RADIO SERVICE BULLETIN

ISSUED MONTHLY BY BUREAU OF NAVIGATION, DEPARTMENT OF COMMERCE

Washington, November 1, 1922—No. 67

CONTENTS.

ABBREVIATIONS.

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

Name =Name of station.
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.
G=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.

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

18353—22——1

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, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by
Camp 62, Calif.[1]	KVP	327, 1,650	P	X	Southern California Edison Co.
Camp 63, Calif.[2]	KRY	327, 1,650	P	X	Do.
Jackson, Ohio[3]	WJQ	485	P	X	Ford Motor Co.

[1] Loc. (approximately) 0.119° 02' 00", N. 37° 12' 00"; range, 75; system, De Forest v. t. telephone and telegraph; rates, none.
[2] Loc. (approximately) 0.118° 56' 00", N. 37° 16' 00"; range, 75; system, De Forest v. t. telephone and telegraph; rates, none.
[3] Loc. (approximately) 0.81° 05' 00", N. 39° 10' 00"; range, 100; system, composite, v. t. telephone and telegraph; rates, none.

Commercial ship stations, alphabetically by names of vessels.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Name of vessel.	Call signal.	Rates.	Service.	Hours.	Owner of vessel.	Station controlled by—
City of Saugatuck[1]	KFET		PG	X	Graham & Morton Transportation Line	R. C. A.
City of Holland[1]	KFES		PG	X	do	Do.
Frank H. Goodyear[1]	KFEG		PG	X	American S. S. Co.	Owner of vessel.
James MacNaughton[1]	KFCN		PG	X	Wilson Transit Co.	Do.
Merida[1]	KFEN	8	PG	X	Atlantic & Caribbean Steam Navigation Co.	Do.
Steelore	KFCO	8	PG	X	Guaranty Trust Co. of New York (trustee)	R. C. A.
Steel traveler	KFCI	8	PG	X	U. S. Steel Products Co.	
Stuyvesant	WJP				Panaman Government	Owner of vessel.
Velero II[2]	WHV		PG	X	G. Allan Hancock	Do.
William C. Agnew[3]	KFCT		PG	X	American S. S. Co.	Do.

[1] Range, 150; system, R. C. A., 1000; w. l., 300, 600; rates, Great Lakes service 2¢ per word.
[2] Range, 150; system, Wireless Specialty Apparatus Co., 1000; w. l., 300, 600; rates, Great Lakes service 2 ¢ per word.
[3] Range, 150; system, Navy–R. C. A., 1000; w. l., 300, 600.
[4] Range, 300; system, composite, 1000; w. l., 300, 600, 1850; rates, North and South American service 4¢ per word; transoceanic service 8¢ per word.

Commercial land and ship stations alphabetically by call signals.

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

Call signal.	Name.		Call signal.	Name.	
KFCO	Steelore	b	KFET	City of Saugatuck	b
KFCI	Steel Traveler	b	KVP	Camp 62, Calif.	c
KFCN	James MacNaughton	b	KRY	Camp 63, Calif.	c
KFCT	William C. Agnew	b	WJQ	Jackson, Ohio	c
KFEG	Frank H. Goodyear	b	WHV	Velero II	b
KFEN	Merida	b	WJP	Stuyvesant	b
KFES	City of Holland	b			

Broadcasting stations, alphabetically by names of cities.

[Additions to the List of Radio Stations of the United States, edition June 30, 1922.]

City.	Call signal.	City.	Call signal.
Ann Arbor, Mich.	WMAX	Lima, Ohio	WOAC
Atlanta, Ga.	WGM	Lincoln, Nebr.	WSAS
Auburn, Ala.	WMAV	Macon, Ga.	WMAZ
Austin, Tex.	WNAS	Manhattan, Kans.	WNAK
Baker, Oreg.	KFDA	Parkesburg, Pa.	WQAA
Belvidere, Ill.	WOAG	Pendleton, Oreg.	KFYE
Billings, Mont.	KFCH	Philadelphia, Pa.	WNAT
Boise, Idaho	KFDD	Portland, Oreg.	KFEC
Butler, Mo.	WNAR	Shreveport, La.	WMAC
Chicago, Ill.	WNAJ	Sigourney, Iowa	WOAD
College Station, Tex.	WTAW	Springfield, Ohio	WNAP
Colorado Springs, Colo.	KFBV	State College, Pa.	WPAB
Council Bluffs, Iowa	WFAV	St. Louis, Mo.	WMAY
David City, Nebr.	WRAR	Syracuse, N. Y.	WNAN
Erie, Pa.	WQAV	Taft, Calif.	KFEB
Evansville, Ind.	WNAM	Waco, Tex.	WWAC
Grand Forks, N. Dak.	WOAB	Wahoo, Nebr.	WPAA
Houston, Tex.	WSAV	Wahpeton, N. Dak.	WMAW
Laredo, Tex.	WWAX	Walla Walla, Wash.	KFCF

Lists of stations broadcasting market or weather reports (485 meters) and music, concerts, lectures, etc. (360 and 400 meters), alphabetically by call letters.

[Additions to the List of Radio Stations of the United States, edition June 30, 1922.]

Call signal.	Station operated and controlled by—	Location of station.	Wave lengths.
KFBV	Clarence O. Ford	Colorado Springs, Colo., 523 South Hancock Street.	360
KFCF	Frank A. Moore	Walla Walla, Wash., 707 Baker Building.	360
KFCH	Electric Service Station (Inc.)	Billings, Mont., 12 North Thirtieth Street.	360
KFDA	Adler's Music Store	Baker, Oreg.	360
KFDD	St. Michaels Cathedral	Boise, Idaho	360
KFEB	City of Taft	Taft, Calif.	360
KFEC	Meier & Frank Co.	Portland, Oreg.	360
KFYE	Eastern Oregon Radio Co.	Pendleton, Oreg., Pendland Building.	360
WGM	Atlanta Constitution	Atlanta, Ga.	400
WMAC	Louisiana State Fair Association (W. E. Anthony).	Shreveport, La.	360
WMAV	Alabama Polytechnic Institute	Auburn, Ala.	360, 485
WMAW	Wahpeton Electric Co.	Wahpeton, N. Dak.	360
WMAX	K. & K. Radio Supply Co.	Ann Arbor, Mich.	360
WMAY	Kings Highway Presbyterian Church	St. Louis, Mo.	360
WMAZ	Mercer University	Macon, Ga.	360
WNAJ	Benson Co.	Chicago, Ill.	360
WNAK	Manhattan Radio Supply Co.	Manhattan, Kans.	360
WNAM	Ideal Apparatus Co.	Evansville, Ind.	360
WNAN	Syracuse Radio Telephone Co.	Syracuse, N. Y.	360
WNAP	Wittenberg College	Springfield, Ohio	360
WNAR	C. C. Rhodus	Butler, Mo.	360
WNAS	Texas Radio Corporation and Austin State Normal.	Austin, Tex.	360
WNAT	Lenning Brothers Co.	Philadelphia, Pa.	360
WOAB	Valley Radio	Grand Forks, N. Dak.	360
WOAC	Maus Radio Co.	Lima, Ohio	360
WOAD	Friday Battery & Electric Corp.	Sigourney, Iowa	360
WOAG	Apollo Theatre (Belvidere Amusement Co.).	Belvidere, Ill.	360
WOAV	Pennsylvania National Guard, 2nd Bat., 112th Inf.	Erie, Pa.	360
WPAA	Anderson & Webster Electric Co.	Wahoo, Nebr.	360
WPAB	Pennsylvania State College	State College, Pa.	360
WPAF	Peterson Radio Co.	Council Bluffs, Iowa	360
WQAA	Horace A. Beale, jr.	Parkesburg, Pa.	360
WRAR	Jacob C. Thomas	David City, Nebr.	360
WSAS	State of Nebraska, Department of Agriculture.	Lincoln, Nebr.	360, 485
WSAV	Clifford W. Vick Radio Construction Co.	Houston, Tex., 1801 Carter Building.	360
WTAW	Agricultural and Mechanical College	College Station, Tex.	360
WWAC	Sanger Bros.	Waco, Tex.	360
WWAX	Woolmser Bros.	Laredo, Tex.	360

