

## RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION

Washington, August 1, 1924—No. 88

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## 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.
F. T. Co.	= Federal Telegraph Co.
I. W. T. Co.	= Independent Wireless Telegraph Co.
K. & C.	= Kilbourne & Clark Manufacturing Co.
R. C. A.	= Radio Corporation of America.
S. O. R. S.	= Ship Owners' Radio Service.
W. S. A. Co.	= Wireless Specialty Apparatus Co.
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.
A. c.	= Alternating current.

This edition is the first supplement to the new edition of the list of Commercial and Government Radio Stations, June 30, 1924, which will be ready for distribution by the Superintendent of Documents about October 1 next. For exact date of distribution and price see future editions of Bulletin.

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—
Cape Chacon, Alaska <sup>1</sup>	KFN	300, 550, 600.....	P	X	Alaska Consolidated Canneries.
Marysville, Mich. <sup>2</sup>	KDPJ	1621.....	FX	X	Detroit-Edison Co.
Nushagak Bay, Alaska. <sup>3</sup>	KLJ	300, 600, 1600.....	FX	X	Columbia River Packers Ass'n.
San Francisco, Calif. <sup>4</sup>	KUO	909.....	P	N	Examiner Printing Co.
Wilsonville, Pa. <sup>5</sup>	WLF	135.....	PX	X	Pennsylvania Power & Light Co.

<sup>1</sup> Range, 150; system, W. S. A. Co., 1000.

<sup>2</sup> Loc. 0.82° 27' 34", N. 42° 55' 40"; range, 150; system, General Electric Co. v. t. telephone and telegraph.

<sup>3</sup> Loc. (approximately) 6.158° 31' 00", N. 58° 51' 00"; range, 200; system, K. & C., 1000.

<sup>4</sup> Range, 150; system, composite v. t. telephone.

<sup>5</sup> Loc. (approximately) 75° 10' 00", N. 41° 28' 00"; 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, 1924, 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—
Colorado <sup>1</sup>	KUGL	8	PG	X	Mallory S. S. Co.....	I. W. T. Co.
Matina Loa	KUVN		PG	X	Inter-Island Steam Nav. Co.	
Republic Lifeboat No. 1. <sup>2</sup>	KSNA	8	PG	X	U. S. S. B.....	Do.
Republic Lifeboat No. 2. <sup>3</sup>	KSNB	8	PG	X	do.....	Do.
Romulus <sup>1</sup>	KZAN	8	PG	X	Campania Maritima..	Owner of vessel.
Vulcan	KFTV		PG	X	Pacific States Lumber Co.	

<sup>1</sup> Range, 200; system, Navy-Simon, 1000; w. l., 300, 450, 600.

<sup>2</sup> Range, 150; system, Cutting & Washington, 1000; w. l., 300, 600.

<sup>3</sup> Range, 300; system, International Radio Telegraph Co., 1000; w. l., 300, 450, 600.

Commercial land and ship stations, alphabetically by call signals

[b—ship station; c—land station]

Call signal	Name of station	Call signal	Name of station
KDPJ	Marysville, Mich.....c	KUGL	Colorado.....b
KFN	Cape Chacon, Alaska.....c	KUO	San Francisco, Calif.....c
KFTV	Vulcan.....b	KUVN	Matina Loa.....b
KLJ	Nushagak Bay, Alaska.....c	KZAN	Romulus.....b
KSNA	Republic Lifeboat No. 1.....b	WLF	Wilsonville, Pa.....c
KSNB	Republic Lifeboat No. 2.....b		

*Broadcasting stations, alphabetically by names of cities*

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924]

City	Call signal	City	Call signal
Albuquerque, N. Mex.	KFLR	Missoula, Mont.	KPLW
Altoona, Pa.	WFBG	New York, N. Y.	WERJ
Boise, Idaho	KFAU	Do.	WFBH
Cambridge, Ohio	WEBE	Do.	WNYC
Eureka, Ill.	WFBH	North Bend, Wash.	KFQW
Holy City, Calif.	KFQU	Omaha, Nebr.	KFQV
Kenosha, Wis.	WOAR	Do.	WNAL
La Crosse, Wis.	WABN	Salisbury, Md.	WEBI
Los Angeles, Calif.	KFCL	Seattle, Wash.	KFQX

*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, 1924]

Call signal	Station operated and controlled by--	Location of station	Power (watts)	Wave length	Frequency (kilocycles)
KFAU	Boise, Idaho	Independent School District of Boise City, Boise High School.	150	270	1,130
KFLR	Albuquerque, N. Mex.	University of New Mexico	100	254	1,180
KFLW	Missoula, Mont.	Missoula Electric Supply Co.	5	234	1,280
KFCL	Los Angeles, Calif.	Leslie E. Rice, Los Angeles Union Stock Yards.	500	206	1,270
KFQU	Holy City, Calif.	W. Riker	100	234	1,280
KFQV	Omaha, Nebr.	Omaha Grain Exchange	100	231	1,300
KFQW	North Bend, Wash.	C. F. Kierlin Photo Radio & Electric Shop.	50	248	1,210
KFQX	Seattle, Wash., 310 Green Bldg	Alfred M. Hubbard.	250	233	1,290
WABN	La Crosse, Wis., 1627 State St.	Ott Radio (Inc.)	500	244	1,230
WEBE	Cambridge, Ohio, 319 Wall Ave.	Roy W. Waller	10	248	1,250
WEBI	Salisbury, Md., 121 Dock St.	Walter Gibbons	15	242	1,240
WERJ	New York, N. Y.	Third Avenue Ry. Co.	500	273	1,100
WFBH	Eureka, Ill.	Eureka College	50	240	1,250
WFBG	Altoona, Pa.	William F. Gable Co.	100	261	1,150
WFBH	New York, N. Y.	Concourse Radio Corporation.	500	273	1,100
WNAL	Omaha, Nebr.	Omaha Central High School.	20	258	1,180
WNYC	New York, N. Y.	City of New York	1,000	226	1,370
WOAR	Kenosha, Wis., 1096 Sheridan Road.	Henry P. Landskow	50	229	1,310

*Government land stations, alphabetically by names of stations*

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924, and to the International List of Radiotelegraph Stations published by the Bureau]

Station	Call signal	Wave lengths	Service	Hours	Station controlled by--
Fort Niagara, N. Y.	WUK		FX	X	U. S. Army.
Fort Porter, N. Y.	WUD		FX	X	Do.
St. Lawrence Island, Alaska.	WWP		FX	X	Department of the Interior, Bureau of Education.
San Diego, Calif. (radio school).	NQG	Variable	O	X	U. S. Navy.

