

RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION, DEPARTMENT OF COMMERCE

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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. (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.

CERTIFICATE.

By direction of the Secretary of Commerce this publication is issued as an administra-

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RADIO SERVICE BULLETIN.

NEW STATIONS.

Commercial land stations, alphabetically by names of stations.

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

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
✓ Cincinnati, Ohio ¹ ...	WMH	360, 485.....	PR	X	Precision Equipment Co.
✓ Everett, Wash. ²	KJB	300, 300, 340, 600...	PR	X	Puget Sound Telephone Co.
✓ Hollywood, Calif. ³ ...	KGC	300, 360, 600.....	PR	X	Electric Lighting Co.
✓ Kahuku, Hawaii (Oahu station). ⁴	KGI	16300.....	PR	N	R. C. of A.
✓ Los Angeles, Calif. ⁵ ...	KYT	300, 360, 600.....	PR	X	Leo J. Meyberg Co.
✓ Los Angeles, Calif. ⁵ ...	KZC	300, 360, 600.....	PR	X	Western Radio Electric Co.
✓ Marion, Mass. ⁶	WCC	300, 600, 1800.....	PG	N	R. C. of A.
✓ New York, N. Y. ⁷ ...	KUVS	300, 400, 450, 600...	PR	X	City of New York Police Department.
✓ New York, N. Y. ⁸ ...	WDT	300, 360, 600.....	PR	X	Ship Owners' Radio Service.
✓ Oakland, Calif. ⁹	KZM	300, 360, 600.....	PR	X	Preston D. Allen.
✓ Oakland, Calif. ⁹	KZY	300, 360, 600.....	PR	X	Atlantic-Pacific Radio Supplies Co.
✓ Omaha, Nebr. ³	WOU	360, 485.....	PR	X	R. B. Howell.
✓ Sacramento, Calif. ¹ ...	KVQ	300, 360, 600.....	PR	X	J. C. Hobrecht.
✓ San Francisco, Calif. ¹ ...	KDN	300, 360, 600.....	PR	X	Leo J. Meyberg Co.
✓ San Francisco, Calif. ¹⁰ ...	KGB	300, 360, 600.....	PR	X	Edwin L. Lorden.
✓ San Francisco, Calif. ¹ ...	KYY	300, 360, 600.....	PR	X	Radio Telephone Shop.
✓ San Jose, Calif. ¹	KQW	300, 360, 600.....	PR	X	Charles D. Herrold.
✓ Seattle, Wash. ¹	KFC	300, 360, 600.....	PR	X	Northern Radio & Electric Co.
✓ Seattle, Wash. ¹	KFL	300, 300, 340, 600...	PR	X	Garrison Babcock.
✓ Shosonset, Mass. ⁷	WSC	300, 450, 600.....	PG	X	R. C. of A.
✓ Stockton, Calif. ¹	KJQ	300, 360, 600.....	PR	X	C. O. Gould.
✓ Stockton, Calif. ¹	KWG	300, 360, 600.....	PR	X	Portable Wireless Telephone Co.
✓ Sunnyvale, Calif. ¹ ...	KJJ	300, 360, 600.....	PR	X	The Radio Shop.
✓ Washington, D. C. ¹ ...	WDN	300, 360, 600.....	PR	X	Church of the Covenant.
✓ Washington, D. C. ¹ ...	WDW	300, 360, 600.....	PR	X	Radio Construction & Electric Co.
✓ Washington, D. C. ¹ ...	WJH	300, 360, 600.....	PR	X	White & Boyer Co.

¹ System, composite (vacuum tube, telephone, and telegraph); rates, none; station used for broadcasting news, concerts, lectures, and such matter.

² System, composite (vacuum tube, telephone); rates, none; station used for broadcasting news, concerts, lectures, and such matter.

³ Loc. 0.157° 58' 33", N. 21° 42' 12"; range, 4000; system, R. C. of A. (Alexanderson alternator, continuous wave); rates, to United States 25 c. per word, to Japan 60 c. per word.

⁴ Loc. 0.70° 48' 30", N. 41° 42' 45"; range, 1000; system, R. C. of A. (v. t., c. w., and i. c. w.); rates, ship service 10c. per word. Distantly controlled from Chatham, Mass. (WCC).

⁵ Range, 300; system, Cutting & Washington, 1000; rates, none.

⁶ System, DeForest (vacuum tube, telephone, and telegraph); rates, none; station used for broadcasting news, concerts, lectures, and such matter.

⁷ Loc. 0.69° 58' 10", N. 41° 16' 35"; range, 300; system, composite, 1000; rates, ship service 10 c. per word.

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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 Bernese Bureau.]

Name of vessel.	Call signal.	Rates.		Service.	Hours.	Owner of vessel.	Station controlled by—
		North and South American service.	Trans-oceanic service.				
All America ¹	KDWF	Cents.	Cents.	PG	N	Mexican Telegraph Co.	Owner of vessel.
Alpha.....	KDWO					E. C. Schroeder.....	Do.
Asher J. Hudson ²	KDWO	8	8	PG	X	Crown Coal & Towing Co.	Do.
Byron D. Benson.....	KDWN	8	8	PG	X	Standard Oil Co. of N. J.	R. C. of A.
Equator.....	KDWI					Cary Davis Tug & Barge Co.	
Lone Star State.....	KDWE	8	8	PG	N	U. S. Shipping Board.	
Munargo.....	KDWH			PG	N	Munson S. S. Line.....	
New Jersey.....	KDWD			PG	X	Texas Co.....	
Spray.....	KDWJ			PG	X	Anthony J. McAllister.	
Steel Navigator.....	KDWL	8	8	PG	X	U. S. Steel Products Co.	
Wego ³	KDWM			PR	X	Claud Nolan.....	Owner of vessel.
Yosemite ⁴	KDWE	8	8	PG	X	Pope & Talbot.....	S. O. R. S.

¹ Range, 300; system, Cutting & Washington, 1000; w. l., 300, 450, 600.² Range, 150; system, Cutting & Washington, 1000; w. l., 300, 600.³ Range, 150; system, composite, 120; w. l., 300, 600.⁴ Range, 200; system, Kilbourne & Clark, 1000; w. l., 300, 600.

Commercial land and ship stations, alphabetically by call signals.

[b—ship station; c—land station.]

