RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION, DEPARTMENT OF COMMERCE

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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.
G. 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.
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. (12s=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. of A. =Radio Corporation of America.
S. O. R. S. =Ship Owners' Radio Service.
Co. =Company.
Corp. =Corporation.
& =And.
Do. =Ditto.
C. w. =Continuous wave.
V. t. =Vacuum tube.
FX. =Fixed station.

CERTIFICATE: By direction of the Secretary of Commerce this publication is issued as an administration report and is required for the proper transaction of the public business.

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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, 1921, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Albany, N. Y.[1]	WNJ	300	PR(FX)		Shotton Radio Manufacturing Co.
Altadena, Calif.[2]	KOO	360	PR(FX)		Altadena Radio Laboratory.
Atlanta, Ga.	WGM	360, 485	PR(FX)		Atlanta Constitution.
Do.	WSB	360, 485	PR(FX)		Atlanta Journal.
Austin, Tex.[3]	WCM	360, 485	PR(FX)	X	University of Texas.
Balaoan, P. I.	KEW				Philippine Insular Government.
Baltimore, Md.[4]	WKC	300	PR(FX)		Joseph M. Zamolski & Co.
Barnegat, N. J. (Tuckerton).[5]	WCI	300, 600, 16, 900	PR(FX)	N	R. C. of A.
Bay City, Mich.[6]	WTP	360	PR(FX)		George M. McBride.
Birmingham, Ala.[7]	WSY	360	PR(FX)		Alabama Power Co.
Bongao, P. I.	KEU				Philippine Insular Government.
Berkeley, Calif.[8]	KRE	360	PR(FX)	X	Maxwell Electric Co.
Buffalo, N. Y.[9]	WGR	360, 485	PR(FX)		Federal Telephone & Telegraph Co.
Do.[10]	WWT	360	PR(FX)		McCarthy Bros. & Ford.
Cagayan de Sulu, P.I.	KEV				Philippine Insular Government.
Camden, N. J.[11]	WRP	360	PR(FX)		Federal Institute of Radio Telegraphy.
Canton, Ohio[12]	WWB	360	PR(FX)	X	Daily News Printing Co.
Charlotte, N. C.[13]	WBT	360	PR(FX)		Southern Radio Corp.
Chicago, Ill.[14]	WGU	360	PR(FX)	X	The Fair.
Chignik, Alaska[15]	KNF	300, 525, 600, 1650	PR(FX)	X	Columbia River Packers' Association.
Cincinnati, Ohio[16]	WLW	360	PR(FX)	X	Crosley Manufacturing Co.
Dearborn, Mich.[17]	WWI	360	PR(FX)	X	Ford Motor Co.
Denver, Colo.[18]	KLZ	360, 485	PR(FX)	X	Reynolds Radio Co.
Do.[18]	KOA	485	PR(FX)	X	Young Men's Christian Association.
Des Moines, Iowa	WGF	360	PR(FX)		The Register and Tribune.
Do.	WHK	360	PR(FX)		Iowa Radio Corporation.
Detroit, Mich.[19]	KOP	360	PR(FX)		Detroit Police Department.
Eldorado, Kans.[20]	WAH	440, 485	PR(FX)		Midland Refining Co.
Erie, Pa.[21]	WJT	360	PR(FX)		Electric Equipment Co.
Do.[22]	WSX	360	PR(FX)		Erie Radio Co.

[1] Loc. 0.73° 45′ 00″, N. 42° 39′ 00″; range, 75; system, composite (v. t. telephone); hours, 7.30–9.45 p. m.; rates, none.

[2] Loc. 0.118° 07′ 37″, N. 34° 11′ 34″; range, 25; system, composite (v. t. telephone); hours, 1–2 and 6–7 p. m.; rates, none.

[3] Loc. 0.57° 44′ 10″, N. 30° 17′ 00″; range, 300; system, De Forest (v. t. telephone and telegraph) and composite, spark 460; rates, none.

[4] Range, 50; system, composite (v. t. telephone); hours, 7.30–8.30 p. m. on Tuesday, Thursday, and Saturday; rates, none.

[5] Loc. (approximately) 0.74° 21′00″; N. 39° 33′ 00″; system, Alexanderson alternator; rates to Germany, 25 c. per word.

[6] Range, 50; system, De Forest (v. t. telephone); hours, 12 m.–1.30 p. m., 6–7 p. m., and 10.30–12 p. m; rates, none.

[7] Loc. 0.86° 49′ 00″, N. 33° 30′ 00″; range, 100; system, composite (v. t. telephone); hours, 7–10 p. m.; rates, none.

[8] Range, 50; system, composite (v. t. telephone); rates, none.

[9] Loc. (approximately) 0.75° 53′ 00″, N. 42° 52′ 00″; range, 100; system, composite (v. t. telephone); hours, 10 a. m.–10 p. m. intermittently; rates, none.

[10] Range, 50; system, composite (v. t. telephone); hours, 3.30–5 and 7–8.30 p. m.; rates, none.

[11] Loc. 0.74° 07′ 24″, N. 39° 56′ 30″; system, composite (v. t. telephone); hours, 1–4 and 7.30–9.30 p. m.; rates, none.

[12] Loc. 0.81° 23′ 15″, N. 40° 45′ 01″; range, 100; system, composite (v. t. telephone); rates, none.

[13] Loc. (approximately) 0.80° 51′ 00″, N. 35° 13′ 00″; range, 100; system, composite (v. t. telephone); hours, 10–11.45 a. m. and 7.30–9.45 p. m.; rates, none.

[14] Loc. (approximately) 0.87° 37′ 00″, N. 41° 53′ 00″; range, 100; system, De Forest (v. t. telephone); rates, none.

[15] Loc. (approximately) 0.138° 23′ 00″, N. 58° 17′ 00″; range, 300; system, composite, 240; rates, none.

[16] Loc. (approximately) 0.84° 30′ 00″, N. 39° 06′ 00″; system, composite (v. t. telephone); rates, none.

[17] Loc. (approximately) 0.82° 14′ 00″, N. 42° 18′ 00″; range, 150; system, composite (v. t. telephone); rates, none.

[18] Loc. (approximately) 0.103° 00′ 00″, N. 39° 45′ 00″; range, 20; system, composite (v. t. telephone); rates, none.

[19] Loc. (approximately) 0.105° 00′ 00″, N. 39° 45′ 00″; range, 100; system, composite, 1,000; rates, none.

[20] Range, 100; system, composite (v. t. telephone); hours, 3–11 p. m.; rates, none.

[21] Range, 200; system, composite (v. t. telephone and telegraph); hours, 8 a. m.–5.30 p. m.; rates, none.

[22] Loc. (approximately) 0.80° 05′ 00″, N. 42° 07′ 00″; system, De Forest (v. t. telephone); hours, 7.30–9.30 p. m. Monday, Wednesday, and Friday; rates, none.

[23] Loc. (approximately) 0.80° 05′ 00″, N. 42° 09′ 49″; range, 50; system, composite (v. t. telephone); hours, 12.15–1.30 and 10–11 p. m.; rates, none.

Commercial land stations, alphabetically by names of stations—Continued.

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Fort Morgan, Ala.[34]	WIO	300, 450, 600, 1700	PR(FX)	X	Tropical Radio Telegraph Co.
Fort Worth, Tex.[35]	WCV	440	PR(FX)		Midland Refining Co.
Do.[36]	WFA	360	PR(FX)	X	Fort Worth Record.
Fresno, Calif.[37]	KMJ	360	PR(FX)		San Joaquin Light & Power Corporation.
Honolulu, Hawaii [38]	KGU	360	PR(FX)		Marion A. Mahoney.
Houston, Tex.[39]	WEV	360, 485	PR(FX)	X	Hurlburt-Still Electrical Co.
Lacey, Wash.[40]	KGY	360	PR(FX)		St. Martins College (Rev. S. Ruth).
Little Rock, Ark.[41]	WSV	360	PR(FX)		L. M. Hunter and G. L. Carrington.
Los Angeles, Calif.[42]	KHJ	360	PR(FX)		C. R. Kieruff & Co.
Do.[43]	KJS	360	PR(FX)	X	Bible Institute of Los Angeles.
Manila, P. I.	KPZ				Philippine Insular Government.
McKeesport, Pa.[44]	WIK	360	PR(FX)		K. & L. Electric Co.
Memphis, Tenn.[45]	WKN	360, 485	PR(FX)	X	Reichman-Crosby Co.
Do.[46]	WPO	360	PR(FX)		United Equipment Co.
Monterey, Calif.[47]	KLN	360	PR(FX)		Noggle Electric Works.
Morgantown, W. Va.[48]	WHD	360	PR(FX)		West Virginia University.
Newark, N. J.[49]	WBS	360	PR(FX)	X	D. W. May.
New Lebanon, Ohio [50]	WPG	360	PR(FX)		Nushawy Poultry Farm.
New Orleans, La.[51]	WGV	360	PR(FX)		Interstate Electric Co.
Do.[52]	WWL	360	PR(FX)	X	Loyola University.
New York, N. Y.[53]	WWZ	360	PR(FX)		John Wanamaker.
Norfolk, Nebr.[54]	WKH	440	PR(FX)		Midland Refining Co.
Oakland, Calif.[55]	KLS	360	PR(FX)	X	Warner Brothers.
Oklahoma City, Okla.[56]	WKY	360, 485	PR(FX)		Oklahoma Radio Shop.
Omaha, Nebr.[57]	WDV	360	PR(FX)		John O. Yelser, jr.
Paris, Tex.[58]	WTK	360	PR(FX)		Paris Radio Electric Co.
Philadelphia, Pa.[59]	WFI	360	PR(FX)		Strawbridge & Clothier.
Do.[60]	WIP	360	PR(FX)		Gimbel Brothers.
Do.[61]	WOO	360	PR(FX)		John Wanamaker.
Portland, Oreg.[62]	KGO	360	PR(FX)		Hallock & Watson Radio Service.

[34] Loc. (approximately) 0.87° 00′ 00″, N. 32° 00′ 00″; range, 100; system, U. S. Signal Corps, 1,000; rates, ship service, 12c. per word; limited public service to Mobile, Burrwood, and New Orleans, 10c. per word.
[35] Range, 150; system, composite (v. t. telephone and telegraph); hours, 8 a. m.–5.30 p. m.; rates, none.
[36] Loc. (approximately) 0.97° 20′ 00″, N. 32° 44′ 00″; range, 100; system, composite (v. t. telephone); rates, none.
[37] Range, 150; system, composite (v. t. telephone); hours, 5–6 p. m. Sunday and 7–8 p. m. Tuesday and Friday; rates, none.
[38] Range, 50; system, composite (v. t. telephone); hours, 8–9 p. m.; rates, none.
[39] System, composite (v. t. telephone and telegraph), also composite spark, 240; rates, none.
[40] Loc. 0.122° 47′ 59″, N. 47° 30′ 00″; range, 25; system, composite (v. t. telephone); hours, 9.30–9.30 p. m. Sunday, Tuesday, and Friday; rates, none.
[41] Range, 150; system, composite (v. t. telephone); hours, 7–10 p. m.; rates, none.
[42] Loc. (approximately) 0.118° 14′ 30″, N. 34° 03′ 00″; range, 150; system, composite (v. t. telephone); hours, 9–10 a. m. and 12.30–1.30, 3–5, and 7–9 p. m.; rates, none.
[43] Range, 50; system, composite (v. t. telephone); rates, none.
[44] Loc. (approximately) 0.79° 50′ 00″, N. 40° 35′ 00″; range, 50; system, composite (v. t. telephone); hours, 6.30–7 p. m. daily; 1.30–2.30 p. m. Sunday and 9.30–10.30 p. m. Tuesday and Thursday; rates, none.
[45] Range 50; system, R. C. of A. (v. t. telephone); rates, none.
[46] Loc. (approximately) 0.90° 00′ 00″, N. 35° 09′ 00″; range, 200; system, composite (v. t. telephone); hours, 7–9.30 p. m.; rates, none.
[47] Range, 50; system, composite (v. t. telephone); hours, 7 a. m.–9 p. m.; rates, none.
[48] System, composite (v. t. telephone); hours, 4–6 and 7.30 p. m. daily; 10.45 a. m.–12 m. Sundays; rates, none.
[49] Loc. 0.74° 10′ 00″, N. 40° 44′ 15″; range, 30; system, De Forest (v. t. telephone); rates, none.
[50] Range, 150; system, composite (v. t. telephone); hours, 1–3 and 7.30–9.45 p. m.; rates, none.
[51] Range, 100; system, composite (v. t. telephone and telegraph); hours, 11 a. m.–12 m. and 7–10 p. m.; rates, none.
[52] Loc. 0.90° 07′ 12″, N. 29° 56′ 54″; range, 100; system, composite (v. t. telephone); rates, none.
[53] Rates, none.
[54] Range, 200; system, composite (v. t. telephone and telegraph); hours, 8 a. m.–5.30 p. m.; rates, none.
[55] Range, 20; system, composite (v. t. telephone and telegraph); rates, none.
[56] Loc. 0.97° 30′ 00″, N. 35° 30′ 15″; range, 100; system, composite (v. t. telephone); hours, 12–1 and 7.30–9.30 p. m. daily and 3–4; 7.30–9.30 p. m. Sunday; rates, none.
[57] Range, 100; system, composite (v. t. telephone); hours, 7.30–9.30 p. m.; rates, none.
[58] Loc. 0.95° 35′ 00″, N. 33° 40′ 00″, range, 150; system, composite (v. t. telephone); hours, 10 a. m.–5 p. m. and 7–10 p. m.; rates, none.
[59] Range, 50; system, composite (v. t. telephone); hours, 7.30–9.30 p. m.; rates, none.
[60] Loc. 0.75° 09′ 44″, N. 39° 57′ 06″; range, 100; system, composite (v. t. telephone); hours, 12 m.–1 p. m. and 7–8 p. m. Monday, Wednesday, and Saturdays; rates, none.
[61] Loc. 0.75° 09′ 44″, N. 39° 57′ 06″, system, De Forest (v. t. telephone); hours, 1–5 and 7–10 p. m.; rates, none.
[62] Loc. 0.122° 45′ 09″, N. 45° 30′ 00″, range, 100; system, composite (v. t. telephone); hours 4–10 p. m.; rates, none.

