

# DEPARTMENT OF COMMERCE

# RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION

Washington, August 1, 1923—No. 76

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## ABBREVIATIONS.

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

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

This edition is the first supplement to the new list of commercial and Government radio stations, edition June 30, 1923.

## NEW STATIONS.

*Commercial land stations, alphabetically by names of stations.*

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

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Anvik, Alaska <sup>1</sup> .....	KKP	300, 450, 600.....	FX	X	John W. Chapman (Bureau of Foreign and Domestic Missions, P. E. Church).
Culver City, Calif. (portable) <sup>2</sup>	KYI	146.....	FX	X	Goldwyn Producing Corp.
Culver City, Calif. (portable) <sup>3</sup>	KYJ	146.....	FX	X	Do.
Port Arthur, Tex. <sup>4</sup> .....	WKI	300, 600.....	PG	.....	D. M. Pierson & Co.
Pysht, Wash. <sup>5</sup> .....	KJA	146.....	FX	X	Merrill & Ring Lumber Co.
West Port Arthur, Tex. <sup>6</sup>	WGO	300, 600.....	PG	.....	Gulf Refining Co.

<sup>1</sup> Loc. (approximately) 0.160° 12' 00", N. 62° 39' 00"; range, 50; system, composite v. t. telephone and telegraph; rates, none.

<sup>2</sup> Range, 25; system, composite v. t. telephone; rates, none.

<sup>3</sup> Loc. 0.95° 55' 35", N. 29° 52' 40"; range, 400; system, U. S. Navy, 240; hours, 8 a. m.—10 p. m.; rates, ship service 12 cents per word.

<sup>4</sup> Loc. (approximately) 0.124° 07' 00", N. 48° 12' 00"; range, 25; system, composite v. t. telephone and telegraph; rates, none.

<sup>5</sup> Loc. 0.68° 57' 50", N. 29° 30' 50"; range, 300; system, composite, 1000; hours, 8 a. m.—12 noon; 1-5 p. m.; rates, ship service 10 cents 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, 1923, 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—
Catherine G. Sudden <sup>1</sup> ....	KFKR	.....	PG	X	Western Mercantile Marine Corp.	
Gumber.....	KFKK	8	PG	X	Bay State Fishing Co.	R. C. A.
General call for all Gulf Refining Co. vessels.	KFKX	.....	.....	.....	Gulf Refining Co.	
Fred J. Wood <sup>2</sup> .....	KFKE	8	PG	X	E. K. Wood Lumber Co.	S. O. R. S.
Lassen.....	KFKG	8	PG	X	do.....	
Leviathan Lifeboat No. 67. <sup>3</sup>	WSNA	8	PG	X	U. S. S. B.....	R. C. A.
Leviathan Lifeboat No. 68. <sup>3</sup>	WSNB	8	PG	X	do.....	Do.
Ocean.....	KFKM	8	PG	X	Bay State Fishing Co.	Do.
Ripple.....	KFEN	8	PG	X	Bay State Fishing Co.	Do.
Shasta.....	KFKF	8	PG	X	E. K. Wood Lumber Co.	
Silverado <sup>4</sup> .....	KFKI	8	PG	X	McCormick & S. S. Line.	Owner of vessel.
Spray.....	KFKO	8	PG	X	Bay State Fishing Co.	R. C. A.
Spray III <sup>5</sup> .....	KFKW	.....	PR	X	Henry B. Jay.....	Owner of vessel.
Tide.....	KFKS	8	PG	X	Bay State Fishing Co.	R. C. A.
Wanderer <sup>6</sup> .....	KFIG	.....	PR	X	Merrill & Ring Lumber Co.	Owner of vessel.
White cap.....	KFKT	8	PG	X	Bay State Fishing Co.	R. C. A.

<sup>1</sup> System, Gray & Danielson.

<sup>2</sup> Range, 200; system, Klibourne & Clark, 1000; w. l., 300, 600, 700.

<sup>3</sup> Range, 50; system, Cutting & Washington, 1000; w. l., 300, 600.

<sup>4</sup> Range, 150; system, R. C. A., 1000; w. l., 300, 450, 600.

<sup>5</sup> Range, 50; system, composite v. t. telephone and telegraph; w. l., 146, 300, 600; this station communicates only with certain stations in emergency.

<sup>6</sup> Range, 25; w. l., 146, 300, 545, 600; this station communicates only with other land and ship stations of same company.

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*Commercial land and ship stations, alphabetically by call signals.*

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

Call signal.	Name.	Call signal.	Name.
KFIG	Wanderer.....b	KFKW	Spray III.....b
KFFE	Fred J. Wood.....b	KFXX	General call for all Gulf Refining Co. vessels.....b
KFEF	Shasta.....b	KJA	Pyshk, Wash.....c
KFEG	Larsen.....b	KKP	Anvik, Alaska.....c
KFKI	Silverado.....b	KYI	Galver City, Calif. (portable).....c
KFKK	Comber.....b	KYJ	Do.....c
KFEM	Ocean.....b	WGO	West Port Arthur, Tex.....c
KFEN	Ripple.....b	WGI	Port Arthur, Tex.....c
KFEO	Spray.....b	WSNA	Leviathan Lifeboat No. 67.....b
KFER	Catherine G. Sudden.....b	WSNB	Leviathan Lifeboat No. 68.....b
KFKS	Tide.....b		
KFKT	White Cap.....b		

*Broadcasting stations, alphabetically by names of cities.*

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

City.	Call signal.	City.	Call signal.
Astoria, Oreg.....	KFJI	Fond du Lac, Wis.....	KFIZ
Bristow, Okla.....	KFIK	New Orleans, La.....	WTAF
Canandaigua, N. Y.....	WSAW	Oklahoma City, Okla.....	KFIJ
Carrollton, Mo.....	KFJJ	Phoenix, Ariz.....	KFCB
Carthage, Ill.....	WTAD	Seattle, Wash.....	KFIY
Chesham, N. H.....	WBAU	Do.....	KFIC
Chicago, Ill.....	WSAX	Selma, Calif.....	KFIH

