

RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION, DEPARTMENT OF COMMERCE

Washington, October 1, 1921—No. 54

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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.
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. (12m=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.

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 Bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Brooklyn, N. Y. ¹ ...	WNY	300, 450, 600, 1,800.	PG	N	R. C. of A.
Flat Rock, Mich. ² ...	WFD	300, 335, 500, 600...	PR	X	Ford Motor Co.
Frankfort, Mich. ³ ...	WFK	300, 450, 600.....	PG	.....	Ann Arbor Railway Co.
Laramie, Wyo. ⁴	KDC	1,685.....	PR	X	Illinois Pipe Line Co.
Ludington, Mich. ⁵	WLD	300, 450, 600.....	PG	.....	Pere Marquette Railway Co.
Manitowoc, Wis. ⁶	WMW	300, 475, 600.....	PG	.....	Do.
Martinsville, Ill. ⁷	WHY	1,685.....	PR	X	Illinois Pipe Line Co.
Negley, Ohio. ⁸	WCQ	1,685.....	PR	X	Do.
New Haven, Conn. ⁹	WCJ	300, 360, 600.....	PR	X	A. C. Gilbert Co.
Roselle Park, N. J. ¹⁰	WDY	300, 360, 600.....	PR	.....	R. C. of A.
Springfield, Mass. ¹¹	WBZ	360, variable.....	PR	X	Westinghouse Electric & Manufacturing Co.
St. James, N. Y. ¹²	WQK	16,465.....	PG	N	R. C. of A.

¹ Loc. O 74° 00' 05", N. 49° 30' 30"; range, 400; system, R. C. of A., 1000; rates, ship service 10 c. per word; vessels plying between ports not over 200 miles from New York City, 3 c. per word.

² Loc. (approximately) O 83° 13' 00", N. 42° 17' 00"; range, 100; system, composite; rates, none.

³ Loc. O 86° 14' 17", N. 44° 37' 46"; range, 150; system, Marconi, 120; hours, 5 a. m. to 12 midnight; rates, Great Lakes service, 3 c. per word.

⁴ Loc. O 106° 34' 51", N. 41° 18' 30"; range, 200; system, Deforest; rates, none.

⁵ Loc. O 86° 29' 19", N. 43° 58' 47"; range, 150; system, Marconi, 120; hours, 5 a. m. to 12 midnight; rates, Great Lakes service, 3 c. per word.

⁶ Loc. (approximately) O 87° 45' 00", N. 44° 07' 00"; range, 100; system, Marconi, 120; hours, 8 a. m. to 12 midnight; rates, Great Lakes service, 3 c. per word.

⁷ Loc. O 87° 54' 06", N. 39° 20' 30"; range, 200; system, Deforest; rates, none.

⁸ Loc. O 80° 34' 54", N. 40° 47' 48"; range, 200; system, Deforest; rates, none.

⁹ Range, 300; system, A. C. Gilbert Co.; rates, none.

¹⁰ Loc. O 74° 20' 07", N. 40° 43' 05"; range, 100; system, General Electric Co.; hours, 7 p. m. to 12 p. m.; rates, none.

¹¹ Loc. O 72° 33' 08", N. 42° 08' 30"; range, 500; system, Westinghouse, arc; rates, none.

¹² Loc. O 72° 56' 30", N. 40° 55' 45"; range, 4,000; system, R. C. of A., Alexanderson alternator; rates, to Germany, 25 c. per word.

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 Bureau.]

Name of vessel.	Call signal.	Rates.		Service.	Hours.	Owner of vessel.	Station controlled by—
		North and South American service.	Trans-oceanic service.				
		Cents.	Cents.				
Adam E. Cornelius...	KDVF			PG	X	American S. S. Co....	
Agwimex.....	KDUQ			PG	X	Atlantic, Gulf & West Indies S. S. Lines.	
Celestial.....	KDUV	4	4	PG	X	U. S. S. B.....	S. O. R. S.
Chattanooga City.....	KDUW			PG	X	U. S. Steel Products Co.	
Faith.....	KDVG				X	Irving E. Raymond...	
Gertrude ¹	KDVC	4		PR	.....	Sabine Towing Co.....	Owner of vessel.
G. N. Wilson.....	KDUX			PG	X	American S. S. Co....	
Hoosier State.....	KDUY	4	4	PG	N	U. S. S. B.....	S. O. R. S.
Levant Arrow.....	KDVD			PG	X	Standard Transportation Co.	
M. A. Reeb.....	KDUZ			PG	X	American S. S. Co....	
Pine Tree State.....	KDUT	4	4	PG	N	U. S. S. B.....	
Robert E. Hopkins.....	KDVE			PG	X	Tidewater Oil Co.....	
Sapphire.....	KDUS				.....	J. D. Adams.....	
Tamiahna.....	KDVA			PG	X	Southern Pacific Co....	
T. J. Williams.....	KDUR	8	8	PG	X	Standard Oil Co. of N. J.	R. C. of A.
West Chopaka.....	KDVH	4	4	PG	X	U. S. S. B.....	

