DEPARTMENT OF COMMERCE

RADIO SERVICE BULLETIN

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CONTENTS

	Page
Abbreviations	1
New stations	2
Alterations and corrections	4
Miscellaneous:	
Secretary Hoover calls third national radio conference	6
Compass station in China	7
Fog signal in Denmark	7
Description of radio apparatus on the Leviathan	8
Discontinuance of weather forecasts by Buffalo, N. Y. (WGR), station	8
Land line rates to Boston	8
Miscellaneous—Continued.	
Frequency transmissions by British laboratory station	8
Prospective radio development in Sumatra	9
Broadcasting stations in foreign countries	9
Distribution of weather forecasts, information, and warnings by radio	10
Standard radio frequency transmissions, September and October	16
Standard frequency stations	16
References to current radio periodical literature	17

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.
FS = Fog signal.
P = Private.
O = Government business exclusively.
Hours = Hours of operation:
N = Continuous service.
X = No regular hours.
F. T. Co. = Federal Telegraph Co.
I. W. T. Co. = Independent Wireless Telegraph Co.
K. & C. = Kilbourne & Clark Manufacturing Co.
R. C. A. = Radio Corporation of America.
S. O. R. S. = Ship Owners' Radio Service.
W. S. A. Co. = Wireless Specialty Apparatus Co.
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.
Fy. = Frequency.
A. c. = Alternating current.

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, 1924, and to the International List of Radiotelegraph Stations published by the Berne Bureau]

Station	Call signal	Wave lengths	Service	Hours	Station controlled by—
Buffalo, N. Y.	WAM		PG		Inter City Radio Telegraph Co.
Duluth, Minn.	WME		PG		Do.
Flint, Mich.[1]	WGF	135	FX	X	Frank D. Fallain.
Tuckerton, N. J.[2]	WSC	300, 600, 670	PG	N	R. C. A.

[1] Loc. (approximately) O 82° 30′ 00″, N 40° 00′ 00″; range, 50; system, composite, v. t. telephone.
[2] Loc. (approximately) O 74° 22′ 00″, N 39° 33′ 00″; range, 500; system, R. C. A. v. t. telegraph; 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, 1924, 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 Panama[1]	KFZA					R. C. A.
City of San Francisco[1]	KFZB					Do.
Fontana[2]	KFTW		PG	X	Progress S. S. Co.	Owner of vessel.
Panay	KFUA		PG	X	Paisley S. S. Co.	
Sequoia	KFTX				Richard M. Cadwalader, Jr.	
Vanadis[3]	KFSX	8	PG	X	New York Yacht Club.	I. W. T. Co.

[1] Letters temporarily assigned until permanent letters can be procured from Panaman Government, as vessels are under that Government's jurisdiction.
[2] Range, 150; system, Navy-Lowenstein, 1800; w. l., 300, 600, 706; rates, Great Lakes service, 4 cents per word.
[3] Range, 200; system, I. W. T. Co., 1000; w. l., 300, 600, 706, 1800, 2100, 2400.

Commercial land and ship stations, alphabetically by call signals

[b=ship station; c=land station]

Call signal	Name of station		Call signal	Name of station	
KFSX	Vanadis	b	KFZB	City of San Francisco	b
KFTW	Fontana	b	WAM	Buffalo, N. Y.	c
KFTX	Sequoia	b	WGF	Flint, Mich.	c
KFUA	Panay	b	WME	Duluth, Minn.	c
KFZA	City of Panama	b	WSC	Tuckerton, N. J.	c

Broadcasting stations, alphabetically by names of cities

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924]

City	Call signal	City	Call signal
Belden, Nebr.	KFQY	Marshfield, Oreg.	KFOF
Denver, Colo.	KFDL	Newark, Ohio	WBBA
Grand Rapids, Mich.	WRBK	Moscow, Idaho	KFAN
Helena, Mont.	KFSY	United States (portable)	WRBL
Hollywood, Calif.	KFQZ		

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

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924]

Call signal	Station operated and controlled by—	Location of station	Power (watts)	Wave length	Frequency (kilocycles)
KFAN	Moscow, Idaho	The Electric Shop, 115 East Third Street	50	360	833
KFDL	Denver, Colo	Knight-Campbell Music Co., 1631 California Street.	5	226	1,330
KFOF	Marshfield, Oreg	Rohrer Electric Co	10	240	1,250
KFQY	Belden, Nebr	Farmers State Bank	10	273	1,100
KFQZ	Hollywood, Calif	Taft Radio Co., 5653 De Longpre Avenue	250	240	1,250
KFSY	Helena, Mont	Van Blaricom Co., 20 South Main Street	10	261	1,150
WBBA	Newark, Ohio	Plymouth Congregational Church	20	240	1,250
WEBK	Grand Rapids, Mich	Grand Rapids Radio Co., 211 Diamond Avenue SE.	20	261	1,150
WEBL	United States (portable).	R. C. A	100	226	1,330

Government ship stations, alphabetically by names of stations

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924, and to the International List of Radiotelegraph Stations published by the Berne bureau]

Station	Call signal	Wave lengths	Service	Hours	Station controlled by—
Lotus [1]	WWBA	300, 378, 476, 600, 800, 952	O		Bureau of Lighthouses.
Orion	NOC				U. S. Navy.

[1] System, Lowenstein, 1,000; hours, 8.15 a. m. to 9.15 p. m.

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
NOC	Orion.....b	WWBA	Lotus.....b

Special land stations, alphabetically by names of stations

[Additions to the List of Radio Stations of the United States, edition of June 30, 1924]

Station	Call signal	Station controlled by—
Chicago, Ill	9ZA	Frederick J. Marco, 6723 Winthrop Avenue.
Cincinnati, Ohio	8XAV	University of Cincinnati.
East Pittsburgh, Pa	8XAU	Westinghouse Electric & Manufacturing Co.
Marion, Ohio	8ZAI	Charles C. Whysall, Bedford Avenue.
Pittsburgh, Pa	8ZAH	Frederic B. Westervelt, 5306 Westminster Place.
Providence, R. I	1ZAB	Henry H. Tilley, Woolworth Building.
Rossville, N. Y	2XBI	Peoples Pulpit Association, 124 Columbia Heights, Brooklyn, N. Y.
St. Louis, Mo	9ZK	Carl W. Klenk, 3148 Halliday Avenue.

Special land stations, grouped by districts

Call signal	District and station	Call signal	District and station
1ZAB	First district: Providence, R. I.	8ZAH	Eighth district—Continued: Pittsburgh, Pa.
2XBI	Second district: Rossville, N. Y.	8ZAI	Marion, Ohio.
	Eighth district:		Ninth district:
8XAU	East Pittsburgh, Pa.	9ZA	Chicago, Ill.
8XAV	Cincinnati, Ohio.	9ZK	St. Louis, Mo.

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, 1924, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

CEIBA, P. R.—Hours, 8 a. m.–12 midnight, except Sundays and holidays.
DAVAO, P. I. (Mindinao Island).—W. l., *600*, 1100.
EAST MORICHES, N. Y.—Loc. O 72° 46′ 05″, N 40° 46′ 00″; range, 150; system, R. C. A., 1000; rates, 10 cents per word.
MALABANG, P. I. (Mindinao Island).—W. l., *600*, 750, 800, 850.
MALITA, P. I.—W. l., 450, *600*, 700.
MANITOWOC, WIS.—System, R. C. A., 240.

