may shift and the operator will not be aware of the change. If a frequency indicator is employed, any change in the transmitting circuit will at once be made evident by a variation in deflection of the indicating instrument. The adjustment should be repeated or verified at intervals during a transmission.

As a result of the bureau's measurements (made by the methods described in Bureau of Standards Letter Circular No. 92) data are given in each month's Radio Service Bulletin on stations which have been found to maintain a sufficient accuracy to be useful as frequency standards. The broadcasting stations included in the list below have, with rare exceptions, attained the goal of varying not more than 2 kilocycles from the assigned frequency as recommended by the Second National Radio Conference (reported in April, 1923, Radio Service Bulletin). There may be many other stations maintaining their frequency just as constant as these, but these are the only ones which reached the degree of constancy shown among the stations upon whose frequencies measurements were made in the bureau's laboratory. There is, of course, no guaranty that the stations named below will maintain the constancy shown. As a means of maintaining constant frequency the high-power low-frequency alternator stations

frequency indicators (one-point wave meters) and maintain a maximum deflection of the instrument on the frequency indicator throughout the transmission.

The transmitted frequencies from these stations can be utilized for standardizing wave meters and other apparatus by the procedure given in Bureau of Standards Letter Circular No. 92, "Radio Signals of Standard Frequency and Their Utilization." A copy of this letter circular can be obtained by a person having actual use for it upon application to the Bureau of Standards, Washington, D. C.

Station.	Owner.	Location.	Assigned frequency (kilocycles).	Period covered by measurements.	Number of times measured.	Greatest deviation from assigned frequency since Nov. 24.	Average deviation from assigned frequency
						Per ct.	*Per ct.*
WQL	Radio Corporation of America.	Coram Hill, Long Island, N. Y.	17.13	Oct. 9–Dec. 15	27	0.4	0.3
NSS	U. S. Navy	Annapolis, Md.	17.48	Aug. 24–Dec. 15	60	.7	.2
WQK	Radio Corporation of America.	Rocky Point, Long Island, N. Y.	18.21	do	38	.5	.3
WGG	do	Tuckerton, No. 1, N. J.	18.85	do	73	.5	.2
WII	do	New Brunswick, N. J.	22.04	Oct. 1–Dec. 15	50	.2	.2
WSO	do	Marion, Mass.	25.80	Aug. 24–Dec. 15	60	.7	.3
WWJ	Detroit News	Detroit, Mich.	580	Aug. 27–Dec. 15	19	(1)	.1
WCAP	Chesapeake & Potomac Telephone Co.	Washington, D. C.	640	Sept. 11–Dec. 15	28	.2	.1
WSB	Atlanta Journal	Atlanta, Ga.	700	Sept. 14–Dec. 15	28	.1	.2
WGY	General Electric Co.	Schenectady, N. Y.	790	June 26–Dec. 15	47	.3	.2
KDKA	Westinghouse Electric & Manufacturing Co.	East Pittsburgh, Pa.	920	Sept. 8–Dec. 15	69	.1	.1

[1] Not measured since Nov. 24.

NOTE.—In the table similar to this one in the December Radio Service Bulletin the assigned frequency for WII was incorrectly stated as 17.04.

RADIO INSTRUMENTS AND MEASUREMENTS.

There is now in preparation a revision of Bureau of Standards Circular No. 74 Radio Instruments and Measurements. Owing to the rapid growth of radio communication, the appliances and methods used have undergone frequent and radical changes. In this growth progress has been made largely by new inventions and applications, and comparatively little attention has been paid to the refinements of measurement. This circular presents information regarding the more important instruments and measurements actually used in radio work. Many of the matters dealt with are or have been under investigation in the laboratories of the Bureau of Standards and are not treated in previously existing publications. No attempt is made in this circular to deal with the operation of apparatus in sending and receiving.

The first edition was issued March 23, 1918. A number of corrections and revisions have been made in the present edition. The bibliography of radio publications has been considerably extended. An announcement of its appearance will be made in a later edition of the Bulletin.

REFERENCES TO CURRENT RADIO PERIODICAL LITERATURE.