¹ Range 150; system, Société Française Electrique, 1000; w. l., 300, 600; hours, 7 a. m. to 7 p. m.

Commercial land and ship stations, alphabetically by call signals.

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

Call signal.	Name.	Call signal.	Name.
KDC	Laramie, Wyo.	KDVF	Adam E. Cornelius.
KDUQ	Agwimex	KDVG	Faith.
KDUR	T. J. Williams.	KDVH	West Chopaka.
KDUS	Sapphire.	WBZ	Springfield, Mass.
KDUT	Pine Tree State.	WCJ	New Haven, Conn.
KDUV	Celestial.	WCQ	Negley, Ohio.
KDUW	Chattanooga City.	WDY	Roselle Park, N. J.
KDUX	G. N. Wilson.	WFD	Flat Rock, Mich.
KDUY	Hoosier State.	WFK	Frankfort, Mich.
KDUZ	M. A. Beeb.	WHY	Martinsville, Ill.
KDVA	Tamiahum.	WLD	Ludington, Mich.
KDVC	Gertrude.	WMW	Manitowoc, Wis.
KDVD	Levant Arrow.	WNY	Brooklyn, N. Y.
KDVE	Robert E. Hopkins.	WQK	St. James, N. Y.

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.	Station controlled by—
Bryan, Ohio	KDEL	Post Office Department.
Fort Crook, Nebr.	WYCG	War Department.
Marfa, Tex.	WUG	Do.
San Francisco, Calif. (Presidio of San Francisco)	WYCH	Do.

Government ship 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.	Station controlled by—
Nantucket	NFU	U. S. Navy.
Polillo	KDVB	Philippine Insular Government.

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.
KDEL	Bryan, Ohio	WYCG	Fort Crook, Nebr.
KDVB	Polillo	WYCH	San Francisco, Calif. (Presidio of San Francisco)
NFU	Nantucket		
WUG	Marfa, Tex.		

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.	Station controlled by—
Baltimore, Md.	3ZN	Harold A. Hogan.
Charlottesville, Va.	3XAB	Virginia Radio Co.
Craddock, Va.	3ZZ	Aloysius A. Kubiac.
Commerce, Tex.	5ZAM	Arthur C. West.
Decatur, Ga.	4ZF	Thurston Hatcher.
Fayetteville, Ark.	5YM	University of Arkansas.
Austin, Tex.	5XU	University of Texas.
Los Angeles, Calif.	6XAK	Leo J. Meyberg Co.
Oakland, Calif.	6XAL	Alfred H. Cohen.
Do.	6XAM	Stafford W. Warner.
Oklahoma City, Okla.	5XT	Oklahoma Radio Shop.
Springfield, Mass.	1XAE	Westinghouse Electric & Manufacturing Co.
Washington, D. C.	3YN	National Radio Institute.
Yankton, S. Dak.	9YAK	Yankton College.

Special land stations, grouped by districts.

Call signal.	District and station.	Call signal.	District and station.
1XAE	First district: Springfield, Mass.	5XT	Fifth district:
3XAB	Third district:	5XU	Oklahoma City, Okla.
3YN	Charlottesville, Va.	5YM	Austin, Tex.
3ZN	Washington, D. C.	5ZAM	Fayetteville, Ark.
3ZZ	Baltimore, Md.	6XAK	Commerce, Tex.
4ZF	Craddock, Va.	6XAL	Sixth district:
	Fourth district: Decatur, Ga.	6XAM	Los Angeles, Calif.
		9YAK	Oakland, Calif.
			Do.
			Ninth district: Yankton, S. Dak.

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

AMUGUIS, P. I.—Loc. (approximately) E. $122^{\circ} 40' 00''$, N. $13^{\circ} 15' 00''$; range, 300; system, Marconi, w. l., 600, 1200; service, PG; hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.

BATANGAS, P. I.—Loc. (approximately) E. $121^{\circ} 00' 00''$, N. $13^{\circ} 47' 00''$; range, 1000; system, Marconi, w. l., 2700; service, PG; hours, 7 a. m. to 8 p. m.; rates, 12 c. per word.