Government land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Columbus, Ohio	WVZ	...	O	N	U. S. Army, (Fifth Corps Area, Columbus Barracks).
Manasquan, N. J.	NAH	600	RC	N	U. S. Navy.

[1] Loc. 0.74° 01' 55", N. 40° 37' 05"; range, 150; system, 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, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Station controlled by-
Army Tanker No. 1 [1]	WXN	U. S. Army.

[1] Range, 200, system, Kilbourne & Clark, 1000; w. l., 600, 800, 975; service O, hours, N.

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.	
NAH	Manasquan, N. J. (RC)	c	WXN	Army Tanker No. 1	b
WVZ	Columbus, Ohio	c			

Special land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922.]

Station.	Call signal.	Wave lengths.	Station controlled by—
Appleton, Wis.	9YAR	200, 375	Lawrence College, Department of Physics.
Berkeley, Calif.	6XAY	200, 375, variable.	C. R. Tinsley, 3017 Wheeler Street.
Binghamton, N. Y.	8XAM	200, variable	Arthur L. Kent, 199 Court Street.
Buffalo, N. Y.	8YP	200, 375	Seneca Vocational School.
Butte, Mont.	7XM	Variable	Great Falls Power Co.
Butte, Mont.	7ZF	200, 375	F. F. Gray, 3200 Richardson Street.
Cleveland, Ohio	8YL	200, 375	East End Y. M. C. A.
Dallas, Tex.	5XADA	200, 375	John O. Newbury, 1822 Bennett Avenue.
Dublin, Tex.	5XAJ	200, 375	C. H. Baxter, 204 Grafton Street.
El Monte, Calif.	6XAX	Variable	U. S. Coffin, 517 West Main Street.
Enid, Okla.	5XAEA	200, 375	Radio Electric Sales Co.
Enumclaw, Wash.	7YQ	200, 375	Enumclaw High School.
Honolulu, Hawaii	6ZY	200, 375	Thomas A. Marshall, 212-D Kaimland Avenue.
Los Angeles, Calif.	6XAH	Variable	Archie Wade, jr., 465 North Lake Street.
Los Angeles, Calif.	6XW	Variable	Hall Berringer, 647 South Hope Street.
Macon, Ga.	4XL	Variable	Mercer University.
Mansfield, Ohio	8ZU	200, 375	Radio Club of Mansfield, 1394 Carpenter Road.
Newark, N. J.	2XAR	Variable	D. W. May (Inc.), 325 Central Avenue.
Quincy, Ill.	9XQ	200, 375	Quincy Electric Supply Co., 10 Maine Street.
Rainbow, Mont. (near Great Falls).	7XO	Variable	Great Falls Power Co.
Redlands, Calif.	6YC	200, 375	University of Redlands.
Reedley, Calif.	6XAV	Variable	W. W. Lindsay, jr., P. O. Box 643.
San Diego, Calif. (portable).	6XN	Variable	Dr. Alfred E. Banks, Timken Building.
San Diego, Calif.	6XZ	200, variable	R. O. Shelton, M. D.
San Ysidro, Calif.	6ZH	200, 375	Lester Picker.
St. Louis, Mo.	9XH	Variable	Colin B. Kennedy Co., 6400 Plymouth Avenue.
Tarrytown, N. Y.	2XL	Variable	Tarrytown Radio Research Laboratory.
Thompson Falls, Mont.	7XN	Variable	Thompson Falls Power Co.
Valley Stream, N. Y.	2XAQ	Variable	J. O. Smith, 3 Corona Avenue.
White Sulphur Springs, W. Va.	8XP	Variable	General Electric Co., Schenectady, N. Y.
Winter Park, Fla.	4XK	225, 275	Winter Park Electrical Construction Co.

Special land stations, grouped by districts.

Call signal.	District and station.
	Second district:
2XAQ	Valley Stream, N. Y.
2XAR	Newark, N. J.
2XL	Tarrytown, N. Y.
	Fourth district:
4XK	Winter Park, Fla.
4XL	Macon, Ga.
	Fifth district:
5XADA	Dallas, Tex.
5XARA	Enid, Okla.
5XAJ	Dublin, Tex.
	Sixth district:
6XAH	Los Angeles, Calif.
6XAV	Reedley, Calif.
6XAX	El Monte, Calif.
6XAY	Berkeley, Calif.
6XN	San Diego, Calif. (portable).
6XW	Los Angeles, Calif.
6XZ	San Diego, Calif.
6YC	Redlands, Calif.
6ZH	San Ysidro, Calif.
6ZY	Honolulu, Hawaii.
	Seventh district:
7XM	Butte, Mont.
7XN	Thompson Falls, Mont.
7XO	Rainbow, Mont. (near Great Falls).
7YQ	Enumclaw, Wash.
7ZF	Butte, Mont.
	Eighth district:
8XAM	Binghamton, N. Y.
8XP	White Sulphur Springs, W. Va.
8YL	Cleveland, Ohio.
8YP	Buffalo, N. Y.
8ZU	Mansfield, Ohio.
	Ninth district:
9XQ	Quincy, Ill.
9XR	St. Louis Mo.
9YAR	Appleton, Wis.

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, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

BAYTOWN, TEX.—W. 1., 300, 450, *600*.
CAPE EDWARDS, ALASKA.—Strike out all particulars.
CLEVELAND, OHIO. (KDPM).—W. 1., 300, 500, *600*, 1810.
DETROIT, MICH.—W. 1., 300, *600*, 1025.
EAST PITTSBURGH, PA.—W. 1., 1875.
EVERETT, WASH. (KFT).—Accounts for message charges should be forwarded to S. O. R. S.
FERRIS OIL FIELD, WYO.—Strike out all particulars.
HYDER, ALASKA.—Range, 300; w. l., 300, *600*, 1610; hours, 9 a. m.–12 noon and 6–9 p. m.
LOCKANDE, ALASKA.—Range, 300.
LOST HARBOR, ALASKA.—W. l., 300, 550, *600*.
MILES CITY, MONT.—Range, 200.
NIXON FORK, ALASKA.—Strike out all particulars.
NORFOLK, VA.—Strike out all particulars.
PIRATE COVE, ALASKA.—Service, PG and PR.
PORT TOWNSEND, WASH.—Strike out all particulars.
QUINCY, MASS.—System, General Electric Co., v. t. telephone, and telegraph.
RAWLINS, WYO.—Strike out all particulars.
SALTCHUCK, ALASKA.—W. l., 300, 550, *600*.
SPRINGWELLS, MICH.—Strike out all particulars.