*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
NQG	San Diego, Calif. c	WUD	Fort Porter, N. Y. c
WUE	Fort Niagara, N. Y. c	WWP	St. Lawrence Island, Alaska. c

*Special land stations, alphabetically by names of stations*

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924]

Station	Call signal	Station controlled by—
Cazenovia, N. Y.	8XH	Clive B. Meredith.
Corvallis, Oreg.	7YJ	Oregon Agricultural College, department of physics.
Culver City, Calif.	6XAB	Thomas H. Ince (Inc.).
Dartmouth, Mass. (portable)	1XAN	Round Hills Radio Corporation.
Dartmouth, Mass.	1XV	Do.
Detroit, Mich.	8XAS	Detroit police department.
Everett, Mass.	1ZAA	Edgar Stewart, 23 Edith Street.
Do.	1ZZ	George F. Wilson, 52 Harvard Street.
Galveston, Tex.	5ZD	Z. L. White, jr., 2902 Avenue N.
Los Angeles, Calif.	6XAA	Paul D. Langrick, 610 North Lake Street.
Do.	6XAP	Dean Farran, 1250 Fifth Avenue.
Do.	6XP	Harold W. Leighton, 286 East Forty-ninth Street.
Macon, Ga.	4XL	Mercer University.
New Orleans, La.	5YR	Loyola University.
Pittsburgh, Pa.	8XY	West Penn Power Co.
Portland, Oreg.	7YG	Oregon Institute of Technology (Y. M. C. A.).
San Antonio, Tex.	5XAQ	Edward G. Conroy, 117 East Mistletoe Avenue.
Seattle, Wash.	7XAA	Amateur Radio Club of Seattle (Robert Waskey), 7213 Twenty-eighth Avenue NW.
Do.	7XE	R. C. A., 233 Broadway, New York, N. Y.
Do.	7XK	Kilbourne & Clark Manufacturing Co., 101 Spokane Street.
West Lafayette, Ind.	9YB	Purdue University.
Whittier, Calif.	6XJ	Harold D. Squires, 306 South Pierce Avenue.
Yakima, Wash.	7XAJ	Rhodes Radio Co., P. O. Box 805.

*Special land stations, grouped by districts*

Call signal	District and station	Call signal	District and station
1XAN	First district:		
1XV	Dartmouth, Mass. (portable).	7XAA	Seventh district:
1ZAA	Dartmouth, Mass.	7XAJ	Seattle, Wash.
1ZZ	Everett, Mass.	7XE	Yakima, Wash.
4XL	Do.	7XK	Seattle, Wash.
	Fourth district: Macon, Ga.	7YJ	Do.
	Fifth district:	7YG	Portland, Oreg.
5XAQ	San Antonio, Tex.	7YJ	Corvallis, Oreg.
5YR	New Orleans, La.		Eighth district:
5ZD	Galveston, Tex.	8XAS	Detroit, Mich.
	Sixth district:	8XH	Cazenovia, N. Y.
6XAA	Los Angeles, Calif.	8XY	Pittsburgh, Pa.
6XAB	Culver City, Calif.	9YB	Ninth district: West Lafayette, Ind.
6XAP	Los Angeles, Calif.		
6XJ	Whittier, Calif.		
6XP	Los Angeles, 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, 1924, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

**BIRMINGHAM, ALA.**—Station operated and controlled by Inland Waterways Corporation.**CLEVELAND, OHIO (WTK).**—System, Navy-Simon v. t. telegraph and Lowenstein spark, 1000.**HILLSBORO, OREG. (KEK).**—W. L., 300, 600, 706, 2300.**KANATAK, ALASKA (ncbr).**—W. L., 300, 525, 600, 1625.**MEMPHIS, TENN.**—Station operated and controlled by Inland Waterways Corporation.**NEW YORK, N. Y. (WNY).**—W. L., 300, 600, 680, 2200, 2375.**MOBILE, ALA. (WPP).**—Station operated and controlled by Inland Waterways Corporation.**NORTHVILLE, MICH.**—System, composite v. t. telegraph.**SEATTLE, WASH. (KPE).**—System, Federal arc and Navy-Liberty, 1000; w. l., 300, 600, 1641, 2300.

Strike out all particulars of the following-named stations: Big Creek Power House No. 3, Calif.; Port Huron, Mich.

## 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, 1924, and to the International List of Radiotelegraph Stations, published by the Berne Bureau]