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

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

Call signal.	Station operated and controlled by—	Location of station.	Power (watts).	Wave length.	Frequency (kilo-cycles).
KFCB	Nielsen Radio Supply Co.....	Phoenix, Ariz.....	20	298	1,260
KFIY	Brett Laboratories.....	Seattle, Wash.....	15	296	1,270
KFIZ	Daily Commonwealth and Oscar A. Huselman.....	Fond du Lac, Wis.....	100	273	1,100
KFIC	Seattle Post Intelligencer.....	Seattle, Wash.....	100	263	1,200
KFJP	National Radio Manufacturing Co.....	Oklahoma City, Okla.....	20	292	1,190
KFIH	"The Sugar Bowl" (H. B. Shaw).....	Selma, Calif.....	10	273	1,100
KFJI	Liberty Theatre (E. E. Marsh).....	Astoria, Oreg.....	10	292	1,190
KFJJ	Carrollton Radio Shop.....	Carrollton, Mo.....	50	296	1,270
KFJK	Delano Radio and Electric Co.....	Bristow, Okla.....	100	283	1,287
WBAU	Camp Marlenfeld.....	Chesham, N. H.....	10	299	1,310
WSAW	Curtice & McElwee.....	Canandaigua, N. Y.....	100	275	1,090
WSAX	Chicago Radio Laboratory.....	Chicago, Ill.....	20	288	1,120
WTAD	Robert E. Compton and First Presbyterian Church.....	Carthage, Ill.....	50	229	1,310

## RADIO SERVICE BULLETIN.

### *Government land stations, alphabetically by names of stations.*

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

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Laramie, Wyo.....	WWD	.....	FX	X	Forest Service, Department of Agriculture.
Medicine Bow Peak, Wyo.	WWF	.....	FX	X	Do.
Pittsburgh, Pa. (portable).	WWY	.....	FX	X	Bureau of Mines, Department of the Interior.
Washington, D. C.....	NKF	.....	FX	X	U. S. Navy.

### *Government ship stations, alphabetically by names of stations.*

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

Station.	Call signal.	Wave length.	Service.	Hours.	Station controlled by—
S. C. 431 <sup>1</sup> .....	NOPR	300, 600.....	PG	X	U. S. Navy.
S. C. 433 <sup>1</sup> .....	NOPZ	300, 600.....	PG	X	Do.
S. C. 437 <sup>1</sup> .....	NOQQ	300, 600.....	PG	X	Do.

<sup>1</sup> System, U. S. Navy, 1000.

### *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.
NKF	Washington, D. C.....c	WWD	Laramie, Wyo.....c
NOPR	S. C. 431.....b	WWF	Medicine Bow Peak, Wyo.....c
NOPZ	S. C. 433.....b	WWY	Pittsburgh, Pa. (portable).....c
NOQQ	S. C. 437.....b		

### *Special land stations, alphabetically by names of stations.*

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

Station.	Call signal.	Station controlled by—
Minneapolis, Minn.....	9XAT	Cutting & Washington Radio Corp.
San Antonio, Tex.....	5XAQ	Edward G. Conroy, 117 E. Mistletoe Ave.
San Diego, Calif.....	6XBI	William W. Burnett, 733 Twenty-sixth St.

NOTE.—Wave lengths between 150 and 230 meters are used by special amateur and technical and training school stations. Experimental stations use variable wave lengths.

### *Special land stations, grouped by districts.*

Call signal.	District and station.	Call signal.	District and station.
5XAQ	Fifth district: San Antonio, Tex.....	9XAT	Ninth district: Minneapolis, Minn.
6XBI	Sixth district: San Diego, Calif.....		

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## ALTERATIONS AND CORRECTIONS.

## COMMERCIAL LAND STATIONS.

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

- CLEVELAND, OHIO (WTK).—Loc. (approximately)  $0.81^{\circ} 44' 00''$ , N.  $41^{\circ} 55' 00''$ ; range, 300; system, Simon, 1000; w. l., 300, 600, 1713; hours, N; rates, ship service, 10 cents per word.
- FRESNO, CALIF.—W. l., 1817; system, composite, v. t. telephone and telegraph.
- GUNTERSVILLE, ALA.—W. l., 1621.
- HILLSBORO, OREG. (KEK).—Hours, N.
- MARION, MASS. (WOC).—W. l., 300, 600, 2000.
- MOBILE, ALA.—Loc.  $0.88^{\circ} 02' 27''$ , N.  $30^{\circ} 41' 34''$ ; range, 150; system, Navy-R. C. A., 1000; service, PG; hours, 7 a. m.—10 p. m.; rates, all classes, 10 cents per word.
- NEW YORK, N. Y. (Borough of Brooklyn) (WNY).—W. l., 300, 600, 1800, 2000.
- PORT HURON, MICH.—W. l., 1621.
- SEATTLE, WASH. (KPE).—System, Navy-Liberty, 1000 and Federal arc; w. l., 300, 550, 600, 1641, 1800.
- TULLAHOMA, TENN.—W. l., 1621.