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, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

NOTE.—(U. S. L.) after operating on quarry denotes that the change applies to the List of Radio Stations of the United States only; does not apply to the Berne list. Hereafter where the rate is given without the service specifically stated—that is, North and South American and transoceanic services—it should be understood that the rate is for both classes of service. When the rate is for one class of service only, the class of service will be stated.

ANTILLA.—W. l., 300, *600*.
ARGON.—W. l., 300, 450, *600*.
ASUNCION.—W. l., 300, *600*; system, R. C. A., 240.
ATENAS.—System, composite, 1000.
BASCOBEL.—Station operated and controlled by R. C. A. (U. S. L.).
BASFORD.—System, Navy-Simon, 1000; w. l., 300, 450, *600*.
BELLA.—Strike out all particulars.
BLUE HILL.—Range, 150; system, R. C. A., 1000; w. l., 300, 450, 600.
CAMAGUEY.—Hours, X.

CAPULIN.—Range, 300; system, Navy-Wireless Specialty Apparatus Co., 1000, w. l., 300, 450, 600.
CASIANA.—Range, 300.
CATHLAMET.—Range, 300; system, Navy-Kilbourne & Clark, 1000.
CEDARHURST.—American-Italian S. S. Co. owner of vessel
CITY OF HONOLULU.—Strike out all particulars.
CITY OF RENO.—Station operated and controlled by I. W. T. Co.
CLARE.—System, I. W. T. Co., 1000; w. l., 300, 450, 600.
COMANCHE.—System, I. W. T. Co., 1000; w. l., 300, 450, 600.
COSTILLA.—Name changed to Charles L. O'Connor.
COURTOIS.—Munson S. S. Line owner of vessel.
COUSHATTA.—Name changed to John Tracy
COVERUN.—Name changed to Mahukona; Matson Navigation Co owner of vessel.
CRAWFORD.—W. l., 300, 450, 600.
CRUDOIL.—Huasteca Petroleum Co. owner of vessel
DELCO.—American Sugar Transit Corp. owner of vessel.
DEPERE.—Range, 200.
EASTERN SAILOR.—Range, 200; system, Navy Kilbourne & Clark, 1000; w. l., 300, 450, 600.
ECLIPSE.—System, Navy-Wireless Specialty Apparatus Co., 1000.
ELABETO.—System, Navy-International Radio Telegraph Co., 1000.
ELDENA.—Station operated and controlled by R. C. A. (U. S. L.)
ELECLORO.—System, Navy-Marconi, 1000.
EL VALLE.—W. l., 300, 600.
EVERGREEN CITY.—Range, 300; system, Navy-R. C. A., 1000; w. l., 300, 600.
FORT SEWARD.—Strike out all particulars.
FUELGIL.—Mexican Petroleum Corp. owner of vessel.
GUANTANAMO.—Hours, X.
JALAPA.—Range, 500; system, Federal arc; w. l., 300, 600, 1800.
JOHN R. GIBBONS.—W. l., 300, 450, 600.
LAKEBRIDGE.—Station operated and controlled by R. C. A.
LAKE FLOURNOY.—Name changed to Southsea.
LAKE SLAVI.—Lyke Bros. S. S. Co. owner of vessel.
LAKE SONAPEE.—Name changed to Frank Lynch; W. J. Gray, jr., owner of vessel.
LANCASTER.—Lancaster S. S. Corp. owner of vessel.
LAVADA.—Station operated and controlled by S. O. R. S. (U. S. L.).
LIBERATOR (KRIU).—System, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, 600; hours, X.
LINCOLN LAND.—Joseph F. Fertilla owner of vessel.
LUXPALILE.—W. l., 300, 450, 600.
MEDON.—Range, 300; system, Federal arc; w. l., 300, 600, 1800.
MEXOIL.—Huasteca Petroleum Co. owner of vessel.
MISSOURIAN.—Range, 300; system, Telefunken, 1000; W. l., 300, 600.
MOUNT CARROLL.—W. l., 300, 450, 600, 1800.
MUNWOOD.—System, R. C. A., 1000; w. l., 300, 450, 600.
MYSTIC.—System, Navy-Marconi, 1000; w. l., 300, 450, 600; rates, 8 c. per word.
NARBO.—Station operated and controlled by S. O. R. S. (U. S. L.).
NEPONSET.—Station operated and controlled by R. C. A. (U. S. L.).
NIKA.—Everett Packing Co. owner of vessel.
NORMA.—System, Navy-Marconi, 1000; Norma S. S. Corp. owner of vessel.
OREGONIAN.—W. l., 300, 450, 600; rates, 8 c. per word.
PANOIL.—Mexican Petroleum Corp. owner of vessel.
PANUCO.—Range, 300.
PHILADELPHIA (KSM).—System, Navy-R. C. A., 1000; w. l., 300, 450, 600; rates, 8 c. per word.
PRESIDENT HARRISON.—Station, operated and controlled by I. W. T. Co. (U. S. L.).
PRESIDENT MONROE.—System, Navy-R. C. A., 1000.
RIO GRANDE.—Strike out all particulars.
ROTARIAN.—Range, 300; system, Navy-R. C. A., 1000, w. l., 300, 450, 600.
SABINE.—Strike out all particulars.
SACCARAPPA.—W. l., 300, 450, 600.
SAN DIEGO.—Hart-Wood Lumber Co. owner of vessel.
SANTA TERESA.—W. l., 300, 150, 600.
SHERMAN.—Range, 150.
SIERRA.—Service, P. G.
SOCONY 84.—Standard Transportation Co. owner of vessel.
SOCONY 89.—Standard Transportation Co. owner of vessel.

STEEL MARINER.—Range, 300; system, R. C. A., 1000; w. l., 300, *600*; hours, X.
SUDBURY.—System, Cutting & Washington, 1000.
SUNOLCO.—Rates, 8 c. per word.
SWIFT SCOUT.—W. l., 300, *600*.
TIPTON.—Name changed to Esther Weems.
VABA.—American-Italian S. S. Co., owner of vessel.
VELERO.—Strike out all particulars.
WESTERN GLEN.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*; hours, X.
WESTERN PLAINS.—System, Navy-R. C. A., 1000; hours, X.
WESTERN WORLD.—Range, 200; system, Navy-Kilbourne & Clark, 1000; w. l., 300, 450, *600*, 1800.
WEST HEMATITE.—Station operated and controlled by I. W. T. Co. (U. S. L.).
WEST MONUS.—System, Navy-Lowenstein, 1000; w. l., 300, 450, *600*.
WILLIAM ISOM.—Curtis Bay Copper & Iron Works owner of vessel.
WOLVERINE STATE.—Name changed to President Harrison.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

KDMQ, *read* President Harrison; KENM, *read* Mahukona; KLIU, *read* Frank Lynch; KUFG, *read* Southseas; WMEA, *read* Charles L. O'Connor; WQOA, *read* Esther Weems; WVOO, *read* John Tracy; strike out all particulars following the call signals, KDIB, KDIC, KDRY, KEB, KEG, KEVJ, KEY, KRP, KUSD, WAX, WHV, WPT, WPZ.

BROADCASTING STATIONS, BY CALL SIGNALS.