This is a monthly list of references prepared by the radio laboratory of the Bureau of Standards, and is intended to cover the more important papers of interest to the professional radio engineer which have recently appeared in technical periodicals. The number at the left of each reference classifies the reference by subject, in accordance with the scheme presented in A Decimal Classification of Radio Subjects: An Extension of the Dewey System, Circular

of Documents, Government Printing Office, Washington, D. C. Further information about these lists, availabilities of previous lists and of the several periodicals, is contained in the extended statement preceding the early lists as published in the Radio Service Bulletin prior to April, 1923, and also in May and September, 1923.

R000.—*Radio communication.*

R010 Wilson, W. Industrial research: Its place in electrical engineering development—its organization, staff and equipment considered. Electrician (London), **91**, pp. 510–511, November 9, 1923.

R060 Institution of Electrical Engineers Wireless Section: Chairman's address (meeting). Electrical Review (London), **93**, pp. 807–808, November 30, 1923.

R060 Lo sviluppo e l'opera dell'officina radiotelegrafica della Regia Marina (résumé of report given at IEE meeting at Venice). Elettrotecnica, **10**, pp. 893–898, November 25, 1923.

R060 Les merveilles de la prochaine exposition de physique et T. S. F. (Nov. 30–Dec. 17, 1923, Grand Palace, Paris). Radioélectricité, **4**, pp. 483–488, November 15, 1923.

R070 Opportunities in radio to-day. Wireless Age, **11**, pp. 22–23, December, 1923.

R100.—*Radio principles.*

R113.1 Chapman, S. R. Blind spots and fading of signals (tests conducted by Radio Research Board with cooperation of amateurs). Wireless World and Radio Review, **13**, pp. 174–176, November 7, 1923.

R114 Diagrammes des forces électromotrices mesurées à Meudon pour les émissions de Bordeaux Nantes et Rome pendant le premier semestre 1923. L'Onde Electrique, **2**, pp. 590–661, October, 1923.

R114 Bonthillon, L. Longueur d'onde optimum (élimination des parasites et longueur d'onde). Radioélectricité, **4**, pp. 68–76, November 15, 1923.

R114 Austin, L. W. Receiving measurements and atmospheric disturbances at the Bureau of Standards, Washington, D. C., May and June, 1923. Proceedings Institute Radio Engineers, **11**, pp. 579–585, December, 1923.

R116 Press, A. Stationary waves on free wires and solenoids. Proceedings Institute Radio Engineers, **11**, pp. 675–677, December, 1923.

R120 Hatry, L. W. Some suggestions on the design and construction of aerials. Radio News, **5**, p. 894, January, 1924.

R120 Mathews, R. H. G. What you should know about antennas and grounds. Radio Broadcast, **4**, pp. 201–204, January, 1924.

R124 Mesny, R. Rayonnement d'un cadre—applications. L'Onde Electrique, **2**, pp. 571–578, October, 1923.

R125.6 Beverage, H. H., and Peterson, H. O. Radio transmission measurements on long-wave lengths. Proceedings Institute Radio Engineers, **11**, pp. 661–673, December, 1923.

R130 Warner, J. C. Recent developments in high vacuum receiving tubes—Radiotrons model UV199 and model UV201A. Proceedings Institute Radio Engineers, **11**, pp. 587–599, December, 1923.

R131 Colebrook, F. M. Grid-filament conductivity—its nature and effect on amplification—a practical application to loud speakers. Electrician, **91**, pp. 574–575, November 23, 1923.

R133 Shuttleworth, N. The theory of the generation of a. c. by means of triodes. Journal Institution Elec. Engrs. (London), **61**, pp. 1121–1133, October, 1923.

R134.75 Haynes, A. J. A simplified super-heterodyne. Radio Broadcast, **4**, pp. 210–216, January, 1924.

R134.8 Watkins, E. S. An original reflex receiver. Radio News, **5**, pp. 902–903, January, 1924.

R134.8 Sleeper, M. B. The Grimes inverse duplex. Radio (San Francisco), **5**, pp. 13–14, December, 1923.

R138 Langmuir, I. The electron emission from thoriated tungsten filaments. Physical Review, **22**, pp. 357–396, October, 1923.

R144 Chapman, E. H. The measurement of wireless quantities—resistance. Modern Wireless (London), **2**, pp. 157–159, December, 1923.

R148.1 Thomas, H. A. Distortion in radiotelephony (with discussion). Wireless World and Radio Review, **13**, pp. 225–229, November 14; pp. 257–260, November 21; pp. 291–293, November 28; and pp. 328–329, December, 1923.