- ALASKA STANDARD.—Range, 150; w. l., 300, 600, 706; system, R. C. A., 1000; station operated and controlled by R. C. A., rates, 8 cents per word.
- AMELIA.—Station operated and controlled by I. W. T. Co.
- ANTINOUS.—W. l., add 706.
- BALLCAMP.—W. l., add 706.
- BAYONNE.—W. l., add 706.
- BIG BILL.—South Seas Research Co. owner of vessel.
- BOWDOIN.—System, composite, v. t. telegraph and telephone and composite spark, 1000.
- BROOKDALE.—Station operated and controlled by I. W. T. Co.
- BUTTERCUP.—System, Navy-R. C. A., 1000; w. l., 300, 450, 600, 706.
- CALAMARES.—W. l., 300, 600, 706.
- CALCITE.—Bradley Transportation Co. owner of vessel.
- CATALINA.—Station operated and controlled by R. C. A.; rates, 8 cents per word.
- CHALMETTE.—Station operated and controlled by owner of vessel.
- CULBERSON.—W. l., add 706, 2100, 2400, station operated and controlled by S. O. R. S. (U. S. L.).
- DAN F. HANLON.—W. R. Chamberlain owner of vessel.
- DOLPHIN.—W. l., add 706.
- DOYLESTOWN.—Charles Nelson Co. owner of vessel.
- Eocene.—Station operated and controlled by owner of vessel (U. S. L.).
- ETHAN ALLEN.—Station operated and controlled by S. O. R. S. (U. S. L.).
- FLUOR SPAR.—W. l., add 706.
- GLYMONT.—Charles Nelson Co. owner of vessel.
- HUKEY.—W. l., add 450, 706.
- INDEPENDENCE.—System, Navy-W. S. A. Co., 1000; w. l., add 706.
- JACOX.—Charles Nelson Co. owner of vessel.
- LAKE CLEAR.—Name changed to Sandcraft.
- LAKE FILLION.—Name changed to City of Dallas.
- MANATAWNY.—Station operated and controlled by I. W. T. Co.
- NEW YORK (WJK).—Range, 100; system, R. C. A., v. t. telegraph and R. C. A. spark, 1000; w. l., 300, 600, 706, 909, 1800.
- NISHMAHA.—W. l., add 706.
- OWEGO.—William F. Brewster owner of vessel.
- PRESIDENT TAFT.—Station operated and controlled by S. O. R. S. (U. S. L.).
- SALAAM.—System, Navy-R. C. A., 1000.
- SANTA MARTA.—W. l., 300, 600, 706.
- SIERRA (WHJ).—W. l., 300, 600, 706, 2100, 2400.
- SIoux CITY.—Name changed to Ortega; Clyde S. S. Co. owner of vessel.
- STEEL TRAVELER.—W. l., add 706.
- STELLARIS.—Joseph B. Schlotman owner of vessel.
- SWORDENCO.—Range, 300; system, Navy-Wireless Improvement Co., 1000; w. l., 300, 450, 600, 706; station operated and controlled by R. C. A.; rates 8 cents per word.
- THE ANGELES.—Station operated and controlled by R. C. A. (U. S. L.).
- THEODORE H. WICKWIRE.—System, Navy-W. S. A. Co., 1000.
- TRI MOUNTAIN.—Station operated and controlled by I. W. T. Co.
- WALTER A. LUCKENBACH.—W. l., 300, 600, 706, 1800, 2100.
- WEST CACTUS.—Station operated and controlled by S. O. R. S.
- WEST CADDOA.—W. l., add 706.
- WEST HARCUIVAR.—System, Navy-Lowenstein, 1000; w. l., add 450, 706.
- WEST JESSUP.—Station operated and controlled by I. W. T. Co. (U. S. L.).
- WESTPORT.—W. l., add 706.
- WEST SELENE.—W. l., add 450, 706.
- Strike out all particulars of the following-named vessels: Algonquin (KIZT), Hutoka, Lake Flambeau, North Pines, Saxon, Wisla.

## COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS

KLEO, read Sandcraft; KOPV, read City of Dallas; KUGK, read Ortega; strike out all particulars following the call signals, KDPJ, KFSU, KIZN, KIZT, KLP, KOTP, WZEA, WZEU.

## 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, 1924]

- KFBC (San Diego, Calif.).—Power, 5.  
 KFFY (Alexandria, La.).—Station operated and controlled by Pincus & Murphey Music House.  
 KFID (Iola, Kans.).—Power, 30.  
 KFIQ (Yakima, Wash.).—Station operated and controlled by First Methodist Church.  
 KFLD (Franklinton, La.).—Power, 10.  
 KFOA (Seattle, Wash.).—Station operated and controlled by Rhodes Department Store.  
 KFPP (Olympia, Wash.).—Address 110½ Fourth Avenue East.  
 KTW (Seattle, Wash.).—Power, 750.  
 WBAA (West Lafayette, Ind.).—W. l., 283, frequency, kc. 1060.  
 WBBP (Petoskey, Mich.).—Power, 100.  
 WCAJ (University Place, Nebr.).—Power, 500; w. l., 283, frequency, kc. 1060.  
 WCAV (Little Rock, Ark.).—Power, 10.  
 WDAP (Chicago, Ill.).—Call signal changed to WGN; station operated and controlled by the Tribune (Drake Hotel-Whitestone Co.); w. l., 370; frequency, kc. 810.  
 WEAU (Sioux City, Iowa.).—W. l., 275, frequency, kc. 1090.  
 WEBP (New Orleans, La.).—Address, Spanish Fort Amusement Park; power, 50; w. l., 280; frequency, kc. 1070.  
 WFAV (Lincoln, Nebr.).—Power, 250.  
 WGAQ (Shreveport, La.).—Station operated and controlled by Youree Hotel.  
 WIAO (Milwaukee, Wis.).—Call signal changed to WSOE.  
 WLAH (Syracuse, N. Y.).—Address 267 Brownell Street.  
 WLAP (Louisville, Ky.).—W. l., 286; frequency, kc. 1050.  
 WNAR (Butler, Mo.).—Station operated and controlled by First Christian Church.  
 WPAM (Topeka, Kans.).—W. l., 275; frequency, kc. 1090.  
 WRW (Tarrytown, N. Y.).—Power, 500.  
 WWL (New Orleans, La.).—Power, 5.  
 Strike out all particulars of the following-named stations: KDZI, Wenatchee, Wash.; KFEZ, St. Louis, Mo.; KFNX, Peabody, Kans.; KFPQ, Denison, Tex.; WABG, Jacksonville, Fla.; WBBJ, West Palm Beach, Fla.; WGAW, Altoona, Pa.; WIAY, Washington, D. C.; WJAQ, Topeka, Kans.; WLAV, Pensacola, Fla.; WNAL, Omaha, Nebr.; WQAL, Mattoon, Ill.

## GOVERNMENT LAND STATIONS, ALPHABETICALLY BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1924, and to the International List of Radiotelegraph Stations, published by the Bernese Bureau]

GALVESTON, TEX.—Rates, 12 cents per word.

## 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, 1924]

- CONNELLSVILLE, PA. (8XAP).—Should not have been deleted in July bulletin.  
 HYATTSVILLE, MD. (3XR).—Should not have been deleted in July bulletin.  
 LOS ANGELES, CALIF. (6XZ).—Changed to Hollywood, Calif., address, 209 Brockman Building, Los Angeles, Calif.  
 NORTH LITTLE ROCK, ARK. (5XBI).—Changed to Memphis, Tenn., 197 Parkview Street.  
 Strike out all particulars of the following-named stations: Alexandria, La. (5ZD); Detroit, Mich. (8XBP); Hauto, Pa. (8XBB); Niles, Ohio (8XBO); Palmetto, Ga. (4XU); Schenectady, N. Y. (2XA); Wilkes-Barre, Pa. (8XBY); Wooster, Ohio (8YAH).

## MISCELLANEOUS

## INFORMATION FROM THE BERNE BUREAU

*Great Britain.*—The Oxford station henceforth will use a wave length of 8,750 meters for the transmission of radiograms to ships provided with this wave length. The hours of transmission in future will be at 1.10–1.50 and 4.48–5.35 G. M. T. (or until all traffic is disposed of). The radiograms will be transmitted twice. The second transmission will immediately follow the first. (Difficulty was experienced on the 12,350 meter wave.)