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, 1924, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

AFEL.—Range, 300; system, Navy-W. S. A. Co., 1000.
AGWIPOND.—W. l., 300, 450, *600*, 706.
AMERICAN BANKER.—Range, 300; system, Navy-Lowenstein, 1000; w. l., 300, 450, *600*, 706.
AMERICAN LEGION.—System, Federal arc and Navy-R. C. A., 1000; w. l., 300, *600*, 706, 1800, 2100, 2400.
AQUILO.—W. l., 300, *600*.
ARA.—W. l., add 706.
ASTORIA.—Astoria S. S. Co., owner of vessel.
BENSON FORD.—Range, 200; system, R. C. A. v. t. telephone and telegraph; w. l., 300, *600*, 706, 1053, 1875; rates, 4 cents per word.
B. H. TAYLOR.—W. l., 300, *600*, 1053, 1800.
BOGOTA.—Station operated and controlled by I. W. T. Co. (U. S. L.).
CADDOPEAK.—Charles Nelson Co., owner of vessel.
CARL D. BRADLEY.—System, W. S. A. Co., 1000; w. l., 300, *600*, 706; service, PG; station operated and controlled by owner of vessel.
CATALINA.—Range, 100; system, R. C. A. v. t. telephone and telegraph; w. l., 300, *600*, 706, 870; service, PG and PR–PR service with vessels equipped with radiophones.
CENTURION.—United States Shipping Board, owner of vessel.
CHARLES O. JENKINS.—W. l., add 706.
CITY OF EUREKA.—W. l., 300, *600*, 706.
CLINCHO.—Correct orthography Clinchco.
COCKAPONSET.—Station operated and controlled by S. O. R. S. (U. S. L.).
COL. E. L. DRAKE.—W. l., 300, *600*, 706.
COLIN H. LIVINGSTONE.—Station operated and controlled by R. C. A. (U. S. L.).
COMMACK.—M. L. Fleischel, owner of vessel.
CONCORD.—System, Lowenstein, 1000; w. l., 300, *600*, 706; hours, X.
CORRALES.—Range, 200; system, Navy-Simon, 1000; w. l., 300, 450, *600*, 706.
CORSICANA.—System, Navy-Simon, 1000; w. l., add 450, 706.
CRANFORD.—Station operated and controlled by S. O. R. S. (U. S. L.).
CRISTOBAL.—W. l., 300, *600*, 706.
DAN F. HANLON.—Range, 150; system, R. C. A., 1000; w. l., 300, *600*, 706; rates, 8 cents per word; station operated and controlled by R. C. A.
EAGLE (KDBF).—W. l., 146, 300, *600*; service, P; Peninsular Terminal Co., owner of vessel.

EASTERN DAWN.—W. l., add 2100.
EASTERN PLANET.—W. l., add 2100, 2400.
EFFNA.—Station operated and controlled by R. C. A.
EL MUNDO.—W. l., 300, *600*, 706; hours, N.
ENDICOTT.—W. l., add 706; station operated and controlled by R. C. A.
ENTERPRISE.—W. l., 300, *600*, 706.
GULFOIL.—W. l., add 706.
HAMILTON.—Hours, N.
HUMRICK.—Station operated and controlled by R. C. A. (U. S. L.).
INSPECTOR.—Range, 300; System, Navy-W. S. A. Co., 1000; w. l., 300, 450, *600*, 706.
J. W. VAN DYKE.—Name changed to Albert Hill.
K. R. KINGSBURY.—W. l., 300, *600*, 706, 2100, 2400.
LAKE TREBA.—W. l., add 450, 706.
LEVIATHAN.—Range, 300–2000.
LEXINGTON.—System, Lowenstein, 1000; w. l., 300, *600*, 706.
MANCHURIA.—Panama Pacific S. S. Co., owner of vessel.
MEXICANO.—Danlan Steamship Corporation, owner of vessel.
MOUNT CLAY.—Station operated and controlled by United American Lines.
ORTEGA.—Station operated and controlled by I. W. T. Co.
OWEGO.—W. l., 300, *600*.
PADNSAY.—Range, 300; system, Navy, 1000; W. l., 300, 450, *600*, 706; station operated and controlled by owner of vessel.
PAN AMERICA.—System, Federal arc and Navy-R. C. A., 1000.
PERE MARQUETTE 8.—Pere Marquette Line Steamers, owner of vessel.
PILGRIM (KURS).—Name changed to Wisconsin.
PRESIDENT ADAMS.—W. l., add 2100, 2400; system, I. W. T. Co. arc and Navy, 1000.
SEEKONK.—Station operated and controlled by I. W. T. Co.
SUJAMECO.—Range, 300; system, Navy-Wireless Improvement Co., 1000; w. l., 300, *600*, 706.
SWIFTWIND.—Range, 200.
TRIPP.—Station operated and controlled by S. O. R. S. (U. S. L.).
VIRGINIA EXPRESS.—W. l., 300, *600*, 706.
VIRGINIA LIMITED.—W. l., add 706.
WAWALONA.—Station operated and controlled by R. C. A. (U. S. L.).
WEST CELERON.—W. l., add 706.
WEST CRESSY.—System, Navy-R. C. A., 1000; w. l., add 706.
WEST DURFEE.—Station operated and controlled by I. W. T. Co. (U. S. L.).
WEST EKONK.—W. l., 300, 450, *600*, 706; station operated and controlled by S. O. R. S.
WESTERN WORLD.—System, Federal arc and Navy-K. & C., 1000; w. l., add 1800, 2100, 2400, hours. N.
WESTFIELD.—Range, 300; system, Navy-R. C. A., 1000; w. l., add 450, 706.
WEST MADAKET.—W. l., 300, 450, *600*, 706; hours, X.
WEST SEGOVIA.—Station operated and controlled by I. W. T. Co. (U. S. L.).
Strike out all particulars of the following-named vessels: Artemis (KDLJ), Satsuma, Suruga, Wabash.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS

KENX, *read* Clinchco; KHR, *read* Albert Hill; KURS, *read* Wisconsin; strike out all particulars following the call signals, KDIJ, KGD, KJI, WNC.

BROADCASTING STATIONS, BY CALL SIGNALS

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 20, 1924]

KFGD (Chickasaw, Okla.).—Power, 100.
KFLV (Rockford, Ill.).—Station operated and controlled by Swedish Evangelical Mission Church.
KFQF (Minneapolis, Minn.).—Address, 2544 Pleasant Avenue.
WABP (Dover, Ohio).—Power, 200.
WBAO (Decatur, Ill.).—W. l., 275, frequency, kc. 1,090.
WCAG (New Orleans, La.).—Power, 50.
WCAY (Milwaukee, Wis.).—Station operated and controlled by Milwaukee Civic Broadcasting Association.

WDBJ (Roanoke, Va.).—Power, 50.
WDBQ (Salem, N. J.).—Frequency, kc. 1,280.
WEAA (Flint, Mich.).—Power, 50.
WEB (St. Louis, Mo.).—Power, 100.
WFAN (Hutchinson, Minn.).—W. 1., 286, frequency, kc. 1,050.
WGR (Buffalo, N. Y.).—Station operated and controlled by Federal Telephone Manufacturing Co.
WHAV (Wilmington, Del.).—Power, 100.
WJY (New York, N. Y.).—Power, 750.
WLAG (Minneapolis, Minn.).—Address, 230 Oak Grove Street.
WLAX (Greencastle, Ind.).—Station operated and controlled by Greencastle Community Broadcasting Station.
WMAK (Lockport, N. Y.).—Station operated and controlled by Lockport Board of Commerce.
WQAN (Scranton, Pa.).—Power, 100.
WQJ (Chicago, Ill.).—Station operated and controlled by Calumet Rainbo Broadcasting Co.
Strike out all particulars following the call signals KFEV (Casper, Wyo.); KFFX, (Omaha, Nebr.); KFID (Iola, Kans.); KFIL (Louisburg, Kans.); KFPB (Seattle, Wash.); KFPS (Casper, Wyo.); WABT (Washington, Pa.); WBBA (Newark, Ohio); WDAK (Hartford, Conn.); WDBA (Columbus, Ga.); WDBE (Atlanta, Ga.); WFAH (Port Arthur, Tex.); WLAW (New York, N. Y.); WOAH (Charleston, S. C.); WSAN (Allentown, Pa.); WTAG (Providence, R. I.); WWAB (Trenton, N. J.); WWAE (Joliet, Ill.); WWAO (Houghton, Mich.).

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, 1924, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

CAPE HATTERAS, N. C.—Notice of deletion in July bulletin should be for PG station and not for RC station.
ST. LAWRENCE ISLAND, ALASKA.—*Read* Savoonga, Alaska (St. Lawrence Island); loc. (approximately) O 169° 30′ 00″ N 63° 30′ 00″.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS

NDW, notice of deletion in July bulletin should be for PG station and not for RC station; WWP, *read* Savoonga, Alaska (St. Lawrence Island).

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, 1924]

ALTADENA, CALIF. (6XR).—Station operated and controlled by Paul F. Johnson.
BREMERTON, WASH. (7ZZ).—Address, 1103 Highland Avenue.
BUFFALO, N. Y. (8XAD).—Station operated and controlled by Federal Telephone Manufacturing Co.
NEW YORK, N. Y. (2XN).—Station operated and controlled by R. C. A.
PITTSBURGH, PA. (8ZD).—Changed to Wilkinsburg, Pa.
Strike out all particulars of the following-named stations: Ann Arbor, Mich. (8XBL); Asheville, N. C. (4XZ); Atlanta, Ga. (4XY); Atlanta, Ga. (4ZA); Bay City, Mich. (8XW); Casper, Wyo. (7ZV); Charlotte, N. C. (4XD); Chicago, Ill. (9XBA); Cranford, N. J. (2XV); Dubuque, Iowa (9ZA); Evanston, Ill. (9XBF); Houghton, Mich. (9XAW); Miami, Fla. (4ZC); New York, N. Y. (2XBH); New York, N. Y. (2XW); Northfield, Minn. (9YAJ); Portland, Oreg. (7XBD); San Juan, P. R. (4ZH); Savannah, Ga. (4ZB); Savannah, Ga. (4ZD); Syracuse, N. Y. (8XBE); Washington, D. C. (3XAP); West Palm Beach, Fla. (4XB); Winston-Salem, N. C. (4XF).