Commercial land stations, alphabetically by names of stations—Continued.

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Portland, Oreg.[48]	KQN	360	PR(FX)		Northwestern Radio Mfg. Co.
Do.[24]	KQW	360	PR(FX)		Oregonian Publishing Co.
Do.[36]	KQY	360	PR(FX)		Stubbs Electric Co.
Do.[36]	KYG	360	PR(FX)		Willard P. Hawley, jr.
Reedley, Calif.[37]	KMC	360	PR(FX)		Lindsay-Weatherill & Co.
Ridgewood, N. Y.[38]	WHN	360	PR(FX)		Ridgewood Times Printing & Publishing Co.
Rockland, Me.[24]	WME	360, 425, 600	PR(FX)	X	Swans Island & Rockland Radio Communication Service.
San Francisco, Calif.[39]	KSL	360	PR(FX)	X	The Emporium.
Schenectady, N. Y.[40]	WRL	360	PR(FX)	X	Union College.
Seattle, Wash.[41]	KJB	360, 485	PR(FX)	X	Vincent I. Kraft.
Sisal, P. I.	KED				Philippine Insular Government.
Spokane, Wash.[42]	KFZ	360	PR(FX)		Doerr-Mitchell Electric Co.
St. Louis, Mo.[43]	KSD	360	PR(FX)		Post Dispatch.
Do.[43]	WEW	485	PR(FX)	X	St. Louis University.
Swans Island, Me.[24]	WTI	300, 425, 600	PR(FX)	X	Swans Island & Rockland Radio Communication Service.
Tacoma, Wash.[44]	KMO	360	PR(FX)		Love Electric Co.
Tarrytown, N. Y.[45]	WRW	360	PR(FX)		Tarrytown Radio Research Lab.
Tulsa, Okla.[46]	WEH	440, 485	PR(FX)		Midland Refining Co.
Urbana, Ill.[47]	WRM	360, 410	PR(FX)		University of Illinois.
Utica, N. Y.[21]	WSL	360	PR(FX)		J. & M. Electric Co.
Washington, D. C.[48]	WIL	360	PR(FX)		Continental Electrical Supply Co.
Do.[48]	WMU	360	PR(FX)		Doubleday-Hill Electric Co.
Do.[48]	WPM	360	PR(FX)		Thomas J. Williams.
Wichita, Kans.[49]	WEY	360, 485	PR(FX)	X	Coerodio Co.
Worcester, Mass.[50]	WCN	360, 485	PR(FX)		Clark University.
Yakima, Wash.[51]	KFV	360	PR(FX)		Foster-Bradbury Radio Store.
Do.[51]	KQT	360	PR(FX)		Electric Power & Appliance Co.
Youngstown, Ohio[52]	WMC	360	PR(FX)		Columbia Radio Co.

[24] Loc. 0.122° 38′ 48″, N. 45° 30′ 54″, range, 150; system, composite (v. t. telephone); hours 4–6 and 7–10 p. m.; rates, none.
[36] Range, 100; system, composite (v. t. telephone); hours, 1–5 p. m. and 7.30–9.30 p. m.; rates, none.
[37] Loc. (approximately) 0. 122° 43′ 00″, N. 45° 30′ 00″; range, 50; system, Westinghouse (v. t. telephone); hours, 7.30–9.30 p. m.; rates, none.
[38] Loc. 0.122° 40′ 44″, N. 45° 31′ 39″; range, 100; system, composite (v. t. telephone); hours, 4.30–5.30 and 7–10 p. m.; rates, none.
[47] Range, 50; system, composite (v. t. telephone); hours, 8–9 p. m.; rates, none.
[48] Range, 30; system, composite (v. t. telephone); hours, 7.30–9.30 p. m.; rates, none.
[49] Loc. (approximately) 0.69° 07′ 00″, N. 44° 07′ 30″; range, 300; system, Wireless Specialty Apparatus Co., 1,000; rates, to Swans Island, Me., 3 c. per word.
[50] Range, 50; system, composite (v. t. telephone); rates, none.
[45] Loc. 0.73° 55′ 42″, N. 42° 49′ 00″, range, 200; system, composite (v. t. telephone); rates, none.
[46] Loc. 0.122° 18′ 24″, N. 47° 40′ 43″, range, 2?; system, composite (v. t. telephone); rates, none.
[47] Loc. (approximately) 0.117° 25′ 00″, N. 47° 40′ 00″; system, composite (v. t. telephone); hours, 7–10 p. m.; rates, none.
[48] Loc. 0.90° 12′ 17″, N. 38° 38′ 03″; range, 100; system, De Forest (v. t. telephone); hours, 10 a. m.–10 p. m. intermittently; rates, none.
[49] Loc. 0.90° 12′ 58″, N. 38° 38′ 17″; range, 150; system, composite (v. t. telephone) and composite spark, 583; rates, none.
[50] Loc. (approximately) 0.68° 27′ 00″, N. 44° 10′ 00″; range, 100; system, Wireless Specialty Apparatus Co., 1,000; rates, to Rockland, Me. 3 c. per word.
[51] Loc. 0.122° 27′ 54″, N. 47° 15′ 45″; range, 50; system, composite (v. t. telephone); hours, 7–10 p. m.; rates, none.
[44] Loc. 0.73° 51′ 30″, N. 41° 04′ 40″; system, composite (v. t. telephone); hours, 9 a. m.–12 p. m.; rates, none.
[45] Loc. (approximately) 0.51° 20′ 00″, N. 35° 20′ 00″; range, 150; system, composite (v. t. telephone and telegraph); hours, 8 a. m.–5.30 p. m.; rates, none.
[46] Loc. (approximately) 0.88° 15′ 00″, N. 40° 07′ 00″; range, 100; system, composite (v. t. telephone and telegraph) and composite spark, 360; hours, 7–10 p. m.; rates, none.
[47] System, De Forest (v. t. telephone); hours, 10 a. m.–6 p. m.; rates, none.
[48] System, composite (v. t. telephone); hours, 7.30–9.30 p. m. Monday and Wednesday; rates, none.
[49] System, composite (v. t. telephone); hours, 4.30–5.30 p. m. Monday, Wednesday, and Friday; rates, none.
[50] Range, 75; system, composite (v. t. telephone); hours, 12–1 p. m. and 7.30–9.30 p. m., Monday; rates, none.
[51] Loc. (approximately) 0.95° 38′ 00″, N. 32° 30′ 00″; range, 150; system, composite (v. t. telephone) and composite spark, 650; rates, none.
[52] Loc. 0.71° 49′ 35″, N. 42° 14′ 33″; range, 150; system, composite (v. t. telephone and telegraph); hours, 7.30–9.30 p. m.; rates, none.
[21] Loc. (approximately) 0.126° 36′ 00″, N. 40° 30′ 00″; range, 150; system, composite (v. t. telephone); hours, 12 m.–10 p. m.; rates, none.
[39] Loc. (approximately) 0.120° 30′ 00″; N. 47° 30′ 00″; range, 50; system, De Forest (v. t. telephone); hours 10 a. m.–10 p. m.; rates, none.
[40] Range, 150; system, composite (v. t. telephone); hours 8.30–9.45 p. m.; rates, none.

NOTE.—Stations having a wave length of 360 meters transmit news, concerts, etc., and those having a wave length of 485 meters transmit market and weather reports.

Commercial ship stations, alphabetically by names of vessels.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1921, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Name of vessel.	Call signal.	Rates. North and South American service.	Rates. Transoceanic service.	Service.	Hours.	Owner of vessel.	Station controlled by—
		Cents.	*Cents.*				
Daniel Kern	KDXG			PG	X	Independent Towing Co.	
Hera [1]	KDGA	8	8	PG	X	Standard Oil Co. of N. J.	R. C. of A.
Jacob Luckenbach	KDXE			PG	X	Luckenbach S. S. Co.	
La Jota [2]	KDXF			P	X	W. W. Wilson	Owner of vessel.
Mandarin	KDXD			PG	X	Dollar S. S. Line	

[1] Range, 150; system, Telefunken, 1,000; w. l., 300, 450, 600.
[2] System, compositte (c. w.-v. t.); w. l., 300, 450, 600; rates, none.

Commercial land and ship stations, alphabetically by call signals.

[b—ship station; c—land station.]

Call signal.	Name.		Call signal.	Name.	
KDGA	Hera	b	WEY	Wichita, Kans	c
KDXD	Mandarin	b	WFI	Philadelphia, Pa	c
KDXE	Jacob Luckenbach	b	WGF	Des Moines, Iowa	c
KDXF	La Jota	b	WGM	Atlanta, Ga	c
KDXG	Daniel Kern	b	WGR	Buffalo, N. Y	c
KED	Sissi, P. I	c	WGU	Chicago, Ill	c
KFO	Bongao, P. I	c	WGV	New Orleans, La	c
KFV	Cagayan de Sulu, P. I	c	WHD	Morgantown, W. Va	c
KFW	Balabac, P. I	c	WHN	Ridgewood, N. Y	c
KFV	Yakima, Wash	c	WHX	Des Moines, Iowa	c
KPZ	Spokane, Wash	c	WIK	McKeesport, Pa	c
KGO	Portland, Oreg	c	WIL	Washington, D. C	c
KGN	Portland, Oreg	c	WIO	Fort Morgan, Ala	c
KGO	Altadena, Calif	c	WIP	Philadelphia, Pa	c
KGU	Honolulu, Hawaii	c	WJT	Erie, Pa	c
KGW	Portland, Oreg	c	WKC	Baltimore, Md	c
KGY	Lacey, Wash	c	WKH	Norfolk, Nebr	c
KHJ	Los Angeles, Calif	c	WKN	Memphis, Tenn	c
KJR	Seattle, Wash	c	WKY	Oklahoma City, Okla	c
KJS	Los Angeles, Calif	c	WLW	Cincinnati, Ohio	c
KLN	Monterey, Calif	c	WMC	Youngstown, Ohio	c
KLS	Oakland, Calif	c	WME	Rockland, Me	c
KLZ	Denver, Colo	c	WMU	Washington, D. C	c
KMC	Reedley, Calif	c	WNJ	Albany, N. Y	c
KMJ	Fresno, Calif	c	WOO	Philadelphia, Pa	c
KMO	Tacoma, Wash	c	WPA	Fort Worth, Tex	c
KNP	Chignik, Alaska	c	WPG	New Lebanon, Ohio	c
KOA	Denver, Colo	c	WPM	Washington, D. C	c
KOP	Detroit, Mich	c	WPO	Memphis, Tenn	c
KPZ	Mati, P. I	c	WRL	Schenectady, N. Y	c
KQT	Yakima, Wash	c	WRM	Urbana, Ill	c
KQY	Portland, Oreg	c	WRP	Camden, N. J	c
KRE	Berkeley, Calif	c	WRW	Tarrytown, N. Y	c
KSD	St. Louis, Mo	c	WSB	Atlanta, Ga	c
KSL	San Francisco, Calif	c	WSL	Utica, N. Y	c
KYO	Portland, Oreg	c	WSV	Little Rock, Ark	c
WAH	El Dorado, Kans	c	WSX	Erie, Pa	c
WBS	Newark, N. J	c	WSY	Birmingham, Ala	c
WBT	Charlotte, N. C	c	WTI	Swans Island, Me	c
WCI	Barnegat, N. J. (Tuckerton)	c	WTK	Paris, Tex	c
WCM	Austin, Tex	c	WTP	Bay City, Mich	c
WCN	Worcester, Mass	c	WWB	Canton, Ohio	c
WCV	Fort Worth, Tex	c	WWI	Dearborn, Mich	c
WDY	Omaha, Nebr	c	WWL	New Orleans, La	c
WEH	Tulsa, Okla	c	WWT	Buffalo, N. Y	c
WEV	Houston, Tex	c	WWZ	New York, N. Y	c
WEW	St. Louis, Mo	c			

Government land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1921, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Boston, Mass.[1]	NAD	600, 975, 1020, 1050, 5000	O	N	U. S. Navy.
Chicago, Ill	WVT		O	X	U. S. Army.
Fort Omaha, Nebr	WVU		O	X	U. S. Army.
Governors Island, N. Y.	WVP		O	X	U. S. Army.
Shanghai, China[2]	NPJ	300, 600, variable	O	X	U. S. Navy.