*St. Thomas and Principe Islands (Portugal colonies).*—A new coast station has been opened at St. Thomas. The particulars are as follows: Call signal, CRD; system, Marconi, 600; w. l., 600, 900, 1,000, 1,500; service, PG; hours, 5–12, 14–17 local time; position, 6° 44' 42" E., 0° 20' 49" N.; range, 750; rates, 40 centimes per word, minimum 4 francs.

*Canada.*—Radiograms addressed to St. John, New Brunswick, and coming from vessels that are east of Cape Sable and are en route to St. John or to a port on the Bay of Fundy can be transmitted to Cape Sable, from which point they are relayed to St. John. In this case the coast charge is 31 centimes per word. There is no further charge for the retransmission between the two stations. Radiograms coming from St. John and destined to ships going eastward can be transmitted via St. John-Cape Sable under the same conditions. Vessels going either westward or eastward and are west of Cape Sable may transmit their radiograms direct to St. John.

*Italy.*—Italian coast stations charge 80 centimes per word for compass bearings given to vessels other than those of Italian registry. This information is gratuitous for Italian vessels.

*Irish Free State.*—This territory has adhered to the International Radiotelegraph Convention and will become a contributing member.

## RADIO BEACON, CAPE BAULD, NEW BRUNSWICK

A radio beacon has been established at Cape Bauld, call letters VCZ, in latitude 51° 38' 41" N., long. 55° 25' 03" W. This station will sound continuously during thick or foggy weather groups of dash, dot, dash, dash (— — —) for one minute, silent four minutes, on a wave length of 1,000 meters.

## ARC OF CALIBRATION OF GREAT LAKES COMPASS STATIONS

Detour Point, Mich., 80° to 260°; Grand Marais, Mich., 270° to 75°; Whitefish Point, Mich., 275° to 180°; Eagle Harbor, Mich., 263° to 70°. The arc of calibration is a sector of the circle of which the compass coil at the radio compass station is the center. The bearings are from the station, clockwise. Compass bearings are reliable only when they fall within the calibrated arcs.

## AMENDED POSITION OF TOULON (LA MITRE), FRANCE, COMPASS STATION

Admiralty Notice to Mariners, No. 966, current year, states that this station, located on the south coast of France, is in latitude 43° 06' N., long. 5° 56' E. (approximately). Mariners are warned that in the sectors 080°–100° and 130°–140° (from the station) there is a probable error of 007° to 008° in the bearings transmitted.

## DISTRIBUTION OF WEATHER INFORMATION, FORECASTS, AND WARNINGS BY RADIO FOR THE BENEFIT OF NAVIGATION ON THE GREAT LAKES

Weather forecasts and information for such States as are contiguous to the Great Lakes and forecasts and warnings for the Great Lakes are broadcast by radio from a number of broadcasting stations cooperating with the United States Weather Bureau. The broadcasts of weather, forecasts, warnings, and other pertinent information have been arranged so as to be of special benefit to navigation and shipping interests of the Great Lakes region and are made from stations at important lake ports. The daily forecasts of wind and weather are made separately for the upper and lower lakes and are broadcast accordingly, as indicated in the following schedules:

*Stations and schedules*

Houghton, Mich.: Michigan College of Mines, call signal WWAQ; radio-phone, w. l., 244 meters; power, 250 watts; 11 a. m.–8 p. m., ninetieth meridian

time; forecasts for upper Michigan and Houghton; warnings only are broadcast at 8 p. m.; storm warnings are also included whenever issued.

Milwaukee, Wis.: Marquette University, call signal WHAD; radiophone, w. l., 280 meters; power, 100 watts; 11 a. m. and 3 p. m., ninetieth meridian time; forecasts for Wisconsin and Milwaukee and for the upper lakes; storm warnings are also included whenever issued.

Great Lakes, Ill.: U. S. Navy, call signal NAJ; radiotelegraph, w. l., 1,986 meters, i. c. w.; 9.45 a. m. and 10 p. m., ninetieth meridian time, daily; forecasts for upper and lower lakes; storm warnings issued in the afternoon are broadcast at 4 p. m., ninetieth meridian time; storm warnings are also included in all daily broadcasts whenever issued. (The broadcasting of coded weather bulletins has been discontinued.)

Chicago, Ill.: The Tribune (Drake Hotel-Whitestone Co.), call signal WGN; radiophone, w. l., 370 meters; power, 1,000 watts; 9 a. m. and 10.45 p. m., ninetieth meridian time; forecasts for Illinois, Indiana, Wisconsin, Minnesota, and upper and lower Michigan (also for Iowa, North Dakota, South Dakota, Nebraska, Kansas, Missouri, Wyoming, and Montana) and for the upper and lower lakes; general forecasts and summary of weather conditions; storm warnings are also included whenever issued. Westinghouse Electric & Manufacturing Co., call signal KYW; radiophone, w. l., 536 meters; power, 1,000 watts; 11 a. m., 12.30, 1.15, 4.15, and 9.30 p. m., ninetieth meridian time; forecasts for Illinois, Indiana, Wisconsin, and upper and lower Michigan and for Lake Michigan; storm warnings are also included whenever issued. Chicago Daily Drivers Journal, call signal WAAF; radiophone, w. l., 286 meters; power, 200 watts; 10.30 a. m. and 12.30 p. m., ninetieth meridian time; forecasts for Illinois, Indiana, Wisconsin, Minnesota, and upper and lower Michigan (also for Iowa, North Dakota, and South Dakota) and for upper and lower lakes; aviation forecasts for zones 4 and 8; general forecasts and summary of weather conditions; storm warnings are also included whenever issued.

Rogers, Mich.: Michigan Limestone and Chemical Co., call signal WHT; radiotelegraph, w. l., 600 and 706 meters; power, 6 k. w. spark and c. w.; 7.45 and 9.45 a. m., 3.45, 7.45, and 9.30 p. m., ninetieth meridian time; state of weather, wind direction, and velocity at Mackinaw, Middle Island, Alpena, Tawas Point, Harbor Beach and Port Huron; condition of sea along west shore of Lake Huron; forecasts for Lake Huron and upper and lower lakes; current warnings for Lake Huron are issued when the weather is thick; storm warnings are also included whenever issued.