MISCELLANEOUS

SECRETARY HOOVER CALLS THIRD NATIONAL RADIO CONFERENCE

Announcement was made on the 26th of last month by Secretary Hoover of the calling of the third national radio conference for the better voluntary regulation of radio. The conference will be held at Washington, beginning the

30th of this month. Two such conferences have already been held, one in February, 1922, and one in March, 1923, both of which were generally attended by the persons and organizations interested. The result has been a lessening friction and misunderstanding through the voluntary cooperation of the industry, the public, and the Department of Commerce, especially in the reduction of interference and the improvement of service.

The growth of radio, and particularly the multiplication of broadcasting stations and the consequent congestion of the air, has made necessary a consideration of many subjects and perhaps a revision of some present methods. Some of the matters which will be discussed and considered at the conference are: Revision of the present frequency or wave length allocations to reduce interference. Use of high frequencies or short waves. Classification of broadcasting stations; possible discontinuance of class C stations. Interconnection of broadcasting stations. Limitation of power; division of time; zoning of broadcasting stations. Means for distinguishing the identity of amateur calls from foreign countries. Interference by electrical devices other than radio transmitting stations. Relations between Government and commercial services. Such other topics as may be proposed by the conference.

To facilitate the work of the conference, the various groups in the radio field will be asked to name representatives who will consitute the formal advisory committee of the conference. As at present planned, the groups to be represented will be as follows: Listeners, marine service, broadcasting (one from each inspection district); engineering, transoceanic communication, wire interconnections, manufacturers, amateurs, point-to-point communication, Government departments. The committee so constituted will hold public hearings. All persons or organizations having any suggestions to make or views to express upon any features of radio activity are urged to attend and will have full opportunity to be heard.

Some of the matters suggested for consideraion are not within the regulatory control of the Secretary. As to such matters, any conclusions reached by the conference can become effective only by voluntary adoption by the interests affected. As to the features falling within the powers of the Secretary the recommendations of the conferenee will be advisory to the department.

COMPASS STATION IN CHINA

A radio compass station, call letters VPS, has been established at Tai Long Head, in latitude 22° 12′ 37″ N., longitude 114° 15′ 30″ E. Ships requiring bearings should call this station in accordance with the procedure outlined below and the latter will reply, giving the true bearing of the ship from the station, expressed in degrees (000°–360°). The radio compass station maintains continuous watch on 600 meters. Bearings, however, will be taken either on 450 or 800 meters, as requested, and the reply transmitted on 600 meters.

The ship calls the compass station in the usual manner on 600 meters, making QTE in conjunction with the call signal of the station from which the bearing is required, followed by the figures 450 or 800, signifying that she will change to either the 450 or 800 meters wave length for the taking of the bearing. The ship then awaits instructions from the station, which will be transmitted on 600 meters.

In order to obtain the greatest possible degree of accuracy, it is important that ships should not transmit with too much power. Signals should, however, be fairly strong and clear; great care must be exercised to keep the note and strength steady and to pay strict attention to spacing; the instructions should be carefully observed.

Although bearings taken by the compass station can generally be considered accurate within 2°, it must be understood that the Hongkong government provides this service on the condition that they incur no liability for any consequences resulting directly or indirectly from any inaccuracy in the bearings given, from any failure in the service, or from any other cause whatever. The director of public works, Hongkong, will be glad to receive periodical reports from the ships on the results obtained. For the present no charge will be made for the use of the station.

FOG SIGNAL IN DENMARK

About September 30 next a radio fog signal will be established on Gjedser Rev Light Vessel. Vessels will be able to determine their bearing and also distance from the light vessel when the distance is less than 12 miles.

The radio signal will consist of the letters GR (– – . – .), followed by 12 dots between which there is an interval of 1.3 seconds, corresponding to the time

required for sound to travel 1 mile in water. A submarine bell will sound 2 strokes every 20 seconds, thus, stroke 3 seconds, silent 1.5 seconds, stroke 3 seconds silent 12.5 seconds. The radio signal will be given every minute, so that every third submarine signal commences simultaneously with the last dot in the letter "R" of the radio signal. By counting the number of dots received after the last dot of the letter "R" until the submarine signal is heard this number will indicate the distance in miles from the light vessel. The radio fog signal is only experimental and will not be used when the radio is used for communications.

DESCRIPTION OF RADIO APPARATUS ON THE "LEVIATHAN"

The United States Shipping Board liner *Leviathan* is equipped with probably the best radio installation afloat, particularly from the viewpoint of flexibility in handling traffic to and from the ship. In addition to a 6-kilowatt Western Electric telephone tube transmitter she is equipped with a 2-kilowatt spark transmitter and a 750-watt Western Electric duplex telephone and telegraph transmitter. Its receiving equipment consists of two Navy receivers, types S. E. 1420 and 1899, respectively, and two Navy universal amplifiers. The telephone transmitter is also provided with a receiver. A Navy coupling tube unit for the receivers permits simultaneous transmission and reception; that is, one operator can send or receive traffic on 600 meters wave length without interfering with the transmission or reception of traffic on 2,400 meters. This vessel, which operates out of New York to Southampton and Cherbourg, remains in touch with coastal stations while at sea both in transmitting and receiving traffic. There is a one-half-kilowatt spark transmitter and suitable receiver installed in each of the two power lifeboats, which are also equipped with transmitting and receiving submarine signal apparatus

Some idea of the amount of traffic handled by the *Leviathan* during her 10 days at sea on a cruise to Europe and return can be obtained when it is noted that the vessel transmits and receives on the average of 1,600 messages, or 26,200 words. The average revenue received from the 8 cents ship toll on commercial traffic is $2,100 per turn around. In addition, there is on the average of 300 messages relayed for other vessels and an appreciable number of official messages on ships' business. Two operators are on watch at all times, a total of eight being employed. In experimenting with the transmitters it was found that in addition to having duplex telegraph service the telephone set could be used efficiently; that is, transmission on three wave lengths could be handled simultaneously.

DISCONTINUANCE OF WEATHER FORECASTS BY BUFFALO, N. Y. (WGR) STATION

The broadcasting of weather forecasts and information by radiophone at 10.45 p. m., seventy-fifth meridian time, from station WGR, Buffalo, N. Y., owned by the Federal Telephone Manufacturing Co. of that city, was discontinued on August 14, this year.

LAND LINE RATES TO BOSTON

The land line rate on messages destined to Boston, transmitted through R. C. A. station at New York (WNY) or Tuckerton (WSC), will be 4 cents per word and on messages through Marion (WCC) or Chatham (WIM) 3 cents per word.

FREQUENCY TRANSMISSIONS BY BRITISH LABORATORY STATION

A program of standard waves is now being transmitted from the National Physical Laboratory radio station at Teddington, England. These transmissions are of accurately known radio frequencies covering the range from 60 to 200 kilocycles per second. The present program of transmissions is as follows:

Time (G. M. T.)	Frequency (kc/s.)	Approximate wave length	Indicating group	Time (G. M. T.)	Frequency (kc/s.)	Approximate wave length	Indicating group
1500–1503	360	833	N1	1532–1535	120	2,500	N5
1508–1511	280	1,072	N2	1540–1543	100	3,000	N6
1516–1519	200	1,500	N3	1548–1551	75	4,000	N7
1524–1527	180	1,667	N4	1556–1559	60	5,000	N8

The program is transmitted in the following form: At 14.58 G. M. T., CQ CQ CQ de 5HW 5HW 5HW repeated for two minutes at a frequency of 360 kilocycles. From 1,500 to 1,503 G. M. T., N1 N1 N1 — — — 20 seconds dash — — — transmitted six times altogether. The aerial current is then immediately transmitted on the same frequency and is given twice. The wait signal ——— is then given. Five minutes interval. From 1508 to 1511 G. M. T., N2 N2 N2 — — — 20 seconds dash — — — transmitted six times. The aerial current is then immediately transmitted on the same frequency and is given twice. The wait signal ——— is then given. During the five minutes interval short dashes will be heard while the exact adjustment of the next frequency is being made, but they are not to be considered as part of the program. These signals are transmitted on alternate Tuesday afternoons at the hours stated above.

