

U. S. DEPARTMENT OF COMMERCE
RADIO DIVISION

RADIO SERVICE BULLETIN

ISSUED MONTHLY

Washington, May 29, 1931—No. 170

CONTENTS

	Page		Page
New stations.....	2	Miscellaneous—Continued.	
Alterations and corrections.....	6	Second meeting of the International Technical Consulting Committee on Radio Communications.....	19
Miscellaneous:		Broadcasting station frequency measurements during April.....	19
Changes in the list of vessels equipped with a radio compass.....	13	Table of air-line distances in statute miles.....	22
General orders of the Federal Radio Commission.....	13	Radio transmission of standard frequency, July, August, and September, 1931.....	22
Radio cross bearings in vicinity of Nantucket Shoals Lightship.....	18	Kennelly-Heaviside layer height measurements.....	23
Radiobeacon established at Dead Tree Point, Canada.....	18	Characteristics of airplane antennas for radio range beacon reception.....	24
Ratifications of the International Radio-telegraph Convention.....	18		
Address of Denver office changed.....	19		

ABBREVIATIONS AND SYMBOLS

The necessary corrections to the List of Commercial and Government Radio Stations of the United States and to the International Lists of Radio 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. W=west longitude. N=north latitude. S=south latitude. E=east longitude.
- Call = Call signal (letters) assigned.
- Type = Type of wave classified as follows: A1=continuous wave (tube), A arc=continuous wave, A2=interrupted continuous wave, A3=phone, B=spark.
- Fy = Frequency in kilocycles; normal frequency in italics; wave length in meters in parentheses.
- Power = Height of antenna (meters) and intensity of current at its base (meters-amperes).
- Service = Nature of service maintained: PG=general public (ship to shore), PR=limited public (limited to public, correspondence between fixed stations), P=private (limited commercial and special), O=Government business exclusively.
- Class = FX=fixed station (point-to-point service), RG=radio-compass station, FA=aeronautical station, AB=aviation beacon, RF=circular radiobeacon, B=ship station, FC=coast station, A=aircraft.
- Hours = Hours of operation: N=continuous service, X=no regular hour, Y=sunrise to sunset.
- Accts. = Message accounts settled by.
- M. R. T. Co. = Mackay Radio & Telegraph Co.
- R. C. A. = Radio Corporation of America.
- R. M. O. A. = Radiomarine Corporation of America.
- T. R. T. Co. = Tropical Radio Telegraph Co.
- C. w. = Continuous wave.
- I. c. w. = Interrupted continuous wave.
- A. C. = Alternating current.
- V. t. = Vacuum tube.
- M. a. = Meters-amperes.
- U. S. L. = Applies only to the List of Commercial and Government Radio Stations of the United States.
- Δ = Equipped with a radio compass (direction finder).

NEW STATIONS

Commercial land stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Fixed and Land Stations, published by the Berne bureau]

Station	Class	Call signal	Frequency in kilocycles, meters in parenthesis	Service	Hours	Licensee
Bradley, Me., radiotelephone. ¹	FX	WOH	66.5 (4,500) to 69.5 (4,315)	PR	N	American Telephone & Telegraph Co.
Fargo, N. Dak. (Hector municipal airport). ²	FA, FX	KNWB	2,680 (111.94), 3,004 (99.86), 5,375 (55.81)	P	X	Aeronautical Radio (Inc.).
Fort Wayne, Ind. ³	FX	WPDZ	2,470 (121.5)	P	N	City of Fort Wayne Police Department.
Los Angeles, Calif. ⁴	FX	KGVV	1,554 (193.05)	P	X	Electrical Research Products (Inc.).
Pembina, N. Dak. (Fort Pembina municipal airport). ⁵	FA, FX	KNWC	2,680 (111.94), 3,004 (99.86), 5,375 (55.81)	P	X	Aeronautical Radio (Inc.).
Robertson, Mo. (St. Louis). ⁶	FA, FX	KGUT	2,722 (110.21), 2,734 (109.73), 3,082 (97.34), 3,088 (97.15), 4,108 (73.03), 5,510 (54.45), 6,365 (47.13), 8,015 (37.43), 12,180 (24.63)	P	X	Do.
St. Louis, Mo. ⁷	FC, FX	KGVX	229 (1,310)	P	X	Inland Waterways Corporation.
St. Paul, Minn. (municipal airport). ⁸	FA, FX	KNWA	2,680 (111.94), 3,004 (99.86), 5,375 (55.81)	P	X	Aeronautical Radio (Inc.).
Tulsa, Okla. ⁹	FX	KGPO	2,452 (122.35)	P	N	City of Tulsa, Oklahoma, Police Department.
<i>Portable</i>						
No. 7 ¹⁰	FX	KGVV	1,600 (187.5), 1,652 (181.6), 1,664 (180.29), 1,680 (178.6), 1,704 (176.06)	P	X	Continental Oil Co.