[1] Loc. 0.71° (0′ 61″, N. 42° 22′ 26″, system, U. S. Navy.
[2] Loc. 0.121° 29′ 00″ E, N. 31° 15′ 00″, range, 100; system, U. S. Navy (receiving station only).

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.
NAD	Boston, Mass. c	WVT	Chicago, Ill. c
NPJ	Shanghai, China c	WVU	Fort Omaha, Nebr. c
WVP	Governors Island, N. Y. c		

Special land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1921.]

Station.	Call signal.	Wave lengths.	Station controlled by—
Amarillo, Tex.	5ZH	200, 375	J. Laurance Martin, 605 East Fourth Street.
Atlanta, Ga.	4XA	Variable 200 to 1000.	Emory University.
Austin, Tex.	5XX	Variable.	Tom L. Gray, 2308 Avenue F.
Bakersfield, Calif.	6ZS	200, 375	Lindley Wisner, 200 Twenty-second Street.
Bangor, Me.	1XG	Variable 200 to 500.	Bangor Railway & Electric Co., Graham Building.
Berkeley, Calif.	6ZQ	200, 375	Fred L. Wixmer, 1906 Chestnut Street.
Brownwood, Tex.	5XF	200, 375, variable.	Howard Payne College.
Buffalo, N. Y.	8ZM	200, 375	Cyrus H. Fraser, 48 Glenwood Avenue.
Chicago, Ill.	9XB	200, 375	City of Chicago, Room 614, City Hall.
Colorado Springs, Colo.	9XC	200, 375	Colorado College.
Columbus, Ohio	8XI	200, 375	Ohio State University.
Do.	8ZO	200, 375	Loren G. Windsor, 1375 Franklin Avenue.
Dallas, Tex.	5ZAQ	200, 375	City of Dallas, Police and Fire Signal Department.
Ellsworth, Me.	1XC	Variable, 200 to 500.	Bangor Railway & Electric Co., Graham Building, Bangor, Me.
El Paso, Tex.	5ZAR	200, 375	Elite Electric Shop, 407 Mesa Avenue.
Fort Worth, Tex.	5YS	200, 375	Otis R. Garrett, 511½ Main Street.
Houston, Tex.	5XN	200, 375	Ernest Hubner, 1507 McKee Street.
Knoxville, Tenn.	5XO	Variable, 200 to 375.	Philip Stout, 152 Riverside Drive.
Lansing, Mich.	8XM	700	Maurice H. Pancost, 1101 Climax Street.
Mayville, N. Dak.	9YF	200, 375	State Normal School.
Mount Carroll, Ill.	9ZG	200, 375	Albert C. Mastz.
New Orleans, La.	5XM	200, 375	Electron Engineering Co., 1115 Whitney Central Building.
Do.	5YR	200, 375	Loyola University.
New York, N. Y.	2XM	Variable.	Columbian University.
Do.	2XY	Variable.	American Telephone and Telegraph Co., 24 Walker Street.
Pasadena, Calif.	6XI	200, 375, variable.	Samuel G. McMeen, 681 South Los Robles Avenue.
Polytechnic, Mont.	7YI	200, 375	Billings Polytechnic Institute.
Portland, Oreg.	7XI	200, 375, variable.	Hallock & Watson Radio Service, 192 Park Street.
San Marcos, Tex.	5YT	200, 375	San Marcos High School.
Washington, Pa.	8XO	200, 375	Washington and Jefferson College.

Special land stations, grouped by districts.

Call signal.	District and station.	Call signal.	District and station.
	First district:		Sixth district:
1XC	Ellsworth, Me.	6XI	Pasadena, Calif.
1XG	Bangor, Me.	6ZQ	Berkeley, Calif.
	Second district:	6ZS	Bakersfield, Calif.
2XM	New York, N. Y.		Seventh district:
2XY	Do.	7XI	Portland, Oreg.
	Fourth district:	7YI	Polytechnic, Mont.
4XA	Atlanta, Ga.		Eight district:
	Fifth district:	8XG	Washington, Pa.
5XF	Brownwood, Tex.	8XJ	Columbus, Ohio.
5XM	New Orleans, La.	8XM	Lansing, Mich.
5XN	Houston, Tex.	8ZM	Buffalo, N. Y.
5XO	Knoxville, Tenn.	8ZO	Columbus, Ohio.
5XX	Austin, Tex.		Ninth district:
5YR	New Orleans, La.	9XB	Chicago, Ill.
5YS	Fort Worth, Tex.	9XC	Colorado Springs, Colo.
5YT	San Marcos, Tex.	9YF	Mayville, N. Dak.
5ZAQ	Dallas, Tex.	9ZG	Mount Carroll, Ill.
5ZAR	El Paso, Tex.		
5ZH	Amarillo, Tex.		

ALTERATIONS AND CORRECTIONS.

COMMERCIAL LAND STATIONS.

BOLINAS, CALIF. (KET).—Loc. 0.122° 40′ 45″, N. 37° 54′ 30″; system, R. C. of A. alternator; w. l., 13,310; rates, from Bolinas or San Francisco, Calif., to Kahuku or any point on the island of Oahu, Hawaii, 25 c. per word; Government rate, 12½ c. per word; press rate, 5 c. per word; lettergrams, $1.50 for the first 12 words and 10 c. each additional word; week-end lettergrams, $2.50 for the first 24 words and 8 c. for each additional word. From Bolinas or San Francisco, Calif., to Japan, 72 c. per word; Government rate 36 c. per word; press rate, 27 c. per word; urgent rate, $2.16 per word.

CAPE MAY, N. J.—W. l., 300, *600*, 1610 (1610 meters used for limited commercial service between stations of the R. C. of A.).

CHARLESTON, W. VA.—Strike out all particulars.

CHICAGO, ILL. (KYW).—System, Westinghouse (v. t. telephone and telegraph); W. l., 360, 485; hours, X.

CLEVELAND, OHIO (WHK).—Hours, 1.30–2, 3.30–4, and 8–9.30 p. m.

CORAM HILL, N. Y.—W. l., 19,000.

DALLAS, TEX. (WRR).—System, composite (v. t. telephone); w. l., 360, 485.

DETROIT, MICH. (WBL).—Call signal changed to WWJ.

EASTHAMPTON, N. Y.—Rates, effective April 1; all ship traffic, 10 c. per word.

EDWIGHT, W. VA.—Strike out all particulars.

LOS ANGELES, CALIF. (KYJ).—W. l., 360, 485; hours 4–5 and 7.45–9 p. m.

LOS ANGELES, CALIF. (KZC).—Call signal changed to KOG.

MARION, MASS. (WCC).—W. l., 300, *600*, 2800 (2800 meters used for limited commercial service between stations of the R. C. of A.).

NEW BRUNSWICK, N. J.—Range, 4,000.

NEW LONDON, CONN. (WLC).—Loc. 0. 72° 05′ 02″, N. 41° 18′ 01″; range, 400; system, R. C. of A., 120; w. l., 300, 450, *600*; hours, 7 a. m.–11 p. m.; rates, ship service, 10 c. per word; station operated and controlled by R. C. of A.

NEW YORK, N. Y. (WSE).—Rates, effective April 1, all ship traffic, 10 c. per word.

OMAHA, NEBR.—Station operated and controlled by Metropolitan Utilities District.

ROCHESTER, N. Y.—Range, 100.

SAN DIEGO, CALIF.—System, composite (v. t. telephone); w. l., 360; hours, 7.30–9 p. m.

SAN FRANCISCO, CALIF. (KDN).—W. l., 360, 485.
SAN FRANCISCO, CALIF. (KGB).—Strike out all particulars.
SAN FRANCISCO, CALIF. (KUO).—Hours, X.
SIASCONSET, MASS.—W. l., 300, *600*, 1610 (1610 meters used for limited commercial service between stations of the R. C. of A.).
TOLEDO, OHIO (WDZ).—Strike out all particulars.
TUCKERTON, N. Y.—W. l., 15,900; rates, to France, 14 c. per word.
WASHINGTON, D. C. (WDM).—Hours, 10 a. m.–12.30 p. m. and 7–9.30 p. m.

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, 1921, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

ABRON.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*; hours, X.
ADMIRAL RODMAN.—System, R. C. of A., 1000.
AGWIBAY.—Range, 200; system, I. W. T. Co., 1000; w. l., 300, *600*; hours, X.
AJAX.—Strike out all particulars.
ALA.—Station operated and controlled by S. O. R. S.
ALASKAN.—Range, 300; w. l., 300, 450, *600*; rates, North and South American and transoceanic services, 8 c. per word.
ALLIANCA.—Hours, X; rates, North and South American service, 4 c. per word.
ALLOWAY.—System, Navy, 1000; w. l., 300, 450, *600*; hours, X.
AMPETCO.—Strike out all particulars.
ANACORTES.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*; hours, X.
ASHEN, J. HUNSON.—Sabine Towing Co. owner of vessel.
BARTHNEY.—Name changed to De Bardeleben; W. G. Coyle & Co. owner of vessel.
BETHORE.—Range, 300; system, R. C. of A., 1000; w. l., 300, *600*.
BOGOTA.—Range, 200; system, Navy-Simon, 1000; w. l., 300, *600*.
BRISTOL.—Coastwise Transportation Co. owner of vessel.
CAMBRIDGE (KGR).—Rates, North and South American and transoceanic services, 8 c. per word.
CARPLAKA.—Range, 300; system, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.
CATHAY.—Station operated and controlled by R. C. of A.
CELESTIAL.—Station operated and controlled by I. W. T. Co.
CERRO-ENANO.—Range, 300; system, R. C. of A., 1000.
CHAMBERINO.—System, Navy-Marconi, 1000; w. l., 300, 450, *600*.
CHATTANOOGA.—Range, 300; system, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.
CITY OF LOWELL.—Range, 150; system, Cutting & Washington, 1000; w. l., 300, 530, *600*; hours, X; rates, North and South American and transoceanic services, 8 c. per word; station operated and controlled by I. W. T. Co.
COAXET.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
CLIFFWOOD.—W. l., 300, 450, *600*.
COLON.—Rates, strike out transoceanic rate.
COMMACK.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l. 300, 450, *600*.
COMMERCIAL PILOT.—Strike out all particulars.
CONCORD.—Rates, North and South American and transoceanic services, 8 c. per word.
CORDOVA.—System, Kilbourne & Clark, 1000.
CRABTREE.—System, Navy-Marconi, 1000; w. l., 300, 450, *600*.
CRAIGSMERE.—System, Navy-Marconi, 1000; w. l., 300, 450, *600*.
CRANENEST.—System, Navy-Marconi, 1000; w. l., 300, 450, *600*.
CRAWL KEYS.—System, Navy-R. C. of A., 1000.
CUBA (KDRT).—Range, 150; system, R. C. of A., 1000; w. l., 300, 450, *600*.
DAVID MCKELVY.—Range, 300; system, R. C. of A., 1000.

DELAWARE SUN.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.

DIXIE ARROW.—Range, 300; system, R. C. of A., 1000; w. l., 300, *600;* hours, X.

DRYDEN.—Range, 300; system, Federal arc, w. l., 300, *600*, 1800.