BOLINAS, CALIF. (KET).—Range, 4000; w. l., 13345.

BROOKLYN, N. Y. (WCG).—Strike out all particulars.

CAPE MAY, N. J.—System, R. C. of A., 240-1000; w. l., 300, 525, 600; station operated and controlled by R. C. of A.

CEBU, P. I.—Loc. (approximately) E. $123^{\circ} 50' 00''$, N. $10^{\circ} 18' 00''$; range, 500; service, PG; w. l., 600, 1200; hours, 7 a. m. to 8 p. m.; rates, 12 c. per word.

CHICAGO, ILL. (WGO).—W. l., 2400, 2800; hours, 7 a. m. to 6 p. m.

CHICHAGOF, ALASKA.—Loc. O $136^{\circ} 05' 40''$, N. $57^{\circ} 39' 35''$; range, 50; system, composite, 120; w. l., 300, 550, 600; service, PR; hours, X; rates, ship service, 6 c. per word, no minimum, cable count; station to station, 6 c. per word, domestic count; station to station night message, 5 c. per word, domestic count; station to station night letter, 60 c. for 50 words, 12 c. for each additional 10 words or fraction thereof.

CLEVELAND, OHIO.—Hours, 8.30 a. m. to 6 p. m.

- CULION, P. I.—Loc. (approximately) E. $120^{\circ} 02' 00''$, N. $11^{\circ} 50' 00''$; range, 200 system, Marconi, w. l., 600, 1200; service, PG; hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- CUYO, P. I.—Hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- DAVAO, P. I.—Hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- FALL RIVER VALLEY, CALIF.—Strike out all particulars.
- ILOILO, P. I.—Loc. (approximately) E. $122^{\circ} 30' 00''$, N. $10^{\circ} 40' 00''$; range, 500; system, Marconi, w. l., 600-1200; service, PG; hours, 7 a. m. to 8 p. m.; rates, 12 c. per word.
- ISABELA DE BASILAN, P. I.—Hours, 8.30 a. m. to 5.30 p. m.; rates, 12 c. per word.
- JOLO, P. I.—Hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- MALABANG, P. I.—Hours, 7 a. m. to 8 p. m.
- MALANGAS, P. I.—Loc. (approximately) E. $123^{\circ} 00' 00''$; N. $7^{\circ} 42' 00''$; range, 300; system, Kilbourne & Clark; w. l., 300, 600; service, PG; hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- MALITA, P. I.—Loc. (approximately) E. $125^{\circ} 36' 00''$, N. $6^{\circ} 22' 00''$; range, 200; system, Marconi, w. l., 600, 1200; service, PG; hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- NEW BRUNSWICK, N. J. (WNY).—Strike out all particulars.
- NEWPORT, R. I.—System, R. C. of A., 1000; hours, 8 p. m. to 4 a. m.
- NEW YORK, N. Y. (WHB).—W. l., 2780, 3600.
- ROCKLAND, ME.—Strike out all particulars.
- SAN FRANCISCO, CALIF. (KDQO).—Strike out all particulars.
- SAN FRANCISCO, P. I. (CAMOTES).—Loc. (approximately) E. $124^{\circ} 22' 00''$, N. $10^{\circ} 38' 00''$; range, 150; system, Marconi, w. l., 300, 600; service, PG; hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- SAN JOSE, P. I.—Hours, 8 a. m. to 5.30 p. m.; rates, 12 c. per word.
- SIASCONSET, MASS.—Strike out all particulars.
- ZAMBOANGA, P. I.—W. l., 600, 1800; hours, 7 a. m. to 8 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.)

- AGWIWORLD.—Range, 200; system, I. W. T. Co., 1000; w. l., 300, 600.
- ALA.—Range, 200; system, Navy, 1000; w. l., 300, 450, 600; station operated and controlled by R. C. of A.
- ALCONA.—System, Navy, 1000; w. l., 300, 450, 600.
- ALGIC.—Range, 300; system, Navy-Marconi, 1000; w. l., 300, 450, 600.
- ALOHA.—Range, 150; system, R. C. of A., 1000; rates, North and South American and transoceanic services, 8 c. per word.
- ANDREA F. LUCKENBACH.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 450, 600; rates, North and South American and transoceanic services 4 c. per word.
- ARIZONA.—System, R. C. of A., 240.
- BALSAM.—Range, 300; system, Navy-Marconi, 1000; hours, X.
- BANNACK.—System, Navy-Liberty, 1000; w. l., 300, 450, 600; hours, X.
- BELAIR.—Strike out all particulars.
- BIRAN.—Station operated and controlled by R. C. of A.
- BLAIR.—Range, 300; system, Navy, 1000; w. l., 300, 450, 600.
- BOSTON (KXA).—Station operated and controlled by R. C. of A.
- CAMBRIDGE (KGR).—Station operated and controlled by R. C. of A.
- CAYO MAMBI.—Range, 200; system, I. W. T. Co., 1000; rates, North and South American and transoceanic services 4 c. per word.
- CERRO EBANO.—Station operated and controlled by R. C. of A.