PROSPECTIVE RADIO DEVELOPMENT IN SUMATRA

In response to the ever-increasing pressure from the public for the general use of radio in the Dutch East Indies, it is believed that the existing prohibitionary law will be modified sometime in the near future so as to permit the installation of receiving sets. Under the present law the installation of both broadcasting and receiving equipment is prohibited. The entire question of radio telephony is being considerably discussed throughout the colony, and while definite information is not available at this time it is generally believed that the increasing agitation for the use of radio will result in the abolishment of the restrictive law within the next year.

An exception to the law prohibiting receiving equipment is the large receiving station of the "Aneta" press service recently opened in Batavia. This station is used for receiving press news from abroad, but all information passing through it is carefully censored prior to release by Government officials stationed in Batavia. The installation of privately-owned broadcasting equipment is absolutely prohibited, radio broadcasting being a monopoly of the Government.

The receiving station in Batavia of the "Aneta" news service, it is understood, will be prepared to furnish a radio service for all of the Dutch East Indies immediately broadcasting is permitted. It is understood that in addition to its present function as a news receiving station "Aneta" has been established and designed with a view to broadcasting later on, and all that will be necessary for this purpose will be the installation of the necessary sending instruments. Northern Sumatra will have no difficulty in listening in on broadcasting from this station. There are no existing broadcasting stations affording entertainment service sufficiently near to be heard in Sumatra, although reports are current that stations will soon be established in Singapore and other places within receiving radius of this part of the world. The nearest existing station is believed to be in Calcutta, too far away to be heard in Sumatra.

BROADCASTING STATIONS IN FOREIGN COUNTRIES

Austria.—Vienna (Radio-Hekaphon), 600 meters.

Belgium.—Brussels, BAV, 1,100 meters, at 2 and 6.50 p. m., meteorological forecast. Brussels (Radio Electrique), 265 meters, daily at 5 to 6 p. m., concert at 8 to 8.15 p. m., general talk at 8.15 to 10 p. m., concert.

China.—Macao (Portuguese colony), no particulars available except that an excellent station of high power is located there.

Czechoslovakia.—Prague, PRG, 1,800 meters, 8 to 12 a. m. and 4 p. m., meteorological bulletin and news; 4,500 meters, 10 a. m., 3 and 10 p. m., concert. Kbely (near Prague), 1,150 meters, week days 7.15 and 10 p. m., Sundays 11 to 12 a. m., concert and news. Brunn, 1,800 meters, 10 to 11 a. m., concert, 2.30 p. m. news.

Denmark.—Lyngby, OXE, 2,400 meters, 8.30 to 9.45 p. m. week days, 8 to 9 Sunday, concert.

France.—Paris (Eiffel Tower), FL, 2,600 meters, 7.40 a. m. weather forecasts, 11 a. m. Sunday; 10.45 a. m. cotton prices; 12 noon market report; 12.15 to 12.30 week days, time signal and weather forecast; 3.40 p. m. financial reports; 5.30 p. m. Bourse closing prices; 6.15 p. m. concert; 8 p. m. weather report; 9 p. m. Wednesday and Sunday concert; 10.10 p. m. weather forecast. Paris (Radio Paris), SFR, 1,780 meters; 12.30 p. m. cotton prices and news; 12.45 p. m. concert; 1.30 p. m. Exchange prices; 4.30 p. m. financial report; 5 p. m. concert; 8.30 p. m. news and concert. Paris (Ecole Superieure des Postes et Telegraphes), 450 meters, 3.45 p. m. Wednesday talk on history; 8 p. m. Tuesday English

lesson; 8.30 p. m. concert; 9 p. m. relayed concert or play. Paris (Station du Petit Parisien), 340 meters, 8.30 p. m. tests.

Germany.—Berlin (Koenigswusterhausen), LP, 2,370 meters, Sunday 10.40 to 11.45 a. m., concert 4,000 meters, 7 to 8 a. m. music and speech; 12.30 to 1.30 p. m. music and speech; 5 to 5.30 p. m. news. Eberswalde, 2,930 meters, daily 1 to 2 p. m. address and concert; 6 to 7.30 p. m. address and concert; Thursday and Saturday 7.20 p. m., concert. Berlin (Vox Haus), 430 meters, 11 a. m. stock exchange; 1.55 p. m. time signals; 5.40 to 7 p. m. concert; 7 to 8 p. m. Sunday, concert. Breslau, 415 meters. Frankfurt Am Main, 467 meters. 7.30 to 10 p. m., tests, graphaphone records. Hamburg, 392 meters. Konigsberg, 460 meters. Leipzig (Mitteldeutsche Rundfunk A. G.), 452 meters. Munchen (Die Deutsche Stunde in Bayern), 485 meters. Stuttgart, 437 meters.

Great Britain.—Aberdeen, 2BD, 405 meters. Birmingham, 5IT, 475 meters Bournemouth, 6BM, 385 meters. Cardiff, 5WA, 351 meters. Chelmsford, 5XX 1,600 meters, week days, 11.30 a. m. to 12.30 p. m., 4.30 to 5.30 and 7.30 to 8.30 p. m., tests. Edinburgh, 2EH (relay), 325 meters. Glasgow, SC, 420 meters. Leeds-Bradford, 2LS (relay), 346 and 310 meters, Tuesdays, Thursdays and Fridays, 1 to 2 p. m. (2LO only), regular daily programs, 3 to 7.30 p. m., 8 to 11.30 p. m.; Sundays, 3 to 5 and 8.30 to 10.30 p. m. Liverpool, 6LV (relay), 318 meters. Manchester, 2ZY, 375 meters. Newcastle, 5NO, 400 meters. London, 2LO. 365 meters. Plymouth, 5PY (relay,) 335 meters. Sheffield, 6FL (relay), 303 meters.

Holland.—Amsterdam, PA5, 1,050 meters (irregular), 8.40 to 10.10 p. m., concert. Amsterdam (Vas Diaz), PCFF, 2,000 meters, 9 a. m. to 5 p. m., share market report, exchange rates and news. Hilversum, 1,050 meters, 9.10 to 11.10, Sunday, concert and news. Ijmuiden (Middelraad), PCMM, 1,050 meters, Saturday, 9.10 to 10.40 p. m., concert. The Hague, PCGG, 1,070 meters, 4–6 p. m., Sunday 9.40 to 11.40 p. m. Monday and Thursday, concerts. The Hague (Velthuisen), PCKK, 1,050 meters, 9.40 to 10.40 p. m., Friday, concert. The Hague (Heussen laboratory), PCUU, 1,050 meters, 10.40 to 11.40 a. m., Sunday, concert; 9.40 to 10.40 p. m., concert; 8.45 to 9 p. m., Thursday, concert.

Italy.—Rome, ICD, 3,200 meters, week days, 12 a. m., 1,800 meters, 4 and 8.30 p. m., tests and graphaphone records.

Portugal.—Lisbon (Aero Lisboa), 370 to 400 meters, Wednesdays and Fridays, 9.30 to 12 p. m., irregular tests.

Spain.—Cartagena, EBX, 1,200 meters, 12 to 12.30 and 5 to 5.30 p. m., lectures and concerts. Madrid, PTT, 400 to 700 meters, 608 p. m., tests. Madrid (Radio Iberica), 392 meters, daily, except Thursdays and Sundays, 7 to 9 p. m., Thursdays and Sundays, 10 to 12 p. m., concerts. Madrid, 1,800 meters, irregular.

Sweden.—Boden, 2,800 meters, Tuesdays and Fridays, 6.30 to 7.30 p. m., Sundays, 5.30 to 6.30 p. m. concert and news. Gothenburg (Nya Varvet), 700 meters, Wednesday 7 to 8 p. m. Stockholm (Radiobolaget) 470 meters, Tuesdays and Thursdays, 8 to 9.30 p. m., concert and news. Stockholm (Telegrafverket), 440 meters, daily 12.45 to 1 p. m., weather report and Nauen time signal; Monday, Wednesday, and Saturday, 8 to 9 p. m., concert and news; Sunday 11 a. m. to 12.30 p. m., divine service from St. James Church.

Switzerland.—Geneva, 1,100 meters, week days, 3.15 and 8 p. m., concert or lecture. Lausanne, HB2, 850 meters, daily, 9.15 p. m., concert and address.