EASTERNER.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600;* hours, X.

EAST WIND.—System, Navy-Marconi, 1000; w. l., 300, 450, *600;* hours, X.

EDGEHILL.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.

ELDRIDGE.—W. l., 300, 450, *600*.

FEDERAL.—Range, 300; system, Westinghouse, 100; w. l., 300, 450, *600;* rates, North and South American and transoceanic services, 8 c. per word; station operated and controlled by owner of vessel.

GAFFNEY.—W. l., 300, 450, *600*.

GARFIELD.—Range, 200; system, Navy-R. C. of A., 1000.

GENERAL G. W. GOETHALS.—Range, 200.

GEORGIAN.—W. l., 300, 450, *600*.

GLADYSBE.—Range, 300; system, Navy-Marconi, 1000; w. l., 300, 450, *600;* rates, North and South American and transoceanic services, 4 c. per word.

GLYMONT.—Range, 200.

HAGOOD.—Range, 300; system, Navy-R. C. of A., 1000.

HAHATONKA.—Range, 300; system, Navy, 1000; w. l., 300, 450, *600*.

HAMMAC.—Range, 300; system, Federal arc, w. l., 300, *600*, 1800; station operated and controlled by S. O. R. S.

HAMPDEN.—Coastwise Transportation Co., owner of vessel.

HANNAWA.—Range, 300; system, Federal arc, w. l., 300, *600*, 1800.

HARRY LUCKENBACH.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 525, *600;* rates, North and South American and transoceanic services, 4 c. per word.

HERBERT L. PRATT.—Range, 300; system, Navy-Lowenstein, 1000.

HERMAN FRASCH.—Range, 200; system, Kilbourne & Clark, 1000; w. l., 300, 450, *600;* rates, North and South American and transoceanic services, 8 c. per word.

HULVER.—System, Navy-Simon, 1000.

INDEPENDENT.—Strike out all particulars.

JACONA.—System, Navy, 1000; w. l., 300, 450, *600*.

JEAN.—Range, 200; system, I. W. T. Co., 1000.

JOLEE.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600*.

KATRINA LUCKENBACH.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 450, *600;* rates, North and South American and transoceanic services, 8 c. per word.

LAKE FREEZEOUT.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.

LEXINGTON.—Rates, North and South American and transoceanic services, 8 c. per word.

LIBBRE.—Rates, North and South American and transoceanic services, 8 c. per word.

LILMAR.—Range, 300; system, Navy, 1000; w. l., 300, 450, *600;* rates, North and South American and transoceanic services, 4 c. per word.

MANITOWOC.—Range, 300; w. l., 300, *600;* rates, North and South American and transoceanic services, 8 c. per word; Manitowoc S. S. Corp., owner of vessel.

MIDDLESEX.—Coastwise Transportation Co., owner of vessel.

MOHAWK (KXE).—Range, 100; system, Cutting & Washington, 1000; rates, North and South American services, 8 c. per word; station operated and controlled by I. W. T. Co.

MOHEGAN.—Range, 150; system, Cutting & Washington, 1000; w. l., 300, 450, 530, *600;* hours, X; rates, North and South American and transoceanic services, 8 c. per word; station operated and controlled by I. W. T. Co.

MORRISTOWN.—W. l., 300, 450, *600;* hours, X.

MOUNT SIDNEY.—Strike out all particulars.
MOUNT SUMMIT.—Strike out all particulars.
MUNISLA.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, *600*.
NANTASKET.—W. l., 300, 450, *600*.
NEBRASKAN.—Station operated and controlled by owner of vessel.
NEW ENGLAND.—Range, 300; system, Navy, 1000; w. l., 300, 450, *600*.
NEW HAMPSHIRE.—Station operated and controlled by I. W. T. Co.
NISHMAHA.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*.
NORFOLK.—Coastwise Transportation Co., owner of vessel.
OHIOAN.—Rates, North and South American and transoceanic services, 8 c. per word.
OKLAHOMA CITY.—Range, 300; system, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
OPELIKA.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.
OPHIR.—W. l., 300, 450, *600*.
OSAGE.—W. l., 300, *600*.
OSAKIS.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.
OZETTE.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*.
PAN AMERICA.—Station operated and controlled by S. O. R. S.
PANUCO (KMM).—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.
PENINSULA STATE.—Range, 500; system, Federal arc; w. l., 300, 450, *600*, 1800; station operated and controlled by S. O. R. S.
PLYMOUTH (KXH).—Range, 100; system, Cutting & Washington, 1000; w. l., 300, 450, 530, *600*; hours, X; rates, North and South American and transoceanic services, 8 c. per word; station operated and controlled by I. W. T. Co.
POINT LOMA.—Range, 300.
PRINCETON.—Range, 300; system, R. C. of A., 1000.
PROVIDENCE.—Range, 150; system, Cutting & Washington, 1000; w. l., 300, 450, 550, *600*; hours, X; rates, North and South American and transoceanic services, 8 c. per word; station operated and controlled by I. W. T. Co.
PUGET SOUND.—System, Navy-R. C. of A., 1000.
QUEEN.—System, R. C. of A., 1000; w. l., 300, *600*.
RADNOR.—System, Navy-R. C. of A., 1000; w. l., 300, 470, *600*; hours, X.
REDONDO (KYT).—Range, 300; w. l., 300, 450, *600*; hours, X.
RICHOONCAL.—Range, 300; system, Navy-Marconi, 1000.
ROCKAWAY PARK.—Station operated and controlled by I. W. T. Co.
SAN JUAN (KGJ).—Hours, X.
SANTA ALICIA.—Name changed to Edna Christenson.
SANTA FLAVIA.—Harry W. Crosby, owner of vessel.
SATARTIA.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600*.
SCOTTSBURG.—Station operated and controlled by R. C. of A.
SELMA.—Strike out all particulars.
SILETZ.—System, Navy-Kilbourne & Clark, 1000.
SOLANA.—Range, 300; system, Federal arc, 1000 with chopper; w. l., 300, *600*, 1800.
STEEL NAVIGATOR.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.
SUFFOLK.—Coastwise Transportation Co., owner of vessel.
SUSQUEHANNA (KOLN).—Station operated and controlled by I. W. T. Co.
SWIFTSTAR.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.
TAMESI.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.
TOPILA.—W. l., 300, 450, *600*.
TOTEDO.—W. l., 300, 460, 530, *600*.
TRANSPORTATION.—Coastwise Transportation Co., owner of vessel.
TRIUMPH.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600*.
WAHKEENA.—Range, 200; system, Gray & Danielson, 240.
WALDEN.—System, Navy-R. C. of A., 1000; w. l., 300, 450, *600*; hours, X.

WALTER D. MUNSON.—Range, 150; system, R. C. of A., 1000; w. l., 300, *600*.
WARD.—Range, 200; system, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*.
WERIKA.—Range, 300; system, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
WEST APAUM.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600;* hours, X.
WEST CAVANAL.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
WEST COHAS.—System, Navy-Kilbourne & Clark, 1000.
WEST COMPO.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600*.
WEST CORUM.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
WEST ELDARA.—System, Navy-Marconi, 1000; w. l., 300, 450, *600;* hours, X.
WESTERN HOPE.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600;* hours, X.
WESTERN KNIGHT.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
WEST GAMBO.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600;* hours, X.
WEST INSKIP.—System, Navy, 1000; w. l., 300, 450, *600*.
WEST IRA.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*.
WEST LASHAWAY.—Hours, X.
WEST SAGINAW.—Range, 200; system, Navy-Kilbourne & Clark, 1000; w. l., 300 450, *600*.
WEST TOTANT.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
W. H. TILFORD.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, *600*.
WILLIAM A. WHITNEY.—Strike out all particulars.
WILLIAM M. MILLS.—Range, 150; rates, North and South American and transoceanic services, 8 c. per word.
WILLSOLO.—System, Navy-Marconi, 1000; w. l., 300, 450, *600*.
WISLA.—Range, 200; system, I. W. T. Co., 1000; w. l., 300, *600*.
W. L. CONNELLY.—System, R. C. of A., 1000; w. l., 300, 450, *600*.
ZAREMBO.—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

KIZD, *read* De Bardeleben; KZC, *read* KOG; WBL, *read* WWJ; WSJ *read* Edna Christenson; strike out all particulars following the call signals KGB, KJC, KMAU, KOJ, KQP, KUKQ, KUSS, WCK, WDZ, WMB, WPI, and WPJ.

GOVERNMENT LAND STATIONS, ALPHABETICALLY BY NAMES OF STATIONS.

ANNAPOLIS, MD. (NAK).—Service, PG; rates, ship service, 6 c. per word.
ASTORIA, OREG.—Loc. 0.123° 50′ 51″, N. 46° 11′ 05″.
BALBOA, C. Z.—Loc. 0.79° 46′ 20″, N. 09° 07′ 15″.
BAR HARBOR, ME. (regular station).—Loc. 0.68° 18′ 00″, N. 44° 14′ 15″.
BOSTON, MASS. (WYCA).—Call signal changes to WVO.
CAPE MALA, PANAMA.—Loc. 0.79° 59′ 30″, N. 07° 27′ 30″.
CAPE MAY, N. J.—Loc. 0.74° 55′ 46″, N. 38° 55′ 50″.
CAYEY, P. R.—Loc. 0.66° 09′ 50″, N. 18° 07′ 10″.
CHARLESTON, S. C.—Loc. 0.79° 57′ 49″, N. 32° 51′ 36″.
CHATHAM, MASS.—Loc. 0.69° 58′ 56″, N. 41° 42′ 11″.
COCO SOLO, C. Z.—Service, 0; hours, X.
COLON, C. Z.—Loc. 0.79° 54′ 01″, N. 09° 21′ 56″; service, PG; rates, ship service, 6 c. per word.
CORDOVA, ALASKA.—Loc. 0.145° 25′ 30″, N. 60° 28′ 30″.
DUTCH HARBOR, ALASKA.—Loc. 0.166° 33′ 07″, N. 53° 53′ 14″.
EAGLE HARBOR, MICH.—Loc. 0.88° 08′ 45″, N. 47° 27′ 49″.
EUREKA, CALIF.—Loc. 0.124° 16′ 24″, N. 40° 41′ 45″.
FORT BENJAMIN HARRISON, IND.—Call signal changed to WVS.