¹ Type, A3.² Loc. (approximate) 96° 45' 00" W., 46° 50' 00" N.; type, A1, A2, A3.³ Loc. (approximate) 85° 10' 00" W., 45° 05' 00" N.; type, A3.⁴ Loc. 118° 20' 30" W., 34° 05' 24" N.; type, A3.⁵ Loc. 97° 18' 25" W., 48° 55' 25" N.; type, A1, A2, A3.⁶ Loc. (approximate) 90° 20' 00" W., 38° 45' 00" N.; type, A1, A3.⁷ Loc. (approximate) 90° 12' 00" W., 38° 38' 00" N.; type, A1.⁸ Loc. (approximate) 93° 04' 00" W., 44° 58' 00" N.; type, A1, A2, A3.⁹ Loc. (approximate) 95° 58' 00" W., 36° 09' 05" N.; type, A3.¹⁰ Type, A2, A3.

Commercial ship stations, alphabetically, by names of vessels

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Ship Stations, published by the Berne bureau]

Name of vessel	Call signal	Rates, all services (cents)	Service	Hours	Owner	Message account settled by—
Aphra	WDER				Herman Behn	Owner.
Arcadian	WDEE				Arcady (Inc.)	
Bayport	KUJC	8	PG	X	W. G. Coyle & Co.	R. M. C. A.
Costa Rica	WEDJ				Northern Fisheries (Inc.)	Owner.
Daylight	WDEJ	8	PG	X	Standard Transportation Co.	R. M. C. A.
E. P. No. 5	WDEG				Farwest Fisheries (Inc.)	Owner.
Halonia	WDEP	8	PG	X	Charles H. Thorne	R. M. C. A.
Herbert Hoover	WDEW				Inland Waterways Corporation.	
Marie II (RC)	WDEH				Howard Zimmerman & James Corn.	Owner.
Navigator	WDEF				Louis L. Kaess	
Nellwood II	WDEQ	8	PG	X	Frank H. Woods	R. M. C. A.
Pan Bolivar	WDEK	8	PG	X	Pan-American Petroleum & Transportation Co. (Inc.)	Do.
Richard S.	WDEI				Farwest Fisheries (Inc.)	Owner.
Turbese	WDEN				Adolf Schwarzman	
William T. Muir	WDEM				Alaska Pacific Salmon Corporation.	Owner.

Commercial aircraft stations, alphabetically, by names of craft

[Additions to the List of Radio Stations of the United States, edition of June 30, 1930, and to the International List of Aircraft Stations published by the Berne bureau]

Station	Call signal	Frequency, in kilocycles; meters in parentheses	Service	Hours	License
NC-408H ¹	KHRBY	3,106 (96.59), 3,238, (92.64), 3,484 (86.10), 5,600 (53.57), 5,630 (53.29).	P	X	American Airways (Inc.).
NC-933Y.....	KHMHS	.....	P	X	Transcontinental & Western Air (Inc.).
NC-942Y.....	KHMIR	.....	P	X	Do.
NC-947Y.....	KHMJQ	.....	P	X	Do.
NC-961Y.....	KHMKP	.....	P	X	Do.
NC-999Y.....	KHMLO	.....	P	X	Do.
NC-10339	KHUAZ	.....	P	X	Boeing Airplane Co.
NC-11118	KHREV	.....	P	X	Examiner Printing Co., San Francisco, Calif.
NR-115W ²	KHNZA	333 (900), 375 (800), 410 (730), 457 (655), 500 (600).	P	X	William Salay, 421 Welch Boulevard, Flint, Mich.
R-898W ³	KHNYB	3,106 (96.59).....	P	X	Z. Smith Reynolds, Winston-Salem, N. C.
Winnie-Mae (NR-105W) ⁴	KHRDW	8,450 (35.5).....	P	X	Wiley Post, 632 Commerce Exchange Building, Oklahoma City, Okla.