DISTRIBUTION OF WEATHER FORECASTS, INFORMATION, AND WARNINGS BY RADIO IN THE SOUTH ATLANTIC OCEAN, GULF OF MEXICO, AND CARIBBEAN SEA

Weather bulletins are broadcast daily from a number of naval and commercial radio stations for the benefit of navigation and other interests in the South Atlantic Ocean, Gulf of Mexico, Caribbean Sea, and adjacent coasts.

Explanation of bulletins

The bulletins which are broadcast from each radio station are of the same general character and are similarly translated. They are based upon observations taken in the United States at 8 a. m. (0800) and 8 p. m. (2000), and one hour earlier at stations in the Gulf of Mexico and Caribbean Sea, of the date of distribution, as indicated.

The bulletins are divided into two parts. The first contains reports of barometric pressure, wind direction and velocity at certain stations, each of which is indicated by one or more "key letters" and using a group of five figures

to represent the data contained in the report. The second part consists of wind and weather forecasts and warnings of storms and hurricanes. If a weather report from any station can not be supplied, the key letters and data figures will be omitted altogether, but in case only a portion of a report is missing the letter "X" will be substituted for the omitted data figure.

These weather reports contained in the first part of the bulletins and supplemented by others picked up from vessels can be used in the production of weather maps, which will be of much value to navigating officers, and charts prepared for this purpose, which show the reporting stations and their key letters, will be forwarded upon application.

The broadcasting schedules in all cases are in seventy-fifth meridian time with its equivalent for that meridian in G. M. T., shown in parentheses.

Key to first part and examples

Barometric pressure (first three figures of group).—Actual pressure in inches and hundredths used, except that first figure of full reading is omitted. Thus, if the actual corrected pressure is 29.98 inches, the figures 998 are sent; or, if the reading is 30.14 inches, the figures 014 are sent.

Direction of surface wind (fourth figure of group).—

0=calm or no movement.
1=north.
2=northeast.
3=east.
4=southeast.
5=south.
6=southwest.
7=west.
8=northwest.

Force of wind (fifth figure of group).—Sent according to Beaufort scale values 0 to 9, inclusive.

Beaufort scale

Scale number	Designation	Miles	
		Statute	Nautical
0	Calm	0–3	0–3
1	Light air	3–8	3–7
2	Light breeze	8–13	7–11
3	Gentle breeze	13–18	11–16
4	Moderate breeze	18–23	16–20
5	Fresh breeze	23–28	20–24
6	Strong breeze	28–34	24–30
7	Moderate gale	34–40	30–35
8	Fresh gale	40–48	35–42
9	Strong gale	48–56	42–49
Ten [1]	Whole gale	56–65	49–56
Eleven [1]	Storm	65–75	56–65
Twelve [1]	Hurricane	75	65

[1] The code does not admit of force in excess of 9 being sent. Therefore the figure 9 will be used for all wind forces 9 to 12, inclusive.

Example of group as sent: 99852.

Translation: Barometric pressure, 29.98 inches, wind from south, wind force, 2 (8 to 13 statute miles per hour).

The second part of the bulletin consists of wind and weather forecasts and, whenever conditions warrant, information as to storm centers, storm and hurricane warnings and advices to shipping. The wind and weather forecasts are for 24 hours. Whenever a storm exists that is likely to affect a section, the location and expected direction of movement of the storm center will be given, followed by any storm or hurricane warnings and advices to shipping that have been issued.

Stations broadcasting bulletins and schedules

Following is a list of radio broadcasting stations from which broadcasts are made in cooperation with the United States Weather Bureau, with a description of the bulletins in each case:

Brownsville, Tex.—Station NAY, United States Navy; radiotelegraph; wave length 5,000 meters c. w.; 12 midnight (0000).

Observation stations contained in first part and code letters	Second part of bulletin
Key West, Fla. (K). Tampa, Fla. (TA). Pensacola, Fla. (P). Mobile, Ala. (MO). Burrwood, La. (BW). Galveston, Tex. (GV). Corpus Christi, Tex. (CC). Brownsville, Tex. (BV). Kingston, Jamaica (KN). Swan Island (SI).	Winds over east Gulf of Mexico (east of longitude 90°). Winds over west Gulf of Mexico (west of longitude 90°). Winds over Caribbean Sea (west of longitude 73°) and Windward Passage. Storm warnings for Gulf of Mexico, Key West to Brownsville. Location and expected movement of storm centers affecting Gulf of Mexico. All hurricane warnings and advices.

Key West, Fla.—Station NAR, United States Navy; radiotelegraph; wave length 5,660 meters, c. w., and 1,462 meters, spark; 10 p. m. (2200).

Observation stations contained in first part and code letters	Second part of bulletin
Hatteras, N. C. (H). Charleston, S. C. (C). Jacksonville, Fla. (JA). Miami, Fla. (MI). Key West, Fla. (K). Pensacola, Fla. (P). Burrwood, La. (BW). Galveston, Tex. (GV). Brownsville, Tex. (BV). Fort Worth, Tex. (FW). Kingston, Jamaica (KN). Turks Island (TI). Havana, Cuba (HA). Guantanamo Bay, Cuba (GO). Swan Island (SI) San Juan, P. R. (SJ).	Winds off Atlantic coast, Hatteras to Key West. Winds over east Gulf of Mexico (east of longitude 90°). Winds over west Gulf of Mexico (west of longitude 90°). Winds over Caribbean Sea (west of longitude 73°) and Windward Passage. Storm warnings Hatteras to Key West and for Gulf of Mexico. Location and expected movement of storm centers affecting Atlantic coast south of Hatteras and Gulf of Mexico. Storm warnings Gulf of Mexico, Key West to Brownsville. All hurricane warnings and advices.

Port Arthur, Tex. (June 1 to November 31, inclusive).—Station WPA, The Gulf Refining Co.; radiotelegraph; wave length 600 meters, spark; 11.45 a. m. (1145).

Observation stations contained in first part and code letters	Second part of bulletin
Brownsville, Tex. (BV). Corpus Christi, Tex. (CC). Galveston, Tex. (GV). Port Arthur, Tex. (PA). New Orleans, La. (NO). Mobile, Ala. (MO). Key West, Fla. (K).	Winds over west Gulf of Mexico (west of longitude 90°). Storm warnings for Gulf of Mexico. All hurricane warnings and advices when issued.

San Juan, P. R. (July 1 to November 15, inclusive).—Station NAU, United States Navy; radiotelegraph; wave length 4,835 meters, c. w., 7.45 p. m. (1945); 2,852 meters, spark, 9 p. m. (2100).

Observation stations contained in first part and code letters	Second part of bulletin
San Juan, P. R. (SJ). St. Thomas, Virgin Islands (ST). Basseterre, St. Kitts (BT). Roseau, Dominica (RS). Bridgetown, Barbados (BB). Santo Domingo, Santo Domingo (SD). Puerto Plata, Santo Domingo (SL). Castries, St. Lucia (LU). Willemstadt, Curacao (W). Port of Spain, Trinidad (PS). St. Martins, Dutch West Indies (SM).	All hurricane warnings. In the absence of a tropical storm the following words will be sent each day "Weather normal."

Hurricane warnings and advisory messages relating thereto are broadcast whenever issued and repeated at 7 and 11 a. m. and 3, 7, and 11 p. m. (0700, 1100, 1500, 1900, and 2300, respectively).

NOTE.—This bulletin is rebroadcast by the Naval Radio station NAW at Guantanamo, Cuba, during the hurricane season, July 1 to Nov. 15, inclusive, on a wave length of 4,543 meters, c. w., at 9 p. m. (2100).

Swan Island, West Indies.—Station US, United Fruit Co.; radiotelegraph; wave length 2,240 meters, spark; 12.30 (1230) and 11.45 p. m. (2345).

Observation stations contained in first part and code letters	Second part of bulletin
Swan Island (SI). Belize, Honduras (BZ). Bluefields, Nicaragua (BFD). Willemstadt, Curaçao (W). San Juan, P. R (SJ). Port au Prince, Haiti (PP). Cienfuegos, Cuba (CFG). La Fe, Cuba (LFE). Kingston, Jamaica (KN). Turks Island, Bahamas (TI).	Winds over east Gulf of Mexico (east of longitude 90°). Winds over west Gulf of Mexico (west of longitude 90°). Winds over Caribbean Sea (west of longitude 75°) and Windward Passage. Storm warnings for Gulf of Mexico and Caribbean Sea. All hurricane warnings and advices when issued.

The first part of this bulletin will be broadcast only during the hurricane season, June to November, inclusive, in the 12.30 p. m. (1230) broadcast. The second part is broadcast twice daily throughout the year, as scheduled above. Whenever conditions warrant, the forecasts will be preceded by advices and warnings regarding any storm or hurricane that may be in progress and of "northers" during the winter months. The storm advices will also be broadcast every two hours on the even hour.