FORT CROOK, NEBR.—Strike out all particulars.
FORT D. A. RUSSEL, WYO.—Call signal changed to WVW.
FORT DOUGLAS, UTAH.—Call signal changed toWVX.
FORT DRUM, P. I.—Call signal changed to WUAL.
FORT HOWARD, MD.—Call signal changed to WVQ.
FORT McPHERSON, GA.—Call signal changed to WVR.
FORT SHERIDAN, ILL.—Strike out all particulars.
FORT WINT, P. I.—Call signal changed to WUAK.
FORT WOOD, N. Y.—Strike out all particulars.
GUANTANAMO, CUBA.—Loc. 0.75° 08′ 35″, N. 19° 54′ 38″.
HEEIA POINT, HAWAII.—*Read* Honolulu, Hawaii (Heeia Point); loc. 0.157° 58′ 00″, N. 21° 29′ 45″.
HONOLULU, HAWAII (Pearl Harbor).—Loc. 0.157° 58′ 00″, N. 21° 20′ 45″.
JEFFERSON BARRACKS, MO.—Call signal changed to WVV.
JUNEAU, ALASKA.—Loc. 0.134° 24′ 45″, N. 58° 18′ 35″.
JUPITER, ALASKA.—Loc. 0.80° 05′ 02″, N. 26° 56′ 54″.
KETCHIKAN, ALASKA.—Loc. 0.131° 38′ 51″, N. 55° 20′ 45″.
KEY WEST, FLA.—Loc. 0.81° 48′ 21″, N. 24° 33′ 22″.
KODIAK, ALASKA.—Loc. 0.152° 21′ 45″, N. 57° 46′ 45″.
LAKEHURST, N. J.—Loc. 0.74° 19′ 48″, N. 40° 02′ 15″.
LA PALMA, PANAMA.—Loc. 0.78° 08′ 30″, N. 08° 26′ 00″; service, PG; rates, ship service, 6 c. per word.
MACKINAC ISLAND, MICH.—Service, PG; rates, ship service, 3 c. per word.
MANAGUA, NICARAGUA.—Loc. 0.86° 17′ 00″, N. 12° 17′ 00″.
MANILA, P. I.—Call signal changed to WUAJ.
MANISTIQUE, MICH.—Loc. 0.86° 15′ 36″, N. 45° 57′ 36″; service, PG; rates, ship service, 6 c. per word.
MARSHFIELD, OREG.—Loc. 0.124° 13′ 33″, N. 43° 20′ 38″; service, 0.
MIAMI, FLA.—Loc. 0.80° 07′ 43″, N. 25° 47′ 56″.
MOBILE, ALA.—Service, PG; rates, ship service, 6 c. per word.
MOREHEAD CITY, N. C.—Loc. 0.76° 44′ 00″, N. 34° 43′ 30″; service, PG; rates, ship service, 6 c. per word.
NAVAL ACADEMY, MD. (NAK).—See Annapolis, Md.
NAVASSA ISLAND, WEST INDIES.—Loc. 0.74° 01′ 00″, N. 18° 24′ 00″; service, PG; rates, ship service, 6 c. per word.
NEW ORLEANS, LA. (NAT).—Loc. 0.90° 01′ 54″, N. 29° 56′ 51″.
NEWPORT, R. I.—Loc. 0.71° 17′ 00″, N. 41° 35′ 20″.
NEW YORK, N. Y.—Loc. 0.73° 58′ 48″, N. 40° 41′ 58″.
NORFOLK, VA.—Loc. 0.76° 17′ 43″, N. 36° 49′ 36″.
NORTH HEAD, WASH.—Loc. 0.124° 04′ 31″, N. 46° 17′ 56″.
OLONGAPO, P. I.—Loc. 0.120° 10′ 49″ E., N. 14° 49′ 78″; service, PG; rates, ship service, 6 c. per word.
PARRIS ISLAND, S. C.—Loc. 0.80° 40′ 22″, N. 32° 21′ 01″.
PEKING, CHINA.—Loc. 0.116° 47′ 00″ E., N. 39° 55′ 00″.
PETERSBURG, ALASKA.—Strike out all particulars.
PHILADELPHIA, PA.—Loc. 0.75° 10′ 50″, N. 39° 53′ 20″.
PENSACOLA, FLA.—Loc. 0.87° 16′ 10″, N. 30° 20′ 53″.
POINT ISABEL, TEX.—Loc. 0.97° 12′ 33″, N. 26° 04′ 10″.
PORT AU PRINCE, HAITI.—Loc. 0.72° 19′ 52″, N. 18° 33′ 18″.
PORTLAND, ME.—Loc. 0.70° 12′ 08″, N. 43° 33′ 54″; service, 0.
PORTSMOUTH, N. H.—Service, 0.
PUGET SOUND, WASH.—Loc. 0.122° 37′ 03″, N. 47° 41′ 46″.
PUERTO OBALDIA, PANAMA.—Loc. 0.79° 13′ 00″, N. 09° 33′ 00″; service, PG; rates, ship service, 6 c. per word.

QUANTICO, VA.—Loc. 0.77° 17′ 15″, N. 38° 31′ 35″.
SAN DIEGO, CALIF.—Loc. 0.117° 14′ 49″, N. 32° 42′ 26″.
SAN DOMINGO, P. R.—Loc. 0.69° 53′ 15″, N. 18° 27′ 43″; rates, ship service, 6 c. per word.
SAN FRANCISCO, CALIF. (NPG).—Loc. 0.122° 22′ 52″, N. 37° 39′ 18″.
SAN FRANCISCO, CALIF. (WYCH).—Call signal changed to WVY.
SAN JUAN, P. R.—Loc. 0.66° 05′ 40″, N. 18° 28′ 03″.
SAN PEDRO, CALIF.—Loc. 0.118° 22′ 35″, N. 33° 37′ 48″.
SAVANNAH, GA.—Loc. 0.81° 05′ 15″, N. 32° 05′ 15″.
SAYVILLE, N. Y.—Loc. 0.73° 06′ 12″, N. 40° 44′ 36″.
SHANGHAI, CHINA (WZI).—Strike out all particulars.
SITKA, ALASKA.—Loc. 0.135° 21′ 00″, N. 57° 02′ 57″.
ST. AUGUSTINE, FLA.—0.81° 17′ 15″, N. 29° 53′ 10″.
ST. PETERSBURG, FLA.—0.82° 38′ 00″, N. 27° 46′ 15″.
TATOOSH, WASH. (regular station).—Loc. 0.124° 44′ 03″, N. 48° 23′ 31″.
TONGSHAN, CHINA.—Strike out all particulars.
VIRGINIA BEACH, VA. (regular station).—Strike out all particulars.
VLADIVOSTOK, RUSSIA.—Loc. (approximately) 0.131° 48′ 00″ E., N. 43° 00′ 00″; w. l., *3950*, variable; service, 6; hours, N.
WASHINGTON, D. C. (Arlington, NAA).—Loc. 0.77° 04′ 47″, N. 38° 52′ 05″.
WASHINGTON, D. C. (Navy Yard, NAL).—Loc. 0.76° 59′ 46″, N. 38° 52′ 22″.

GOVERNMENT SHIP STATIONS, ALPHABETICALLY BY NAMES OF VESSELS.

WEST LEWARK.—Name changed to Meigs.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

NAK, *read* Annapolis, Md. (Naval Academy); NPM, *read* Honolulu, Hawaii (Heeia Point); WJD, strike out all particulars; WVI, strike out all particulars; WVP, *read* WUAL; WVR, *read* WUAK; WVU, *read* WUAJ; WXD, *read* Meigs; WYCA, *read* WVO; WYCB, strike out all particulars; WYCC, *read* WVQ; WYCD, *read* WVR; WYCE, *read* WVS; WYCF, strike out all particulars; WYCG, strike out all particulars; WYCH, *read* WVY; WYCI, *read* WVV; WYCJ, *read* WVX; WYCK, *read* WVW; WZI, strike out all particulars.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

ANTHONY, KANS. (9ZAC).—Station controlled by T. & H. Radio Co.
BELFAST, ME. (1XR).—Strike out all particulars.
BOISE, IDAHO (7YA).—Address, Boise High School.
BOZEMAN, MONT. (7XB).—W. l., variable from 200 to 375.
BURLEY, IDAHO (7YF).—Strike out all particulars.
BUFFALO, N. Y. (8XAD).—Station controlled by Federal Telephone & Telegraph Co., 1738 Elmwood Avenue.
DEFIANCE, OHIO (8ZY).—Address, 1000 Wilhelm Street.
EL PASO, TEX. (5ZAD).—Address, 811 North Oregon Street.
FRANKLINTON, LA. (5ZK).—W. l., 200, 375.
FRESNO, CALIF. (6ZU).—Address, 100 Olive Avenue.
HAMPTON, N. H. (1XY).—Strike out all particulars.
HIGHLAND PARK, MICH. (8XAF).—Address, 396 Monterey Avenue.
HOUSTON, TEX. (5ZAA).—Address, R. F. D. No. 3, Box 29-B, Bellaire Boulevard.
HOUSTON, TEX. (5ZX).—Address, 2504 Bagby Street.
KNOXVILLE, TENN. (5XK).—W. l., variable from *200* to 375.
MEDFORD, MASS. (1XE).—*Read* Medford Hillside, Mass.
MEDIA, PA. (3ZM).—W. l., *200*, 375.

MINNEAPOLIS, MINN. (9ZT).—W. l., 150, *200*, 375; address, 402 Courthouse Building.
MOUNT CLEMENS, MICH. (8XAE).—W. l., *200*, 375.
MULGA, ALA. (5ZY).—Strike out all particulars.
NEW HAVEN, CONN. (1ZC).—Strike out all particulars.
PHILADELPHIA, PA. (3ZG).—Address, 3936 Locust Street.
PITTSBURGH, PA. (8XK).—Address, 7712 Pennsylvania Avenue.
POLYTECHNIC, MONT. (7XD).—Strike out all particulars.
PORTLAND, OREG. (7XA).—Strike out all particulars.
RICHFIELD, UTAH. (6ZH).—Strike out all particulars.
RICHMOND, VA. (3ZP).—Address, 2112 East Clay Street.
SAN DIEGO, CALIF. (6XZ).—Strike out all particulars.
SAN FRANCISCO, CALIF. (6XT).—*Read* Vernon, Calif.; address, 604 Mission Street, San Francisco, Calif.
SANFORD, FLA. (5ZH).—Strike out all particulars.
SCHENECTADY, N. Y. (2XQ).—W. l., *200*, 375, variable.
SOUTH MANCHESTER, CONN. (1XT).—Strike out all particulars.
SOUTH SAN ANTONIO, TEX. (5XI).—Station controlled by Max E. Schneider, Kelly Field, Tex.
TUCSON, ARIZ. (5YP).—Call signal changed to 6YB.
WASHINGTON, D. C. (3ZW).—W. l., 100, 150, *200*, 250.

MISCELLANEOUS.

LOCALIZED RADIO LANDING SIGNALS FOR AIRPLANES.

Radio direction finders and other radio devices have been in use for some time to assist airplanes to land during the night, during fog, or at other time of poor visibility. The most usual method of using radio for this purpose is to transmit from an ordinary elevated antenna at the landing field radio signals which are received on a direction finder located on the airplane. On small planes the direction finder may be simply a coil of wire wound on the fuselage; in larger planes a small rotatable coil may be mounted vertically aft in the plane. This method gives the direction of the landing field, but does not give accurate information as to its distance when the plane is near the landing field.

Several years ago the Bureau of Standards was called upon to develop a method to assist airplanes to accurately locate the landing field when the airplane was quite near. It was desired to develop a method which would give a good signal which would be easily audible over a comparatively large area when the airplane was at comparatively high altitudes, but would be localized within a small area when the airplane was near the ground. The accurate location of the landing field is very important when near the ground.

A method of induction signaling was first tried, using 500-cycle alternating current. This current flowed through a large horizontal single-turn coil, 600 by 800 feet, at the landing field. The coil was tuned to 500 cycles, so that a large current flowed. For the induction signaling the reception on the airplane was made using horizontal coils wound on the lower wings of the airplane. It was found that this method gave a signal which was audible over a wide area when the airplane was near the ground, but was confined to a small area when the airplane was at an elevation of about a mile. This was not satisfactory.

The use of radio-frequency waves was therefore undertaken. Two horizontal coils were placed one above the other. The coils were identical in construction, and placed so that their axes coincided. The current in one coil flowed in a direction opposite to the current in the other coil. A fairly high radio frequency, suitable for direction-finding work, such as 300 kilocycles, was used.

A calculation was made which indicated that the signals radiated from the two coils would be strongest for an airplane flying in a given horizontal plane, whenever the plane was inside a comparatively small ring-shaped area located above the landing field. After the coils had been constructed a careful experimental investigation was made under actual flying conditions, and the results of this calculation were verified. Signals were received on the airplane only when it was nearly above and in the immediate vicinity of the landing field. A Curtiss Type R plane was used for the experimental work for both the induction signaling and the radio signaling.

The Bureau of Standards has just published a paper giving the theory of the radiation from an antenna consisting of two horizontal coils, as used in this work. It is found that if a vertical coil antenna is used for reception on the airplane and if the airplane flies horizontally, the maximum signal is received when the line joining the airplane to the transmitting coils makes an angle of 30° with the vertical, assuming that the effect of the earth is negligible. The region of space within which the signal can be detected by receiving instruments of given sensibility has nearly the form of the space between two inverted coaxial vertical circular cones of finite length having their common apex at the transmitting station. The upper limit of the region within which the signal is audible depends on the sensitivity of the receiving apparatus and is not as clearly defined as the bounding conical surfaces. The signal vanishes when the airplane is directly over the transmitting station, and vanishes rather soon after the airplane passes over the region of maximum signal and flies away from the transmitting station.

The effect on the transmission of having a perfectly conducting earth directly under the transmitting coils has also been investigated, and it has been found that in this case a maximum signal is obtained when the line joining the airplane to the transmitting station makes an angle of 26° 34′ with the vertical. It is expected that these theoretical studies will be very useful in the design of radio transmitting stations for sending localized landing signals to airplanes.

The results of these investigations are given in Bureau of Standards Scientific Paper No. 431, "The Field Radiated from Two Horizontal Coils," by Gregory Breit. A copy may be purchased for 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.—*Submitted by Bureau of Standards.*

A RADIO RELAY RECORDER.

Recording devices have been used for many years in wire and cable telegraphy, but it has only been within the last few years that their use has been extended to radiotelegraphy. The very small amount of energy in a received radio signal, usually only a few microwatts, has made it difficult to construct recorders which would operate from radio signals.