¹ Type, A3.

² Type, A1, A2, A3.

³ Type, A1, A3.

⁴ Type, A1, A2.

Government aircraft stations, alphabetically, by names of craft

[Additions to the List of Radio Stations of the United States, edition of June 30, 1930, and to the International List of Aircraft Stations published by the Berne bureau]

Station	Call signal	Frequency, in kilocycles, meters in parentheses	Hours	Owner
NS-1.....	KHRLO	3,106 (96.59), 3,160 (94.9)	.....	Department of Commerce, Aeronautics Branch.
ZMC-2 (metal clad airship)	NZMCT	.....	.....	U. S. Navy.

Airway radiobeacon stations

[Addition to the List of Radio Stations of the United States, edition of June 30, 1930, and to the International List of Aircraft Stations published by the Berne bureau]

Station and geographical location	Frequency and type for emission	Power (height of aerial and intensity of current at base)	Characteristic signal	Hours
Cherokee, Wyo. (marker).....	A2-296 (1,015), 350 (855).	.....	---..	N.
Crews, Va. (marker).....	A2-260 (1,155), 320 (940).	.....	....	N.
Fontana, Calif.: 118° 00' 00" W., 34° 00' 00" N. (approximate).	A2-332 (905).....	(¹)	Interlocked N (---) and A (---).	N.
Jefferson, Ga. (marker).....	A2-266 (1,130)	.....	---..	N.
Lexington, Nebr. (marker).....	A2-260 (1,155), 284 (1,055).	.....	....	N.
Parkman, Ohio (marker).....	.....	.....	---..	N.
Pine Bluff, Nebr. (marker).....	A2-284 (1,055), 326 (920).	.....	....	N.
Vincennes, Ind. (marker).....	A2-248 (1,210)	.....	...-	N.

¹ Power, 10-M/amp.

NOTE.—All of the above-named beacons are owned and operated by the Department of Commerce, Bureau of Lighthouses, airways division.

Marine radiobeacon stations

[Addition to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Stations Performing Special Services, published by the Berne bureau]

FRYING PAN SHOALS LIGHTSHIP, N. C.—Loc. 77° 33' 45" W., 33° 28' 00" N.; transmits every 180 seconds, groups of 2 dashes for 60 seconds, silent 120 seconds, thus:

— — — etc.	Silent
60 seconds	120 seconds

Fy., 310 (968); hours, continuously during thick or foggy weather and daily in clear weather during the third 15 minutes of each hour, radio operator stands watch during the first 15 minutes of each hour from 8 a. m. to 9.15 p. m.; power, 85 m/amp.; call signal WSD.

FOWEY ROCKS LIGHT STATION, FLA.—Loc., 80° 05' 49" W., 25° 35' 25" N.; transmits every 180 seconds groups of 1 dash and 3 dots for 60 seconds, silent 120 seconds, thus:

— . . .	Silent
60 seconds	120 seconds

Fy., 290 (1,034); hours, continuously during thick or foggy weather and daily in clear weather for the second 15 minutes of each hour. This station is not in operation at the present time but is expected to be operating about August 16th, next.

MARY ISLAND LIGHT STATION, ALASKA.—Loc., 131° 10' 57" W., 55° 05' 53" N.; transmits every 180 seconds groups of 1 dash and 1 dot for 60 seconds, silent 120 seconds, thus:

—	Silent
60 seconds	120 seconds

Fy., 200 (1,500); hours, continuously during thick or foggy weather and daily in clear weather from 6.30 to 7 and 12.30 to 1 a. m. and p. m.