## COMMERCIAL SHIP STATIONS ALPHABETICALLY BY NAMES OF VESSELS.

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

- AGWIMARS.—W. l., add 706.
- AGWIMOON.—W. l., add 706.
- AGWISTAR.—W. l., add 706.
- ALAMEDA.—System, Navy-R. C. A., 1000; w. l., 300, 600, 706; Harold L. Arnold owner of vessel.
- ALASKA.—Alaska S. S. Co. owner of vessel; station operated and controlled by S. O. R. S.
- ALASKAN.—W. l., add 706.
- ALBERT JEFFRESS.—W. l., add 706.
- ALL AMERICA.—W. l., add 706.
- AMERICA.—System, Federal arc, 1000 with chopper; w. l., 300, 600, 706, 1800.
- ANACORTES.—W. l., add 706.
- ANNETTA.—Annetta S. S. Corp. owner of vessel.
- ANTIETAM.—System, R. C. A., 1000; David Berg Industrial Alcohol Co. owner of vessel.
- APACHE.—System, R. C. A., 1000; w. l., 300, 450, 600, 706.
- ARCTURUS.—W. l., add 706.
- ATLAS.—W. l., add 706.
- BARBARA O.—W. l., add 706.
- BERKSHIRE.—Range, 300; system, R. C. A., 1000; w. l., 300, 450, 600, 706; hours, N; station operated and controlled by I. W. T. Co.
- BERT E. HANEY.—Rates, 8 cents per word; station operated and controlled by Federal Telegraph Co.
- BLAIR.—W. l., add 706.
- BYLAYS.—W. l., 300, 450, 600, 706.
- CABRILLE.—Station operated and controlled by I. W. T. Co.
- CANIBAS.—Name changed to Mauna, Ala.; w. l., 300, 600, 706.
- CAROLYN.—W. l., add 706.
- CASCADE.—Range, 200; system, Navy, 1000; w. l., 300, 450, 600.
- CHARLES H. CRAMP.—W. l., add 706.
- CHILORE.—Range, 300; system, R. C. A., 1000.
- CITY OF BENTON HARBOR.—System, R. C. A., 1000; w. l., 300, 600, 706.
- CITY OF HOUSTON.—System, Navy—R. C. A., 1000.
- CITY OF SAVANNAH.—W. l., add 706.
- CITY OF ST. JOSEPH (KFIT).—Range, 150; system, R. C. A., 1000; w. l., 300, 600, 706; rates, Great Lakes service 2 cents per word.
- CLAUSEUS.—System, R. C. A., 1000; w. l., 300, 450, 600, 706.
- CLONTARF.—W. l., add 706.
- COLELEDA.—W. l., add 706.
- COEUR D'ALENE.—W. l., add 706.

- COMMERCIAL PATHFINDER.—W. l., add 706.  
 CONCHO.—W. l., add 706.  
 CORNELIA.—W. l., add 706.  
 CRASTER HALL.—W. l., add 706.  
 CREOLE.—System, R. C. A., 1000.  
 CRISTOBAL.—W. l., add 706.  
 CURACAO.—W. l., add 706.  
 DAKOTAN.—W. l., add 706.  
 DARDEN.—Station operated and controlled by I. W. T. Co.  
 D. G. SCOFIELD.—W. l., add 706.  
 DIXIANO.—W. l., 300, 600, 706.  
 DOMINO.—W. l., add 706.  
 EASTERN GLEN.—W. l., add 706.  
 EASTERN GUIDE.—W. l., add 706.  
 EASTERN KING.—W. l., add 706.  
 EASTERN KNIGHT.—System, Navy—R. C. A., 1000; w. l., 300, 450, 600, 706.  
 EASTERN MOON.—W. l., add 706.  
 EASTERN SEA.—W. l., add 706.  
 EASTERN STAR.—W. l., add 706.  
 EDITH.—W. l., add 706.  
 EDWARD LUCKENBACH.—W. l., add 706.  
 EL ABETO.—Station operated and controlled by Federal Telegraph Co.  
 EL CICUTA.—W. l., 300, 600; station operated and controlled by Federal Telegraph Co.  
 EL CID.—W. l., add 706.  
 ELDORADO.—W. l., add 706.  
 EL ISLEO.—W. l., add 706.  
 ELMSPORT.—W. l., add 706.  
 EL SIGLO.—W. l., add 706.  
 EL SUD.—W. l., add 706.  
 EL VALLE.—W. l., add 706.  
 ESPARTA.—Range, 200; w. l., 300, 600, 706.  
 F. A. WARNER.—System, Navy—R. C. A., 1000; w. l., 300, 450, 600, 706.  
 FISHER.—W. l., add 706.  
 FLORIDIAN.—W. l., add 706.  
 FRED J. WOOD.—Range, 200; system, Kilbourne & Clark, 1000; w. l., 300, 600, 706; rates, 8 cents per word; station operated and controlled by S. O. R. S.  
 FRED W. WHELLER.—W. l., add 706.  
 GENERAL G. W. GOETHALS.—W. l., add 706.  
 G. E. ROPER.—Range, 150; system, R. C. A., 1000; w. l., 300, 450, 600; Crown Coal & Towing Co. owner of vessel; station operated and controlled by S. O. R. S.  
 GUARDSMAN.—W. l., 300, 450, 600, 706.  
 HALEAKALA (KFEU).—Station operated and controlled by owner of vessel.  
 HANLEY.—Weyerhaeuser Timber Co. owner of vessel; station operated and controlled by owner of vessel.  
 HONBAR.—Station operated and controlled by I. W. T. Co.  
 HURON.—System, R. C. A., 1000.  
 I. J. MERRITT.—System, R. C. A., 1000; w. l., 300, 600, 706.  
 IMLAY.—W. l., 300, 450, 600, 706.  
 JUVIGNY.—W. l., add 706.  
 KEKOSKEE.—Station operated and controlled by I. W. T. Co. (U. S. L.).  
 KERMIT.—W. l., 300, 450, 600, 706.  
 KROONLAND.—W. l., add 706.  
 KVICHAK.—W. l., 300, 600.  
 LABETE.—W. l., add 706.  
 LAKE FILBERT.—Station operated and controlled by S. O. R. S.  
 LAKE FRANCES.—W. l., 300, 450, 600, 706.  
 LAKE GILPEN.—Station operated and controlled by S. O. R. S.  
 LANCASTER.—W. l., add 706.  
 LAVADA.—Station operated and controlled by S. O. R. S. (U. S. L.).  
 LEVIATHAN.—Range, 300; system, Navy, 1000 and Western Electric v. t. telegraph; w. l., 300, 600, 1800; station operated and controlled by R. C. A.  
 LILLIAN LUCKENBACH.—W. l., add 706.  
 LOS ALAMOS.—General Petroleum Corp. owner of vessel; station operated and controlled by I. W. T. Co.