Call signal.	Name.	Call signal.	Name.
KDN	San Francisco, Calif.....c	KJJ	Sunnyvale, Calif.....c
KDWD	New Jersey.....b	KJQ	Stockton, Calif.....c
KDWE	Yosemite.....b	KQW	San Jose, Calif.....c
KDWF	All America.....b	KQVS	New York, N. Y.....c
KDWO	Asher J. Hudson.....b	KVQ	Sacramento, Calif.....c
KDWH	Munargo.....b	KWG	Stockton, Calif.....c
KDWI	Equator.....b	KYJ	Los Angeles, Calif.....c
KDWJ	Spray.....b	KYY	San Francisco, Calif.....c
KDWE	Lone Star State.....b	KZC	Los Angeles, Calif.....c
KDWL	Steel Navigator.....b	KZM	Oakland, Calif.....c
KDWM	Wego.....b	KZY	Oakland, Calif.....c
KDWN	Byron D. Benson.....b	WCC	Marion, Mass.....c
KDWO	Alpha.....b	WDM	Washington, D. C.....c
KFC	Seattle, Wash.....c	WDT	New York, N. Y.....c
KFL	Seattle, Wash.....c	WDW	Washington, D. C.....c
KGB	San Francisco, Calif.....c	WJH	Washington, D. C.....c
KGC	Hollywood, Calif.....c	WMI	Cincinnati, Ohio.....c
KGI	Kahuku, Hawaii (Oahu Station).....c	WOU	Omaha, Nebr.....c
KJB	Everett, Wash.....c	WSC	Siasconset, Mass.....c

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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—
Amagansett, N. Y. ¹ ..	NBM	300, 600, 975, 1851..	PG	N	U. S. Navy.
Portland, Me. ²	NAB	600, 800.....	PG	N	Do.
Soapstone Point, Alaska.	NUW	300, 600.....	PG	N	Do.

¹ Loc. O. 72 07' 50", N. 40 57' 52"; range, 100.

² Loc. O. 70 12' 00", N. 43 33' 58"; range, 100.

NOTE.—The above stations are used exclusively for radio compass work. All naval radio stations are equipped with the Navy's own make apparatus.

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—
Nokomis.....	NAMM	U. S. Navy.

Government land and ship stations, alphabetically by call signals.

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

Call signal.	Name of station.	Call signal.	Name of station.
NAB	Portland, Me.....c	NUW	Soapstone Point, Alaska.....c
NBM	Amagansett, N. Y.....c	NAMM	Nokomis.....b

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—
Albuquerque, N. Mex.....	5YQ	200, 375.....	University of New Mexico.
Boulder, Colo.....	9XAQ	200, 375, variable	University of Colorado.
Cincinnati, Ohio.....	8YAC	200, 375.....	St. Xavier College.
Cincinnati, Ohio.....	8YAD	200, 375.....	C. M. Howe.
Detroit, Mich.....	8YAF	200, 375.....	University of Detroit.
Douglas, Wyo.....	7ZV	200, 375.....	Felix Thompson.
Eagle Rock, Calif.....	6ZAL	200, 375.....	Oliver S. Garretson.
East St. Louis, Ill.....	9ZAG	200, 375.....	Boy Scouts of America.
Highland Park, Mich.....	8XAF	200, 320, 460, 530.	Howard P. Hardesty.
Lamoni, Iowa.....	9YO	200, 350, 425.....	Graceland College.
Los Angeles, Calif.....	6XAQ	200 to 550.....	Lex B. Benjamin.
Mt. Clemens, Mich.....	8XAE	200, 320, 460, 530.	Henry B. Joy.
New York, N. Y.....	2ZG	200, 375.....	National Amateur Wireless Association.
Norman, Okla.....	5XW	200, variable...	University of Oklahoma.
Oberlin, Ohio.....	8YAE	200, 375.....	Oberlin College.
Ogden, Utah.....	6ZAM	200, 375.....	W. G. Garner.
Philadelphia, Pa.....	3XAD	200, 340.....	Earl L. Noceross
Philadelphia, Pa.....	3ZAC	200, 375.....	Edwin M. Hartley.
Pittsburgh, Pa.....	8ZAE	200, 375.....	Burton P. Williams.
Port Arthur, Tex.....	5XV	200, 250, 375.....	Port Arthur Radio Laboratory.
Roswell, N. Mex.....	5ZAO	200, 375.....	Roswell Public Service Co.
San Francisco, Calif.....	6XO	Variable.....	National Radio Co.
Seattle, Wash.....	7XE	Variable.....	R. C. of A.
Seattle, Wash.....	7YM	200, 375.....	Lincoln High School.
Toledo, Ohio.....	8YAB	200, 375.....	Scott High School.

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Special land stations, grouped by districts.

Call signal.	District and station.	Call signal.	District and station.
2ZG	Second district: New York, N. Y.		
3XAD	Third district: Philadelphia, Pa.	8XAE	Eighth district: Mt. Clemens, Mich.
3ZAC	Do.	8XAP	Highland Park, Mich.
5XV	Fifth district: Port Arthur, Tex.	8YAB	Toledo, Ohio.
5XW	Norman, Okla.	8YAC	Cincinnati, Ohio.
5YP	Tucson, Ariz.	8YAD	Do.
5YQ	Albuquerque, N. Mex.	8YAE	Oberlin, Ohio.
5ZAO	Roswell, N. Mex.	8YAF	Detroit, Mich.
6XAQ	Sixth district: Los Angeles, Calif.	8ZAE	Pittsburgh, Pa.
6XO	San Francisco, Calif.	9XAQ	Ninth district: Boulder, Colo.
6ZAL	Eagle Rock, Calif.	9YAM	Vermillion, S. Dak.
6ZAM	Ogden, Utah.	9YO	Lamoni, Iowa.
7XE	Seventh district: Seattle, Wash.	9ZAG	East St. Louis, Ill.
7YM	Do.		
7ZV	Douglas, Wyo.		

ALTERATIONS AND CORRECTIONS.

COMMERCIAL LAND STATIONS.

CHATHAM, MASS. (WCC).—Loc., (approx.) O. $70^{\circ} 00' 00''$; N. $41^{\circ} 42' 00''$; W. l., 300, 450, 600.

KAHUKU, HAWAII (KIE).—System, R. C. of A. (Alexanderson alternator); w. l., 16975.

KENAI, ALASKA.—Range, 20; w. l., 300, 600, 1650; service, PR; hours, 6-7 p. m.; rates, none.

LIMA, OHIO.—Loc., O. $84^{\circ} 06' 40''$, N. $40^{\circ} 45' 20''$.

NEW LONDON, CONN.—Hours, 6 p. m.-2 a. m.

NEW YORK, N. Y. (WNY).—W. l., 300, 600, 1800.

ROSELLE PARK, N. J.—Range, 200; system, composite, 800 with chopper (V. T. telephone and telegraph); hours, 11 a. m.-12 midnight.

SPRINGFIELD, MASS.—W. l., 360, 500.

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.]

ALBERT E. WATTS.—Range, 300; system, R. C. of A., 1000.

ANTINOUS.—System, Kilbourne & Clark, 1000.

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

ATLAS.—Range, 300; w. l., 300, 600.

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

ASTMAHCO, III.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 450, 600.

BABINDA.—Rates, North and South American and transoceanic services, 4 c. per word; station operated and controlled by owner of vessel.

BAYSIDE.—Strike out all particulars.

BELFAST.—Range, 150; system, R. C. of A., 1000; w. l., 300, 450, 600.

BELLEMINA.—System, Navy-Wireless Improvement Co., 1000; hours, X.

BENOWA.—Range, 300; system, Kilbourne & Clark, 1000.

BIRKENHEAD.—Range, 300; system, R. C. of A., 1000.

BOHEMIAN CLUB.—Range, 300; system, Federal arc, w. l., 300, 450, 600, 1800; station operated and controlled by S. O. R. S.

BOOBYALLA.—Range, 300; system, Kilbourne & Clark, 1000; rates, North and South American and transoceanic services, 4 c. per word.