R200.—*Radio measurements and standardization.*

R200 Conrad, F. Radio modulating system. U. S. Patent No. 1477816, issued December 11, 1923.

R230 McMeen, S. G. Certain inductance considerations. Radio (San Francisco), **5**, pp. 15–16, December, 1923.

R240 Bryan, A. B. Dielectric losses at radio frequencies in liquid dielectrics, Physical Review, **22**, pp. 399–404, October, 1923.

R270 Fletcher, H. Physical measurements of audition and their bearing on the theory of hearing. Bell System Technical Journal, **2**, pp. 145–178, October, 1923.

R281.13 Whitehead, J. B. The influence of gaseous ionization and spark discharge on fibrous insulating materials and on mica. Journal American Institute Elec. Engrs., **42**, pp. 1297–1304, December, 1923.

R300.—*Radio apparatus and equipment.*

R320.6 Ilerty, H. B. Protective device for radio receiving systems. U. S. Patent No. 1475932, issued November 27, 1923.

R320 King, R. W. Thermionic vacuum tubes and their applications. Bell System Technical Journal, **2**, pp. 31–100, October, 1923.

R330 New types of valves (British Wecovalve, B4, B5). Wireless World and Radio Review, **13**, pp. 211–212, November 14, 1923.

R330.1 Doole, H. P. Radio frequency device. U. S. Patent No. 1476156, issued December 4, 1923.

R333 La triode Holweck et sa pompe moléculaire. Radioélectricité, **4**, pp. 499–506, November 15, 1923.

R342.6 Stark, K. H. How to neutralize the neutrodyne. Radio Broadcast, **4**, pp. 223–235, January, 1924.

R343 Barrell, W. S. The supersonic heterodyne receiver. Wireless World and Radio Review, 15 pp. 201–203, November 14; pp. 237–238, November 21; and pp. 280–282, November 28, 1923.
R343 Round, H. J. Apparatus for wireless telegraphy and telephony. U. S. Patent No. 1474382, issued November 20, 1923.
R345 Sawyer, B. The "ham special" receiver (description of Reinartz tuner 140–250 meters). Radio (San Francisco), 5, p. 17, December, 1923.
R343 Cockaday, L. M. How to build the improved 4-circuit tuner. Popular Radio, 5, pp. 23–35, January, 1924.
R343 Meagher, J. R. The Wireless Age unl-control receiver. Wireless Age, 11, pp. 44–47, December, 1923.
R342 Fischer, H. A. Unique design for short and long wave receiver. Radio (San Francisco), 5, p. 25, December, 1923.
R344.3 Felder, L. R. Continuous wave and radiophone transmitters (part 4). Radio News, 5, p. 895, January, 1924.
R344.3 Reinartz, J. L. A balanced continuous wave circuit for quick wave length changes. Radio News, 5, pp. 890–891, January, 1924.
R374 Randall, E. F. Detector for wireless signals. U. S. Patent No. 1475027, issued November 20, 1923.
R374 Oard, P. Crystal detector notes. Radio (San Francisco), 5, p. 18, December, 1923.
R374 • McGown, D. B. Crystal detectors and their adjustment. Radio (San Francisco), 5, pp. 19–20, December, 1923.
R376 McGregor-Morris, J. T. and Mallett, E. Resonant vibrations of telephone receiver diaphragms. Journal Institution Elec. Engrs. (London), 61, pp. 1134–1138, October, 1923.
R378.3 Alexander, E. Loudspeakers and how they work. Modern Wireless (London), 2, pp. 160–165, December, 1923.
R377 Mauborgne, J. O. Break-in radio relay communication. Radio News, 5, pp. 886–887, January, 1924.
R381 James, W. The construction of variable condensers. Wireless World and Radio Review, 15, pp. 305–308, December 5, 1923.
R381 MacPherson, B. Electrical condenser. U. S. Patent No. 1474486, issued November 20, 1923.
R386 Lippincott, D. Electric current filters. Radio (San Francisco), 5, p. 12, December, 1923.
R388 Keys, D. A. The cathode-ray oscillograph and its application to the exact measurement of explosion pressures, potential changes in vacuum tubes and high tension magnetos. Journal of the Franklin Institute, 196, pp. 577–591, November, 1923.
R388 Kipping, N. V. Investigations with the cathode-ray oscillograph. Wireless World and Radio Review, 15, pp. 309–312, December 5, 1923.