Saginaw, Mich.: F. E. Doherty Automotive and Radio Equipment Co., call signal WABM; radiophone, w. l., 254 meters; power, 100 watts; 9.15 a. m. and 5 p. m., ninetieth meridian time; forecasts for lower Michigan and Saginaw and for the upper lakes; storm warnings are also included whenever issued.

Detroit, Mich.: Detroit Free Press, call signal, WCX; radiophone, w. l., 517 meters; power, 500 watts; 1.50 p. m., ninetieth meridian time; forecasts for lower Michigan and Detroit and for the upper and lower lakes; summary of weather conditions; storm warnings are also included whenever issued. Detroit Evening News, call signal, WWJ; radiophone, w. l., 517 meters; power, 500 watts; 9.25 and 11 a. m. and 2.30 p. m., ninetieth meridian time; forecasts for lower Michigan and Detroit and for the upper and lower lakes; summary of weather conditions; storm warnings are also included whenever issued. Cleveland, Ohio: Union Trust Co., call signal, WJAX; radiophone, w. l., 390 meters; power, 500 watts; 10.40 a. m., 2.30, and 3.40 p. m., seventy-fifth meridian time; state of weather, barometric pressure, wind direction and velocity at 8 a. m. at Cleveland, Toledo, and Erie; forecasts for Ohio and Cleveland and for the lower lakes; summary of weather conditions; storm warnings are also included whenever issued. Intercity Radio Co., call signal, WTK; radiotelegraph, w. l., 706 meters; 3 k. w. spark; 11 a. m. and 4 p. m., seventy-fifth meridian time; state of weather, barometric pressure, wind direction and velocity at 8 a. m. at Cleveland, Toledo, and Erie; forecasts for the lower and upper lakes; summary of weather conditions; storm warnings for Lake Erie and advisory messages for the Great Lakes are also included whenever issued. Buffalo, N. Y.: Federal Telephone & Telegraph Co., call signal, WGR; radiophone, w. l., 319 meters; power, 750 watts; 10.45 a. m. and 10.45 p. m., seventy-fifth meridian time; forecasts for Buffalo and western New York and for the lower lakes; state of weather, barometric pressure, wind direction and velocity at 8 a. m. and 8 p. m. at Buffalo and Oswego; storm warnings are also included whenever issued.

## NOTICES TO MARINERS BROADCAST BY ARGENTINE STATIONS

The Argentine radio stations Darsena Norte (north entrance to the port of Buenos Aires), in 34° 35' 35" S., 58° 22' 10" W., call signal LIH, and Comodoro Rivadavia (Gulf of St. George), in 45° 52' S., 67° 28' W. (approximately), call signal LIJ, are broadcasting important notices to mariners in Spanish and in English, there being an interval of one minute between the two bulletins. The first-named station broadcasts the notices immediately after the radio time signal at 2200 civil time. The last-named station broadcasts the notices immediately after the first-named station has finished.

## RADIO INTERFERENCE FROM ELECTRICAL PRECIPITATORS

This is a report recently received from the Western Precipitation Co., Los Angeles, Calif., dated February 13, this year. Recent developments make it necessary to modify our previous conclusions as set forth in a report dated November 10, 1922, in regard to the proper means for eliminating radio interference from electrical precipitators. At the time the work was done on which the previous conclusions were based our only experience had been with plants where the electrical equipment was of the motor generator type. Since then we have encountered interference in other plants where synchronous motor sets were in use and have discovered that other factors came into play there. The following is therefore the status of this problem as we know it now:

The source of the high frequency oscillations which are sent out from electrical precipitation installations appear to be the discharge in the precipitator itself and the spark gaps at the rectifier. These oscillations are evidently radiated in two ways: First, from the connections between the rectifier and the precipitator, whether this be the high tension connection or the ground connections, and second, from the low-tension power line where the electrical equipment is of the synchronous motor type, so that the high-tension oscillations can pass through the transformer direct on to the low-tension power lines.

The oscillations from the high tension connecting line from the precipitator and the rectifier may be prevented from reaching the outside by properly screening this line by means of a grounded screen. The oscillations which caused the radiations may also be largely prevented from reaching this connecting line by the inclusion in either end of the circuit of suitable resistances. In certain cases where the disturbance is very serious both resistances and the grounded screen have been installed. The radiations from the grounded circuit, which circuit may sometimes include the part of the building around the rectifiers, can, of course, only be prevented by including a resistance in the grounded leg of the rectifier.

Where the electrical equipment is of the synchronous motor type, so that the oscillations can pass on to the primary power lines, these oscillations can be prevented from going on to this line by means of suitable condensers which are placed either in each of the three phases of the primary or else only in one phase, which supplies the transformer. These condensers may be ordinary power condensers of about 1 microfarad each, and about 800 volts, and two of these condensers may be placed in parallel and two in series, the middle being grounded. In this connection each one of the lines is connected with the ground through two 1-microfarad condensers. By this means it has been possible to practically eliminate all interference from precipitators where either the motor generator set or the synchronous motor set was used.

## CHANGE IN RATES FOR GERMAN STATIONS

On June 1 last the coast station rate of all German stations open to general public correspondence was changed to 30 centimes per word, minimum 2 francs, 40 centimes. The ship station rate, with the exception of the naval stations, the ship station Hertha (DHQ), and the ship station Odin (DOQ), was changed to 40 centimes per word, minimum 3 francs 20 centimes. The land rate was also changed to 15 centimes per word, minimum 1 franc 20 centimes, for ordinary radiograms, and 45 centimes per word, minimum 3 francs 60 centimes, for urgent radiograms.

## CHANGE IN RATES FOR NORWEGIAN STATIONS

On June 1 last the Norwegian coast stations placed in effect a new rate, in that a charge of 4 francs 50 centimes (gold) will be made for each request made to a station and the reply thereto regarding weather messages, ice conditions, etc.

## IMPORTANT NOTICE REGARDING PAYMENT OF RADIO ACCOUNTS

On July 1 last the Naval Communication Service transferred all accounts for radio traffic through coastal stations of foreign administrations to the Radio Service, Bureau of Navigation, Department of Commerce. The various foreign administrations, in accordance with a notification issued through the Berne bureau, are now forwarding all accounts for American ship traffic to the Radio Service, Department of Commerce, the bills for which will be sent to the various debtor companies. It is requested, therefore, that all checks in payment of accounts for traffic through coastal stations of foreign administration be drawn to the order of "Radio Service, Bureau of Navigation," and mailed to the Department of Commerce, Washington, D. C., irrespective of whether such accounts have been received from the Naval Communication Service or the Radio Service, Bureau of Navigation, Department of Commerce.