BRAMELL POINT.—W. l., 300, 600.

- BUTTERFIELD.—Range, 300; system, Navy-Lowenstein, 1000; w. l., 300, 450, 600.
- CALDAS.—Range, 300; system, Marconi, 1000; w. l., 300, 450, 600.
- CAPULIN.—Station operated and controlled by R. C. of A.
- CAROLYN.—Range, 150.
- CARRABULLE.—Station operated and controlled by S. O. R. S.
- C. A. SNIDER.—Range, 300; system, Kilbourne & Clark, 1000; w. l., 300, 600; rates, North and South American and transoceanic services 4 c. per word.
- CASTANA.—Station operated and controlled by S. O. R. S.
- CATAHOULA.—Station operated and controlled by S. O. R. S.
- CERRO-AZUL.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- CERRO-EBANO.—Range, 150; system, Marconi, 1000; w. l., 300, 450, 600; hours, X.
- CETHANA.—W. l., 300, 600.
- CHARLES M. EVEREST.—W. l., 300, 450, 600.
- CHESTER SUN.—Range, 300; system, Marconi, 1000.
- CITY OF ALMA.—Range, 300; system, Navy, 1000; w. l., 300, 450, 600.
- CITY OF DALHART.—Range, 200; system, Navy-International Radio Telegraph Co. 1000; w. l., 300, 450, 600.
- CITY OF RAYVILLE.—Range, 200; system, R. C. of A., 1000; w. l., 300, 450, 600.
- CLARKSBURG.—American-Hawaiian S. S. Co. owner of vessel.
- CLEMENT SMITH.—Range, 300; system, R. C. of A., 1000.
- CLIFFWOOD.—Station operated and controlled by R. C. of A.
- COLDBROOK.—Range, 300; system, Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- COLD HARBOR.—Station operated and controlled by R. C. of A.
- COLIN H. LIVINGSTONE.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- COMET.—Range, 150; system, R. C. of A., 1000.
- COOLCHA.—W. l., 300, 600.
- CRASTER HALL.—Range, 150; system, R. C. of A., 240.
- CURACAO.—System, R. C. of A., 1000.
- DANIEL WEBSTER.—Range, 300; system, Navy-Marconi, 1000; w. l., 300, 450, 600.
- DELANSON.—Range, 300; system, Navy-Marconi, 1000; w. l., 300, 450, 600.
- DILLWYN.—System, Navy-Lowenstein, 1000.
- DIRECTOR.—Range, 150; system, Navy-Simon, 1000; w. l., 300, 450, 600.
- DISTRICT OF COLUMBIA.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
- DONNA LANE.—Range, 200; system, composite, 480; station operated and controlled by owner of vessel.
- DUNGANNON.—Station operated and controlled by R. C. of A.
- EASTERN BREEZE.—Station operated and controlled by R. C. of A.
- EASTERN MOON.—Range, 200; hours, X.
- EASTERN TEMPEST.—Station operated and controlled by R. C. of A.
- EASTERN PLANET.—Station operated and controlled by S. O. R. S.
- EDITOR.—Station operated and controlled by R. C. of A.
- EDWARD L. DOHENY, JR.—Range, 300; system, R. C. of A., 1000.
- ELISHA WALKER.—Range, 300; system, R. C. of A., 1000.
- EL SOL.—W. l., 300, 600; hours, X.
- EMERGENCY AID.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
- ERNEST H. MEYER.—System, Gray & Danielson, 1000.
- ESTRADA PALMER.—Range, 150; system, R. C. of A., 1000.
- E. T. BEDFORD.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600; hours, X.
- E. W. SINCLAIR.—Range, 300; system, R. C. of A., 1000.
- F. H. HILLMAN.—Range, 300; system, R. C. of A., 1000.
- FLEETCO.—Strike out all particulars.
- GATEWAY CITY.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.

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- GLADYSBE.—Station operated and controlled by S. O. R. S.
- GRIFFDU.—Station operated and controlled by S. O. R. S.
- HALF MOON (KUVX).—Station operated and controlled by R. C. of A.
- HALO.—W. l., 300, 600, 1800.
- HAMER.—Range, 300; system, Federal arc; w. l., 300, 450, 600, 1800.
- H. C. FOLGER.—Range, 300.
- HENRY S. GROVE.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
- HERMAN FRASCH.—Station operated and controlled by S. O. R. S.
- H. M. STOREY.—Station operated and controlled by R. C. of A.
- H. M. WHITNEY.—System, Marconi, 240.
- HOOSIER STATE.—Range, 1000; system, Federal arc, 1000 with chopper; w. l., 300, 450, 600, 1800; station operated and controlled by S. O. R. S.
- HOUMA.—System, Navy-Marconi, 1000; w. l., 300, 450, 600.
- HUMBOLDT.—Fred Linderman, owner of vessel.
- H. T. HARPER.—Range, 300; system, R. C. of A., 1000; w. l., 300, 600.
- HYADES.—Range, 150; w. l., 300, 600.
- JAMES MCGEE.—System, R. C. of A., 1000.
- JENNIE R. MORSE.—Range, 300; system, Marconi, 1000; w. l., 300, 450, 600.
- J. N. PEW.—Range, 300; system, R. C. of A., 1000.
- JOHN D. ROCKEFELLER.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- JOSEPH M. CUDAHY.—Range, 150; system, Navy-Marconi, 1000.
- J. W. VAN DYKE.—Range, 300.
- KENNECOTT.—Station operated and controlled by S. O. R. S.
- KING AND WINGE.—Range, 150; system, Kilbourne & Clark, 1000; w. l., 300, 425, 600; rates, North and South American services, 6 c. per word; station operated and controlled by owner of vessel.
- LAKE DEVAL.—System, Navy-Marconi, 1000.
- LAKE FABYAN.—W. l., 300, 450, 600.
- LAKE FANNIN.—Range, 200; system, Navy, 1000; w. l., 300, 450, 600.
- LAKE FERNANDO.—W. l., 300, 450, 600.
- LAKE GALATA.—System, Navy-Simon, 1000; w. l., 300, 450, 600.
- LAKE GRAVETT.—System, Navy-Marconi, 1000; w. l., 300, 450, 600.
- LA PURISIMA.—Range, 150; system, Federal arc, 1000 with chopper; w. l., 300, 600, 1800; rates, North and South American and transoceanic service, 8 c. per word; station operated and controlled by Federal Telegraph Co.
- LIEBRE.—Range, 300; w. l., 300, 600; rates, North and South American and transoceanic services, 4 c. per word; station operated and controlled by owner of vessel.
- LIGHTBURNE.—System, Navy-Wireless Specialty Apparatus Co., 1000.
- LILMAE.—Station operated and controlled by S. O. R. S.
- MANOA (WMQ).—Range, 300.
- MASON CITY.—Range, 200; system, Navy-Simon, 1000.
- MERIDEN.—Rates, North and South American and transoceanic services, 8 c. per word.
- MEXICAN.—Range, 300; w. l., 300, 450, 600.
- MINNEQUA.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- MORAVIA BRIDGE.—Range, 300; system, Navy, 1000; w. l., 300, 450, 600.
- NARWHAL.—Range, 150; system, Wireless Specialty Apparatus Co., 1000; rates, North and South American services, 4 c. per word.
- NEW YORK (KSN).—Worden & Co., owner of vessel.
- NYANZA.—Range, 200.
- OSSINING.—Range, 300; system, Navy-Liberty, 1000; w. l., 300, 450, 600.
- PARAGUAY.—System, R. C. of A., 1000.
- PASTORES.—Range, 300.