NOTE.—The daily bulletins will be transmitted to Swan Island from the Tropical Radio Telegraph station at New Orleans (WNU) on 3,331 meters wave length, c. w., at 11.30 a. m. (1130), and p. m. (2330), and any ship or shore station is at liberty to pick up these messages and repeat them to other stations, should it desire to do so.

Local distribution of forecasts, storm and hurricane warnings, and weather information by radio

Localized services, consisting of broadcasts of wind and weather forecasts, storm and hurricane warnings and advices relating thereto, which is supplemented to the bulletins as described above, is provided as follows:

Location	Transmitting wave (meters)	Call letters	Weather information broadcast	Broadcasting time	Weather Bureau stations issuing information
Charleston, S. C.	2,600, spark...	NAO	(a) Wind and weather forecasts and storm warnings for South Carolina coast; advisory messages relating to storm warnings issued for middle, south Atlantic, and east Gulf coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Charleston. (b) Storm warnings and advices issued in afternoon.	(a) 10.30 a. m. (1030). (b) 6 p. m. (1800).	Charleston, S. C.
Savannah, Ga.	1,808, spark...	NEV	(a) Wind and weather forecasts and storm and hurricane warnings for Georgia coast; advisory messages relating to storm warnings issued for middle and south Atlantic and east Gul coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Savannah.	(a) 11 a. m. (1100).	Savannah, Ga.

Location	Transmitting wave (meters)	Call letters	Weather information broadcast	Broadcasting time	Weather Bureau stations issuing information
Savannah, Ga.	1,508, spark.	NEV	(b) Storm warnings and advices issued in afternoon. (c) Hurricane warnings and advisory messages relating thereto.	(b) 6 p. m. (1800). (c) When issued and repeated at 2-hour intervals until midnight (0000).	
St. Augustine, Fla.	2,100, spark.	NAP	(a) Wind and weather forecasts and storm warnings for east Florida coast, Jacksonville to Miami; advisory messages relating to storm warnings issued for middle and south Atlantic and east Gulf coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Jacksonville and Titusville. (Except Sundays during summer.) (b) Storm warnings and advices when issued in afternoon. (c) Hurricane warnings and advisory messages relating thereto.	(a) 11.30 a. m. (1130). (c) When issued and repeated at 2-hour intervals until 6 p. m. (1800).	Jacksonville, Fla.
Jupiter, Fla.	1,305, spark.	NAQ	(a) Wind and weather forecasts and storm warnings for east coast of Florida, Miami to Key West; advisory messages relating to storm warnings issued for the middle and south Atlantic and east Gulf coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Miami. (b) Storm warnings and advices issued in afternoon. (c) Hurricane warnings and advisory messages relating thereto.	(a) 11.30 a. m. (1130). (b) 6 p. m. (1800). (c) When issued and repeated at 2-hour intervals until midnight (0000).	Jacksonville, Fla.
Pensacola, Fla.	1,330, spark.	NAS	(a) Wind and weather forecasts and storm warnings for Florida, Alabama, and Mississippi coasts, Apalachicola to Bay St. Louis; advisory messages relating to storm warnings issued for south Atlantic and Gulf coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Pensacola. (b) Storm warnings and advices issued in afternoon. (c) Hurricane warnings and advisory messages relating thereto.	(a) 11.45 a. m. (1145). (b) 6 p. m. (1800). (c) When issued and repeated at 2-hour intervals until midnight (0000).	Pensacola, Fla.

Location	Transmitting wave (meters)	Call letters	Weather information broadcast	Broadcasting time	Weather Bureau stations issuing information
New Orleans, La.	2,607, spark	NAT	(a) Wind and weather forecasts and storm warnings for Louisiana and Texas coasts, Bay St. Louis to Port Arthur; advisory messages relating to storm warnings issued for south Atlantic and Gulf coasts; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Burrwood and Port Arthur.	(a) 11 a. m. (1100).	New Orleans, La.
			(b) Storm warnings and advices issued in afternoon.	(b) 5 p. m. (1700).	
			(c) State forecasts and weather summary (States of Louisiana, Arkansas, Oklahoma, and eastern and western Texas). River forecasts for the Ouachita and lower Red and Mississippi Rivers are broadcast only during the 10.30 a. m. schedule.	(c) 10.30 a. m. (1030); 10 p. m. (2200).	
			(d) Hurricane warnings and advisory messages relating thereto.	(d) When issued and repeated at 2-hour intervals until midnight (0000).	
Galveston, Tex.	1,820, spark	NKB	(a) Wind and weather forecasts and storm warnings for Texas coast, Port Arthur to Corpus Christi; advisory messages relating to storm warnings issued for the west Gulf coast; and 8 a. m. barometric pressure, wind direction and velocity, and state of weather at Galveston.	(a) 11.30 a. m. (1130).	Galveston, Tex.
			(b) Storm warnings and advices issued in afternoon.	(b) 6 p. m. (1800).	
			(c) Hurricane warnings and advisory messages relating thereto.	(c) When issued and repeated at 2-hour intervals until midnight (0000).	
Brownsville, Tex.	2,250, spark	NAY	(a) Wind and weather forecasts and storm warnings for Texas coast, Corpus Christi to Brownsville; advisory messages relating to storm warnings issued for the west Gulf coast.	(a) Noon (1200)	Brownsville, Tex.
			(b) Storm warnings and advices issued in afternoon.	(b) 7 p. m. (1900).	
			(c) Hurricane warnings and advisory messages relating thereto.	(c) When issued and repeated at 2-hour intervals until midnight (0000).	
Guantanamo, Cuba.	1,396, spark	NAW	All hurricane warnings and advisory messages relating thereto whenever issued. (Repeats San Juan bulletin. See note under that station, p. 2.)	When issued and repeated at about 4-hour intervals.	Washington, D. C.
Port au Prince, Haiti.	2,250, spark	NSC	....do....	....do....	Do.
St. Thomas, Virgin Islands.	1,655, spark	NBB	....do....	....do....	Do.
St. Croix, Virgin Islands.	425, spark	NNI	....do....	....do....	Do.

Weather Bureau circular dated October 26, 1920, and other announcements of this service are superseded by this circular. These data furnished by the Department of Agriculture, Weather Bureau forecast division, August 1, 1924.

STANDARD RADIO FREQUENCY TRANSMISSIONS, SEPTEMBER AND OCTOBER

The Bureau of Standards is transmitting special signals of standard frequency, on announced dates, from the Bureau of Standards radio laboratory at Washington, D. C., and from Stanford University, at Palo Alto, Calif. The signals can be heard and utilized within 500 to 1,000 miles from the transmitting stations.

These special signals of standard frequency are of use to testing laboratories, transmitting station operators, and others in standardizing wave meters and adjusting transmitting and receiving apparatus. The transmissions on September 5 include frequencies used in ship communication, those on September 22 broadcasting, those on October 8 amateurs, and those on October 21 a new group of higher frequencies. The schedule for October 21 is tentative for station 6XBM, Stanford University; later announcement will be made if there is any change. The accuracy of these frequencies is better than three-tenths of 1 per cent. Information on how to use them is given in Bureau of Standards Letter Circular No. 92, which may be obtained on application from the Bureau of Standards, Washington, D. C.

All transmissions are by unmodulated continuous-wave telegraphy. A complete frequency transmission includes a "general call," a "standard frequency signal," and "announcements." The "general call" is given at the beginning of the 8-minute period and continues for about 2 minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters (WWV or 6XBM) intervening. This signal continues for about 4 minutes. The "announcements" are on the same frequency as the "standards frequency signal" just transmitted and contain a statement of the measured frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4-minute interval while the transmitting set is adjusted for the next frequency.

The schedule of standard frequency signals from both the Bureau of Standards and Stanford University is as follows. Attention is called to the change in time of the October schedules, beginning at 10 instead of 11 p. m.