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MACOM.—W. I., 300, 600.  
 MADISON.—Range, 300; w. l., 300, 450, 600, 706.  
 MANULANI.—W. I., 300, 600, 706.  
 MEXICAN.—W. I., 300, 450, 600, 706.  
 MISSOURIAN.—W. I., add 706.  
 MORRISTOWN.—W. I., 300, 450, 600, 706.  
 MUNAMAR.—W. I., add 706.  
 NEBRASKAN.—W. I., add 706.  
 ONEIDA (KEZJ).—W. I., 300, 450, 600, 706.  
 OSSA.—W. I., add 706.  
 OTHO.—W. I., add 706.  
 OWEGO.—Station operated and controlled by owner of vessel.  
 PANAMAN.—W. I., add 706.  
 PASTORES.—W. I., add 706.  
 PATRICK HENRY.—W. I., add 706.  
 PAUL LUCKENBACH.—W. I., add 706.  
 PENNSYLVANIA.—W. I., add 706.  
 PENOBSCOT.—System, Navy-R. C. A., 1000; w. l., 300, 450, 600, 706.  
 PIPESTONE COUNTY.—W. I., add 706.  
 POINSETTIA.—Range, 50; system, composite v. t. telephone; w. l., 300, 600; service, PG; hours, X; rates, 8 cents per word; station operated and controlled by owner of vessel.  
 PONCE.—System, R. C. A., 1000.  
 PRESIDENT HARRISON.—Station operated and controlled by R. C. A. (U. S. L.).  
 ROBERT E. HOPKINS.—W. I., add 706.  
 ROMAGNE.—System, R. C. A., 1000.  
 SAGADAHO.—System, R. C. A., 1000; w. l., 300, 450, 600, 706.  
 SAGUA.—Hours, X.  
 SALEM COUNTY.—W. I., 300, 600.  
 SANGAMON.—W. I., add 706.  
 SANTA LUISA.—W. I., add 706.  
 SATSUMA.—W. I., add 706.  
 SHENANDOAH.—W. I., 300, 450, 600, 706.  
 SHERMAN.—W. I., add 706.  
 SINSINAWA.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, 600, 706.  
 SOLITAIRE.—W. I., 300, 450, 600, 706.  
 STANDARD ARROW.—System, R. C. A., 1000; hours, X.  
 STEEL ENGINEER.—W. I., add 706.  
 STEEL INVENTOR.—W. I., add 706.  
 STORM KING (KDJM).—Station operated and controlled by R. C. A. (U. S. L.).  
 SURICHCO.—W. I., add 706.  
 SURUGA.—W. I., add 706.  
 TANAMO.—System, R. C. A., 1000.  
 TEXAN.—W. I., add 706.  
 TIGER.—W. I., add 706.  
 TRI MOUNTAIN.—Station operated and controlled by R. C. A.  
 VINCENT.—W. I., add 706.  
 VIRGINIA OLSON.—Range, 200; system, Gray & Danielson, 240; w. l., 300, 600; rates, 8 cents per word; station operated and controlled by owner of vessel.  
 WABASH.—W. I., 300, 600.  
 WALTER D. MUNSON.—W. I., add 706.  
 WASHINGTON.—System, R. C. A., 1000; w. l., 300, 450, 600, 706.  
 WAUKEGAN.—Range, 300; system, Navy-R. C. A., 1000; w. l., add 706.  
 WEST CADRON.—System, Navy-Kilbourns & Clark, 1000; w. l., 300, 600, 706.  
 WEST CALUMB.—W. I., add 706.  
 WEST CARMONA.—W. I., 300, 600, 1800; station operated and controlled by S. O. R. S. (U. S. L.).  
 WEST GRAYLOCK.—W. I., add 706.  
 WEST HUMHAW.—W. I., add 706.  
 WEST LASHAWAY.—W. I., add 706.  
 WEST MAXIMUS.—W. I., add 706.  
 WEST NIVARIA.—W. I., 300, 450, 600, 706; station operated and controlled by I. W. T. Co.  
 WILHELMINA.—W. I., add 706.

WINNEBAGO.—W. l., 300, 450, 600; Winnebago S. S. Corp. owner of vessel.

ZULIA.—System, R. C. A., 1000.

Strike out all particulars of the following-named vessels: Advance, City of Detroit II, City of St. Ignace, J. T. Hutchinson, Marina, and Swiftsure.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

WQEU, read Mauna Ala; strike out particulars following the call signals, KDNQ, KDXX, KIVD, KMV, WEC, and WEG.

BROADCASTING STATIONS, BY CALL SIGNALS.

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

KDZE (Seattle, Wash.).—W. l., 455, kc. 660.

KFBU (Laramie, Wyo.).—Power, 50; W. l., 283, kc. 1060.

KFCZ (Omaha, Nebr.).—Power, 100; W. l., 258, kc. 1160.

KFFR (Sparks, Nev.).—W. l., 226, kc. 1330.

KFHD (St. Joseph, Mo.).—Power, 20.

KLS (Oakland, Calif.).—Station operated and controlled by Warner Brothers Radio Supplies Co.

KLZ (Denver, Colo.).—Power, 500.

KNJ (Roswell, N. Mex.).—W. l., 250, kc. 1200.

WDAX (Centerville, Iowa).—Station operated and controlled by First National Bank (Appamoose County Farm Bureau).

WEAB (Fort Dodge, Iowa).—Power, 500.

WEAH (Wichita, Kans.).—W. l., 244, kc. 1230.

WEAY (Houston, Tex.).—Power, 250.

WFAJ (Asheville, N. C.).—Power, 50.

WFAQ (Cameron, Mo.).—Station operated and controlled by Missouri Wesleyan College.

WGR (Buffalo, N. Y.).—Power, 500.

WHA (Madison, Wis.).—Power, 500.

WHAC (Waterloo, Iowa).—Power, 10.

WHK (Cleveland, Ohio).—Power, 500.

WIAH (Newton, Iowa).—Power, 10.

WIAO (Milwaukee, Wis.).—Power, 200; station operated and controlled by School of Engineering of Milwaukee.

WIAQ (Marion, Ind.).—W. l., 226, kc. 1330.

WIL (Washington, D. C.).—Power, 5.

WJAM (Cedar Rapids, Iowa).—Power, 20; W. l., 268, kc. 1120.

WJAQ (Topeka, Kans.).—Power, 100.

WKAD (East Providence, R. I.).—W. l., 240, kc. 1250.