- PHILIP PUBLICKER.—Range, 150; system, Cutting & Washington, 1000; w. l., 300, 450, 600.
- PIPESTONE COUNTY.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- POLAR STAR.—W. l., 300, 450, 600.
- PRINCESS.—Archibald M. Ostrom, owner of vessel.
- PRUSA.—W. l., 300, 450, 600.
- PUENTE.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- PULWICO.—Station operated and controlled by R. C. of A.
- PYLOS.—Strike out all particulars.
- PYTHON.—Range, 200; system, Navy-Simon, 1000; w. l., 300, 450, 600.
- REDONDO (WBM).—Station operated and controlled by S. O. R. S.
- ROYAL ARROW.—Hours, N.
- ROBERT P. CLARK.—Range, 200; system, I. W. T. Co., 1000; w. l., 300, 450, 600.
- RUTH E. MERRILL.—Station operated and controlled by owner of vessel.
- SAGAPORACK.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600.
- SAMUEL Q. BROWN.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- SAN JUAN.—Station operated and controlled by S. O. R. S.
- SANTORE.—Range, 300; w. l., 300, 450, 600.
- SARAMACA.—Range, 200; w. l., 300, 450, 600.
- SENATOR BAILEY.—System, I. W. T. Co., 1000; w. l., 300, 450, 600.
- SEWALLS POINT.—Range, 300; hours, X.
- SHENANDOAH.—System, Navy-Lowenstein, 1000.
- STANDARD ARROW.—Hours, N.
- STEEL SCIENTIST.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600; station operated and controlled by R. C. of A.
- STEEL TRADER.—Hours, X.
- STEEL VOYAGER.—Station operated and controlled by S. O. R. S.
- SUN.—Range, 300; system, R. C. of A., 1000.
- SUNBEAM.—System, Navy-Marconi, 1000.
- SYLVAN ARROW.—Hours, N.
- TIFPECANOE.—Range, 300; system, Fessenden, 1000; w. l., 300, 450, 600; hours, X; station operated and controlled by R. C. of A.
- TOMALVA.—Range, 300; system, Navy, 1000; w. l., 300, 450, 600.
- TULSAGAS.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
- TRI MOUNTAIN.—Station operated and controlled by I. W. T. Co.
- VIRGINIA.—W. l., 300, 600.
- VOLANT.—Range, 150; system, R. C. of A., 1000.
- WEST CHOPAKA.—Station operated and controlled by S. O. R. S.
- WEST COBALT.—System, Navy-Marconi, 1000; w. l., 300, 450, 600.
- WESTERN KING.—Range, 300; system, Marconi, 1000; w. l., 300, 450, 600; hours, N.
- WESTERN PLAINS.—Station operated and controlled by R. C. of A.
- WEST KATAN.—Station operated and controlled by R. C. of A.
- WEST NOSSKA.—Station operated and controlled by R. C. of A.
- WEST PROSPECT.—Range, 300; system, Federal arc; w. l., 300, 450, 600, 1800.
- WHEATON.—System, Navy-Marconi, 1000; w. l., 300, 450, 600.
- W. H. LIBBY.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- WILLPOLO.—System, Navy-Wireless Improvement Co., 1000.
- WINDING GULF.—System, Navy-Lowenstein, 1000.
- WM. ROCKEFELLER.—Range, 300; system, R. C. of A., 1000; w. l., 300, 450, 600.
- WOODMANSIE.—Station operated and controlled by R. C. of A.
- YOUNGSTOWN.—System, Navy-Marconi, 1000; w. l., 300, 450, 600; hours, X.

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COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

Strike out all particulars following the call signals KDDX, KULQ, and KURK.

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.]

- ANACOSTIA, D. C.—W. I., 507.
 BOSTON, MASS. (NAD).—W. I., 600, 975, 1620, 3950, 5000.
 CALUMET, MICH.—Name changed to Eagle Harbor, Mich.
 CAPE MAY, N. J.—W. I., strike out 507 and 2750.
 CHATHAM, MASS.—W. I., 600, 975, 1870.
 CLEVELAND, OHIO (NRH).—W. I., 600, 1080, 3800, 4250.
 COCO SOLO, Canal Zone.—W. I., strike out 600.
 EUREKA, CALIF.—W. I., strike out 2400.
 FARRALONS, CALIF.—Strike out all particulars.
 GREAT LAKES, ILL.—W. I., 600, 1988, 3800, 3950, 4900.
 KETCHIKAN, ALASKA.—W. I., 600, 975, 1870, 2400, 4525, 5000.
 LAKEHURST, N. J.—W. I., 507.
 MANATI, CUBA.—Strike out all particulars.
 MARSHFIELD, OREG.—W. I., 600, 975, 1948, 2400.
 NAVAL ACADEMY, ANNAPOLIS, MD.—Station temporarily out of commission.
 NORFOLK, VA.—W. I., strike out 2950.
 NORTH HEAD, WASH.—W. I., strike out 2400.
 PARRIS ISLAND, S. C.—W. I., strike out 975.
 POINT ARGUELLO, CALIF.—Strike out all particulars.
 QUANTICO, VA., W. I., 507, 600.
 SAN FRANCISCO, CALIF. (NPG).—W. I., 150, 600, 975, 1908, 2400, 2900, 3950, 4650, 4800, 7900.
 SAN PEDRO, CALIF.—W. I., 150, 365, 600, 975, 1851, 2400, 2750, 3950, 4525.
 SAVANNAH, GA.—W. I., strike out 975.
 SAYVILLE, N. Y.—W. I., 9145.
 SEATTLE, WASH.—W. I., 600, 700, 975, 2400.
 ST. CROIX, VIRGIN ISLANDS.—W. I., 450, 600.
 ST. PETERSBURG, FLA.—W. I., 600, 975, 2400, 2700, 3700, 3950.
 TATOOSH, WASH.—W. I., 600, 975, 1654.
 VIRGINIA BEACH, VA.—W. I., 507.
 WASHINGTON, D. C. (Arlington) (NAA).—W. I., strike out 600, 975.
 WASHINGTON, D. C. (Navy Yard) (NAL).—W. I., strike out 600, 975, 2250.

NOTE.—Naval Stations having only one wave length use the one wave length for "listening in" and transmitting.

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.]

- COLUMBIA (NGA).—Strike out all particulars.
 GREAT NORTHERN.—Name changed to Columbia.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

Strike out all particulars following the call signals NGA, NMB, NPI, and NPK;
 NUG, read Eagle Harbor, Mich.; NAXL, read Columbia.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

- BOSTON, MASS. (1YS).—W. I., 200, 375.
 CLIFTON, N. J. (2ZM).—Strike out all particulars.
 COURIER STATION, TEX. (5VF).—Strike out all particulars.