In the last few years several devices have been developed for recording radio signals. One type is photographic and is expensive in operation. Another type uses a sensitive air jet. A third is an electron tube device which operates at the critical point of the characteristic curve of the tube, where the tube is just on the verge of oscillation. These are all very sensitive devices and are designed to operate on currents of a milliampere or less. Their mechanical systems are therefore delicate and require careful adjustment. In some types very sensitive relays are used.

There has recently been developed at the Bureau of Standards a type of recorder which differs from those heretofore available, in that larger currents of the order of 5 milliamperes or more are used, and the whole apparatus is therefore more rugged. Currents of this strength are obtained by amplifying the feeble received signals by the use of the electron tube amplifier. Electrical tuning to the audio frequency which is being received is employed. This relay has been made possible by the development of the electron tube amplifier as a reliable radio instrument suitable for use in engineering practice and not simply as a laboratory instrument. With a cur-

rent of 5 milliamperes or more available, it is possible to use an ordinary telegraph relay, which possesses rugged construction and does not require careful and repeated adjustment for operation. With 5 milliamperes a strong and positive action is obtained.

The received signal after amplification is delivered through a tuned audio-frequency transformer to the plate circuit of an electron tube in which is connected the windings of a high-resistance telegraph relay. A condenser having a capacity of about 1 microfarad is shunted across the relay windings. The movement of the armature of the relay may be made to operate any desired mechanism, such as the usual ink-tape register or other apparatus. The relay may therefore be used for remote control of boats or other vehicles.

The selectivity of the apparatus is greatly increased by the use of audio-frequency tuning of the secondary circuit of the input transformer. This makes duplex operation possible. By the use of two such relays operated in series from the output of the same amplifier, simultaneous records have been made of two messages sent at the same time on slightly different wave lengths. On a double-pen register, with one antenna, simultaneous records have been made of the marking wave and the spacing wave of Annapolis by proper audio-frequency tuning.

This relay has been so constructed that all of the power required for operating the electron tube circuits may be obtained from lighting mains carrying 110-volt, 60-cycle, alternating current. If such alternating current power is not available, the relay is also constructed so as to operate from batteries connected to the proper terminals provided for this purpose.

This device has many applications:

1. Code messages may be received on tape, and the necessity for an experienced operator therefore eliminated. News, market, and weather reports and other material broadcasted by radiotelegraph at fairly high speeds may be received on tape and read by an operator of comparatively little experience.

2. A call system may be used, thus avoiding the necessity of a constant watch being kept by an operator.

3. In line-radio telegraphy a sounder may be operated from the signal transmitted by radio-frequency currents, thus making it unnecessary for the Morse operator to read signals received on a telephone receiver.

4. Any form of mechanism may be operated by radio for the remote control of a moving body. Thus this relay can be used for controlling an automobile, a boat, or an airplane.

5. By means of two recorders of this type connected in series simultaneous reception may be made of two messages on the same antenna.

6. Interference from strays is somewhat reduced by the audio-frequency tuning.

A complete description of this recorder may be found in a paper by F. W. Dunmore, "A relay recorder for remote control by radio," published in the April (1922) issue of the Journal of the American Institute of Electrical Engineers.—*Submitted by Bureau of Standards.*

ELEMENTARY RADIO PUBLICATIONS.

The Signal Corps has published two pamphlets which will be found of interest by any person who desires an elementary discussion of electricity and radio.

Signal Corps Radio Communication Pamphlet No. 1, "Elementary Principles of Radio Telegraphy and Telephony," is a pamphlet of 79 pages which presents in simple language the fundamental principles of radio communication and discusses the operation of the more important methods and apparatus for transmitting and receiving, including spark gaps, arcs, electron tubes, crystal detectors, regenerative reception, and radio telephony. The use of the electron tube as a generator, detector, and amplifier, and in beat reception, is discussed. No mathematics is used. The pamphlet contains 56 explanatory figures, many of which are circuit diagrams. A

copy of this pamphlet may be purchased for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Signal Corps Training Pamphlet No. 1, "Elementary Electricity," is a pamphlet of 52 pages which presents the fundamental facts of electricity and magnetism. It includes discussions of the flow of the electric current, the action of electric charges, the magnetic field, electromagnetism, batteries, and the action of dynamos. There are 37 explanatory figures and a number of illustrative problems. A copy may be purchased for 15 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.—*Submitted by Bureau of Standards.*

A METHOD OF MEASURING COIL CAPACITIES AND STANDARDIZING WAVE METERS.

In any laboratory in which accurate radio measurements are made it is important to have available exact methods of measuring and comparing frequencies. A method of accomplishing this result has been developed at the Bureau of Standards.

This paper describes a method of adjusting the frequencies of two alternating currents accurately to a ratio which is known. It may be used for the measurement of capacities of inductance coils and for standardizing wave meters, because in both of these an accurate knowledge of frequencies is required.

It is often observed that if a detector is placed in the neighborhood of two radio-frequency electron tube generating sets a musical note is heard in a pair of telephone receivers connected in the detector output even if the frequencies of the two generating sets are not near equality. A measurement of the frequencies of both generating sets reveals the fact that if the note is heard the ratio of the frequencies is very nearly that of two small whole numbers. The reason which makes the musical note appear when the two frequencies are nearly in this ratio is the distortion in the current of the detector circuit caused by the rectifying properties of the detector and at times the distortion of the wave form of the oscillator itself—that is, the action of the detector is to introduce various harmonics. The method used depends on this fact.

The harmonics produced by a circuit of adjustable frequency are made to give beats with the fundamental of a circuit of fixed frequency. The beats are rectified and amplified and are heard as a musical note. When the beat frequency is zero, the ratio of the frequencies is exactly a whole number. This whole number may be made very large, as, for example, 100.

The paper describes the method in detail, and gives applications to frequency standardization and the measurement of coil capacities.—*Submitted by Bureau of Standards.*

VIOLATION OF REGULATIONS.

A number of complaints of violation of article 2 of the International Convention Service Regulations by radio operators on board American vessels have been recently received from Canadian direction-finding stations. This article prohibits the use of 800 meters for commercial traffic; 800 meters should be used only for obtaining radio compass bearings.

The attention of all ship radio operators is invited also to article 35 of the International Convention Service Regulations, which requires shipboard stations to transmit their messages to the nearest coast station. Several foreign land stations have reported American ship stations for violation of this regulation.

Any operator violating these regulations may have his license suspended or revoked.

ALASKAN STATIONS OPENED.

The following-named stations in Alaska opened for the season as follows:

Ikutan (KXW), March 14, 1922.
False Pass (KJL), March 13, 1922.
Yakutat (KKA), March 16, 1922.
Port Walter, Alaska (KEQ), April 2, 1922.
Port Altherp, Alaska (KJW), April 3, 1922.

DAILY POSITION OF VESSELS BY RADIO.

The following information was furnished by the assistant traffic manager of the Radio Corporation of America:

"Mariners are advised that their daily ship position reports may be forwarded without charge if addressed to one of the radio stations given below:

Station.	Call signal.	Station.	Call signal.
Chatham, Mass. (Cape Cod)	WCC	New York, N. Y	WNY
Siasconset, Mass.	WSC	Cape May, N. J	WCY
New London, Conn.	WLC	San Francisco, Calif.	KPH

"Such reports are now being printed on the marine pages of several of the daily newspapers on the Atlantic and Pacific coasts."—*From Hydrographic Bulletin, March 22, 1922.*

DATE ON WHICH AN OBSTRUCTION IS SIGHTED.

The attention of shipmasters is invited to the fact that it is very desirable to know the date when ice and other obstructions reported by radio from ship to ship were sighted. Many reports of this kind come to the Hydrographic Office bearing only the date of the radiogram and lacking the date when the obstruction was seen. Cooperation in supplying this additional fact will assist the work of this office and will be thankfully appreciated.—*From Hydrographic Bulletin, March 22, 1922.*

CHANGE IN RATES FOR NAVAL STATIONS.

The notice regarding "Change in rates for naval stations," published in the Radio Service Bulletin for September, 1921, is canceled and the following should be substituted.

Effective November 1, 1921, the delivery rates for traffic destined to points in Panama via naval radio stations in the Canal Zone will be as follows: For the first 10 words (or fraction thereof), 20 cents. For each additional word in excess of 10, 1 cent per word. The foregoing are the land-line delivery rates and are in addition to the published rates for radio reception by the various naval radio stations in the Canal Zone.

RADIO WEATHER REPORT BY KARLSBORGS, SWEDEN, STATION.

From March 15, 1922, Karlsborgs Radio Station (call letters SAJ) will transmit daily at 12.15, G. M. T., on a 2,500-meter wave length, a weather report compiled by the Meteorologic-Hydrographic Office in Stockholm. The report is divided into four parts:

Part I.—Meteorological observations at 7, G. M. T., same day, from the following seven stations:

Station.	Code letter.	Position.
Røst	R	Lat., 67° 30' N.; long., 12° 04' E.
Kinn	K	Lat., 61° 34' N.; long., 4° 47' E.
		Lat., 59° 18' N.; long., 4° 53' E.
Hanstholm	Hm	Lat., 57° 07' N.; long., 8° 36' E.
Vinga	V	Lat., 57° 38' N.; long., 11° 36' E.
Hasmaerskär (Bornholm)	Hs	Lat., 55° 16' N.; long., 14° 47' E.
Gotska Sandön	G	Lat., 58° 25' N.; long., 19° 11' E.
Bremö	B	Lat., 62° 33' N.; long., 17° 44' E.

The observations, which are preceded by the word "Weatherreport," are transmitted in two groups of five symbols each for every station, thus: BBBDD FvTTS.

"BBB" signifies the barometer reading given in millimeters and tenths of millimeters.

"DD" signifies the direction of the wind, in points, reckoned from the north, as:

02—Wind from NNE.	18—Wind from SSW.
04—Wind from NE.	20—Wind from SW.
06—Wind from ENE.	22—Wind from WSW.
08—Wind from E.	24—Wind from W.
10—Wind from ESE.	25—Wind from WNW.
12—Wind from SE.	28—Wind from NW.
14—Wind from SSE.	30—Wind from NNW.
16—Wind from S.	32—Wind from N.

00—Calm.

"F" signifies the force of the wind according to the Beaufort scale, given in one symbol. When the force is over 9, the figure 9 is given and the real force is given at the end of the information for the station concerned, preceded by the word "storm"; for example, "Force 11, storm 11."

"v" signifies the weather at the time of observation, as:

0—Clear sky.	5—Rain.
1—Almost clear.	6—Snow.
2—Half clear.	7—Haze.
3—Almost overcast.	8—Fog.
4—Overcast.	9—Thunder.

"TT" signifies the air temperature in whole degrees. The temperature under 0° is given by increasing the number indicating the temperature by 50. For example, 01 signifies +1°; 51 signifies −1°, etc.

"s" signifies the state of the sea according to the following scale:

0—No swell, smooth sea.	5—Heavy swell, moderate sea.
1—Moderate swell, smooth sea.	6—Rather high sea.
2—Heavy swell, smooth sea.	7—High sea.
3—No swell, moderate sea.	8—Very high sea.
4—Moderate swell, moderate sea.	9—Extraordinary high sea.

The letter "x" will replace a symbol to indicate missing data.

Example of Part I:

"Weatherreport R 67020 60515

"K 65808 50573 U 65520 10582

"Hm 62404 4461x V 62004 3166x

"Hs 56232 2661x G 59204 8364x" means:

"The following observations were made to-day at 7 a. m., G. M. T.

Point of observation.	Barometer.	Wind.		Weather.	Temperature.	State of the sea.
		Direction.	Force.			
Roxt	767.0	SW.	6	Clear	− 1°	Heavy swell, moderate sea.
Kitta	765.8	E.	5	Clear	− 7°	No swell, moderate sea.
Utsire	765.5	SW.	1	Clear	− 9°	Heavy swell, smooth sea.
Hanstholm	762.4	NE.	4	Overcast	−11°	
Vinga	763.0	NE.	3	Almost clear	−16°	
Hammerdiup	756.2	N.	2	Snow	−11°	
Gotska Sandön	759.2	NE.	8	Almost overcast	−14°	
Bremö	(No reports.)					

Part II.—Division by atmospheric pressure and changes of atmospheric pressure in Europe at 7, G. M. T., will be given the same day in a short report in the English language.

Part III.—Weather forecasts for the next 24 hours will be given for the following four districts and preceded by the word "*Forecasts*":

Eastern part of the North Sea (code letter), N.
West coast of Sweden (code letter), V.
Baltic Sea (code letter), Oe.
Gulf of Bothnia (code letter), B.

It will be given in groups of symbols, thus: "ddynt" for each district.