## MISUSE OF DISTRESS SIGNAL

Notification 148, May 8, 1924, of the International Bureau of the Telegraph Union states that the British Government has informed that bureau that the distress signal is frequently used by vessels when not actually in immediate danger, and as other administrations will doubtless consider it advisable to bring this matter to the attention of masters of vessels under their control the British administration requests that the following warning be published (the Bureau of Navigation desires that masters of vessels of the United States be governed accordingly):

The British Government recognizes the fact that the question of knowing whether a vessel is in such urgent need that it is necessary to send a distress signal should be left to the decision of the captain of the vessel. However, they have deemed it proper to advise captains of British vessels the serious inconveniences which result from the abusive use of this signal and the risk vessels run of not receiving response to their calls of distress if they make use of the signal without absolute necessity.

According to the terms of the International Radiotelegraph Convention regulations, the signal . . . . . (SOS) shall be employed by ships in distress. It is transmitted, conforming to the international prescriptions, and all ships equipped with radio apparatus are under obligations to give it the consideration it is entitled to. The stations which hear the signal shall suspend all correspondence and shall not resume transmitting until after it has made sure that the correspondence to which the call for assistance has given rise is terminated. The master of a vessel is held, by means of international agreement, to aid any person in peril.

The transmission of the distress call seriously interrupts radio traffic. It has also resulted in making vessels deviate from their normal route and consequently delays them; consequently the call should not be made except when a vessel is in pressing danger and has need of immediate assistance. If use of the distress signal is made without necessity, it will inevitably be ignored in case of real danger.

## AMATEUR STATIONS AUTHORIZED TO USE SHORT WAVE LENGTHS

JULY 24, 1924.

To all supervisors of radio:

Effective this date you are authorized to issue general and restricted amateur radio station licenses to permit the use of any one or all of the following bands of short wave lengths: 75 to 80 meters, 40 to 43 meters, 20 to 22 meters, 4 to 5 meters, in addition to the band 150 to 200 meters, provided application is made by the owner of the station, which station must be prepared to use the wave length or wave lengths requested.

The use of continuous-wave telegraphy only will be permitted on wave lengths other than 150 to 200 meters, and the antenna circuit must not be directly coupled to the transmitting circuit. Silent hours will not be required of amateurs while using the wave lengths within the above bands below 80 meters, except where the transmitting station is so situated as to produce objectionable interference with other services.

Hereafter special amateur stations will not use wave lengths above 200 meters. They may be authorized to use the band of wave lengths from 105 to 110 meters in addition to the wave lengths within the bands authorized for general and restricted amateur use where the special amateurs are engaged in conducting tests with Government or commercial stations.

General, restricted, and special amateur stations will be permitted to use the entire band of wave lengths from 150 to 200 meters employing pure c. w. spark and modulated forms of transmission.

It should be made clear to the amateurs that the authority granted above is necessarily tentative because of the rapid development taking place in radio communication, and the bands of wave lengths authorized may be changed whenever, in the opinion of the Secretary of Commerce, such change is necessary.

D. B. CARSON, Commissioner.

Approved.

J. WALTER DRAKE, Assistant Secretary of Commerce.

## PRIMARY RADIO FREQUENCY STANDARDIZATION BY USE OF THE CATHODE-RAY OSCILLOGRAPH

A method of high accuracy for the primary standardization of radio frequency has been developed by the Bureau of Standards. Comparison is made between the frequencies of two alternating currents, one of radio frequency and one of an accurately known audio frequency by the use of Lissajous figures produced in a cathode-ray tube. The Lissajous figures were formed on the fluorescent screen by the alternating electric fields from two generating sets applied to two pairs of small condenser plates mounted in the tube at right angles to each other and to the electron stream. The procedure adopted was to adjust a radio-frequency generating set to a known multiple of the audio frequency by the use of Lissajous pattern produced in the cathode-ray oscillograph.

The standard wave meter was then brought into resonance with the radio-frequency generating set and read for the known frequency. A range from  $1\frac{1}{2}$  to 22 times the known audio frequency was covered in this matter. Further extension of the frequency was made by use of an intermediate generating set which could be compared directly with the known audio frequency. The range of the wave meter standardized in this manner is from 3.5 to 5,000 kilocycles. The paper describing this work is Bureau of Standards Scientific Paper No. 489. Primary Radio Frequency Standardization by Use of the Cathode-Ray Oscillograph, by G. Hazen and F. Kenyon. A copy of this paper may be obtained for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

## KILOCYCLE-METER CONVERSION TABLE

The Bureau of Standards has published a table for converting wave lengths into kilocycles and kilocycles into wave lengths. The table has been published in mimeographed form, but the supply of copies is limited. Anyone having actual use for the table, however, may procure a copy by writing to the Bureau of Standards, Washington, D. C., for a copy of Letter Circular 123.

## STANDARD FREQUENCY STATIONS

As a result of measurements by the Bureau of Standards upon the transmitted waves of a limited number of radio transmitting stations, data are given in each month's Radio Service Bulletin on such of these stations as have been found to maintain a sufficiently constant frequency to be useful as frequency standards. A new station (WBZ) is included in this month's list. 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 listed below have speed regulators. Most of the broadcasting stations listed use frequency indicators (one-point wave meters) and maintain a maximum deflection of the instrument on the frequency indicator throughout the transmission. These broadcasting stations, with rare exceptions, vary not more than 2 kilocycles from the assigned frequency. 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 Frequencies and Their Utilization. A copy of that 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 (1923-24)	Number of times measured	Great-est deviation from assigned frequency since June 16, 1924	Average deviation from assigned frequency
NRR	U. S. Navy	Annapolis, Md.	17.50	Aug. 24-July 15	81	Per cent 0.5	Per cent 0.2
WGG	Radio Corporation of America	Tuckerton No. 1, N. J.	18.85	do	100	.4	.2
WHI	do	New Brunswick, N. J.	22.04	Oct. 1-July 15	82	.1	.3
WBO	do	Marion, Mass.	25.80	Aug. 21-July 15	90	.2	.3
WWJ	Detroit News	Detroit, Mich.	380	Aug. 27-July 15	41	.0	.1
WCAP	Chesapeake & Potomac Telephone Co.	Washington, D. C.	640	Sept. 11-July 15	56	.2	.1
WRC	Radio Corporation of America	do	640	Dec. 16-July 15	40	.2	.1
WSB	Atlanta Journal	Atlanta, Ga.	700	Sept. 14-July 15	52	( <sup>1</sup> )	.1
WGY	General Electric Co.	Schenectady, N. Y.	790	June 26-July 15	89	.2	.2
WBZ	Westinghouse Electric & Manufacturing Co.	Springfield, Mass.	890	May 1, 1924-July 15, 1924	9	.0	.0
KDKA	do	East Pittsburgh, Pa.	920	Sept. 8-July 15	114	.0	.1

<sup>1</sup> Not measured since June 15.