WLAN (Houlton, Me.).—Power, 250; W. l., 283, kc. 1060.

WMAV (Auburn, Ala.).—Power, 500.

WMAV (St. Louis, Mo.).—W. l., 280, kc. 1070.

WNAR (Butler, Mo.).—Power, 20.

WNAX (Yankton, S. Dak.).—Power, 100.

WOAA (Ardmore, Okla.).—Power, 100.

WOAB (Grand Forks, N. Dak.).—W. l., 280, kc. 1070.

WOS (Jefferson City, Mo.).—W. l., 441, kc. 680.

WPG (New Lebanon, Ohio).—Power, 50; W. l., 234, kc. 1280.

WRAD (Marion, Mass.).—W. l., 248, kc. 1210.

WRAY (Scranton, Pa.).—W. l., 280, kc. 1070.

WRC (Washington, D. C.).—Power, 500; W. l., 469, kc. 640.

WRK (Hamilton, Ohio).—Power, 200.

WWL (New Orleans, La.).—W. l., 280, kc. 1070.

Strike out all particulars of the following-named stations: KFAT, Eugene, Oreg.; KFDF, Casper, Wyo.; KFIC, Denver, Colo.; WABA, Lake Forest, Ill.; WQAZ, Carthage, Ill.; WCN, Worcester, Mass.; WFAG, Waterford, N. Y.; WGAX, Washington Court House, Ohio; WIAV, Binghamton, N. Y.; WIAW, Saginaw, Mich.; WIZ, Cincinnati, Ohio; WJAJ, Dayton, Ohio; WMAD, Rock Port, Mo.; WMAW, Wahpeton, N. Dak.; WNAB, Bowling Green, Ky.; WOAS, Middletown, Conn.; WOE, Akron, Ohio; WPAS, Amsterdam, N. Y.; WPAW, Wilmington, Del.; WPAY, Bangor, Me.; WPI, Clearfield, Pa.; WQAJ, Ann Arbor, Mich.; WQAT, Richmond,



## RADIO SERVICE BULLETIN.

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## 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, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

EAGLE HARBOR, MICH.—Loc.  $0.88^{\circ} 08' 43''$ , N.  $47^{\circ} 27' 53''$ .  
SEATTLE, WASH.—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, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

CURACOA.—Correct orthography Curacao.

## GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

Strike out all particulars following the call signal NVL.

## SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

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

LITTLE ROCK, ARK. (5XAB).—Changed to North Little Rock, Ark., address, 207½ Main St., Little Rock, Ark.

LOS ANGELES, CALIF. (6XD).—Station operated and controlled by Western Radio, Inc.

Strike out all particulars of the following-named stations: Alliance, Ohio (8YT); Auburn, N. Y. (8YA); Cincinnati, Ohio (8XT); Cincinnati, Ohio (8YAC); Cincinnati, Ohio (8YAD); Cleveland, Ohio (8XM); Columbus, Ohio (8XJ); Des Moines, Iowa (8YAO); Detroit, Mich. (8YAF); Kalamazoo, Mich. (8XF); Lewisburg, Pa. (8XN); Lynn, Mass. (1XL); Manhattan, Kans. (9YV); Marietta, Ohio (8YAA); New Brunswick, N. J. (2XAM); Pittsburgh, Pa. (8XX); Tampa, Fla. (4XG); and Toledo, Ohio (8YAB).

## MISCELLANEOUS.

## WORKING SECTORS OF UNITED STATES NAVAL RADIO COMPASS STATIONS.

[From Hydrographic Bulletin.]

Information relative to the methods for obtaining radio compass bearings from the U. S. radio compass stations situated on the U. S. Atlantic, Gulf, and Pacific coasts, together with a list of such stations, will be found on the Pilot Charts of the North Atlantic and North Pacific Oceans.

Information has been received from the Director Naval Communication Service that the working sectors, or calibrated arcs, of the radio compass stations are as given below:

Station.	Call letters.	Position.		Arc of calibration.
GREAT LAKES.				
Eagle Harbor, Mich.....	NOG	$47^{\circ} 27' 53''$ N.,	$88^{\circ} 08' 43''$ W.	$270^{\circ}$ to $75^{\circ}$
Grand Marais, Mich.....	NZT	$46^{\circ} 40' 29''$ N.,	$85^{\circ} 58' 26''$ W.	$270^{\circ}$ to $75^{\circ}$
Whitedfish Point, Mich.....	NZT	$46^{\circ} 46' 19''$ N.,	$84^{\circ} 57' 22''$ W.	$275^{\circ}$ to $180^{\circ}$
Detour Point, Mich.....	NZU	$45^{\circ} 57' 20''$ N.,	$83^{\circ} 54' 54''$ W.	$100^{\circ}$ to $260^{\circ}$
ATLANTIC COAST.				
Bar Harbor, Me.....	NBD	$44^{\circ} 18' 36''$ N.,	$68^{\circ} 11' 27''$ W.	$70^{\circ}$ to $235^{\circ}$
Cape Elizabeth, Me.....	NAB	$43^{\circ} 33' 59''$ N.,	$70^{\circ} 11' 59''$ W.	$50^{\circ}$ to $210^{\circ}$
Gloucester, Mass.....	NAD	$42^{\circ} 35' 19''$ N.,	$70^{\circ} 41' 08''$ W.	$60^{\circ}$ to $220^{\circ}$
Deer Island, Mass.....	NAD	$42^{\circ} 21' 16''$ N.,	$70^{\circ} 57' 29''$ W.	$15^{\circ}$ to $150^{\circ}$
Fourth Cliff, Mass.....	NAD	$42^{\circ} 09' 40''$ N.,	$70^{\circ} 42' 22''$ W.	$330^{\circ}$ to $135^{\circ}$
North Truro, Mass.....	NAE	$42^{\circ} 02' 23''$ N.,	$70^{\circ} 03' 37''$ W.	$210^{\circ}$ to $150^{\circ}$
Surfside, Mass.....	NBS	$41^{\circ} 14' 39''$ N.,	$70^{\circ} 05' 53''$ W.	$345^{\circ}$ to $275^{\circ}$
Prince Neck, R. I.....	NBF	$41^{\circ} 27' 04''$ N.,	$71^{\circ} 20' 16''$ W.	$80^{\circ}$ to $270^{\circ}$
Amagansett, L. I., N. Y.....	NBM	$40^{\circ} 58' 10''$ N.,	$72^{\circ} 07' 27''$ W.	$70^{\circ}$ to $230^{\circ}$
Fire Island, N. Y.....	NAH	$40^{\circ} 39' 07''$ N.,	$73^{\circ} 12' 32''$ W.	$88^{\circ}$ to $262^{\circ}$