- CHESTER W. CHAPIN.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- CHETOFA.—System, Navy, 1000; w. l., 300, 450, 600.
- CITY OF ALTON.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- CITY OF BENTON HARBOR.—Strike out all particulars.
- CITY OF BROCKTON.—Station operated and controlled by R. C. of A.
- CITY OF BRUNSWICK.—Strike out all particulars.
- CITY OF BUFFALO.—System, R. C. of A., 1000.
- CITY OF DETROIT II.—System, R. C. of A., 1000; w. l., 300, 450, 600.
- CITY OF ERIE.—Range, 150; system, R. C. of A., 1000.
- CITY OF GRAND RAPIDS.—Strike out all particulars.
- CITY OF LOWELL.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- CITY OF TAUNTON.—Station operated and controlled by R. C. of A.
- COMAL.—Range, 300; w. l., 300, 600.
- COMMONWEALTH.—Station operated and controlled by R. C. of A.
- CONCORD.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- CRICKET.—Fred Linderman, owner of vessel.
- CROFTON HALL.—Range, 150; system, R. C. of A., 1000.
- CUBURRA.—Anglo-California Trust Co., owner of vessel.
- DAVID MCKELVY.—Station operated and controlled by R. C. of A.
- DEMOCRACY.—Station operated and controlled by R. C. of A.
- EASTERN SEA.—Hours, X.
- EASTERN VICTOR.—W. l., 300, 450, 600; hours, X.
- EDWARD J. LAWRENCE.—Strike out all particulars.
- EMPIRE ARROW.—Station operated and controlled by R. C. of A.
- ESPARTA.—System, composite, 1000.
- FEDERAL.—Range, 300; system, Marconi, 1000; w. l., 300, 450, 600; hours, X.
- FLORIDA (KUS).—Range, 150; system, R. C. of A., 1000.
- GALESBURG.—Station operated and controlled by R. C. of A.
- GEORGE PIERCE.—Range, 300; system, Federal, 1000 with chopper; w. l., 300, 600, 1800.
- GUINEVERE.—Range, 300; system, Wireless Specialty Apparatus Co., 1000; w. l., 300, 600; service, PR; station operated and controlled by owner of vessel.
- GULFMAID.—Station operated and controlled by R. C. of A.
- GULF OF MEXICO.—Station operated and controlled by R. C. of A.
- GULFPORT.—System, R. C. of A., 240.
- GULF PRINCE.—Range, 200; system, I. W. T. Co., 1000; w. l., 300, 600.
- GULF QUEEN.—Range, 300; system, Navy, 1000.
- HANCOCK COUNTY.—W. l., 300, 450, 600.
- HARTFORD.—Station operated and controlled by R. C. of A.
- HATTERAS.—Station operated and controlled by R. C. of A.
- HAWARDEN.—Station operated and controlled by I. W. T. Co.
- HEGIRA.—System, Navy-Lowenstein, 1000; hours, X.
- H. F. DIMOCK.—Range, 150; system, R. C. of A., 1000.
- ICE KING.—Station operated and controlled by R. C. of A.
- I. D. FLETCHER.—Strike out all particulars.
- ILLINOIS (KDSZ).—Range, 300; system, I. W. T. Co. (arc); w. l., 300, 600, 1800; rates, North and South American services 4 c. per word; station operated and controlled by I. W. T. Co.
- ILLINOIS (WCZ).—Chicago, Racine & Milwaukee Line owner of vessel.
- INDIANA.—Range, 150; system, R. C. of A., 1000.
- IROQUOIS (KUTQ).—System, R. C. of A., 1000.