#### 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 No. 138, a copy of which may be obtained for 10 cents from the Superintendent 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

- R007.5 Concerning amateur transmissions (rules in Great Britain). *Wireless World and Radio Review*, 14, p. 329, June 18, 1924.
- R007.8 Nuevos reglamento de comunicaciones radioelectricas: Decreto del poder ejecutivo (in Argentine). *Revista Telefonica* (Buenos Aires), 12, pp. 171-172, June, 1924.
- R090 Hoffman, R. A measurement chart for converting wave lengths into kilocycles. *Popular Radio*, 6, pp. 180-181, August, 1924.

#### R100.—Radio principles

- R100 Jansky, C. M., jr., The reception of radio waves. *Radio* (San Francisco), 6, pp. 13-14, July, 1924.
- R111 Campbell, G. A., Complete electromagnetic equations and a single system of units (brief abstract), 22, p. 782, June, 1924.
- R111 Carrell, R., Light, energy, and radio activity. *Radio Journal* (Los Angeles), 4, pp. 211-213, May, 1924.
- R113.4 Howe, G. W. O., The overworked heaviside layer problem and a possible alternative. *Electrician*, 92, p. 720, June 13, 1924.
- R120 Campbell, C. H., Finding the natural period of the antenna. *Radio* (San Francisco), 6, p. 33, July, 1924.
- R134.4 Jolliffe, C. B., and Rodman, J. A. (Miss), A quantitative study of regeneration by inductive feed-back. Bureau of Standards Scientific Paper No. 487, 1924. Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 10 cents per copy.
- R134.4 Valve input impedance. *Wireless Trader* (Supplement), 2, pp. 168-170, July, 1924.
- R134.75 Batzel, M. C., Wireless receiving circuit. U. S. Patent No. 1499331, issued July 1, 1924.
- R134.75 Kruse, S., Building superheterodynes that work—II. *QST*, 7, pp. 14-27, July, 1924.
- R134.75 Best, G. M., Improvements in Best's 45,000 cycle superheterodyne. *Radio* (San Francisco), 6, pp. 33-34, July, 1924.
- R134.75 Haynes, A. J., Tips on the operation of the superheterodyne. *Popular Radio*, 6, pp. 200-205, August, 1924.

- R138 Rodebush, W. H., The application of the third law of thermodynamics to electron emission (brief abstract). *Physical Review*, 23, p. 774, June, 1924.
- R139 Emmett, W., Effect of tube capacitance and resistance. *Radio* (San Francisco), 6, p. 22, July, 1924.
- R142 Herzog, A., Über kapazitive Kopplungen in induktiv gekoppelten Hochfrequenzkreisen. *Telefunken Zeitung*, 6, pp. 27-32, May, 1924.
- R145.3 Butterworth, S., Note on the alternating current resistance of single layer coils. *Physical Review*, 23, pp. 752-755, June, 1924.
- R145.3 Grover, F. W., The significance of formulas for the inductance of a portion of a circuit (brief abstract), 23, p. 781, June, 1924.

## R200.—Radio measurements and standardization

- R200 Wade, A., Essential instruments for the amateur's laboratory. *Radio Journal* (Los Angeles), 4, pp. 217-218, May, 1924.
- R200 Haten, Grace, and Kenyon, Frieda, Primary radio-frequency standardization by use of the cathode-ray oscillograph. Bureau of Standards Scientific Paper No. 489, 1924. Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 10 cents per copy.
- R214 Shaw, H. S., Oscillating crystals (quartz). *QST*, 7, pp. 30-33, July, 1924.
- R214 Powers, W. F., On the temperature coefficient of frequency of quartz resonators (brief abstract). *Physical Review*, 23, p. 783, June, 1924.
- R220 Gunn, R., On the measurement of very small change of capacity. *Philosophical Magazine*, 48, pp. 224-226, July, 1924.
- R225 Medlam, W. B., and Oswald, U. A., Dead end effects on tuners. *Wireless World and Radio Review*, 14, pp. 344-347, June 18, 1924.