EVANSVILLE, IND. (9XAH).—W. I., 200, 210, 375.
 LOS ANGELES, CALIF. (6XAO).—Strike out all particulars.
 NEW ORLEANS, LA. (5ZP).—Strike out all particulars.
 NEW YORK, N. Y. (2XNB).—W. I., 325.
 PORT CHESTER, N. Y. (2ZE).—Read Cedar Grove, N. J.
 PRINCETON, N. J. (2XU).—W. I., variable.
 SAN ANTONIO, TEX. (5ZAK).—R. C. Walken owner of station.
 SAN FRANCISCO, CALIF. (6ZAI).—Strike out all particulars.
 ST. LOUIS, MO. (9XS).—W. I., variable.
 ST. MARYS, OHIO (8ZL).—W. I., 200, 375.
 TACOMA, WASH. (7ZL).—Strike out all particulars.

MISCELLANEOUS.

USE OF 800 METERS.

Radio operators are cautioned that the use of 800 meters for commercial messages is in violation of the act of August 13, 1912, and the International Convention service regulations. This wave length is reserved exclusively for radio compass work. Any operator using 800 meters for commercial traffic may expect to have his license suspended or revoked.

AMENDMENTS TO REGULATIONS.

To radio inspectors and others concerned:

Paragraph 57, page 55, amended December 1, 1921, to read:

CLASS 2.—Limited commercial stations are not open to public service and are licensed for a specific commercial service or services defined in the license. Stations of this class must not transmit to or accept public messages from other stations. No rates are authorized. Licenses of this class are required for all transmitting radio stations used for broadcasting news, concerts, lectures, and such matter. A wave length of 360 meters is authorized for such service, and a wave length of 485 meters is authorized for broadcasting crop reports and weather forecasts, provided the use of such wave lengths does not interfere with ship to shore or ship to ship service.

Paragraph 58, page 55, which reads: "If a coast station, the operators shall hold a commercial second-grade license, or higher" (par. 57) is amended, effective January 10, 1922, to read: "Operators of limited commercial stations shall hold a commercial second-class license or higher."

D. B. CARSON, Commissioner of Navigation.

Approved.

HERBERT HOOVER, Secretary of Commerce.

COUNTERFEIT WEATHER FORECASTS.

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 \$500 or imprisoned not more than 90 days, or both. (Act of Mar. 4, 1909, c. 321, 35 Stat., 1088).—Submitted by Weather Bureau.

RADIO WEATHER SERVICE FROM KIRUN, JAPAN.

A radio weather bulletin and storm-signal service has been instituted at Kirun radio station, in latitude 25° 08' N., longitude 121° 45' E., call letters JFK and wave length 600 meters. This station transmits daily a weather bulletin at 11.30 G. M. T. (civil) and storm signals at 12.05 G. M. T. (civil). The station transmits the warnings issued by the Central Meteorological Observatory at Tokyo immediately after being received. No charge is made except in cases where the warnings are transmitted specially at the request of ships. The messages are sent out in English and are transmitted three times in succession, each being preceded by the signal QST sent three times. The warnings contain the following: Typhoon or low atmospheric pressure, date, time, position of center, reading of barometer at center, and direction of progressive motion; or locality, warning, and remarks.—From *Hydrographic Bulletin*,

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HIGH-POWER RADIO INSTALLATIONS, BRAZIL.

Two high-power radio stations are shortly to be established in Brazil, each being equipped with a 1,000-kilowatt Alexanderson high-frequency generator. One of these stations is being erected at Rio de Janeiro to communicate directly with Europe; the other is being erected at Para to communicate with the United States.—*From Hydrographic Office, Dec. 7, 1921.*

RADIO TIME SIGNALS, EIFFEL TOWER, FRANCE.

From November 15, 1921, the automatic radio time signals from Eiffel Tower radio station are preceded by a series of the letter "V" sent from 0923 to 0924, then the words "Observatoire de Paris," sent from 0925 to 0926. The instants 0928, 0929 are indicated by the end of a group of three dashes, according to the cadence adopted by the International Time Conference of 1912. The semiautomatic radio time signals from this station indicate, by means of a dot, the instants 1045, 1047, and 1049; also 2245, 2247, and 2249, according to the cadence of the old-time signals from Eiffel Tower radio station.—*From Hydrographic Office, Dec. 21, 1921.*

RADIO COMPASS STATIONS, PEN-AR-ROCH, FRANCE.

The service of the radio compass station at Pen-ar-Roch, Ouessant, in (approximately) latitude $48^{\circ} 26' 27''$ N., longitude $5^{\circ} 05' 37''$ W., has been resumed.—*From Hydrographic Office, Dec. 21, 1921.*

INFORMATION FROM THE BERNE INTERNATIONAL BUREAU.

Italy.—By letter of September 29 last the Italian office states there has been established a regulation by which each ship which is in need of a compass bearing asks the coast station interested the coast charge to be paid for the service. Also, in order to have a way of checking in case of dispute, the coast station, as well as the ship station, transcribes the bearing on a radiotelegram form. The radio station of Brindisi will be closed to public service beginning December 15, 1921. The service of this station will be assumed by the S. Cataldo di Bari station.

Portugal.—The coast station of Lisbonne (Lisbon) is reopened to service.

France.—The legal hour was reestablished during the night of October 25–26 last.

Belgium.—The legal hour was reestablished during the night of October 25–26 last.

Persia.—The rate for the stations of Bahrein, Bushire, Henjam, and Lingah is 0 fr. 60 per word, beginning December 1, 1921.

APPLICATIONS OF RADIO TELEPHONY IN THE LIFE-SAVING SERVICE USING A COIL ANTENNA.

The Bureau of Standards has been cooperating with the United States Coast Guard in the development of radio telephone apparatus to maintain communication between a motor lifeboat and a shore station. The great importance of maintaining reliable communication between the shore and a boat engaged in rendering assistance to a wrecked ship is obvious. The proper navigation of such a boat in a storm makes it highly desirable to reduce to a minimum any apparatus above the deck level. No loose wires above, in, or under the boat were permissible, since this would interfere with the proper handling of the boat and the throwing of lines. The installation of a small antenna of the ordinary elevated type even a comparatively small distance above the deck would be very undesirable from a navigating point of view. After considerable investigation it was decided that a coil antenna offered the best prospects.

A coil antenna need not be insulated from the earth to give good results. Two vertical pipes, grounded at each end and having a connection made across their upper ends, have been successfully used as a coil antenna. Several years ago two members of the staff of the Bureau of Standards developed a coil antenna for use on a submarine,

nected at each end to the metallic hull of the vessel. The vessel was thus equipped with a single-turn coil antenna of which the hull formed a part, and successful communication has been carried on with a submarine so equipped.

A similar arrangement has been used on the motor lifeboat for the Coast Guard. The boat on which the installation was made was a 36-foot gas-engine driven boat equipped with a heavy metal keel. The receiving and transmitting set was installed on the boat as far forward as possible. From the set a wire was run forward and connected to the keel, while two wires, heavily insulated, were run aft along the guards and connected to the keel. A particular kind of a coil antenna was thus formed, of which the keel constituted a part. This arrangement was satisfactory from a navigating point of view.