[Alterations and corrections to be made in the List of Radio Stations of the United States, edition of June 30, 1922.]

KFAY (Central Point, Oreg.).—*Read* Medford, Oreg.; w. l., add 485.
KFBB (Butte, Mont.).—Strike out all particulars.
KFBS (Trinidad, Colo.). Station operated and controlled by Trinidad Gas & Electric Co. and the Chronicle News.
KJR (Seattle, Wash.).—Station operated and controlled by Northwest Radio Service Co. (Vincent I. Kraft).
KMC (Reedley, Calif.).—Station operated and controlled by W. W. Lindsay, jr., 1516 F. Street.
KOE (Spokane, Wash.).—Strike out all particulars.
KQT (Yakima, Wash.).—Strike out all particulars.
KVQ (Sacramento, Calif.).—Station operated and controlled by Sacramento Bee (James McClatchy Co.).
KYG (Portland, Oreg.).—Strike out all particulars.
WAAL (Minneapolis, Minn.).—Station operated and controlled by Beaniek Electric Co. only.
WBAP (Fort Worth, Tex.).—W. l., 400, 485.
WBAM (New Orleans, La.).—Strike out all particulars.
WBAZ (Richmond, Va.).—Strike out all particulars.
WCAN (Jacksonville, Fla.).—Strike out all particulars.
WCAW (Quincy, Ill.).—Station operated and controlled by Quincy Electric Supply Co. only.
WCK (St. Louis, Mo.).—W. l., 300 only.
WDAB (Portsmouth, Ohio).—Strike out all particulars.
WDAD (Lindsborg, Kans.).—Strike out all particulars.
WDAF (Kansas City, Mo.).—W. l., 400, 485.
WDAT (Worcester, Mass.).—Strike out all particulars.
WFAT (Sioux Falls, S. Dak.).—W. l., 360, 485.
WFI (Philadelphia, Pa.).—W. l., 400, 485.
WGAV (Savannah, Ga.).—Strike out all particulars.
WHAD (Milwaukee, Wis.).—W. l., 360, 485.
WHAJ (Bluefield, W. Va.).—Strike out all particulars.
WHAL (Lansing, Mich.).—Station operated and controlled by Jefferys & Derby Drug Co.
WHAM (Rochester, N. Y.).—W. l., 360, 485.
WHAO (Corinth, Miss.).—Strike out all particulars.
WHAX (Holyoke, Mass.).—Strike out all particulars.
WHB (Kansas City, Mo.).—W. l., 400, 485.

WHQ (Rochester, N. Y.).—Strike out all particulars.
WHU (Toledo, Ohio).—Strike out all particulars.
WIAC (Galveston, Tex.).—W. l., 300, 485.
WIAL (Norwood, Ohio).—Strike out all particulars.
WIAP (Springfield, Mass.).—Strike out all particulars.
WJAE (San Antonio, Tex.).—W. l., add 485.
WJAG (Norfolk, Nebr.).—W. l., add 485.
WJAK (Stockdale, Ohio). W. l., add 485.
WJT (Erie, Pa.).—Strike out all particulars.
WJZ (Newark, N. J.).—W. l., strike out 485.
WKAA (Cedar Rapids, Iowa). —W. l., add 485; station operated and controlled by H. F. Paar.
WLAB (Carrollton, Mo.).—Strike out all particulars.
WLAQ (Kalamazoo, Mich.).—Address 408 Elm Street.
WQC (Davenport, Iowa).—W. l., 400, 485.
WPL (Zanesville, Ohio).—Strike out all particulars.
WSB (Atlanta, Ga.).—W. l., 400, 485.
WMT (Buffalo, N. Y.).—Strike out all particulars.

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, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

BETHEL, ALASKA. —Loc. (approximately) 0.161° 45′ 00″, N. 60° 48′ 00″; system, U. S. Army, v. t. telephone, and telegraph; w. l., 430, 480, 530, *600*; service, PG; hours, 9 a.m.–7 p. m.; rates, ship service, 6 c. per word.
CHICAGO, ILL. (KDQA).—Call signal changed to WWG.
CIRCLE, ALASKA.—Loc. (approximately) 0.144° 01′ 48″, N. 65° 49′ 12″; range, 500; service, PG (FX); hours, 7:30 a. m.–5 p. m.
CRAIG, ALASKA.—Range, 200; hours, 9 a. m.–7 p. m.; rates, ship service, 6 c. per word.
FAIRBANKS, ALASKA.—Range, 500; system, U. S. Army arc; w. l., 1000, 1400, *2000*, 3800, 4200, 5000; service, PG (FX).
FORT EGBERT, ALASKA.—Loc. 0.141° 13′ 48″, N. 64° 46′ 19″; system, U. S. Army v. t. telephone, and telegraph; w. l., 600; service, PG (FX); hours, 8 a. m.–5 p. m.
FORT GIBBON, ALASKA.—Loc. 0.152° 05′ 21″, N. 65° 10′ 16″; range, 1000; service, U. S. Army, 1000; service, PG (FX); hours, 8 a. m.–5 p. m.
FORT ST. MICHAEL, ALASKA.—System, U. S. Army, v. t. telephone, and telegraph; w. l., 450, 485, 550, *600*, hours, 8:30 a. m.–7:15 p. m.; rates, ship service, 6 c. per word.
FORT YUKON, ALASKA.—Range, 200; service, PG (FX); hours, 7.30 a. m.–5 p. m.
GREAT LAKES, ILL.—W. l., 4900 meters changed to 4650 meters.
HOLY CROSS, ALASKA.—System, U. S. Army, v. t. telephone, and telegraph; service, PG (FX); hours, 9 a. m. 7 p. m.
IDITAROD, ALASKA.—System, U. S. Army, v. t. telephone, and telegraph; w. l., 425, 580, *600*, 650; service, PG (FX); hours, 9 a. m. 8 p. m.
KOTLIK, ALASKA.—Strike out all particulars.
LIVENGOOD, ALASKA.—System, U. S. Army, 1000; w. l., 600; service, PG (FX); hours, 8 a. m.–5 p. m.
MANTOLOKING, N. J. (NAH).—Strike out all particulars.
MCGRATH, ALASKA.—Loc. 0.155° 35′ 00″, N. 62° 55′ 00″; system, U. S. Army, v. t. telephone, and telegraph; w. l., 450, 500, 550, *600*; hours, 8 a. m.–6 p. m.
NEW ORLEANS, LA. (NAT).—W. l., 4650 meters changed to 6300 meters.
NOME, ALASKA.—Loc. 0.165° 23′ 39″, N. 64° 30′ 20″; system, U. S. Army, arc and v. t. telephone, and telegraph; w. l., 450, 540, *600*, 1400, 1950, 2600, 3300, 4300, *6000*; rates, ship service, 6 c. per word.
NOORVIK, ALASKA.—Loc. (approximately) 0.160° 40′ 00″, N. 66° 40′ 00″; system, U. S. Army, v. t. telephone, and telegraph; range, 600; service, PG; hours, 8 a. m.–7.30 p. m.; rates, ship service, 6 c. per word.
NULATO, ALASKA.—System, U. S. Army, v. t. telephone, and telegraph; w. l., 520, *600*, 730, 1950; service, PG (FX); hours, 8 a. m.–9 p. m.
ST. PETERSBURG, FLA.—Strike out all particulars.
WRANGELL, ALASKA.—System, U. S. Army, v. t. telephone, and telegraph; w. l., 425, *600*, 850; hours, 10 a. m.; 2, 4, and 6.30 p. m., listening in 15 minutes each schedule for ships; rates, ship service, 6 c. per word.