- JANELAW.—Range, 200; system, Federal arc; w. l., 300, 600, 1800.
- JOHN D. ARCHBOLD.—Station operated and controlled by R. C. of A.
- JOMAR.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- KNOXVILLE CITY.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600; rates, North and South American and transoceanic services 8 c. per word; station operated and controlled by R. C. of A.
- LAKE ELRIO.—Range, 300; system, Wireless Improvement Co., 1000; w. l., 300, 450, 600.
- LAKE FLATONIA.—Station operated and controlled by I. W. T. Co.
- LAKE FLYNUS.—System, Navy-Marconi, 1000.
- LAKE FREELAND.—Range, 200; system, Navy-Marconi, 1000; w. l., 300, 450, 600.
- LAKE GITANO.—Hours, N.
- LAKE GLEBE.—Range, 200; system, Navy-Marconi, 1000; w. l., 300, 450, 600.
- LAKE INDIAN.—System, Simon, 1000.
- LEXINGTON.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- MANUKAI.—Range, 300; hours, N.
- MARNE (KEDJ).—Station operated and controlled by R. C. of A.
- MISSOURI.—Range, 150; system, R. C. of A., 1000.
- MOHAWK (KVM).—Range, 300.
- MOHAWK (KXE).—Station operated and controlled by R. C. of A.
- MOHEGAN.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- MONTAUK.—Range, 300; system, Navy-Marconi, 1000; w. l., 300, 450, 600; hours, X; rates, North and South American and transoceanic services 4 c. per word.
- NARCISSUS.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
- NEW HAMPSHIRE.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- NEW HAVEN.—System, R. C. of A., 260; station operated and controlled by R. C. of A.
- NEW YORK (KSN).—W. l., 300, 450, 600.
- NORTH AMERICAN.—Station operated and controlled by R. C. of A.
- OLDHAM.—Station operated and controlled by R. C. of A.
- ORINOCO.—Station operated and controlled by R. C. of A.
- O. T. WARING.—System, R. C. of A., 1000.
- PANOLA.—W. l., 300, 450, 600.
- PEQUONNOCK.—Station operated and controlled by R. C. of A.
- PEQUOT.—Station operated and controlled by S. O. R. S.
- PLAYA.—Station operated and controlled by R. C. of A.
- PLYMOUTH (KXH).—Station operated and controlled by R. C. of A.
- PRINCESS MATOIKA.—Station operated and controlled by I. W. T. Co.
- PRISCILLA.—System, R. C. of A., 1000; station operated and controlled by R. C. of A.
- PROVIDENCE.—Station operated and controlled by R. C. of A.
- PUENTE.—Station operated and controlled by R. C. of A.
- PURITAN.—System, R. C. of A., 1000.
- PYLOS.—System, Lowenstein, 1000.
- RELIEF.—System, Telefunken, 1000; w. l., 300, 600.
- RESOLUTE.—Range, 150; system, Navy-Simon, 1000; w. l., 300, 450, 600.
- RICHARD PECK.—Station operated and controlled by R. C. of A.
- RIPPLE.—Range, 150; system, Marconi, 1000; w. l., 300, 450, 600; rates, North and South American and transoceanic services, 4 c. per word; station operated and controlled by S. O. R. S.
- ROBERT P. CLARK.—W. l., 300, 600.
- RUTH.—System, I. W. T. Co., 1000; w. l., 300, 450, 600.
- SAC CITY.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.

SALMON.—Strike out all particulars.

SAMUEL MITCHELL.—System, R. C. of A., 1000.

SAN MATEO.—Range, 200; system, Wireless Specialty Apparatus Co., 1000.

SANTA INEZ.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.

SAUGUS.—W. l., 300, 450, 600.

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

SOUTH AMERICAN.—Range, 150; system, R. C. of A., 1000; station operated and controlled by R. C. of A.

THE LIMIT.—Strike out all particulars.

TIONESTA.—System, R. C. of A., 1000; w. l., 300, 450, 600.

TRONTOLITE.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 600.

TUNICA.—Station operated and controlled by R. C. of A.

TURRIALBA.—Range, 300; system, Wireless Specialty Apparatus Co., 1000.

WACHUSETT.—Station operated and controlled by R. C. of A.

WAPAMA.—Range, 200; system, Gray & Danielson, 240.

WEST GREYLOCK.—Station operated and controlled by S. O. R. S.

WEST HAVEN.—Range, 300; w. l., 300, 600; hours, N.

WEST ISLAY.—Range, 300; system, Navy, 1000; w. l., 300, 450, 600.

WEST KEENE.—System, Navy, 1000; w. l., 300, 450, 600.

WESTMEAD.—Station operated and controlled by R. C. of A.

WEST QUECHE.—System, Navy-Lowenstein, 1000; w. l., 300, 450, 600.

WEST VACA.—Station operated and controlled by I. W. T. Co.

WESTWARD HO.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.

WILLAMETTE.—Range, 200; system, Gray & Danielson, 240.