Station.	Call letters.	Position.	Arc of calibration.
ATLANTIC COAST—continued.			
Cape May, N. J.	N&D	38° 55' 53" N., 74° 54' 35" W.	40° to 235°
Cape Henlopen, Del.	N&D	38° 47' 35" N., 75° 05' 26" W.	0° to 200°
Bethany Beach, Del.	N&D	38° 32' 45" N., 75° 03' 22" W.	10° to 200°
Hog Island, Va.	NCZ	37° 22' 35" N., 75° 42' 37" W.	50° to 200°
Virginia Beach, Va.	NCZ	36° 51' 10" N., 75° 58' 33" W.	354° to 157°
Poyners Hill, N. C.	NCE	36° 17' 16" N., 75° 47' 48" W.	0° to 150°
Cape Hatteras, N. C.	NDW	35° 14' 22" N., 75° 31' 42" W.	20° to 230°
Cape Lookout, N. C.	NAN	34° 36' 11" N., 76° 32' 18" W.	40° to 250°
North Island, S. C.	NZV	33° 13' 18" N., 79° 11' 10" W.	40° to 230°
Folly Island, S. C.	NZV	32° 41' 00" N., 79° 53' 22" W.	50° to 210°
Jupiter, Fla.	NAQ	26° 55' 59" N., 80° 04' 57" W.	0° to 160°
GULF COAST.			
South Pass, La.	NBX	29° 00' 43" N., 89° 09' 32" W.	80° to 240°
ALASKAN COAST.			
Cape Hinchbrook <sup>1</sup>	NRM	60° 14' 00" N., 146° 35' 54" W.	112° to 294°
Soapstone Point <sup>2</sup>	NUW	58° 06' 13" N., 138° 28' 51" W.	245° to 50°
PACIFIC COAST.			
Cattle Point, Wash. <sup>1</sup>	NFN	48° 27' 04" N., 122° 57' 45" W.	120° to 290°
Smith Island, Wash. <sup>1</sup>	NFH	48° 19' 04" N., 122° 50' 39" W.	0° to 300°
New Dungeness, Wash. <sup>1</sup>	NFT	48° 10' 36" N., 123° 07' 51" W.	240° to 110°
Tatoosh, Wash.	NPD	48° 23' 41" N., 124° 44' 13" W.	180° to 90°
Ocean Park, Wash.	NZS	46° 27' 53" N., 124° 03' 16" W.	195° to 340°
Fort Stevens, Oreg.	NZS	46° 11' 32" N., 123° 39' 15" W.	175° to 335°
Empire, Oroc. <sup>1</sup>	NPW	43° 23' 03" N., 124° 18' 58" W.	230° to 10°
Eureka, Calif.	NPW	40° 41' 48" N., 124° 16' 34" W.	180° to 5°
Point Reyes, Calif.	NLG	38° 02' 13" N., 122° 59' 35" W.	120° to 2°
Bird Island, Calif. <sup>2</sup>	NLD	37° 49' 27" N., 122° 32' 12" W.	120° to 305°
Point Montara, Calif.	NLH	37° 32' 02" N., 122° 31' 07" W.	178° to 352°
Ferrallon Island, Calif.	NPI	37° 41' 58" N., 122° 56' 56" W.	0° to 360°
Point Arguello, Calif.	NPX	34° 34' 43" N., 120° 38' 51" W.	170° to 360°
Point Huonema, Calif.	NMD	34° 08' 43" N., 119° 12' 30" W.	135° to 305°
Point Fermin, Calif.	NPX	33° 43' 19" N., 118° 17' 38" W.	90° to 290°
Point Loma, Calif. <sup>1</sup>	NPL	32° 42' 21" N., 117° 15' 17" W.	185° to 250°
Imperial Beach, Calif.	NPL	32° 35' 14" N., 117° 07' 54" W.	182° to 331°

<sup>1</sup> Limited service. Standing watch during thick and heavy weather.  
<sup>2</sup> Out of commission at present. Notice will be given when operation is resumed.

Note.—The arc of calibration is a sector of the circle of which the compass coil at the radio station is the center; the bearings are from the station (clockwise). Compass bearings are reliable only when they fall within the calibrated arcs.

ALTERATIONS IN TIME SIGNALS OF MASSAWA (RED SEA) STATION.

[From Admiralty Notice to Mariners, No. 963 of 1923.]

Position.—Lat. 15° 37' N., long. 39° 29' E. (approx.).

Call signal.—ICX.

Wave length.—2,650 metres (spark).

Details.—Wireless time signals are now transmitted daily by Massawa W/T station at 17h. 00m. 00s. G. M. T. (astronomical), corresponding to 20h. 00m. 00s. standard time, in accordance with the following amended procedure:

G. M. T. (astronomical).		Signal.
H. M. S.	H. M. S.	
15 52 00 to 15 53 48		ICX ICX ICX etc.
15 54 00 " 15 54 38		"Signale orario" followed by . . . . . sent four times.
15 55 00 " 15 55 51		— sent every 5 seconds.
15 56 00 " 15 56 23		• Time signal.
15 57 00 " 15 57 52		— . . . sent every 5 seconds.
15 58 00 " 15 58 31		• Time signal.
15 59 00 " 15 59 53		— . . . sent every 5 seconds.
17 00 00		• Time signal.

Note.—All preliminary signals are made by hand. The dots, which constitute the time signals, are of 0.20 of a second duration, and are transmitted automatically.

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## LINE RADIO COMMUNICATION.