NOTE.—All radio stations of the Lighthouse Service are now operated and controlled by that service.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

Strike out all particulars following the call signals, NAH (Mantoloking, N. J.; NGL and WVF; KDQA changed to WWG.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

[Alterations and corrections to be made in the List of Radio Stations of the United States, edition of June 30, 1922.]

ALTADENA, CALIF. (6XR).—Strike out all particulars.
ATHOL, MASS. (1XP).—W. L., variable.
ATLANTA, GA. (4XC).—W. L., 200, 375, variable.
AUSTIN, TEX. (5XX).—W. L., 200, 375.
BIRMINGHAM, ALA. (5ZAS).—Address 1913 Fifth Avenue.
BOZEMAN, MONT. (7ZD).—Strike out all particulars.
BUENA VISTA, GA. (4XE).—Strike out all particulars.
BUTTE, MONT. (7YP).—Strike out all particulars.
CHICAGO, ILL. (9ZN).—Address 832 South Michigan Avenue.
CINCINNATI, OHIO (8XAH).—W. L., 360, variable.
CLEVELAND, OHIO (8XT).—Strike out all particulars.
COLORADO SPRINGS, COLO. (9XC).—W. L., 200, variable.
COLUMBUS, OHIO (8ZO).—Strike out all particulars.
DAVENPORT, IOWA (9YAP).—Strike out all particulars.
EDGENDALE, N. DAK. (9ZX).—Station operated and controlled by H. J. Goddard only.
HAGERSTOWN, MD. (3ZI).—Strike out all particulars.
HIGHLAND PARK, MICH. (8ZZ).—Address 147 Hill Avenue.
MEMPHIS, TENN. (5XL).—Strike out all particulars.
MONTCLAIR, N. J. (2XS).—Strike out all particulars.
NEW BRAUNFELS, TEX. (5YK).—Address, Box 567.
NEW YORK, N. Y. (2XU).—W. L., 420, variable.
OAKLAND, CALIF. (6ZI).—Changed to Alameda, Calif.; station operated and controlled by R. S. Rheem and F. Ives Beetham, 1555 Sixth Street.
PHILADELPHIA, PA. (3ZJ).—Strike out all particulars.
PITTSBURGH, PA. (8ZD).—Station operated and controlled by Parker E. Wiggin and F. B. Westervelt.
PORTLAND, OREG. (7XG).—W. L., 200, 375, variable.
PORTLAND, OREG. (7YK).—Station operated and controlled by Benson Tech Radio Club, Twelfth and Hoyt Streets.
PRINCETON, N. J. (3XM).—W. L., 200, variable; station operated and controlled by Princeton University Radio Club.
RICHMOND, IND. (9ZAE).—Strike out all particulars.
RICHMOND, VA. (3ZP).—Station operated and controlled by Ralph R. Chappell and Wayne R. Beavers, 1815 Main Street.
ROCHESTER, N. Y. (8ZK).—Strike out all particulars.
SALEM, OHIO (8ZG).—Address 252 McKinley Avenue.
SALT LAKE CITY, UTAH (6ZZ).—Station operated and controlled by H. C. Wilson (the Deseret News).
SAN ANTONIO, TEX. (5ZAK).—Station operated and controlled by Headquarters, Battery, Second Field Artillery Brigade, Camp Travis, Tex.
SAN FRANCISCO, CALIF. (6XO).—Station operated and controlled by Globe Radio Co.
SCHENECTADY, N. Y. (2XA).—Address 212 Parkwood Boulevard.
SOUTH PASADENA, CALIF. (6XAS).—W. L., 200, variable.
ST. LOUIS, MO. (9ZV).—Address, 3047 Washington Street.
TOLEDO, OHIO (8ZH).—Station operated and controlled by Earl S. Ensign only; address, 923 West Bancroft Street.
WASHINGTON, D. C. (3XH).—Strike out all particulars.
WASHINGTON, D. C. (3XZ).—W. L., 175, 300, 200.
WATERBURY, CONN. (1XT).—W. L., variable.

MISCELLANEOUS.

FREE MEDICAL RADIO SERVICE FOR SHIPS AT SEA.

The United Fruit Co. announces the inauguration of a free medical radio service from its hospitals in the various countries of Central America and from its passenger ships to all ships at sea. So far as the United Fruit Co. and its subsidiary companies are concerned, this service is available without charge to ships of all nationalities through the following radio stations operated by the United Fruit Co. or the Tropical Radio Telegraph Co:

Radio stations and their call letters.

New Orleans, La. (WNU).	Puerto Castilla, Honduras (UA).
Burwood, La. (WBW).	Tegucigalpa, Honduras (UG).
Fort Morgan, Ala. (WIO).	Port Limon, Costa Rica (UX).
Swan Island, Caribbean Sea (US).	Almirante, Panama (UB).
Tela, Honduras (UC).	Santa Marta, Colombia (UJ).

All passenger steamships of the United Fruit Co.

For ships' call letters see International Radio Call Letter List or List of Radio Stations of the United States.

Radiograms requesting medical advice should be signed by the captain of the ship and should state briefly, but clearly, the symptoms of the person afflicted. Such radiograms should be addressed "Unifruitco" (name of place) and may be sent to any of the United Fruit Co.'s hospitals listed below:

Santa Marta, Colombia.	Tela, Honduras.
Port Limon, Costa Rica.	Puerto Castilla, Honduras.
Almirante, Panama.	Puerto Barrios, Guatemala.

All United Fruit Co. passenger steamships carry doctors, and free medical service may be procured by radio from any of them by a radiogram addressed "Ship's Doctor," followed by the name of the steamship. This free medical service is established, primarily, for the benefit of ships not carrying doctors. However, should occasion require, ships' doctors may hold consultation by radio with the United Fruit Co. ships' doctors and hospital staffs. The physicians and surgeons comprising the medical staff of the United Fruit Co. and its subsidiaries are thoroughly qualified, but in view of the fact that radio medical advice to ships at sea is given free and without an opportunity for a personal examination of the patients by them no responsibility will be assumed by either the company and its subsidiaries or the physicians or surgeons giving the advice as to its accuracy or for error in the receipt or transmission of any message sent or received in connection therewith. It is requested that when sending medical advice radiograms radio operators check them "(number of words) DH Medico." "DH Medico" radiograms will be given preference over all other radiograms, excepting SOS calls, throughout the radio service of the United Fruit Co. and subsidiary companies.

APPLICANT FOR RADIO OPERATOR LICENSE BARRED FROM EXAMINATION.

Recently an applicant for radio operator's license was barred from being examined for a period of six months on account of having used a false name in his examination papers. Anyone making false statements in applying for examination will be likewise treated.

LARGE FRENCH RADIO COMPANY FOUNDED FOR COMMUNICATION WITH ASIA.

The French Wireless Co., "La Compagnie Generale de Telegraphie Sans Fil," has founded a subsidiary radio company to operate under the name of "Radio-Orient," which will inaugurate radio communications with Syria, Lebanon, and most of the European countries.