WOODMANSIE.—System, Navy-Liberty, 1000; w. l., 300, 450, 600.

YUKON.—Station operated and controlled by R. C. of A.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

Strike out all particulars following the call signals WCG, WCV, WDS, WDV, WNY (New Brunswick), WSC, WST, WTOI, KDNQ, KDQN, KDQO, KFI, KPOU, and KQY.

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, 1921.)

BOSTON, MASS.—Call signal changed to WYCA.

FORT BENJAMIN HARRISON, IND.—Call signal changed to WYCE.

FORT HOWARD, MD. (WZB).—Strike out all particulars.

FORT MASON, CALIF.—Strike out all particulars.

FORT MCINTOSH, TEX.—*Read* Laredo, Tex.

FORT MCPHERSON, GA.—Call signal changed to WYCD.

FORT MILLS, P. I.—Strike out all particulars.

FORT MONROE, VA. (WUG).—Strike out all particulars.

FORT OMAHA, NEBR.—Strike out all particulars.

FORT SHERIDAN, ILL.—Call signal changed to WYCF.

FORT STORY, VA.—*Read* Fort Storey, Va.

FORT ST. PHILIP, LA.—Strike out all particulars.

FORT WOOD, N. Y.—Call signal changed to WYCB.

SEATTLE, WASH.—Strike out all particulars.

ST. LOUIS, MO.—Strike out all particulars.

GOVERNMENT SHIP STATIONS, ALPHABETICALLY BY NAMES OF VESSELS.
 [Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1921.]

GREAT NORTHERN (WIR).—Strike out all particulars.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

WUH, read Laredo, Tex.; WXZ, read Fort Storey, Va.; WZAA, read WYCA; WZAB, read WYCB; WZAD, read WYCD; WZAE, read WYCE; WZAF, read WYCF; strike out all particulars following the call signals KDEL (St. Louis, Mo.), KPA, WIR, WUG, WVZ, WXQ, WZAG, WZAH, and WZB.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

NEW YORK, N. Y. (2XAG).—Strike out all particulars.

PARKERSBURG, VA. (3XW).—Read Parkesburg, Pa.

PARKERSBURG, PA. (3ZO).—Read Parkesburg, Pa.

PITTSBURGH, PA. (8XH).—Strike out all particulars.

MISCELLANEOUS.

CHRONOMETERS CORRECTED BY RADIO.

The British steamer *Port Kembla* reports that on June 26, 1921, time signals were received from Manila, P. I., bearing N. 34° W. (true) 3,630 miles, and 12 hours later time signals were received from Melbourne, Australia, bearing west about 740 miles. The comparison of these two time signals from Manila and Melbourne gave very satisfactory chronometer corrections.—*From Hydrographic Bulletin, Aug. 31, 1921.*

RADIO RESTRICTIONS AT RUSSIAN SOVIET PORTS.

The commander of the United States naval attachment in Turkish waters reports the following, which was issued by radio from Moscow, under date of August 11, 1921: "To all Governments: The Russian Government calls to the attention of captains of ships making passage to Russian ports that it is temporarily forbidden by the local authorities of the following ports, Petrograd, Kronstadt, Mourmansk, Archangelsk, Odessa, Novorossiisk, Touapsee, Nikolaev, Teodosia, Sebastopol, to make use of the radio stations on board when the ships are in ports above mentioned."—*From Hydrographic Bulletin, Sept. 14, 1921.*

ERROR IN BEARINGS OBTAINED BY RADIO.

The director, United States naval communications, states that considerable difficulty is being experienced with merchant ships asking for radio bearings on very broad tunes, and that "bearings obtained by radio should be accurate within 2 degrees, provided that the transmitting equipment on board vessels is tuned sharply to 800 meters. Radio operators are cautioned to use sufficiently wide coupling to obtain low decrement. If radio transmitters are not tuned sharply, it is difficult to obtain bearings that are sufficiently accurate for navigational purposes."

Masters of vessels are advised to use the radio compass stations frequently, particularly in clear weather and when the vessel's position is definitely fixed, in order that the degree of accuracy and dependability of the radio compass may be established.—*From Hydrographic Bulletin, Sept. 28, 1921.*

A SIMPLE TYPE OF RADIO DIRECTION FINDER FOR USE ON SHIPBOARD—ITS APPLICATION, CONSTRUCTION, AND OPERATION.¹

APPLICATION IN MARINE DISASTERS.