The transmitting apparatus used at the shore station and on the boat were identical and consisted of a 5-watt radio telephone transmitting set. The wave length used for transmission from the boat was 380 meters, and the wave length used for transmission from the shore station was 675 meters. The receiving equipment used included an amplifier, using three stages of radio-frequency amplification and two stages of audio-frequency amplification, and was specially designed for the wave length used. The apparatus installed on the boat can be made very compact.

On November 15 a demonstration was made at Atlantic City before representatives of the Coast Guard on a Coast Guard motor lifeboat equipped with this type of apparatus. When the boat was 6 miles from shore, good communication was maintained with the shore station. This distance is sufficient for the ordinary needs of the Coast Guard. If a greater distance is to be covered, it will, of course, be possible to use a transmitting set more powerful than the small 5-watt set used in these tests. The results of the tests were regarded as very satisfactory.

Consideration is being given by the Coast Guard to the installation of radio telephone equipment at a number of the more important stations.—*Submitted by Bureau of Standards, Nov. 30, 1921.*

WEATHER REPORTS.

Masters of all vessels are reminded that all communications concerning weather should be forwarded to the Weather Bureau, Washington, D. C., and if sent by radio or telegraph should be addressed "Govt. Observer." Under the subject "Weather" should be included all information of a meteorological nature, including reports on barometric pressures, winds, force and direction, and movements of all air strata. Forms and instructions for reports can be obtained from the Weather Bureau, Washington, D. C.

All hydrographic information, which includes reports on ice, wrecks, derelicts, floating obstructions, and important changes in aids to navigation, should be addressed to the Hydrographic Office and any of its branch offices by mail, and to any of the following naval radio stations by radio, addressed "Govt. Hydro."

United States naval radio stations.	Call letters.	United States naval radio stations.	Call letters.
<i>Atlantic Ocean.</i>		<i>Pacific Ocean.</i>	
Boston.....	NAD	Balboa.....	NBA
New York.....	NAH	San Francisco.....	NPG
Philadelphia.....	NAI	North Head.....	NPE
Norfolk.....	NAM	Seattle.....	NVL
Baltimore.....	NBZ	<i>Great Lakes.</i>	
Charleston.....	NAO	Duluth.....	NUX
New Orleans.....	NAT	Chicago.....	NVR
Galveston.....	NKB	Buffalo.....	NNZ
St. Thomas, Virgin Islands.....	NAV	Cleveland.....	NRH
San Juan.....	NBB		
Navassa Island.....	NAW		
Guantanamo, Cuba.....	NKC		
Colon.....	NAX		

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RADIO ICE SIGNALS, SWEDEN.

Radio ice signals for the coast of Sweden are transmitted daily at 13.15 (middle European time) by Karlsborgs radio station, on a 2,500-meter wave length. The signals are transmitted according to the following code:

Main group AA.			Main group BB.		
Group I.	Group II.	Group III.	Group I.	Group II.	Group III.
AA IS IS IS	IS IS IS	IS IS IS	BB IS IS IS	IS IS IS	IS IS IS
Main group CC.			Main group DD.		
Group I.	Group II.	Group III.	Group I.	Group II.	Group III.
CC IS IS IS	IS IS IS	IS IS IS	DD IS IS IS	IS IS IS	IS IS IS

The letter "I," replaced by either a figure or the letter "x," signifies ice, as below; the letter "s," replaced by either a figure or the letter "x," signifies effects on navigation, as below:

Ice reports.

- | | |
|---------------------|------------------------|
| 0=Clear of ice. | 6=Difficult land ice. |
| 1=Brash ice. | 7=Difficult drift ice. |
| 2=Spread drift ice. | 8=Pack ice. |
| 3=Floe ice. | 9=Hummocky ice. |
| 4=Land ice. | x=Not known. |
| 5=Drift ice. | |

Effects on navigation.

- 0=Open for navigation.
- 1=Navigation difficult for sailing vessels.
- 2=Navigation difficult but practicable for sailing vessels assisted by tugs.
- 3=Navigation closed to sailing vessels.
- 4=Navigation only practicable for powerful steamers.
- 5=Navigation only practicable with the assistance of ice breakers.
- 6=Channel kept open by ice breakers.
- 7=Navigation closed.
- 8=Navigation held up.
- 9=Conditions not known on account of fog, snow, etc.

Channels and districts for which the signals are given.

Main group.	Subgroup.	Number or letter "x" in subgroups.	Channels and districts.
AA	I	1st and 2d.....	Channel from sea to Karlsborg.
		3d and 4th.....	Waters outside of Rödkailem.
		5th and 6th.....	Channel to Lulea through Tjeuholms-sundet.
	II	1st and 2d.....	Waters outside of Gäseren.
		3d and 4th.....	West Quarken.
		5th and 6th.....	Waters outside of Skag.
	III	1st and 2d.....	Waters outside of Härnö.
		3d and 4th.....	Angermanälven above Svanö.
		5th and 6th.....	Angermanälven below Svanö.
BB	I	1st and 2d.....	Waters outside of Bremö.
		3d and 4th.....	Channel: Bremö to Draghällans Light.
		5th and 6th.....	Alnöundet.
	II	1st and 2d.....	Waters outside of Lälljungfrun.
		3d and 4th.....	Waters around Eggegrund.
		5th and 6th.....	North channel to Gefle.
	III	1st and 2d.....	Oregrundsgrepen.
		3d and 4th.....	Waters in sight of Grundkallen Light Vessel.
		5th and 6th.....	Waters outside of Södersarm.
CC	I	1st and 2d.....	Waters outside of Sandhamn.
		3d and 4th.....	Channel: Sandhamn to Stockholm.
		5th and 6th.....	Waters outside of Landsort.
	II	1st and 2d.....	Channel: Landsort to Stockholm.
		3d and 4th.....	Channel: Hävringe to Orelösund.
		5th and 6th.....	Kalmarsund, north of Kalmar.
	III	1st and 2d.....	Kalmarsund, south of Kalmar.
		3d and 4th.....	Southern entrance to Kalmarsund.
		5th and 6th.....	Waters outside of Kalshamn.
DD	I	1st and 2d.....	Southern entrance to Oresund.
		3d and 4th.....	Flint Channel.
		5th and 6th.....	Waters outside of Helsingborg.
	II	1st and 2d.....	Northern entrance to Oresund.
		3d and 4th.....	Waters outside of Halmstad.
		5th and 6th.....	Waters outside of Varberg.
	III	1st and 2d.....	Waters outside of Vinga.
		3d and 4th.....	Channel: Vinga to Gothenborg.
		5th and 6th.....	Waters outside of Smogen.

In each subgroup the first and second figures, the third and fourth figures, and the fifth and sixth figures are given together, or in place of a figure the letter "x."

The conditions for a channel or district is found by looking up the two figures, or in the place of a figure the letter "x," in its respective main group and subgroup. When conditions are the same in all channels and districts under one main group, for example, clear of ice, open for navigation, only main group letters are given, followed by the figures as "AA 00." If the conditions should be the same in all channels and districts in several main groups, the letters of the main group would be sent out, followed by the figures indicating the conditions, as "CC DD 00."