USE OF RADIO ON FOREIGN SHIPS PROHIBITED BY SWEDEN.

The decree of May 31, 1921, prohibiting the operation of radio of foreign ships in Swedish territorial waters within 10 miles (nautical) of a coastal radio station is being strictly enforced. The only exception to this rule is in cases of great urgency, or

where the safety of the ship is concerned. Under the same decree foreign ships in Swedish harbors may not receive wireless messages without the permission of the telegraph directorate.

GENERAL CALL ASSIGNED FOR R. C. A. SHIPS.

The general call signal WWAA has been assigned for all vessels operated and controlled by the Radio Corp. of America. This general call signal will be used by R. C. A. ships or coast stations desiring to ascertain whether there is an R. C. A. ship within range, and any R. C. A. vessel hearing another ship or coast station calling WWAA should answer. This call signal also will be used in broadcasting general instructions to R. C. A. ships.

CHANGE IN LAND LINE RATES FOR R. C. A. STATIONS.

Effective October 10, 1922, traffic received from ships at sea via coastal stations at Siasconset, Mass. (WSC), Chatham, Mass. (WIM), and Marion, Mass. (WCC), destined to points within the States of Maine, Massachusetts, or Rhode Island will apply a land line forwarding rate of 1 cent per word less than the published tariffs. The new land-line rates follow:

	Maine.	Massachusetts.	Rhode Island.
	Cents.	*Cents.*	*Cents.*
Via Siasconset (WSC)	4	3	3
Via Chatham (WIM)	4	3	3
Via Marion (WCC)	4	3	3

INFORMATION FROM THE BERNE INTERNATIONAL BUREAU.

Egypt.—Port Said radio coast station is closed.

Italy.—From September 18, current, the coast station of Stromboli (IDE) no longer replaces Messina radio (ICF). It corresponds with ships, 600-meter wave length, only in cases of distress. The working hours for Messina radio station (ICF) are as follows: 1 to 3.30, 4 to 9, 9.30 to 13, 14 to 15, 16 to 18, 20 to 21, 21.30 to 22.30, and 23.30 to 24 (mean Greenwich time). At times, when this station is occupied with military or State communications, the ships to the northward of the Straits of Messina will transmit their radiotelegrams to Palermo (ICP), Napoli (ICN), or Cape Sperone (ICR) radio stations. Ships to the south of the Straits will transmit to Vittoria (ICV) or Cotrone (IDH) radio stations.

Tempio (IDR) station is open for the following hours: 8 to 10, 12 to 14, 16 to 18, 20 to 22 (mean Greenwich time). However, for particular reasons, this service may be interrupted.

From September 10, current, the hours of service of Genova (ICB) radio station are as follows: (*a*) For 600-meter wave length—0 to 4, 4.30 to 6, 6.20 to 15, 15.20 to 16, and 16.20 to 24 (mean Greenwich time). (*b*) For 2,400-meter wave length—4 to 4.20, 6 to 6.20, 15 to 15.20, and 16 to 16.20 (mean Greenwich time). During this last horary listening in upon 600 meters for distress calls is effected by radio station Spezia (ICS).

REPORTING DERELICTS AND VESSELS IN DISTRESS.

It frequently happens that masters of vessels when sighting derelicts or vessels in distress and in reporting them by radio fail to observe and report essential data as to the position and condition of the craft, necessary before a search is begun by a United States Coast Guard cutter. In consequence of this neglect it frequently becomes necessary for the searching cutter to send radiograms in an effort to obtain the necessary information. To be complete, information concerning a derelict should state: (*a*) The position by latitude and longitude confirmed by the approximate bearing and distance from a fixed point on land; (*b*) the general condition of the vessel; (*c*) whether bottom up or awash; (*d*) height of hull above water and any abnormal conditions as to buoyancy; (*e*) as to whether masts are standing, sails set, or otherwise; (*f*) force and direction of wind; (*g*) any observed current, its set and strength.

Similar descriptive information should also be furnished of vessels in distress. This information is necessary in order to determine roughly the direction and speed of drift of the derelict or vessel and also to give an idea of the appearance of the object sought.

DATE ON WHICH AN OBSTRUCTION IS SIGHTED.

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

RADIO WEATHER BULLETINS.

Beginning the first day of this month, the weather bulletins containing the weather reports, forecasts, and storm warnings will be broadcast from the naval radio stations at Key West, Fla., and Point Isabel, Tex., by continuous wave (arc) instead of by spark, as at present, on the following schedules: Key West (NAR), 10 p. m. (seventy-fifth meridian time); wave length, 5,700 meters. Point Isabel (NAY), midnight, noon, and 7 p. m. (seventy-fifth meridian time); wave length, 5,000 meters.

CALIBRATED ARCS OF U. S. NAVAL RADIO COMPASS STATIONS.

Bearings are only reliable in the arcs of the circle for which stations have been calibrated.

Stations.	Arc of calibration.
Empire [1]	240–360 (true).
Fort Stevens [2]	185–295 (true).
Ocean Park [3]	205–345 (true).
Tatnosh [2]	240–90 (true), clockwise.
New Dungeness [3]	255–95 (true), clockwise.
Smith Island [3]	0–360 (true), complete circle.
Cattle Point [3]	130–275 (true), clockwise.
Soapstone Point [3]	253–50 (true), clockwise.
Cape Hinchinbrook [2]	112–291 (true), clockwise.

NOTE.—All of the above sectors must be understood as being of the circle of which the compass coil is at the center and are observed from the listed position of the compass stations.

STATIONS IN ALASKA CLOSED FOR THE SEASON.

Lazy Bay (KEPS) closed October 7.
Port Althorp (KLW) closed October 14.
Port Beauclaire (KWO) closed October 22.
Uyak (KHA) closed October 13.
Yakutat (KKA) closed October 22.

ADMIRALTY NOTICE TO MARINERS.

North Sea and Baltic Entrance—Denmark, Jutland.
Blaavand W/T station.—Information regarding ice signals.
Position.—Lat. 55° 33′ N., long. 8° 05′ (approximately).
Call signal.—OXB.
Wave length.—600 meters
Details.—During the winter ice signals are broadcasted by Blaavand W/T station twice daily, namely, at 11.30 and 21.20 G. M. T. (civil). The message is sent en clair (in the English language) and contains a short report on ice conditions in the main Danish waterways, compiled from information received by the Meteorological Institute. The preliminary signals are as follows: —.—.— OXB OXB OXB, ice report. This is followed by the number of words comprising the message proper and then the text of the latter, concluding with —. . —. The text only is repeated and the message ends with OXB OXB OXB . . . . .

Example. —.—.— OXB OXB OXB, ice report 26w. Kattegat west channel, closed for sailing vessels; east channel, park ice, steamers beset; southern part, open ice Sound and belts, drift ice, along west coast park ice All light vessels removed. —. . .—. (Repetition of foregoing.) OXB OXB OXB . . —.—.—.—*From Admiralty Notice to Mariners, September 28, 1922.*

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[1] Not in commission.
[2] In commission for continuous service.
[3] Limited commission; available for bearings during foggy weather.

DESCRIPTION OF LOADING COIL, CONDENSERS, AND ELECTRON-TUBE UNITS FOR VERY SIMPLE RADIO RECEIVING SETS.