Schedule of frequencies in kilocycles

[Approximate wave lengths in meters in parentheses]

Time [1]	Sept. 5	Sept. 22	Time [1]	Oct. 8	Oct. 21
11.00 to 11.08 p. m.	300 (1,000)	550 (545)	10.00 to 10.08 p. m.	1,350 (222)	1,900 (158)
11.12 to 11.20 p. m.	315 (952)	650 (461)	10.12 to 10.20 p. m.	1,420 (211)	2,000 (150)
11.24 to 11.32 p. m.	345 (869)	750 (400)	10.24 to 10.32 p. m.	1,500 (200)	2,200 (136)
11.36 to 11.44 p. m.	375 (800)	833 (360)	10.36 to 10.44 p. m.	1,600 (187)	2,400 (125)
11.48 to 11.56 p. m.	425 (705)	1,000 (300)	10.48 to 10.56 p. m.	1,700 (176)	2,600 (115)
12.00 to 12.08 a. m.	500 (600)	1,200 (250)	11.00 to 11.08 p. m.	1,800 (167)	2,800 (107)
12.12 to 12.20 a. m.	600 (500)	1,350 (222)	11.12 to 11.20 p. m.	1,900 (158)	3,000 (100)
12.24 to 12.32 a. m.	666 (450)	1,500 (200)	11.24 to 11.32 p. m.	2,000 (150)	3,200 (93.7)

[1] Eastern standard time for WWV, Washington, D. C. Pacific standard time for 6XBM, Palo Alto, Calif.

STANDARD FREQUENCY STATIONS

As a result of measurements by the Bureau of Standards upon the transmitted waves of a limited number of radio transmitting stations, data are given in each month's Radio Service Bulletin on such of these stations as have been found to maintain a sufficiently constant frequency to be useful as frequency standards. There may be many other stations maintaining their frequency just as constant as these, but these are the only ones which reached the degree of constancy shown among the stations upon whose frequencies measurements were made in the bureau's laboratory. There is, of course, no guaranty that

the stations named below will maintain the constancy shown. As a means of maintaining constant frequency the high-power, low-frequency alternator stations listed below have speed regulators. Most of the broadcasting stations listed use frequency indicators (one-point wave meters) and maintain a maximum deflection of the instrument on the frequency indicator throughout the transmission. These broadcasting stations, with rare exceptions, vary not more than 2 kilocycles from the assigned frequency. The transmitted frequencies from these stations can be utilized for standardizing wave meters and other apparatus by the procedure given in Bureau of Standards Letter Circular No. 92, "Radio signals of standard frequencies and their utilization." A copy of that letter circular can be obtained by a person having actual use for it upon application to the Bureau of Standards, Washington, D. C.

Station	Owner	Location	Assigned frequency (kilocycles)	Period covered by measurements, months	Number of times measured	Average deviation from assigned frequency	Greatest deviation from assigned frequency since July 15, 1924
						Per ct.	*Per ct.*
NSS	United States Navy	Annapolis, Md	17.50	12	88	0.2	0.4
WGG	Radio Corporation of America.	Tuckerton No. 1, N. J.	18.85	12	102	0.2	0.1
WII	do	New Brunswick, N. J.	22.04	11	85	0.2	0.1
WSO	do	Marion, Mass	25.80	12	90	0.3	
WWJ	Detroit News	Detroit, Mich	360	12	41	0.1	
WCAP	Chesapeake & Potomac Telephone Co.	Washington, D. C	440	11	58	0.1	0.9
WRC	Radio Corporation of America.	do	440	8	40	0.1	
WSB	Atlanta Journal	Atlanta, Ga	700	11	52	0.1	
WGY	General Electric Co	Schenectady, N. Y	790	14	89	0.2	
WBZ	Westinghouse Electric & Manufacturing Co.	Springfield, Mass	890	4	9	0.0	
KDKA	do	East Pittsburgh, Pa	920	11	116	0.1	0.4

REFERENCES TO CURRENT RADIO PERIODICAL LITERATURE

This is a monthly list of references prepared by the Radio Laboratory of the Bureau of Standards and is intended to cover the more important papers of interest to the professional radio engineer which have recently appeared in technical periodicals. The number at the left of each reference classifies the reference by subject, in accordance with the scheme presented in "A Decimal Classification of Radio Subjects—An Extension of the Dewey System," Circular No. 138, a copy of which may be obtained for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C. Further information about these lists, availabilities of previous lists and of the several periodicals is contained in the extended statement preceding the early lists as published in the Radio Service Bulletin prior to April, 1923, and also in May and September, 1923.

R000.—*Radio communication*

R007.1 Special short wave lengths without silent hours for amateur operators. American Radio Journal, **5**, p. 4, August, 1924.

R007.1 Decided changes in radio regulations: Amateurs benefit more than commercials. Radio Digest Illustrated, **10**, p. 3, August 16, 1924.

R007.8 La reglamentacion de las comunicaciones inalambricas. Revista Telegrafica, **12**, p. 191, July, 1924.

R020 Shaughnessy, E. H. Some recent wireless literature (books). Electrician, **93**, p. 154, August 8, 1924.

R100.—*Radio principles*

R113 Howe, G. W. O. The effect of the earth in the transmission of electromagnetic waves in radiotelegraphy. Electrician, **93**, pp. 148-149, August 8, 1924.

R114 Eckersley, T. L. The energy of atmospherics. Electrician, **93**, pp. 150-151, August 8, 1924.

R114 Austin, L. W. Long distance radio receiving measurements at the Bureau of Standards in 1923. Proceedings Institute Radio Engrs., **12**, pp. 289-394, August, 1924.

R130 Freeman, H. M. Vacuum tubes in radio (theory). Radio News of Canada, **5**, pp. 12-13, August, 1924.

R131 Baggally, W. Plotting valve curves automatically. Wireless World and Radio Review, **14**, pp. 506-508, July 30, 1924.

R134.4 Little, N. C. The limit of regeneration. Proceedings Institute Radio Engrs., 12, pp. 479–488, August, 1924.
R134.75 Kruse, S. Building superheterodynes that work—III. QST, 8, pp. 13–25, August, 1924.
R134.75 Schottky, W. Electric wave receiver. United States Patent No. 1502063, issued July 22, 1924.
R134.75 Greiff, V. The superheterodyne. Radio (Toronto), 8, pp. 20–27, July, 1924.
R134.75 Best, G. M. Improvements to the 45,000 cycle superheterodyne. Radio (San Francisco), 6, pp. 33–34, August, 1924.
R134.8 Scott-Taggart, J. Reflex radio receivers in theory and practice. Radio News, 6, pp. 318–321, September, 1924.
R138 Wilson, H. A. The theory of thermionics. Physical Review, 24, pp. 39–48, July, 1924.
R140 Kuprijanow, G and Schmakow, P. Zur Berechnung kombinierter Schwingungskreise. Jahrbuch der drahtlosen Telegraphie, 23, pp. 15–18, January, 1924.
R142 Rossman, F. and Zenneck, J. Der Einfluss einer leitenden Verbindung von zwei gekoppelten Kreisen. Jahrbuch der drahtlosen Telegraphie, 23, pp. 53–54, March, 1924.
R142 Rossman, F. and Zenneck, J. Über erzwungene Schwingungen in gekoppelten Elektronenröhrenkreisen. Jahrbuch der drahtlosen Telegraphie, 23, pp. 47–52, March, 1924.
R142 Wicker, D. Berechnung der Kopplungskoefficienten für einige besonders Fälle der gegenseitigen Induktion. Jahrbuch der drahtlosen Telegraphie, 23, pp. 35–40, February, 1924.
R142 Runge, W. Ziehvorgange in induktiv gekoppelten Zwischenkreisröhrensendern. Jahrbuch der drahtlosen Telegraphie, 23, pp. 1–7, January, 1924.
R142.1 Rossman, F. and Zenneck, J. Der Verhaltnis von Induktiver und direkter Kopplung. Jahrbuch der drahtlosen Telegraphie, 23, pp. 54–56, March, 1924.
R143 Rosehansky, D. Die Resonanzkurven bei verschiedenen Dampfungstypen. Jahrbuch der drahtlosen Telegraphie, 23, pp. 23–31, February, 1924.

R200.—*Radio measurements and standardization*

R230 Erskine-Murray, J. On the calculations of inductances and capacities for a multirange or other consecutive series of tuned transmitting or receiving circuits the total range and accuracy required being given. Proceedings Institute Radio Engineers, 12, pp. 485–495, August, 1924.
R270 Hollingsworth, J. A resume of modern methods of signal measurements. Wireless World and Radio Review, 14, pp. 483–487, July 23; pp. 518–520, July 30, 1924.
R270 Bown, R. and Gillett, G. D. Distribution of radio waves from broadcasting stations over city districts. Proceedings Institute Radio Engineers, 12, pp. 395–410, August, 1924.
R281.47 Testing insulating varnishes. Electric Journal, 21, p. 394, August, 1924.