"dd" signifies the forecast of the wind according to the following table:

Wind.	From a direction between—								
	N.–E.	NE.–SE.	E.–S.	SE.–SW.	S.–W.	SW.–NW.	W.–N.	NW.–NE.	Variable.
Light	01	06	11	16	21	26	31	36	41
Moderate	02	07	12	17	22	27	32	37	42
Fresh	03	08	13	18	23	28	33	38	43
Strong	04	09	14	19	24	29	34	39	44
Storm	05	10	15	20	25	30	35	40	45

00—Very light wind or calm.

"y" signifies forecasts regarding changes in the wind's force, or strength, according to the following table:

0—No change can be given.
1—Unchanged.
2—Increasing.
3—Decreasing.
4—Shifting to the right.
5—Shifting to the left.
6—Gradually increasing.
7—Gradually decreasing.
8—Gradually shifting to the right.
9—Gradually shifting to the left.

"n" signifies forecasts regarding rainfall, according to the following scale:

0—Clear weather.
1—None or insignificant rainfall.
2—Rainfall at a few places.
3—Rainfall at scattered places.
4—Rainfall at several places.
5—General rainfall.
6—Showers at several places (snow in winter).
7—Showers at scattered places (snow in winter).
8—Showers at a few places (snow in winter.)
9—Probable fog.

"t" signifies forecasts regarding changes of temperature, according to the following scale:

0—Unchanged.
1—Rising.
2—Gradually rising.
3—Falling.
4—Gradually falling.
5—About mean temperature.
6—Above mean temperature (more than 3°).
7—Below mean temperature (more than 3°).
8—Probable thaw.
9—Probable frost.

The letter "x" will replace a symbol to indicate missing data.

Example of Part III:

"Forecasts N 02812 V 03200 Oe 04250" means—

"Forecasts until to-morrow noon:

"Eastern part of the North Sea:

"Moderate wind from a direction between north and east, gradually shifting to the right. None or insignificant rainfall. Temperature gradually rising.

"West coast of Sweden:

"Fresh wind between north and east, increasing. Clear weather. Temperature unchanged.

"Baltic Sea:

"Strong wind between north and east, increasing. General rainfall. Temperature unchanged.

"Gulf of Bothnia:

"No report."

Part IV.—Storm warnings valid until 7 a. m., G. M. T., of the following day will be transmitted in a group of five symbols, thus: GGGGG

The group will be preceded by the word "Gale warning."

First symbol concerns the Skagerrak.

Second symbol concerns the Kattegatt.

Third symbol concerns the southern part of the Baltic.

Fourth symbol concerns the northern part of the Baltic.

Fifth symbol concerns the Gulf of Bothnia.

"g" signifies the storm warning according to the following scale:

0—No storm warning.
1—Gale (7–10 Beaufort) from a direction between north and west.
2—Gale (7–10 Beaufort) from a direction between south and west.
3—Gale (7–10 Beaufort) from a direction between north and east.
4—Gale (7–10 Beaufort) from a direction between south and east.
5—Gale (7–10 Beaufort) without given direction.
6—Storm (11–12 Beaufort) from a direction between north and west.
7—Storm (11–12 Beaufort) from a direction between south and west.
8—Storm (11–12 Beaufort) from a direction between north and east.
9—Storm (11–12 Beaufort) from a direction between south and east.

The letter "x" will replace a symbol to indicate missing data.

Example of Part IV:

"Gale warning 3033x," means—

"Storm warning valid until 7 a. m., G. M. T., to-morrow:

"Skagerrak—Gale (7–10 Beaufort) from a direction between north and east.

"Kattegatt—No storm warning.

"South part of Baltic—Gale (7–10 Beaufort) from a direction between north and east.

"North part of Baltic—Gale (7–10 Beaufort) from a direction between north and east.

"Gulf of Bothnia—Missing data."

B. When necessary, storm warnings and other dangers to navigation will be transmitted on a 600-meter wave length:

For Skagerrak } From Gothenburgs Radio Station, call letters SAB, at 17 and
For Kattegatt } 22 G. M. T.
For South part of Baltic } From Vaxholm Radio Station, call letters SAF, at
For North part of Baltic } 16.50 and 21.50 G. M. T.
For Gulf of Bothnia from Harnösand Radio Station, call letters SAH, at 16.55 and 21.55 G. M. T.

The storm warnings, which are preceded by the signal — — — — (TTT), are transmitted in the English language.

The reports regarding light vessels, buoys, and wrecks, and information regarding ice and navigating conditions, will follow the Weather Report instead of at 20 G. M. T., in the order named.—*From Hydrographic Bulletin, Mar. 29, 1922.*

RADIO PRATIQUE FOR MERCHANT VESSELS.

The following is a copy of Circular No. 626-10, issued by the Executive Office, The Panama Canal, February 17, 1922:

"Hereafter ships with clean bills of health, from noninfected ports, and without sickness on board, intending to transit the canal without taking supplies or stores of any kind or landing passengers or cargo, may be granted pratique by radio under the following conditions:

"(a) By making application therefor by radio between the hours of 8 a. m. and 4 p. m. Such application to state—

"(1) That the vessel has a clean bill of health and has no sickness on board.

"(2) Names of ports and places visited within the past ten days.

"(3) That the vessel intends to transit the canal without taking stores of any kind or landing passengers or cargo.

"(b) Radio will be addressed to Chief Quarantine Office, through port captain.

"(c) Pratique will not be considered as granted until reply has been received from port captain, 'Chief quarantine officer grants pratique.'"—*From Hydrographic Bulletin, March 15, 1922.*

REGULATIONS PERTAINING TO THE RADIO BROADCASTING OF WEATHER, CROP, AND MARKET INFORMATION.

1. Forecasts, warnings, and weather reports issued by the Weather Bureau and crop and market reports issued or approved by the Bureau of Markets and Crop Estimates shall be broadcast only from radio stations authorized and licensed to do so by the Bureau of Navigation, Department of Commerce.

2. Broadcasting of weather forecasts and information and crop and market reports shall be confined to radio stations properly equipped for the work and operated by persons holding a commercial second-class or a higher grade of license.

3. No plant will be licensed by the Bureau of Navigation to disseminate weather forecasts and information or crop and market reports, except on the approval of the Chief of the Weather Bureau and of the Chief of the Bureau of Markets and Crop Estimates, respectively.

4. The call letter and location of the station and the official authenticity of the information shall be announced preliminary to each broadcast, and is approximately as follows.

This is located at . The weather forecast and reports issued by the U. S. Weather Bureau are as follows; or, market and crop reports, approved by the Bureau of Markets and Crop Estimates, are as follows:

5. The laws pertaining to the issuance of weather forecasts shall be observed. Violators of the following law will be prosecuted.

SEC. 61. Whoever shall knowingly issue or publish any counterfeit weather forecast or warning of weather conditions falsely representing such forecast or warning to have been issued or published by the Weather Bureau, United States Signal Service, or other branch of the Government service, shall be fined not more than five hundred dollars, or imprisoned not more than ninety days, or both. (Act of March 4, 1909, C 321, 35 Stat., 1088.)

6. All broadcasts shall be according to schedules approved by the Weather Bureau or by the Bureau of Markets and Crop Estimates. No forecasts based on a. m. observations shall be broadcast after 7 p. m. of the same day; no special warnings based on special observations shall be broadcast after midnight of the same day; and no forecasts or warnings based on p. m. observations shall be sent after 7 a. m. of the succeeding day, 75th meridian time applying in all cases.

7. Stations authorized to broadcast official weather forecasts and information and crop and market reports will use a wave length of 485 meters unless otherwise licensed to do so by the Bureau of Navigation, Department of Commerce. This special wave length shall be used for no other purpose.

8. License to broadcast weather forecasts and information and crop and market reports shall be revocable at any time that it may be in the public interest to do so.—*Submitted by Department of Agriculture.*

HOW CAN THE RADIO SERVICE BULLETIN BE MADE MORE VALUABLE TO YOU?

The Bureau of Navigation would like to have any practical suggestions which would be helpful in making this publication of greater value to its readers.

RADIO BROADCASTING.

At the present time two wave lengths are assigned for broadcasting—the wave length of 485 meters for Government reports, such as crop and market estimates and weather forecasts furnished by the Department of Agriculture; the wave length of 360 meters for important news, items, entertainment, lectures, sermons, and similar matter.

Stations conducting this service must have limited commercial licenses and be operated by radio operators licensed by the Department of Commerce holding commmercial second-class licenses or higher.

Applications for licenses should be made through the radio inspector of the district in which the station is situated.

The radio inspection districts are as follows:

1. Headquarters, Boston, Mass. (radio inspector, customhouse): Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

2. Headquarters, New York, N. Y. (radio inspector, customhouse): New York (County of New York, Staten Island, Long Island, and counties on the Hudson River to and including Schenectady, Albany, and Rensselaer) and New Jersey (Counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).

3. Headquarters, Baltimore, Md. (radio inspector, customhouse): New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.

4. Headquarters, Savannah, Ga. (the work of this district is being performed by the radio inspector of the third district, customhouse, Baltimore, Md.): North Carolina, South Carolina, Georgia, Florida, Porto Rico.

5. Headquarters, New Orleans, La. (radio inspector, customhouse): Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.

6. Headquarters, San Francisco, Calif. (radio inspector, customhouse): California, Hawaii, Nevada, Utah, Arizona.

7. Headquarters, Seattle, Wash. (radio inspector, 2301 L. C. Smith Building): Oregon, Washington, Alaska, Idaho, Montana, Wyoming.

8. Headquarters, Detroit, Mich. (radio inspector, Federal Building): New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (lower peninsula).

9. Headquarters, Chicago, Ill. (radio inspector, Federal Building): Indiana, Illinois, Wisconsin, Michigan (upper peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

AMATEUR RADIO OPERATOR'S LICENSE SUSPENDED.

First-grade amateur radio operator's license No. 22358 has been suspended for a period of three months on account of the holder of the license violating regulation 133, in that he failed to wait three months between examinations.

List of stations broadcasting market or weather reports (485 meters) and music, concerts, lectures, etc. (360 meters).