The Bureau of Standards has prepared a series of pamphlets which give descriptions of parts of very simple radio receiving sets. Two of the series have been published and announced previously and are available from the Superintendent of Documents, Washington, D. C. They are Circular No. 120, Construction and Operation of a Simple Homemade Radio Receiving Outfit, and Circular No. 121, Construction and Operation of a Two-Circuit Radio Receiving Equipment with Crystal Detector. The later pamphlets of the series, describing a simple loading coil, auxiliary condensers, and electron-tube detector and amplifier units, have now been prepared. They are included in Letter Circulars Nos. 46, 47, 48, 49 of the Bureau of Standards and are not now available to the public. They will be printed, and the time when they become available will be announced in the Radio Service Bulletin, a monthly publication of the Department of Commerce, obtainable from the Superintendent of Documents, Washington, D. C., for 25 cents per year.

The description of auxiliary condensers includes two fixed condensers, one of which is connected in series with the antenna to adjust to short wave lengths and the other of which is connected across the telephone receivers. The purpose of the loading coil described in one pamphlet is to extend the range of the receiving equipment so as to respond to wave frequencies between 100 and 500 kilocycles (that is, wave lengths between 3,000 and 600 meters).

The electron-tube detector unit described may be used instead of the crystal detector with either the single-circuit or two-circuit radio receiving sets described in Bureau of Standards Circulars Nos. 120 and 121. It makes the receiving set operate for signals from transmitting stations at greater distances. The audio-frequency amplifier unit described in another of the pamphlets employs a single electron tube. The amplifier unit is used by connecting it to the receiving set in place of the telephone receivers and then connecting the telephone receivers to the output of the amplifier. The distance over which the receiving set receives signals is increased by the use of one or more of these amplifier units.

DIRECTIVE RADIO TRANSMISSION ON A WAVE LENGTH OF 10 METERS.

The enormous increase in the use of radio telegraphy and telephony during the past two years has created a demand for apparatus capable of being operated with a minimum of interference. Wherever the need is not for broadcasting but for point-to-point communication the case seems hopeless, unless directive transmission can make it possible. Directional transmission on very short wave lengths (below 20 meters) may offer a solution to this problem.

Recent reports by Marconi, Franklin, and others show that interesting and valuable data have been obtained on directive radio transmission using wave lengths below 20 meters. The Bureau of Standards has just completed a series of similar experiments, the preliminary results of which confirm the work of these investigators. The experiments conducted at the Bureau of Standards were made with a parabolic reflector (cylindrical type), which was designed for a 10-meter wave length. It was made by constructing a parabolic wooden frame with an aperture of one wave length. This frame was suspended in the air and 40 wires spaced 1 foot apart were suspended from it. The source, located at the focus, consisted of a 50-watt electron tube. The output from this tube was coupled to an antenna, which was a linear oscillator of the Hertzian type, which was tuned to a wave length of 10 meters. The complete reflector system was arranged so that it could be rotated.

Numerous polar curves were obtained by rotating the reflector and taking readings of the received current at every 10° position of the reflector. The receiving apparatus was located 170 feet from the reflector in most of the work and consisted of a loop antenna (single turn) with a thermoelement in the loop circuit. A portable galvanometer was connected to the thermoelement.

With all adjustments correctly made at the reflector, good directional transmission was obtained. With the reflector turned 20° from the direct line to the receiver, the received current dropped off to one-half of what it was with the reflector directed to the receiver. There was practically no radiation over an angle of 270°, while the majority of the radiated power was confined to an angle of 30°. Good radiophone transmission was obtained over a distance of 3 miles.

The report to be issued on this work will present the results of these experiments and give details regarding the apparatus and circuits used, so that others may duplicate or continue this line of investigation. When the publication is issued, details

regarding it and information as to how it may be obtained will be published in the Radio Service Bulletin, obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 25 cents per year.

PUBLICATION ON PROPERTIES OF ELECTRICAL INSULATING MATERIALS.

The Bureau of Standards has just published a paper giving the results of extensive research on the laminated phenolmethylene type of insulating materials. This publication, Technologic Paper No. 216, Properties of Electrical Insulating Materials of the Laminated Phenol-Methylene Type, by J. H. Dellinger and J. L. Preston, is now obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 30 cents.

The manufacture of these electrical insulating materials is an industry that has become commercially important within the last 20 years.

This paper is concerned only with materials of the laminated type, which are made up by building up to some desired thickness sheets of paper, fiber, or fabric which has been previously impregnated or coated with phenol (synthetic) varnish and then subjecting the stack to comparatively great pressure in a heated hydraulic press. All the materials of this type on the market have been investigated; that is, Condensite Celoron, Bakelite Dilecto, Formica, and Bakelite Micarta. The properties or effects which have been measured for this type of material include radio frequency, phase difference, or power loss, dielectric constant, flash-over voltage, direct-current volume resistivity and surface resistivity, moisture absorption, thermal expansivity, and other properties. The data of these properties have been arranged in such a manner as to be conveniently available for reference either by a person desiring detailed information or by a person interested only in a general way.

INFORMATION ON RADIO MEASUREMENTS.

The Bureau of Standards has prepared a series of pamphlets which deal with radio measurements. These pamphlets are: Letter Circular No. 75, The Secondary Standardization of Radio Wave Meters, Letter Circular No. 76, the Standardization of Inductors at Radio Frequencies, and Letter Circular No. 77, The Comparison of Condensers at Radio Frequencies. Like the other publications in the Letter Circular series, they are in mimeographed form and are not obtainable by purchase. A limited supply of these is available at the bureau to persons who have actual use for such information.

The first pamphlet describes the method of standardizing wave meters of both the transmitting and receiving type. In the receiving type of wave meters the standardizing consists in measuring by means of a standard wave meter the frequencies emitted by a generator of continuous waves which is tuned to resonance with the wave meter under test at various settings of the scale with the latter. In the transmitting type of wave meters, which consists of a condenser, an inductor, and an exciting device, usually a battery and a buzzer coupled to the circuit, the standardizing process utilizes the make and break of the buzzer, which excites the wave meter by impact and emits waves whose frequency is regulated by the wave meter setting, the frequency of the waves emitted at each setting being known for each setting of the wave meter.

The second pamphlet describes the method of measuring the apparent inductance at any radio frequency of a fixed or variable inductor. The apparatus consists of a variable condenser, a wave meter standardized in terms of frequency or wave length, a thermoelement and galvanometer, current square meter, several noninductive resistors of known resistance, and a source of undamped unmodulated waves. The observations consist of the readings necessary for standardization in terms of frequency or wave length of the circuit composed of the standardized condenser, the inductor to be measured, and connecting leads spaced well apart and as short as is possible without bringing the coil to within about 10 centimeters of the condenser. With this circuit is combined the device used to indicate resonance.

The third pamphlet describes the method of comparison of the capacity and effective resistance or phase difference of two condensers one of which has already been standardized. The method here described is that of comparison by substitution; that is, tested and untested condensers are compared by inserting them in turn in a circuit which is brought to resonance with a source of undamped waves.

These three pamphlets are, primarily, for research and testing laboratories. Together, with Letter Circular No. 78, Design of a Suitable Short-Wave Radio Wave Meter, they constitute a supplement to Bureau of Standards Circular No. 74, Radio Instruments and Measurements.