R300.—*Radio apparatus and equipment*

R300.5 Rudolph, W. Protective device in sound signaling apparatus. United States Patent No. 1503599, issued August 5, 1924.
R330 Mullard valves on test. Wireless Trader (Supplement), 2, p. 206, August, 1924.
R330 Valve tests: the Marconi Osram D. E. 5. Wireless World and Radio Review, 14, pp. 512–513, July 30, 1924.
R330 Hamm, A. Versuche über Telephonie mit Doppelgitterröhren. Jahrbuch der drahtlosen Telegraphie, 23, pp. 41–43, February, 1924.
R333 Wigge, H. Typisierung von Dreielektrodenröhrensendern. Jahrbuch der drahtlosen Telegraphie, 23, pp. 12–15, January, 1924.
R334 Donisthorpe, H. DeA. The Marconi four electrode tube and its circuit. Proceedings Institute Radio Engineers, 12, pp. 411–421, August, 1924.
R334 Hey, W. Eine neuartige Rückkopplung beim Vierröhren-Hochfrequenzverstärker. Jahrbuch der drahtlosen Telegraphie, 23, p. 56, March, 1924.
R341 Jones, E. T. The truth about rectifiers and filter systems. Radio (San Francisco), 6, pp. 25–26, August, 1924.
R341 Kraut, S. B. Testing and operation of rectigon rectifiers. Electric Journal, 21, pp. 363–368, August, 1924.
R342 Arnold, H. De F. Power limiting amplifying device. United States Patent No. 1504537, issued August 12, 1924.
R342.15 Oard, P. Construction of power amplifying transformers. Radio (San Francisco), 6, pp. 13–16, August, 1924.
R342.6 Groves, A. L. Neutrodyne receivers. Radio News, 6, pp. 316–317, September, 1924.
R342.6 McLaughlin, J. L. A one control neutrodyne. QST, 8, pp. 9–12, August, 1924.
R343 Hull, L. M. The prevention of radiation from a radio receiver. QST, 8, pp. 32–34, August, 1924.
R343 Baker, J. V. A tuner that's different: A Reinartz type tuner that goes from 30 to 550 meters. QST, 8 pp. 43–44, August, 1924.
R343 Conrad, F. Tuning system of antennae. United States Patent No. 1502848, issued July 29, 1924.
R343 Pupin, M. I. and Armstrong, E. H. Tone producing radio receiver. United States Patent No. 1502875, issued July 29, 1924.
R344.3 Pyle, H. W. An ideal amateur transmitter (20 watts). Radio News, 6, p. 312, September, 1924.
R344.3 Hatry, L. W. Loop transmission experiments. Radio News, 6, p. 313, September, 1924.
R344.3 Ehret, C. D. Method of and apparatus for electrically transmitting intelligence. United States Patent No. 1503308, issued July 29, 1924.
R348 Herdman, W. J. Duplex repeater. United States Patent No. 1503650, issued August 5, 1924.
R351 Horton, J. W. Vacuum tube oscillators. Bell System Technical Journal, 3, pp. 508–524, July, 1924.
R352.2 Clark, G. H. Radio signaling apparatus. United States Patent No. 1502460, issued July 22, 1924.
R353 Chubb, L. W. System of control. United States Patent No. 1504804, issued August 12, 1924.
R353 Woolverton, R. B. Transmission of radiosignals employing undamped waves. United States Patent No. 1504462, issued August 12, 1924.
R358 Herzog, R. Means for producing electric oscillations by an electric arc. United States Patent No. 1503324, issued July 29, 1924.
R359 Sabine, P. E. and Friedman, W. F. Apparatus for and method of rapid transmission of telegraphic messages. United States Patent No. 1503250, issued July 29, 1924.
R374 Crystodyne principle. Radio News, 6, pp. 294–295, September, 1924.
R376.3 Goldsmith, A. N. and Minton, J. P. The performance and theory of loud speaker horns. Proceedings Institute Radio Engineers, 12, pp. 423–478, August, 1924.
R377 Bruce, W. M. Wireless telegraphy. United States Patent No. 1504426, issued August 12, 1924.
R380 Pruden, H. M. Vacuum tube circuits. United States Patent No. 1503709, issued August 5, 1924.

R381 MacPherson, B. Process and apparatus for making electrical condensers. United States Patent No. 1502343, issued July 22, 1924.
R381 McCrum, D. S. Variable condenser. United States Patent No. 1502860, issued July 29, 1924.
R381 Pickard, G. W. Electrical condenser. United States Patent No. 1503765, issued August 5, 1924.
R381 Thomson, E. Electrostatic condenser. United States Patent No. 1504009, issued August 5, 1924.
R382 Kruse, S. More about low loss coils. QST, 8, pp. 39-41, August, 1924.
R384.1 White, E. L. An accurate wavemeter: How to build an oscillator that will really hold calibration. QST, 8, pp. 29-31, August, 1924.
R384.1 Buchbinder, M. Methods of wavemeter calibration. Wireless Age, 11, pp. 65-66, August, 1924.
R388 Casper, L.; Hubmann, K. and Zenneck, J. Zur Bestimmung der Kurvenform von Wechselstromen mit Hilfe der Braunschen Röhre. Jahrbuch der drahtlosen Telegraphie, 23, pp. 32-34, February, 1924.

R400.—*Radio communication systems*

R400 Reno, C. System for transmitting energy without wires. United States Patent No. 1504974, issued August 12, 1924.
R402 Long distance radio transmission: The use of short waves in directional wireless telegraphy. Electrician, 93, pp. 43-44, July 11, 1924.
R402 KDA's powerful short wave station. Radio News, 6, pp. 292-293, September, 1924.
R414 Van der Bijl, H. J. Method of and system for radiosignaling. United States Patent No. 1502889, issued July 29, 1924.
R422 Kintner, S. M. System of control. United States Patent No. 1502831, issued July 29, 1924.
R431 Fritz, H. R. Ringing machine radio interference. Telephony, 87, pp. 18-19, July 26, 1924.
R431 Investigation of power circuit interference in radio (report of radio subcommittee, inductive coordination committee). National Electric Light Association Bulletin, 11, pp. 511-513, August, 1924.
R431 Maurogne, J. O. and Cohen, L. Electrical signaling. United States Patent No. 1504570, issued August 12, 1924.
R431 Affel, H. A. Method of and means for reducing static disturbances. United States Patent No. 1504303, issued August 12, 1924.
R431 Brackett, Q. A. Means for protecting wireless outfits from static disturbances. United States Patent No. 1504600, issued August 12, 1924.
R435 Molins, A. R. Secret system for radiotelegraphy. United States Patent No. 1506055, issued August 12, 1924.
R450 Espenschied, Lloyd. High-frequency multiplex signaling system. United States Patent No. 1502813, issued July 29, 1924.
R470 Slaughter, N. B. and Wolfe, W. V. Carrier telephony on lower lines (abstract). Bell System Technical Journal, 3, pp. 525-526, July, 1924.
R485 Hallborg, H. E. High speed signaling system. United States Patent No. 1499565, issued July 1, 1924.

R500.—*Applications of radio*

R510 Slee, J. A. Wireless on board ship: Recent progress in the use and development of radio apparatus. Electrician, 93, pp. 90-92, July 25, 1924.
R514 Kilk, W. Radio compass calibration. Radio (San Francisco), 6, p. 35, August, 1924.
R520 Byrnes, L. F. Air mail radio equipment. General Electric Review, 27, pp. 492-497, August, 1924.
R533 Coursey, P. R. Radio coach 6ZZ: A preliminary report of the transmission and reception on an express train. Wireless World and Radio Review, 14, pp. 446-451, July 16, 1924.
R550 Danish broadcasting development: New station at Copenhagen. Wireless World and Radio Review, 14, pp. 468-469, July 23, 1924.
R550 Broadcast interference statistics. Wireless World and Radio Review, 14, p. 489, July 23, 1924.
R555 Calibration waves from 5HW: A service from the National Physical Laboratory. Wireless World and Radio Review, 14, pp. 460-461, July 16, 1924.
R580 Pond, W. The value of radio to the deaf. Radio News, 6, p. 304, September, 1924.

R600.—*Nonradio subjects*

534 Minton, J. P. Sound in its relation to radio. Wireless Age, 11, pp. 38-41, August, 1924.
537.55 Palm, A. Die Messung der Scheitelspannung mit der Glimmröhre. Jahrbuch der drahtlosen Telegraphie, 23, pp. 18-20, January, 1924.
621.313.2 Nesper, E. Die Maschinelle Frequenz Multiplikationsordnung von W. Dornig. Jahrbuch der drahtlosen Telegraphie, 23, p. 44, February, 1924.
621.327.7 Coolidge, W. D. X-ray device. United States Patent No. 1502937, issued July 29, 1924.
621.385 Nyquist, E. Telephone repeater circuits. United States Patent No. 1504135, issued August 5, 1924.

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