R400.—*Radio Communication Systems.*

R400 Goldschmidt, R. B. Wireless selection system. U. S. Patent No. 1475297, issued November 27, 1923.
R401 The transatlantic broadcasting tests and what they prove (tests conducted with British stations on November 25, 1923). Radio Broadcasting, 4, pp. 183–191, January, 1924.
R412 McLachlan, N. W. The transmission and reception of speech and music in radiotelephony. Beama (London), 67, pp. 285–292, November, 1923.
R420 Baker, W. R. G. Commercial radio tube transmitters. Proceedings Institute Radio Engrs., 11, pp. 601–659, December, 1923.
R420 Baker, W. R. G. Signal transmitting system. U. S. Patent No. 1475164, issued November 27, 1923.
R422 Pession, G. munzionamento dell'arco Poulsen su circuiti accoppiati. L'Elettrotecnica, 10, pp. 899–903, November 25, 1923.
R430 Horn, C. W. Simple method to aid in overcoming interference from local broadcasters (how to make a wavetrap). Radio Digest Illustrated, 7, p. 2, December 15, 1923.
R430 Sprague, C. A. Current controlling and static-reducing system. U. S. Patent No. 1477017, issued December 11, 1923.
R430 Alexanderson, E. F. W. Radio receiving system. U. S. Patent No. 1477413, issued December 11, 1923.
R431 Cohen, L. and Mauborgne, J. O. Electrical signaling (resonance wave coil). U. S. Patent No. 1476691, issued December 11, 1923.
R435 Rowntree, H. Electrical transmission of communications. U. S. Patent No. 1475488, issued November 27, 1923.
R460 Bown, R. Radio signaling system. U. S. Patent No. 1475219, issued November 27 1923.
R460 Martin, DeL. K. Radiosignaling call system. U. S. Patent No. 1476006 issued December 4, 1923.
R470 Fuller, L. F. Recent developments in carrier-current communication. Journal American Institute Elec. Engrs., 42, pp. 1271–1274, December, 1923.
R470 Crellin, E. A. Some experiences with a 202-mile carrier-current telephone. Journal American Institute Elec. Engrs., 42, pp. 1275–1277, December, 1923.
R470 Suit over "wired wireless"—General Squier charges the American Tel. & Tel. Co. with infringement of his patents. Elec. World, 82, p. 1234, December 15, 1923.
R470 Martin, DeL. K. Frequency-control system. U. S. Patent No. 1476721, issued December 11, 1923.
R470 Affel, H. A. Demodulating apparatus. U. S. Patent No. 1476678, issued December 11, 1923.

R500.—*Applications of radio*

R514 Neuberger, A. The German radiocompass for shipboard. Radio News, 5, p. 885, January, 1924.
R533 Skerrett, R. G. Avoiding train wrecks by radio. Popular Radio, 5, pp. 3–11, January, 1924.
R550 Broadcasting station directory (revised to November 20, 1923). Wireless Age, 11, pp. 39–40, December, 1923.
R550 The broadcasting stations of the United States (corrected to November 16, 1923). Popular Radio, 5, pp. 97–100, January, 1924.
R550 Complete international list of broadcasting stations in United States, England, Canada, etc. (compiled to December 1, 1923, by the American Radio Journal). American Radio Journal, 2, pp. 12–13, December 1, 1923.
R593 The Paris radio center: Some details of an important foreign wireless tation (St. Assise). Electrician, 91, pp. 513–513, November 9, 1923.

R700.—*Radio manufacturing.*

R709 Radio Corporation has monopoly: Because of its control of essential patents, Federal Trade Commission says. Electrical World, 82, p. 1139, December 8, 1923.

R749 McMichael, L. Retailing wireless apparatus; How business is developed; The demand for broadcasting; A saleman's job—points to bear in mind. Electrician, 91, p. 809, November 9, 1923.

R900.—*Nonradio subjects.*

534.83 Langmuir, I. Sound detecting device. U. S. Patent No. 1475190 issued November 27, 1923.
621.313.23 Hoxie, C. A. Variable-current generator. U. S. Patent No. 1475883, issued November 27, 1923.
621.314.3 Marsten, J. Storage battery chargers. Radio (San Francisco), 5, pp. 23-24, December, 1923.
621.395 Blackwell, O. B. Telephone repeater. U. S. Patent No. 1474490, issued November 20, 1923.

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