PRECISION STANDARDIZATION OF RADIO FREQUENCIES.

The Bureau of Standards has developed a very precise method of standardization of radio wave lengths and frequencies, which is the fundamental basis of radio measurements in this country. By the process used the frequency of radio waves is compared with that of an audible musical note. A tuning fork is mounted in such a way that it may be made to control the frequency of an oscillatory circuit. The frequency of another oscillatory circuit operating at much higher frequencies is then compared with it by means of a cathode-ray oscillograph.

This latter instrument consists of the cathode-ray tube, a special kind of vacuum tube in which the narrow stream of electrons is subjected to the action of electric fields applied by the two alternating current generators. When neither generator is operating, the electrons, impinging on the active screen at the end of the tube, cause a single luminous spot. If one generator is connected, the spot is deflected back and forth along the single line, horizontal or vertical, as the case may be, with such rapidity that it appears as a solid line. If both generators are applied simultaneously, the spot oscillates both horizontally and vertically and appears, in general, as a blurred luminous rectangle. If, however, the frequencies of the two generators bear a simple ratio, such as four to one, the spot traverses and retraverses a definite simple path, forming a figure by which the frequency ratio may be recognized. It has been found possible to compare frequency ratios as high as 21 to 1.

The bureau is at present engaged in the standardization of a high-precision standard wave meter by this means. A tuning fork of known frequency, approximately 1,000 cycles per second, is used as the basis of the standardization. A low-frequency generator is tuned to successive multiples of this frequency by means of the cathode-ray oscillograph, and corresponding settings of the wave meter are obtained. A third generator is similarly tuned to multiples of these frequencies, and thus by successive stages the standardization is extended to include frequencies as high as 5,000 kilocycles (60 meters). It is intended that this wave meter be used as the basic standard for the standardization of commercial wave meters.

MINUTES OF OPEN MEETINGS OF DEPARTMENT OF COMMERCE CONFERENCE ON RADIO TELEPHONY, FEBRUARY 27-28, 1922.

At the Radio Telephony Conference which was called in Washington on February 27, 1922, by Secretary Hoover, of the Department of Commerce, two days were spent in hearing the statements of representatives of the many radio interests who were present. The minutes of this open meeting have now been prepared in mimeographed form. Copies are available for reference at the offices of the District Radio Inspectors of the Department of Commerce. There is a very limited number on hand at the Bureau of Standards for supplying the requests of organizations particularly concerned with the work of the conference.

DESCRIPTION OF RADIO WORK OF THE BUREAU OF STANDARDS.

The radio laboratory of the Bureau of Standards of the Department of Commerce was established in 1910, and during the past few months parts of its work have come to the attention of most of the radio experimenters and radio broadcast listeners throughout the country. The work of the Bureau of Standards in radio research and measurements and in assisting the various Government bureaus in the solution of technical radio problems covers a wide scope.

A glimpse of what the Bureau of Standards is doing to increase the knowledge and extend the usefulness of radio is given in an article by J. H. Dellinger, chief of the radio section, entitled "The Bureau of Standards lends a hand." This article appears in the magazine Radio Broadcast for November, 1922.

PUBLICATION ON RADIO-FREQUENCY AMPLIFIERS.

Electron-tube amplifiers now form an essential part of all but the most simple radio receiving sets. Amplifiers may make use of either radio-frequency amplification, or audio-frequency amplification, or both. For satisfactory reception with coil antennas it is generally found necessary to use radio-frequency amplification.

There are three methods of coupling the output of one tube into the input of another tube, so as to provide a multistage amplifier of radio-frequency current: (1) Resistance coupling, (2) tuned plate-circuit coupling, and (3) transformer coupling. A paper entitled "Radio-frequency amplifiers," by P. D. Lowell, has just been issued as Bureau of Standards Scientific Paper No. 449. This paper deals, for the

most part, with transformer coupling and gives circuits and constructional details for transformers with both "air cores" and iron cores. The paper can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents.

FEES FOR RADIO TESTS.

The Bureau of Standards has prepared a pamphlet, Letter Circular No. 73, Fees for Testing Radio Apparatus, for the information of those who desire to have tests performed. The bureau limits its tests of radio materials to tests for the Government, tests of instruments, which in turn are to be used as standards, tests of importance to the bureau for research, tests in which the bureau is to act as referee, and a few other special tests in which special reason is shown why these tests are to be undertaken by the bureau. Before an article is submitted for test it must be preceded by a written request for test, and if it can not be undertaken the applicant is furnished, if possible, with the name and address of one or more laboratories who may make the test if requested.

The request should enumerate the articles, giving serial numbers or other identification marks, if any, should state the nature of the test desired and the conditions under which the apparatus is used, and state his reasons for believing that the test should be made by the Bureau of Standards. There is a limited number of copies of this fee schedule available at the Bureau of Standards to persons who have actual use for it.

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CORRECT CALL LETTERS OF SWAN ISLAND STATION.

The correct call letters of the Swan Island radio station mentioned in connection with the transmission of weather reports in the October edition of this publication, pages 11 and 12, are US.

NEW LIST OF RADIO STATIONS OF THE UNITED STATES.

The new edition of the List of Commercial and Government Radio Stations of the United States, edition June 30, 1922, is available from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 15 cents per copy.

WEATHER PREDICTION IN CONNECTION WITH RECENT HURRICANE.

The Weather Bureau advises in connection with the recent hurricane which occurred in the Yucatan Channel and southern Gulf of Mexico during the latter part of last month that the warnings issued by the Weather Bureau were promptly received by cable and by Swan Island. These messages were broadcasted by radio and by notices to mariners as fast as received by the Panama Canal office. They were instrumental in causing some of the boats in the New Orleans trade to postpone their sailings for a day or two. So far not many marine casualties have been reported. The canal and shipping interests appreciate the prompt service given by Forecaster Mitchell and the Swan Island radio station.

OFFICIAL MAP OF RADIOTELEGRAPH STATIONS.

The International Bureau of the Telegraphic Union, Berne, Switzerland, is publishing a map of radiotelegraph stations. The map is in five sections. Sections 1 and 2 of the map are ready for distribution. Sections 3, 4, and 5 will be ready in the near future. The map indicates the coast stations, the routes of the principal lines of navigation, the length and duration of voyages. The price of each sheet of the map is 3 francs (Swiss money), post charges and packing included. The shipments are made only after receipt of the price of the sections ordered, either by postal check or by check payable to the Berne bureau. The information of the map will be kept up to date by bulletins which will appear whenever the information warrants such. The price of these bulletins is included in the cost of the map. All remittances should be forwarded to the "International Bureau of the Telegraph Union, Radiotelegraph Service, Berne, Switzerland."

CHANGE IN RATE FOR BOSTON (WBF) STATION.

Effective December 1, next, the rate for the Boston station of the Tropical Radio Telegraph Co. will be 10 cents per word in lieu of 12 cents per word.

WEATHER REPORTS BY WHITEFISH POINT (MICH.) NAVAL STATION.

Beginning on the 15th of this month, weather will be broadcasted twice daily from the naval radio station at Whitefish Point, Mich. (NZT), on a wave length of 1,200 meters. Times of transmission: 10.45 a. m. and 4.45 p. m. (seventy-fifth meridian). Position of station: 84° 57′ 21″ N., 46° 46′ 10″ W.

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