At about 9.15 on the night of August 6 the steamship *Alaska*, from Portland to San Francisco, carrying 136 passengers and a crew of 84, struck Blunts Reef, off Cape Mendocino in northern California, in a heavy fog and sank in about 30 minutes. Throughout this time the *Alaska* sent out distress signals and the steamship *Anyox* reached the scene of the wreck from a distance of about 10 miles at about 11.15 p. m., and with the assistance of other boats which came later rescued many persons. Forty-two lives were lost. The *Anyox* had a barge in tow, which made it extremely difficult for her to stop or start or maneuver around in the fog. The steamship *Wahkeena* was only about 14 miles from the *Alaska* at the time that the first distress signal was transmitted and responded promptly, but did not reach the scene of the disaster until 7.30 a. m. the next morning. For two hours prior to the grounding of the *Alaska* its radio operator had been trying to obtain radio bearings by transmitting to the radio compass station on shore, at Eureka, Calif., but had been unable to get in communication with that station. The failure to obtain radio bearings was due in part to the fact that a large number of ships were endeavoring to obtain radio bearings at the same time. The *Wahkeena* did not rescue any persons. Neither the *Alaska*, the *Anyox*, nor the *Wahkeena* was equipped with a radio compass.

If the steamship *Alaska* had been provided with a radio compass and radio beacon transmitting stations had been established on shore, the radio operator on the *Alaska* could have determined her position at frequent intervals, and the wreck would probably never have occurred. If the *Anyox* had been provided with a simple radio compass, it could probably have reached the *Alaska* before it sank, instead of requiring two hours. If the *Wahkeena* had been equipped with a very simple type of radio compass, her radio operator could have very promptly determined the direction of the *Alaska*, so that the *Wahkeena* could have reached the *Alaska* in about an hour. The installation of radio compass equipment could thus have in all probability saved many lives and valuable property. The provision of radio compass equipment on board ship is obviously of particular importance in cases in which there are uncharted currents, since in such cases the setting of a course by dead reckoning in a fog may be disastrous. There is here given a description of a very simple type of radio compass coil which can be made by any one and if carried on board ship may prove to be of great value in emergencies.

The following extract from a letter from the senior radio operator on the *Alaska* will serve to emphasize the statements made above:

G. F. DILLON,

Radio Inspector, San Francisco, Calif.

Strongest in my mind remains the picture of the *Wahkeena*, 12 or 15 miles from us at 9.15 p. m., and after that trying unsuccessfully all night to locate us, while many unfortunate human lives were clinging to floating wreckage and succumbing slowly to exposure. I believe many lives could have been saved if seagoing vessels were equipped with even a simple device for finding the location of other vessels by radio signals. It has been proved that such apparatus can be installed with small cost. It would be still better to have ships equipped with audions or amplifiers.

(Signed) JOHN J. MICHELSON,
Operator, S. S. *Alaska*

The use of the radio compass to direct assistance to a wrecked ship is probably its most valuable field of usefulness. It has, however, many other applications, some of which are as follows:

1. A neighboring ship may be located in fog, and thereby passed in safety.

¹ By F. W. Dunmore, associate physicist, of the Bureau of Standards.

2. By means of the radio beacon installations now being made on lightships and at lighthouses a ship equipped with a radio direction finder may be guided safely along the coast or into harbor, during fog.

3. Lifeboats, adrift in the fog and full of survivors from a wreck, if equipped with even the most simple type of low-powered, hand-operated transmitting apparatus, could be located and picked up with little delay by the rescuing ship equipped with the radio direction finder. No knowledge of the code is necessary. The importance of the use of the direction finder for this purpose will be apparent when it is realized that many instances have occurred where a lifeboat adrift in the fog in the open ocean was not located until it was too late to save those aboard, and cases are on record where boats full of survivors were never found.

4. Harbor pilots during fog may locate ships waiting to be piloted into port.

5. Small boats and launches when detached from the mother ship on fishing trip, etc., if equipped with the radio compass, may locate the mother ship and return to her during fog.

CONSTRUCTION.

A simple form of direction finder may be made on shipboard and experimented with by any operator. Having once determined its range and application, it will be found of inestimable value, especially in such cases as the one of the S. S. *Alaska* cited above.

A type most easily constructed consists of two light pieces of wood, 7 feet long, crossed at an angle of 90 degrees, with 6-inch wooden spreaders on the four ends. This frame is wound with eight turns (spaced one-half inch) of No. 20 insulated copper wire, thus forming a square of approximately 5 feet on each side. The two terminals of the coil are connected directly to a tuning condenser and also to the grid and filament of the detector tube. With a tuning condenser of 0.0007 microfarad capacity it should be possible to tune to wave lengths from 400 to 800 meters. With a 0.0015 microfarad condenser the radio beacon wave length of 1,600 meters may be tuned to, and during fog if the ship is near Fire Island or Ambrose Channel Lightships or Sea Girt Lighthouse these beacons should be heard in operation on this wave length. Twelve turns in place of eight with the 0.0007 microfarads condenser will enable one to tune to 1,000 meters also.