Information is also sent when any of the principal light vessels or buoys on the coast has been withdrawn or are not functioning and of wrecks that constitute a danger to navigation. The radio information is given thus: First, the preliminary signal (—, —, —) to call attention; then the call signal for all stations from Karlsborgs Radio Station (CQ CQ CQ de SAJ SAJ SAJ) repeated three times, and thereafter the words "Swedish ice report," with the information following:

For example:

—, —, — CQ CQ CQ de SAJ SAJ SAJ CQ CQ CQ de SAJ SAJ SAJ CQ CQ CQ de

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Then information concerning light vessels and light buoys follows.

Signification:

(For places under main group AA)—

Ice conditions not known.

Navigation held up.

(For places under main group BB, Subgroup I)—

Ice conditions not known.

Navigation held up.

Waters outside of Lilljungfrun:

Ice conditions not known.

Navigation held up.

Waters around Eggegrund:

Spread drift ice.

Navigation closed to sailing vessels.

North Channel to Gefle:

Difficult land ice.

Navigation only practicable for powerful steamers.

Oregrundagrepen:

Difficult land ice.

Navigation only practicable with assistance of ice breakers.

Waters within sight of Grundkallen Light Vessel:

Not known.

Not known.

Waters outside of Soderarm:

Clear of ice.

Open for navigation.

(For places under main groups CC and DD):

Clear of ice.

Open for navigation.

Information concerning light vessels, buoys, and wrecks are sent in English.

* RADIO COMPASS STATION, VINGA ISLAND, SWEDEN.

Vinga Island Radio Compass Station in (approximately) latitude $57^{\circ} 08' N.$, longitude $11^{\circ} 38' 10'' E.$, is now in operation. It is controlled by the coast station (Gothenburg) call letters SAB, which operates on a 600-meter wave length.

Vessels desiring bearings should call Gothenburg radio station and send out QTE (What is my true bearing?) and then await instructions. Gothenburg radio station will send the results by sending out QTE (the true bearing of your vessel from ——— is ——— degrees), followed by the compass station's call letters SAL and a group of three figures, from 000 to 359, for the bearing from the compass station. As soon as the bearing is received the vessel should acknowledge its receipt in the usual manner and give the regulation signal for the end of the message, which will be repeated by the Gothenburg station. Bearings are furnished free on 600-meter wave lengths. No responsibility is assumed for inexact information.

As an aid to the work performed by the radio compass station the following information should be sent to Kungl. Telegrafstyrelsens Radiolyra, Stockholm 2:

- (a) Vessel's name.
- (b) Radio compass station's name.
- (c) Date and time (G. M. T.) when vessel received bearing.
- (d) Bearing given by radio compass station.
- (e) Vessel's position when bearing was received, determined in some other manner.
- (f) The probable accuracy of the calculated position.
- (g) Weather conditions at the time.
- (h) Eventual remarks.
- (i) Captain's or observer's signature.

RADIO COMPASS STATIONS INSTRUCTIONS.

The Naval Communications Service will furnish radio bearings to mariners of all vessels equipped with radio telegraph transmitters. While the use of these bearings should not lead a mariner to neglect other precautions, such as the use of the lead, etc., during a fog, these bearings will greatly reduce the dangers to navigation for mariners who are compelled for any reason to proceed during foggy or misty weather. These radio compass stations are provided, primarily, to assist the mariner in closing the land during fog or poor visibility, but they may also be used to obtain the positions of vessels at sea in radio compass range, about 150 miles, when for any reason positions can not be obtained by other means.

The maximum distance for which bearings from these stations are accurate is 150 miles. But accurate positions can not be plotted when more than 50 miles from the shore on Mercator charts, for the Mercator projection introduces a distortion of the true bearing. Charts based on Gnomonic projection are essential to plot correctly long-distance radio bearings. Such charts are now under construction by the Hydrographic Office, and until they are available mariners may use the Mercator chart for long-distance bearings, applying necessary corrections, which may be obtained by various methods, one of which is fully explained on the backs of H. O. Pilot Charts of the North Atlantic Ocean for February, 1921; North Pacific Ocean for May, 1921; Indian Ocean for June, 1921; and Central American waters for March, 1921.

Radio compass stations are divided into two classes:

(a) Single stations, operating independently and furnishing a single bearing. These stations are located with the view of giving service to ships at a distance of not over 150 miles from the station.

(b) Harbor entrance groups. All stations in harbor entrance groups are connected to and controlled by the master station. All stations of the group take bearings simultaneously, and these bearings are transmitted to the ship requesting them by the control station. The purpose of these stations is to lead mariners to the light vessels off harbor entrances.

Where only one radio compass station is available, the mariner may fix his position by two or more bearings from the station with the distance run between or may use the bearing as a line of position or as a danger bearing. Or the bearing may be crossed with a line of position obtained from an observation of an astronomical body to establish a fix.

Wave lengths.—All independent and group radio compass stations keep watch on 800 meters. Only this wave should be used to call and work with these stations.

Calling a radio compass station.—To obtain a bearing from independent radio compass stations, call the station from which the bearing is desired in the usual manner and request bearings by means of the conventional signal given hereafter. Simultaneous bearings from two or more compass stations can be obtained by making the call include the other compass stations desired. To obtain bearings from the harbor entrance, compass stations carry out the procedure previously given. The compass control station only will answer.

Conventional signals.—The following abbreviated signals will be used:

Signal.	Meaning.
QTE.....	What is my true bearing?
QTE.....	Your true bearing is — degrees from — radio compass station.

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(a) *Procedure in detail.*—A ship calling the radio compass station or compass control station should make the abbreviation "QTE," ("What is my bearing?"). This request will be answered by the radio compass station or control station, and when ready to observe the radio bearing it will send the signal "K," indicating to the ship to commence "testing;" i. e., repeating its distinguishing signal for a period of 50 seconds. The signal should be made slowly with the dashes considerably prolonged.

(b) The testing should be made on 800 meters, upon the completion of which the ship should await reply from the radio compass station.

(c) The radio compass station or control station will then reply, repeating the abbreviation "QTE," ("Your bearing from _____ was _____ degrees"), followed by the bearing in degrees given by a group of three figures 000 to 359, indicating the true bearing in degrees of the ship station from the radio compass station, and then the time group giving the time of observations in local standard time. In the case of more than one radio compass connected by land line only the station originally called will answer. This station will combine all the bearings taken by itself and associated station into one message, which gives each bearing observed immediately after the name of the station making the observation.

All radio compass stations transmit on 800 meters.

Example.—A ship (call letters KVA) desires to get bearings from the Delaware Bay entrance group (call letters NSD). The following procedure is used:

```

- . . . . NSD NSD NSD - . . . . KVA KVA KVA - . . . . QTE
  . . . . . AR
- . . . . KVA - . . . . NSD K
- . . . . NSD - . . . . KVA - . . . . QTE . . . . KVA KVA KVA
  _____ (making call letters KVA for 50 seconds prolonging the dashes)
- . . . . KVA AR
- . . . . KVA - . . . . NSD - . . . . QTE
Cape May 120, Cape Henlopen 110, Bethany Beach 085 at 0126 - . . . .
  NSD AR
- . . . . NSD - . . . . KVA - . . . . 120 110 085 at 0126 . . . . AR
- . . . . KVA - . . . . NSD R . . . . NSD
  
```

This method is the only authorized procedure for calling, answering, and testing and should be followed exactly. Such signals as MO — V — and other test signals are not authorized for radio compass traffic. The testing period of 50 seconds should not be exceeded. Mariners who do not follow the prescribed procedure exactly occasion delay to themselves in obtaining bearing and to other mariners who may be waiting for an opportunity to use the radio compass stations.