A publication giving an introduction to line radio communication has recently been prepared under the direction of the Chief Signal Officer with the cooperation of the Bureau of Standards.

This pamphlet gives an explanation of how messages are carried to distant points by radio-frequency currents directed over wires such as ordinary telephone lines or power lines. The fundamental principles of radio and its relations to line radio telegraphy and telephony are discussed.

This pamphlet is "Introduction to Line Radio Communication," Signal Corps Radio Communication Pamphlet No. 41, a copy of which may be obtained for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

## USE OF KILOCYCLES IN RADIO.

The Second National Radio Conference, which met with Secretary Hoover in March, introduced a method of designating radio waves which is somewhat new to the radio public. This is the use of frequency in kilocycles (abbreviated kc.) instead of wave length in meters. The advantages of this practice have been familiar to radio engineers for some time, and it is probable that it will eventually replace the use of wave length in meters. As a matter of fact, wave length is a somewhat artificial conception in the handling of radio apparatus and is one of the difficult things for the beginner to understand. The frequency of the radio wave is the same as the frequency of the alternating current which flows in the radio transmitting or receiving set.

As often happens in technical matters, the idea of "kilocycles" is simpler than the forbidding aspect of the word suggests. "Kilo" means a thousand, and "cycle" means one complete alternation. The number of kilocycles indicates the number of thousands of times that the rapidly alternating current repeats its flow in either direction in the antenna in one second. The smaller the wave length in meters, the larger is the frequency in kilocycles.

The reason that kilocycles are coming into use and displacing meters is that the necessary separation of the frequency of transmitting stations to prevent interference is the same, no matter what the frequency may be. This necessary separation is variable and quite misleading when expressed in meters. Thus the number of radio messages that can be transmitted simultaneously without interference can be correctly judged from the kilocycles but not from the meters. For example, the amateurs will in the future work in a band of wave lengths from 150 to 200 meters, but this is a frequency band from 2,000 to 1,500 kilocycles. This is an enormously wider band when considered from the viewpoint of kilocycles than, for example, the band having the same width in meters from 1,000 to 1,050 meters, which is 300 to 286 kilocycles. While it is possible to carry on 50 simultaneous radio telephone communications between 150 and 200 meters, only one could be carried on between 1,000 and 1,050 meters.

In accordance with the recommendation of the Second National Radio Conference, the Department of Commerce and other Government departments will hereafter follow the practice of specifying in even values of kilocycles rather than meters. The conference recommended the practice of expressing wave frequency in kilocycles per second with wave length in meters in parentheses thereafter. The relation between the two is very simple. For approximate calculation, to obtain kilocycles divide 300,000 by the number of meters; to obtain meters, divide 300,000 by the number of kilocycles. For example, 100 meters equals approximately 3,000 kilocycles, 300 meters equals 1,000 kilocycles, 1,000 meters equals 300 kilocycles, 3,000 meters equals 100 kilocycles. The following table may be used for rapid and accurate conversion either from kilocycles to meters or meters to kilocycles.

For highly accurate conversion the factor 299,820 should be used instead of 300,000. The table below gives accurate values of kilocycles corresponding to any number of meters and vice versa. It should be particularly noticed that the table is entirely reversible; that is, for example, 50 kilocycles is 5,996 meters and also 50 meters is 5,996 kilocycles. The range of the table is easily extended by shifting the decimal point; for example, one can not find 223 in the first column, but its equivalent is obtained by finding later in the table that 2,230 kilocycles or meters is equivalent to 134.4 meters