Owner of station.	Location of station.	Wave lengths.	Call signal.
Alabama Power Co.	Birmingham, Ala.	360	WSY
Allen, Preston D.	Oakland, Calif.	360	KZM
Altadena Radio Laboratory	Altadena, Calif.	360	KGO
American Radio & Research Corporation	Medford Hillside, Mass.	360	WGI
Atlanta Constitution	Atlanta, Ga.	360, 485	WQAM
Atlanta Journal	....do.	360, 485	WSB
Atlantic-Pacific Radio Supplies Co.	Oakland, Calif.	360	KZY
Bamberger & Co., L.	Newark, N. J.	360	WOR
Bible Institute of Los Angeles	Los Angeles, Calif.	360	KJS
Church of the Covenant	Washington, D. C.	360	WDM
Chicago, city of	Chicago, Ill.	360	WBU
Clark University	Worcester, Mass.	360, 485	WCN
Columbia Radio Co.	Youngstown, Ohio.	360	WMC
Continental Electrical Supply Co.	Washington, D. C.	360	WIL
Conradio Co.	Wichita, Kans.	360, 485	WEY
Cox, Warren R.	Cleveland, Ohio.	360	WHK
Crosley Manufacturing Co.	Cincinnati, Ohio.	360	WLW
Daily News Printing Co.	Canton, Ohio.	360	WWR
Dallas, city of	Dallas, Tex.	360, 485	WRR
DeForest Radio Telephone & Telegraph Co.	New York, N. Y.	360	WJX
Detroit News	Detroit, Mich.	360, 485	WWJ
Detroit Police Department	....do.	360	KOP
Doerr-Mitchell Electrical Co.	Spokane, Wash.	360	KFZ
Dorgi Brothers Electrical Co.	Hamilton, Ohio.	360	WRK
Doubleday-Hill Electrical Co.	Pittsburgh, Pa.	360	KQV
Do.	Washington, D. C.	360	WMU
Dueck Co., William B.	Toledo, Ohio.	360	WHU
Dunn & Co., J. J.	Pasadena, Calif.	360	KLB
Electric Equipment Co.	Erie, Pa.	360	WJT
Electric Lighting Supply Co.	Hollywood, Calif.	360	KGC
Electric Power & Appliance Co.	Yakima, Wash.	360	KQT
Emporium, The	San Francisco, Calif.	360	KSL
Erie Radio Co.	Erie, Pa.	360	WsX
Examiner Printing Co.	San Francisco, Calif.	360	KGO
Fair, The	Chicago, Ill.	360	WQJ
Federal Institute of Radio Telegraphy	Camden, N. J.	360	WR3
Federal Telephone & Telegraph Co.	Buffalo, N. Y.	360, 485	WGR
Ford Motor Co.	Dearborn, Mich.	360	WWI
Fort Worth Record	Fort Worth, Tex.	360	WPA
Foster-Bradbury Radio Store	Yakima, Wash.	360	KFV
General Electric Co.	Schenectady, N. Y.	360	WGY
Gilbert Co., A. C.	New Haven, Conn.	360	WCJ
Gimbel Brothers	Philadelphia, Pa.	360	WIP
Gould, C. O.	Stockton, Calif.	360	KJQ
Hallock & Watson Radio Service	Portland, Oreg.	360	KOG
Hamilton Manufacturing Co.	Indianapolis, Ind.	360	WLK
Hatfield Electric Co.	....do.	360	WOH
Hawley, Willard P., jr.	Portland, Oreg.	360	KYG
Herrold, Charles D.	San Jose, Calif.	360	KQW
Hobrecht, J. C.	Sacramento, Calif.	360	KVQ
Howlett, Thomas F. J.	Philadelphia, Pa.	360	WGL
Hunter, L. M., and G. L. Carrington	Little Rock, Ark.	360	WSY
Hurlburt-Still Electrical Co.	Houston, Tex.	360, 485	WEY
Interstate Electric Co.	New Orleans, La.	360	WGV
Iowa Radio Corporation	Des Moines, Iowa	360	WHX
J. & M. Electric Co.	Utica, N. Y.	360	WSL
K. & L. Electric Co.	McKeesport, Pa.	360	WIK
Kariowa Radio Co.	Rock Island, Ill.	360, 485	WOC
Kennedy Co., Colin B.	Los Altos, Calif.	360	KLP
Kieruff & Co., C. R.	Los Angeles, Calif.	360	KHJ
Kluge, Arno A.	....do.	360	KQL
Kraft, Vincent J.	Seattle, Wash.	360, 485	KJR
Lindsey-Weatherill & Co.	Reedley, Calif.	360	KMC
Love Electric Co.	Tacoma, Wash.	360	KMO
Loyola University	New Orleans, La.	360	WWL
Maxwell Electric Co.	Berkeley, Calif.	360	KRE
May (Inc.), D. W.	Newark, N. J.	360	WBS
McBridge, George M.	Bay City, Mich.	360	WTP
McCarthy Bros. & Ford	Buffalo, N. Y.	360	WWT
Metropolitan Utilities District	Omaha, Nebr.	360, 485	WOU
Meyberg Co., Leo J.	Los Angeles, Calif.	360, 485	KYJ
Do.	San Francisco, Calif.	360, 485	KDN
Midland Refining Co.	El Dorado, Kans.	485	WAH
Do.	Tulsa, Okla.	485	WEH
Missouri State Marketing Bureau	Jefferson City, Mo.	485	WOS
Montgomery Light & Power Co.	Montgomery, Ala.	360, 485	WGH
Mulrony, Markus A.	Honolulu, Hawaii.	360	KGU
Newspaper Printing Co.	Pittsburgh, Pa.	360	WPB
Noggle Electric Works	Monterey, Calif.	360	KLN

List of stations broadcasting market or weather reports (485 meters) and music, concerts, lectures, etc. (360 meters)—Continued.

Owner of station.	Location of station.	Wave lengths.	Call signal.
Northern Radio & Electric Co	Seattle, Wash	360	KFC
Northwestern Radio Manufacturing Co	Portland, Oreg	360	KGN
Nushawg Poultry Farm	New Lebanon, Ohio	360	WPG
Oklahoma Radio Shop	Oklahoma City, Okla	360, 485	WKY
Oregonian Publishing Co	Portland, Oreg	360	KGW
Palladium Printing Co	Richmond, Ind	360, 485	WOZ
Paris Radio Electric Co	Paris, Tex	360	WFK
Pine Bluff Co	Pine Bluff, Ark	360	WOK
Pomona Fixture & Wiring Co	Pomona, Calif	360	KGF
Portable Wireless Telephone Co	Stockton, Calif	360	KWG
Post Dispatch	St. Louis, Mo	360	KSD
Precision Equipment Co	Cincinnati, Ohio	360, 485	WMH
Precision Shop, The	Gridley, Calif	360	KFU
Radio Construction & Electric Co	Washington, D. C	360	WDW
Radio Corporation of America	Roselle Park, N. J	360	WDY
Radio Telephone Shop, The	San Francisco, Calif	360	KYY
Radio Shop, The	Sunnyvale, Calif	360	KJJ
Register & Tribune, The	Des Moines, Iowa	360	WGF
Reynolds Radio Co	Denver, Colo	360, 485	KLZ
Ridgewood Times Printing & Publishing Co	Ridgewood, N. Y	360	WHN
Riechmann-Crosby Co	Memphis, Tenn	360, 485	WKN
Rike-Kumler Co	Dayton, Ohio	360, 485	WFO
Rochester Times Union	Rochester, N. Y	360, 485	WHQ
St. Louis University	St. Louis, Mo	485	WEW
St. Martins College (Rev. S. Ruth)	Lacey, Wash	360	KGY
San Joaquin Light & Power Corporation	Fresno, Calif	360	KMJ
Seeley, Stuart W	East Lansing, Mich	485	WHW
Service Radio Equipment Co	Toledo, Ohio	360	WJK
Ship Owners Radio Service	New York, N. Y	360	WDT
Shuster Radio Manufacturing Co	Albany, N. Y	360	WNJ
Southern Electrical Co	San Diego, Calif	360	KDPT
Southern Radio Corporation	Charlotte, N. C	360	WBT
Strawbridge & Clothier	Philadelphia, Pa	360	WFI
Stubbs Electric Co	Portland, Oreg	360	KQY
Tarrytown Radio Research Laboratory	Tarrytown, N. Y	360	WRW
Union College	Schenectady, N. Y	360	WRL
United Equipment Co	Memphis, Tenn	360	WPO
University of Illinois	Urbana, Ill	360	WRM
University of Minnesota	Minneapolis, Minn	360, 485	WLB
University of Texas	Austin, Tex	360, 485	WCM
University of Wisconsin	Madison, Wis	360, 485	WHA
West Virginia University	Morgantown, W. Va	360	WHD
Wanamaker, John	Philadelphia, Pa	360	WOO
Do	New York, N. Y	360	WWZ
Warner Brothers	Oakland, Calif	360	KLS
Warner, Louis	Seattle, Wash	360	KHQ
Western Radio Co	Kansas City, Mo	360, 485	WOQ
Western Radio Electric Co	Los Angeles, Calif	360	KOG
Westinghouse Electric & Manufacturing Co	East Pittsburgh, Pa	360	KDKA
Do	Chicago, Ill	360, 485	KYW
Do	Newark, N. J	360	WJZ
Do	Springfield, Mass	360	WBZ
White & Boyer Co	Washington, D. C	360	WJH
Williams, Thomas J	do	360	WPM
Wireless Telephone Co. of Hudson County, N. J	Jersey City, N. J	360	WNP
Yeiser, John D., jr	Omaha, Nebr	360	WDV
Young Men's Christian Association	Denver, Colo	485	KOA
Zamolski Co., Joseph M	Baltimore, Md	360	WEC
SUPPLEMENTAL LIST—FROM APR. 1 TO APR. 15, 1922.			
Aldrich Marble & Granite Co., C. F	Colorado Springs, Colo	485	KHD
Anthony, Earl C	Los Angeles, Calif	360	KFI
Arrow Radio Laboratories	Anderson, Ind	360	WMA
Auburn Electrical Co	Auburn, Me	360	WMB
Beacon Light Co	Los Angeles, Calif	360	KNR
Benwood Co	St. Louis, Mo	360	WKB
Blue Diamond Electric Co	Hood River, Oreg	360	KQP
Braun Corporation	Los Angeles, Calif	360	KXS
Buckeye Radio Service Co	Akron, Ohio	360	WOE
Bush, James L	Tuscola, Ill	360	WDZ
Central Radio Co	Kansas City, Mo	360	WPE
City Dye Works & Laundry Co	Los Angeles, Calif	360	KUS
Commonwealth Electric Co	St. Paul, Minn	360	WAAH
Cooper, Irving S	Los Angeles, Calif	360	KZI
Eastern Radio Institute	Boston, Mass	360	WAAJ
Electric Supply Co	Clearfield, Pa	360	WPI
Elliott Electric Co	Shreveport, La	360	WAAG
Fergus Electric Co	Zanesville, Ohio	360	WPL
Findlay Electric Co	Minneapolis, Minn	360	WCE
Gimbel Brothers	Milwaukee, Wis	360	WAAK
Graves-Thornton Hardware Co	Huntington, W. Va	360	WAAR
Herald Publishing Co	Modesto, Calif	360	KXD
Hollister-Miller Motor Co	Emporia, Kans	360	WAAZ

List of stations broadcasting market or weather reports (485 meters) and music, concerts, lectures, etc. (360 meters)—Continued.

Owner of stations.	Location of station.	Wave lengths.	Call signal.
SUPPLEMENTAL LIST—FROM APR. 1 TO APR. 15, 1922—continued.			
Holzwasser (Inc.)	San Diego, Calif.	360	KON
Howe, Richard H.	Granville, Ohio	360	WID
Kansas State Agricultural College	Manhattan, Kans.	485	WTG
Los Angeles Examiner	Los Angeles, Calif.	360	KWH
Minnesota Tribune Co. and Anderson-Beamish Co.	Minneapolis, Minn.	360	WAAL
Modesto Evening News	Modesto, Calif.	360	KOQ
Mullins Electric Co., Wm. A.	Tacoma, Wash.	360	KGB
Nelson Co., I. R.	Newark, N. J.	360	WAAM
New England Motor Sales Co.	Greenwich, Conn.	360	WAAQ
New Mexico College of Agriculture & Mechanical Arts.	State College, N. Mex.	360, 485	KOB
Frost & Dean Radio Research Laboratory	Long Beach, Calif.	360	KSS
Purdue University	West Lafayette, Ind.	360	WBAA
Radio Service Co.	Charleston, W. Va.	360	WAAO
Radio Supply Co.	Los Angeles, Calif.	360	KNV
Roswell Public Service Co.	Roswell, N. Mex.	360	KNJ
Ship Owners Radio Service	Norfolk, Va.	360	WSN
Spokane Chronicle	Spokane, Wash.	360	KOE
Standard Radio Co.	Los Angeles, Calif.	360	KJC
Stix-Baer-Fuller	St. Louis, Mo.	360	WCK
St. Joseph's College	Philadelphia, Pa.	360	WPJ
St. Louis Chamber of Commerce	St. Louis, Mo.	360	WAAE
Taylor, Otto W.	Wichita, Kans.	360	WAAU
T. & H. Radio Co.	Anthony, Kans.	360	WBL
Union Stock Yards & Transit Co.	Chicago, Ill.	360, 485	WAAP
University of Missouri	Columbia, Mo.	360	WAAN

INTERFERENCE BY BROADCASTING STATIONS.

Broadcasting stations should shut off transmitters when not in actual operation to prevent unnecessary interference from carrier wave.

Care should be taken not to extend schedules resulting in interference with the schedules of other stations.

Transmitters must be adjusted so as not to produce unnecessary interference. It has come to the attention of the bureau that some stations have interfered over a band of from 200 to 500 meters which may be reported as a violation of the law.

DISSEMINATION OF ICE INFORMATION.

The Hydrographic Office gives publicity to all information relative to ice and its movement in the North Atlantic which is received from the Coast Guard Cutter on the ice patrol by the following methods:

(*a*) By radio broadcast from—

Station.	Seventy-fifth meridian standard time.	Wave length (meters).
Arlington, Va.	10.30 a. m.	5,950
	12.00 noon	2,650
	10.00 p. m.	2,850
Boston, Mass.	11.00 a. m.	1,620
	5.00 p. m.	
New York, N. Y.	10.30 a. m.	1,892
	5.00 p. m.	
Philadelphia, Pa.	10.45 a. m.	1,918
	5.00 p. m.	
Norfolk, Va.	10.45 a. m.	1,851
	4.00 p. m.	
Charleston, S. C.	10.30 a. m.	2,250
	6.00 p. m.	
Ice-patrol ship	6.00 p. m.	600

(*b*) All reports of ice are published in the Daily Memorandum and the weekly Hydrographic Bulletin.

(*c*) The ice-patrol vessel will give ice information at any time to any ship with which the patrol vessel can communicate on 600 meters wave length.—*From Hydrographic Bulletin, April 12, 1922.*

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