## R300.—Radio apparatus and equipment

- R330 Best, G. M., Vacuum tube data. *Radio* (San Francisco), 6, p. 26, July, 1924.
- R330 Valve tests: The Marconi-Ogram "B"; Mullard "Ora"; The 05 class. *Wireless World and Radio Review*, 14, pp. 342-343, June 18; pp. 369-373, June 25, 1924.
- R330 Über die Empfangsrohren mit Theorimkathoden. *Telefunken Zeitung*, 6, pp. 45-48, May, 1924.
- R331 Colloids: Their use in detectors and amplifiers. *Wireless World and Radio Review*, 14, pp. 362-365, June 25, 1924.
- R331 Rottgardt, K., Manufacture and operation of vacuum tubes. U. S. Patent No. 1501260, issued July 15, 1924.
- R342 Frank, L., Amplifiers—III (transformer coupled). *Wireless Age*, 11, pp. 54-55, July, 1924.
- R343 Haynes, F. H., Short-wave receiver. *Wireless World and Radio Review*, 14, pp. 333-336, June 18, 1924.
- R343 Fitch, C. J., The tropydyne circuit (improvement over superheterodyne). *Radio News*, 6, pp. 170-172, August, 1924.
- R343 Scott-Taggart, J., Working vacuum tubes without "B" batteries—Solodyne principle. *Radio News*, 6, pp. 158-159, August, 1924.
- R343 Rice, C. W., Signaling system. U. S. Patent No. 1501726 issued July 15, 1924.
- R343 100 best hookups—No. 9. *Popular Radio*, 6, pp. 155-159, August, 1924.
- R343.7 Radio without batteries: A new development of thermoelectric transformer to make possible operation of radio receivers from electric light current. *Wireless Age*, 11, p. 64, July, 1924.
- R344 Scriven, E. O., Oscillation generator. U. S. Patent No. 1501729, issued July 15, 1924.
- R351 Buckeye, N. J., A handy calibrated oscillator. *QST*, 7, pp. 55-58, July, 1924.
- R353 Baruch, S. N., Apparatus for producing continuous electrical oscillations. U. S. Patent No. 1498526, issued June 24, 1924.
- R374.1 Strahan, J., The crystal detector in theory and practice. *Wireless World and Radio Review*, 14, pp. 338-341, June 18; pp. 326-328, July 2; pp. 424-426, July 9, 1924.
- R376 Mallett, E., Telephone diaphragm resonances. *Wireless World and Radio Review*, 14, pp. 330-332, June 18; pp. 374-375, June 25, 1924.
- R377 Winkler, W., Constructing a siphon recorder. *Wireless World and Radio Review*, 14, pp. 365-368, June 25, 1924.
- R381 Priess, W. H., Electrical condenser. U. S. Patents Nos. 1499403 and 1499404, issued July 1, 1924.
- R381 Jacobs, G., Variable condenser. U. S. Patent No. 1501402, issued July 15, 1924.
- R381 Rathburn, F. F., Variable electric plate condenser. U. S. Patent No. 1500628, issued July 8, 1924.
- R381 Table of condenser capacities. *Radiofax*, 2, pp. 34-38, July, 1924.
- R381 Hammarlund, L. A., Variable condenser. U. S. Patent No. 1501563, issued July 15, 1924.
- R381 Ward, D. G., Condensers: Radio frequency and the design of an efficient condenser—II. *Wireless Age*, 11, pp. 50-51, July, 1924.
- R382 Haynes, F. H., Low loss inductance coils. *Wireless World and Radio Review*, 14, pp. 303-305, July, 1924.
- R384.1 Hill, E. L., The standard wave meters of the Bureau of Standards. *Popular Radio*, 6, pp. 173-177, August, 1924.

## R400.—Radio communication systems

- R402 Directional transmission to Australia (British experiments). *Wireless Age*, 11, p. 47, July, 1924.
- R402 Short wave directional wireless telegraphy (résumé of paper by G. Marconi on his short-wave work). *Wireless World and Radio Review*, 14, pp. 441-442, July 9, 1924.
- R402 Experiments with short-wave transmission (WGY transmission). *Radio* (San Francisco), 6, p. 12, July, 1924.
- R412 Der neue Sprachverstärker für 3KW in Nauen. *Telefunken Zeitung*, 6, pp. 41-43, May, 1924.
- R412 Murphy, P. B., Signaling system. U. S. Patent No. 1501132, issued July 15, 1924.
- R412 Hund, A., Wireless signaling system. U. S. Patent No. 1501664, issued July 15, 1924.
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- R431 Bethnod, J., Calling system for radiosignaling. U. S. Patent No. 1499310, issued June 24, 1924.
- R440 Oswald, A. A., Remote control system. U. S. Patents Nos. 1501583 and 1501684, issued July 15, 1924.
- R440 Espenschied, Lloyd, Multiplex radio system. U. S. Patent No. 1501104, issued July 15, 1924.
- R440 Muth, H., Mehrfach-Telephonie und Telegraphie lange Leitungen. *Telefunken Zeitung*, 6, pp. 7-10, May, 1924.

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- R513 Keiser, M., and Eckhardt, E. A., Position finding in hydrography by a radio acoustic method (brief abstract). *Physical Review*, 23, p. 725, June, 1924.
- R550 Schulte, W. B., Radio and its relation to telephony (broadcasting). *Telephony*, 86, pp. 24-26, June 23, 1924.
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- 534.83 Field, J. C., Switching system (submarine). U. S. Patent No. 1499766, issued July 1, 1924.
- 535.2 Oschwald, U. A., and Tarrant, A. G., A new photoelectric and ionization effect. *Physical Society of London*, 86, pp. 241-252, June 15, 1924.
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- 621.874.2 Wolff, I., An alternating current bridge for the measurement of the small phase angle of a high resistance (brief abstract). *Physical Review*, 23, p. 730, June, 1924.
- 621.382.8 Squier, G. O., The application of radio engineering principles to submarine telegraph cables. *Journal Franklin Institute*, 198, pp. 29-58, July, 1924.
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- 621.385 Bendernagel, W. H., Telephone transmission system. U. S. Patent No. 1496892, issued June 24, 1924.
- 621.385 Bendernagel, W. H., Telephone transmission system. U. S. Patent No. 1496945, issued June 24, 1924.

## STATISTICAL STUDY OF CONDITIONS AFFECTING DISTANCE RANGE

On August 1 the Bureau of Standards is bringing to a close the taking of observations in its study of radio distance range. This study has been in progress for two years and has as its aim the securing of statistical data on the actual distances of broadcast reception and the effects of varying conditions, such as fading, atmospherics, station interference, radiating receiving sets, weather, etc. The observations were made on the signals from stations KDKA (Pittsburgh) and WLAG (Minneapolis) by about 200 voluntary observers located at varying distances up to 1,000 miles from these stations. These tests were so organized and the recording forms so devised that it is possible to analyze the complex data with mechanical tabulating machines. Preliminary results indicate that the major obstacles to broadcast reception in these tests were, in the order named, other broadcast stations, atmospherics, fading. About 50,000 separate observations were made. The analysis of these will require considerable time. When the results are available or a publication issued, announcement will be made in the *Radio Service Bulletin*.

## STANDARD FREQUENCY TRANSMISSIONS IN CALIFORNIA

Arrangements have been made for the transmission of standard frequency signals for the Bureau of Standards by station 6XBM, Stanford University, Palo Alto, Calif. Beginning in September, these signals will extend to the western part of the United States the same standard frequency service that is available in the eastern half of the country through the transmissions from the Bureau of Standards laboratory in Washington. In preliminary trials the 6XBM signals have been heard as far east as Minneapolis, Minn.

The signals will duplicate those of the Bureau of Standards in schedule, character, and possible methods of utilization. Information on these points is given in the July *Radio Service Bulletin*, page 17. The schedule of transmission will be exactly as there stated for September 5 and 22, except that the times will be Pacific standard time instead of eastern standard time. The transmissions are from 11 p. m. of the date scheduled to 12:32 a. m. On September 5 the frequencies will be from 300 to 666 kilocycles (1,000 to 450 meters) and on September 22 from 550 to 1,500 kilocycles (545 to 200 meters).

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