*Kilocycles to meters or meters to kilocycles.*

10	29980	840	356.9	1660	177.4	2530	118.5	3760	79.74
20	14990	850	352.7	1700	175.4	2540	118.0	3780	79.32
30	9994	860	348.6	1710	175.3	2550	117.6	3800	78.90
40	7496	870	344.6	1720	174.3	2560	117.1	3820	78.49
50	5996	880	340.7	1730	173.3	2570	116.7	3840	78.08
60	4997	890	336.9	1732	173.2	2580	116.2	3860	77.67
70	4283	900	333.1	1740	172.3	2590	115.8	3880	77.27
80	3748	910	329.5	1750	171.3	2600	115.3	3900	76.88
90	3331	920	325.9	1760	170.4	2610	114.9	3920	76.49
100	2998	930	322.4	1770	169.4	2620	114.4	3940	76.10
110	2726	940	319.0	1780	168.4	2630	114.0	3960	75.71
120	2499	950	315.6	1790	167.5	2640	113.6	3980	75.33
130	2306	960	312.3	1800	166.6	2650	113.1	4000	74.96
140	2142	970	309.1	1810	165.6	2660	112.7	4020	74.58
150	1999	980	305.9	1820	164.7	2670	112.3	4040	74.21
160	1874	990	302.8	1830	163.8	2680	111.9	4060	73.85
170	1764	1000	299.8	1840	162.9	2690	111.5	4080	73.49
173.2	1732	1010	296.9	1850	162.1	2700	111.0	4100	73.13
180	1666	1020	293.9	1860	161.2	2710	110.6	4120	72.77
190	1578	1030	291.1	1870	160.3	2720	110.2	4140	72.42
200	1499	1040	288.3	1880	159.5	2730	109.8	4160	72.07
210	1428	1050	285.5	1890	158.6	2740	109.4	4180	71.73
220	1363	1060	282.8	1900	157.8	2750	109.0	4200	71.39
230	1304	1070	280.2	1910	157.0	2760	108.6	4220	71.05
240	1249	1080	277.6	1920	156.2	2770	108.2	4240	70.71
250	1199	1090	275.1	1930	155.3	2780	107.8	4260	70.38
260	1153	1100	272.6	1940	154.5	2790	107.5	4280	70.05
270	1110	1110	270.1	1950	153.8	2800	107.1	4300	69.73
280	1071	1120	267.7	1960	153.0	2810	106.7	4320	69.40
290	1034	1130	265.3	1970	152.2	2820	106.3	4340	69.08
300	999.4	1140	263.0	1980	151.4	2830	105.9	4360	68.77
310	967.2	1150	260.7	1990	150.7	2840	105.6	4380	68.45
320	936.9	1160	258.5	2000	149.9	2850	105.2	4400	68.14
330	908.6	1170	256.3	2010	149.2	2860	104.8	4420	67.83
340	881.8	1180	254.1	2020	148.4	2870	104.5	4440	67.53
350	856.6	1190	252.0	2030	147.7	2880	104.1	4460	67.22
360	832.8	1200	249.9	2040	147.0	2890	103.7	4480	66.91
370	810.3	1210	247.8	2050	146.3	2900	103.4	4500	66.63
380	789.0	1220	245.8	2060	145.5	2910	103.0	4520	66.33
390	768.8	1230	243.8	2070	144.8	2920	102.7	4540	66.04
400	749.6	1240	241.8	2080	144.1	2930	102.3	4560	65.75
410	731.3	1250	239.9	2090	143.5	2940	102.0	4580	65.46
420	713.9	1260	238.0	2100	142.8	2950	101.6	4600	65.18
430	697.3	1270	235.1	2110	142.1	2960	101.3	4620	64.90
440	681.4	1280	233.2	2120	141.4	2970	100.9	4640	64.62
450	666.3	1290	231.4	2130	140.8	2980	100.6	4660	64.34
460	651.8	1300	229.6	2140	140.1	2990	100.3	4680	64.06
470	637.9	1310	227.9	2150	139.5	3000	99.94	4700	63.79
480	624.6	1320	227.1	2160	138.8	3020	99.28	4720	63.52
490	611.9	1330	225.4	2170	138.1	3040	98.62	4740	63.25
500	599.6	1340	223.7	2180	137.5	3060	97.96	4760	62.99
510	587.9	1350	222.1	2190	136.9	3080	97.34	4780	62.72
520	576.6	1360	220.4	2200	136.3	3100	96.72	4800	62.46
530	565.7	1370	218.8	2210	135.7	3120	96.10	4820	62.20
540	555.2	1380	217.3	2220	135.1	3140	95.48	4840	61.95
550	545.1	1390	215.7	2230	134.4	3160	94.88	4860	61.69
547.6	547.6	1400	214.2	2240	133.8	3180	94.28	4880	61.44
560	535.4	1410	212.6	2250	133.3	3200	93.69	4900	61.19
570	523.0	1420	211.1	2260	132.7	3220	93.11	4920	60.94
580	510.9	1430	209.7	2270	132.1	3240	92.54	4940	60.69
590	508.2	1440	208.2	2280	131.5	3260	91.97	4960	60.45
600	499.7	1450	206.8	2290	130.9	3280	91.41	4980	60.20
610	491.5	1460	205.4	2300	130.4	3300	90.86	5000	59.96
620	483.6	1470	204.0	2310	129.8	3320	90.31	5020	59.72
630	475.9	1480	202.6	2320	129.2	3340	89.77	5100	58.79
640	468.5	1490	201.2	2330	128.7	3360	89.23	5150	58.22
650	461.3	1500	199.9	2340	128.1	3380	88.70	5200	57.66
660	454.3	1510	198.6	2350	127.6	3400	88.18	5250	57.11
670	447.5	1520	197.2	2360	127.0	3420	87.67	5300	56.57
680	440.9	1530	195.0	2370	126.5	3440	87.16	5350	56.04
690	434.6	1540	194.7	2380	126.0	3460	86.65	5400	55.52
700	428.3	1550	193.4	2390	125.4	3480	86.16	5450	55.01
710	422.3	1560	192.2	2400	124.9	3500	85.66	5475	54.76
720	416.4	1570	191.0	2410	124.4	3520	85.18	5500	54.51
730	410.7	1580	189.8	2420	123.9	3540	84.70	5550	54.02
740	405.2	1590	188.6	2430	123.4	3560	84.22	5600	53.54
750	399.8	1600	187.4	2440	122.9	3580	83.75	5650	53.07
760	394.5	1610	186.2	2450	122.4	3600	83.28	5700	52.60
770	389.4	1620	185.1	2460	121.9	3620	82.82	5750	52.14
780	384.4	1630	183.9	2470	121.4	3640	82.37	5800	51.69
790	379.5	1640	182.8	2480	120.9	3660	81.92	5850	51.25
800	374.8	1650	181.7	2490	120.4	3680	81.47	5900	50.82
810	370.2	1660	180.6	2500	119.9	3700	81.03	5950	50.39

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Kilocycles to meters or meters to kilocycles—Continued.

6100	49.15	6900	43.45	7700	38.94	8500	35.27	9300	32.24
6150	48.75	6950	43.14	7750	38.69	8550	35.07	9350	32.07
6200	48.35	7000	42.83	7800	38.44	8600	34.86	9400	31.90
6250	47.97	7050	42.53	7850	38.19	8650	34.66	9450	31.73
6300	47.59	7100	42.23	7900	37.95	8700	34.46	9500	31.56
6350	47.22	7150	41.93	7950	37.71	8750	34.27	9550	31.39
6400	46.86	7200	41.64	8000	37.48	8800	34.07	9600	31.23
6450	46.48	7250	41.35	8050	37.25	8850	33.88	9650	31.07
6500	46.13	7300	41.07	8100	37.02	8900	33.69	9700	30.91
6550	45.77	7350	40.79	8150	36.79	8950	33.50	9750	30.75
6600	45.43	7400	40.52	8200	36.56	9000	33.31	9800	30.59
6650	45.09	7450	40.24	8250	36.34	9050	33.13	9850	30.44
6700	44.75	7500	39.98	8300	36.12	9100	32.95	9900	30.28
6750	44.42	7550	39.71	8350	35.91	9150	32.77	9950	30.13
6800	44.09	7600	39.45	8400	35.69	9200	32.59	10000	29.98
6850	43.77	7650	39.19	8450	35.48	9250	32.41		

## REFERENCES TO CURRENT PERIODICAL LITERATURE.

## R000.—Radio communication.

- R000 Dellinger, J. H. Reciente desarrollo de la radiografía en los Estados Unidos. Boletín de la Unión Panamericana, 57, pp. 117-133, August, 1923.
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