Danger from reciprocal bearings.—Attention is invited to the fact that when a single bearing is furnished there is a possibility of an error of approximately 180 degrees, as the operator at the compass station can not always determine on which side of the station the vessel lies. Certain radio compass stations, particularly those on islands or extended capes, are equipped to furnish two corrected true bearings for any observation. Such bearings when furnished vessels may differ by approximately 180 degrees, and whichever bearing is suitable should be used.

Caution.—Mariners receiving bearings which are evidently the approximate reciprocal of the correct bearing should never attempt to correct these bearings by applying a correction of 180 degrees, as such correction would not include the correction necessary on account of deviation at the compass station. An error as large as 30 degrees may be introduced by mariners applying an arbitrary correction of 180 degrees to such bearings. Vessels receiving bearings manifestly requiring an approximate 180-degree correction should request the other bearing from the radio compass

Bearings, except in the case of approximate reciprocal bearings, should be accurate within 2 degrees of arc provided the transmitting equipment on board vessels is tuned sharply to 800 meters. Operators should 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. When bearings from three or more compass stations are not over 2 degrees of arc in error, but do not meet at a fixed point, the geometric center of the triangle formed by the bearings can generally be taken as the approximate position of the vessel.

Mariners until thoroughly familiar with the system are advised to use radio compass stations frequently, especially in clear weather, when positions of vessels can be accurately fixed in order to accustom operators to the procedure and to acquaint themselves with the degree of accuracy and dependability of bearings furnished by the radio compass stations.

Reports.—In order that the operation of shore radio compass stations may be checked, mariners obtaining bearings are requested to forward a brief report to the Director Naval Communications, Navy Department, Washington, D. C., containing the following particulars:

1. Name of ship.
2. Name of radio compass station.
3. Date and local standard time at which radio bearing was taken.
4. Bearing given by radio compass station.
5. Estimated position of ship at above time and dates by methods other than radio.
6. The probable degree of accuracy of the estimated position.
7. Weather conditions at above time.
8. Remarks, if any.
9. Signature of master or responsible navigating officer.

There is no charge for bearings furnished by the United States naval radio compass stations.

RADIO COMPASS STATIONS.

The following stations are within the continental limits of the United States:

Name of station.	Call letters.	Position.
<i>Atlantic coast.</i>		
Bar Harbor.....	NBD	44 18 36 N. 68 11 27 W.
Cape Elizabeth (Portland), Me.....	NAB	43 33 59 N. 70 11 59 W.
Gloucester, Mass.....	NAD	42 35 19 N. 70 41 08 W.
Deer Island, Mass.....	NAD	42 21 15 N. 70 57 30 W.
Fourth Cliff, Mass.....	NAD	42 09 40 N. 70 42 22 W.
North Truro, Mass.....	NAE	42 02 23 N. 70 03 37 W.
Chatham, Mass.....	NXA	41 42 48 N. 69 57 53 W.
Surtside (Nantucket), Mass.....	NBX	41 14 42 N. 70 05 56 W.
Prices Neck, R. I.....	NAF	41 27 06 N. 71 20 15 W.
Amagansett (Long Island), N. Y.....	NBM	40 58 10 N. 72 07 27 W.
Fire Island (Long Island), N. Y.....	NAH	40 38 07 N. 73 12 32 W.
Sandy Hook, N. J.....	NAH	40 27 54 N. 73 59 50 W.
Mantoloking, N. J.....	NAH	40 01 30 N. 74 03 10 W.
Cape May, N. J.....	NSD	38 55 53 N. 74 54 35 W.
Cape Henlopen, Del.....	NSD	38 47 35 N. 75 05 26 W.
Bethany Beach, Del.....	NSD	38 32 45 N.

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Name of station.	Call letters.	Position.		
		°	'	"
<i>Atlantic coast—Continued.</i>				
Hog Island, Va.....	NCZ	37	22	36 N.
		75	42	37 W.
Virginia Beach, Va.....	NCZ	36	51	10 N.
		75	58	33 W.
Poyner's Hill, N. C.....	NCZ	36	17	16 N.
		75	47	48 W.
Cape Hatteras, N. C.....	NDW	35	14	22 N.
		75	31	42 W.
Cape Lookout, N. C.....	NAN	34	36	11 N.
		76	32	18 W.
North Island, S. C.....	NZW	33	13	21 N.
		79	11	06 W.
Folly Island, S. C.....	NZV	32	41	00 N.
		79	53	14 W.
Jupiter, Fla. ¹	NAQ	26	56	59 N.
		80	04	57 W.
Key West, Fla. ¹	NAR	24	33	08 N.
		81	45	18 W.
<i>Gulf coast.</i>				
Pass a Loure, La.....	NBX	29	11	24 N.
		89	02	26 W.
Burwood, La.....	NBX	28	57	27 N.
		89	23	10 W.
Grand Island, La.....	NLI	29	13	52 N.
		89	59	46 W.
<i>Pacific coast.</i>				
Cattle Point, Wash. ¹	NFN	48	27	04 N.
		122	57	45 W.
Smith Island, Wash. ¹	NFH	48	19	05 N.
		122	50	39 W.
New Dungeness, Wash. ¹	NFT	48	10	36 N.
		123	07	51 W.
Port Angeles, Wash. ¹	NFT	48	08	30 N.
		123	24	19 W.
Tatoosh, Wash.....	NFD	48	23	41 N.
		124	44	13 W.
Ocean Park, Wash. ¹	NPE	46	27	53 N.
		124	03	16 W.
Fort Stevens, Oreg.....	NPE	46	11	32 N.
		123	59	15 W.
Empire, Oreg. ¹	NPF	43	23	03 N.
		124	18	58 W.
Eureka, Calif.....	NPW	40	41	48 N.
		124	16	34 W.
Point Reyes, Calif.....	NLG	38	02	13 N.
		122	59	35 W.
Bird Island, Calif.....	NLD	37	49	27 N.
		122	32	12 W.
Point Montara, Calif.....	NLH	37	32	02 N.
		122	31	07 W.
Farallon Island, Calif.....	NPI	37	41	58 N.
		122	59	56 W.
Point Arguello, Calif.....	NPK	34	34	43 N.
		120	38	51 W.
Point Hueme, Calif.....	NMD	34	08	43 N.
		119	12	30 W.
Point Fermin, Calif.....	NPX	33	42	19 N.
		118	17	38 W.
Point Loma, Calif.....	NPL	32	42	21 N.
		117	15	17 W.
Imperial Beach, Calif.....	NPL	32	35	14 N.
		117	07	54 W.

¹ Out of commission at present. Notice will be given when operation is resumed.

NOTE.—These instructions embody the latest information on United States naval radio compass stations and cancel all previous instructions issued.—Submitted by Naval Communication Service.

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