When the coil is turned in the direction for maximum signal, distances of a few miles may be covered when using a crystal detector, but to operate satisfactorily a sensitive electron-tube detector should be used, or even better an electron-tube detector and one or two stages of audio amplification. With the two-stage amplifier a range of 25 miles or so should be obtained. A type of radio direction finder recently installed on the lighthouse tender *Tulip* by the Bureau of Standards and the Bureau of Lighthouses makes use of a six-step amplifier containing three radio stages, a detector, and two audio stages. In this radio compass the bearings are read directly on the card of the magnetic compass. This radio compass has a range of 50 miles when using the minimum method described below and has an accuracy of two or three degrees.

OPERATION.

To take a bearing, a station should first be tuned in. If no signal is heard, turn the coil 90 degrees. The operator should grasp the coil in both hands, holding it vertically in front of him. This will be found the easiest and most natural position in which to operate the coil.

As the coil is rotated about a vertical axis it will be found that the signal dies out over a certain sector of the revolution, then increases in strength to a maximum, decreases, and dies out again. This cycle is repeated twice as the coil is rotated through 360 degrees. Signals from a given transmitting station will be heard most strongly when the coil is turned in the direction of that station, and the signal dies

out when the plane of the coil is at right angles to the direction of the transmitting station. With a fairly strong signal the direction of a transmitting station can thus be determined by setting on either the position of the coil for maximum signal or the position for minimum signal. In general, for a strong signal the minimum method can be expected to give more accurate directions. With a weak signal, or with receiving apparatus of comparatively small sensitivity, it is preferable to set on the maximum signal. Thus, when a ship at a distance of 30 miles wishes to direct its course to another ship, it may be advantageous to determine the course by using the maximum signal until within perhaps 15 miles of the ship, and then with a stronger signal to use the minimum method to determine the direction of the ship more accurately.

In using the minimum method, as the coil is rotated through the silent zone, the two extreme positions where the signal becomes just audible should be noted. The coil is then turned to the position in the silent zone halfway between these points. The direction to the transmitting station is then approximately on a line lying at right angles to the plane of the coil; that is, either in front or to the rear of the operator, provided the operator turns with the coil. With care and practice directions may thus be determined to within 5 or 10 degrees, which should be sufficiently accurate to set a course to another ship. In cases where another ship is to be located and reached the accuracy of the bearings increases rapidly as the ship is approached, so that it is a simple matter to proceed directly to it.

The maximum method should be used in cases in which the sector over which the signal is inaudible is greater than the sector over which it is heard; that is, the latter sector should be used. Set the coil in the position where the signal is strongest. The transmitting station is then either directly to the operator's right or to his left; that is, in a line along the plane of the coil.

When taking a bearing, it is important that the ship's antenna be grounded and that the compass coil be as free as possible from metallic guys, wires, etc. For more accurate work it is important also to have all apparatus as near the coil as possible, with the filament battery at least a foot from the deck. Where the walls of the radio room are metallic, the coil should be located outside. Lead wires may be run in to the radio set, or, preferably, weather permitting, the tuning condenser, detector, etc., could be located outside near the coil.

The distortion of the radio wave due to the ship's mass may introduce an error of from 10 to 20 degrees. This error will generally be a maximum when the transmitting station lies on a line at 45 degrees to the ship's center line. With the signal coming from fore, aft, starboard, or port, the wave distortion is practically zero. When more accurate bearings are required, therefore, the ship should be turned so that the wave will approach the ship from any one of these directions. In cases where the radio compass is a permanent installation, such as the one on the lighthouse tender *Tulip*, a scale and pointer are provided and the bearings read in degrees. In this type of installation the radio compass is calibrated, so that corrections may be made for the effect of the ship in distorting the wave.

Information regarding the operation of the radio compass is contained in a publication of the Bureau of Standards now in press, "The Radio Direction Finder and its Application to Navigation." Persons desiring more detailed information on specific points concerning the construction and operation of the radio compass may address an inquiry to the radio laboratory, Bureau of Standards, Washington, D. C.

INCREASE IN RATES FOR BOLINAS STATION.

Effective November 1, next, the marine station of the Radio Corporation of America at Bolinas (KPH) will charge 10 cents per word in lieu of the present rate of 6 cents per word.