Commercial and Government land, ship, aircraft, radiobeacon, and radio-compass stations, alphabetically by call signals

Call signal	Name of station	Call signal	Name of station
KGPO	Tulsa, Okla. fa, fx	KNWC	Pembina, N. Dak. (Fort Pembina airport) fa, fx
KGUT	Robertson, Mo. (St. Louis) fa, fx	KUJC	Bayport b
KGVV	No. 7 (portable) fx	NZMCT	ZMC-2 a
KGVW	Los Angeles, Calif. fx	WDEE	Arcadian b
KGVX	St. Louis, Mo. fa, fx	WDEF	Navigator b
KHMHS	NC-983Y a	WDEG	E. P. No. 5 b
KHMIR	NC-942Y a	WDEH	Marie II b
KHMJQ	NC-947Y a	WDEI	Richard S b
KHMKP	NC-961Y a	WDEJ	Daylight b
KHMLO	NC-999Y a	WDEK	Pan Bolivar b
KHNYB	R-898W a	WDEM	William T. Muir b
KHNZA	NR-115W a	WDEN	Turbese b
KHBBY	NC-408H a	WDEP	Halonia b
KHRDW	Winnie-Mae (NR-105W) a	WDEQ	Nellwood II b
KHREV	NC-11118 a	WDER	Aphra b
KHUAZ	NC-10339 a	WDEW	Herbert Hoover b
KHRLQ	NS-1 a	WEDJ	Costa Rica b
KNWA	St. Paul, Minn. (municipal airport) fa, fx	WOH	Bradley, Me., radiotelephone fx
KNWB	Fargo, N. Dak. (Hector municipal airport) fa, fx	WPDZ	Fort Wayne, Ind. fx

Broadcasting stations, by name of State and city

[Addition to the List of Radio Stations of the United States, edition of June 30, 1930]

State and city	Call signal	Frequency in kilocycles, meters in parentheses	Power (watts)
Alabama: Huntsville	WBHS	1,200 (250)	50
Michigan: Ironwood	WJMS	1,420 (211.3)	100

Broadcasting stations, by call signals

Call signal	Location of transmitter (mail address)	Licensee	Frequency in kilocycles, meters in parentheses	Power (watts)
WBHS WJMS	Huntsville, Ala., 100 Jefferson St. ¹ Ironwood, Mich., 124 W. Aurora St. ² ..	Hutchens Co. Johnson Music Store (Marius Johnson, proprietor).	1,200 (250)..... 1,420 (211.3).....	50 100

¹ Loc. (approximate) 87° 40' 00" W., 35° 00' 00" N.

² Loc. (approximate) 90° 09' 00" W., 46° 28' 00" N.

Experimental stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Power (watts)	License and post-office address
New Jersey: Wayne.....	W2XDR	660 (455), 760 (395), 800 (375), 860 (349), 900 (333), 980 (306), 1,000 (300), 1,020 (294.1), 1,040 (288.5), 1,100 (272.7), 1,180 (254.2), 1,200 (250), 1,260 (238.1), 1,300 (230.8), 1,400 (214.3), 1,500 (200), 1,600 (187.5), 1,700 (176.5), 1,800 (166.7), 1,850 (162.2), 1,900 (157.9), 2,000 (150), 2,100 (142.9), 2,200 (136.4), 2,400 (125), 2,600 (115.4).	100	Atlantic Broadcasting Corporation, 485 Madison Avenue, New York, N. Y.
New York: Brighton..... <i>Portable</i>	W8XBA	60,000 (5.) to 100,000 (3.)..	75	John J. Long, jr., 63 Sonora Parkway, New York, N. Y.
New Jersey: Hoboken.....	W2XDQ	570 (525).....	60	Knickerbocker Broadcasting Co. (Inc.).
United States—throughout... <i>Aircraft</i>	W10XAU	2,398 (125.1), 3,256 (92.5), 4,795 (62.57).	15	Robert E. Autrey, Navasota, Tex.
NC-11151.....	W10XAV	4,795 (62.56).....	15	Master Electric Co., 100 Davis Avenue, Dayton, Ohio.

Visual broadcasting stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Power (watts)	Owner
<i>Portable</i>				
Massachusetts: Boston.....	W1XG	43,000 (6.977) to 46,000 (6.522), 48,500 (6.186), to 50,300 (5.964), 60,000 (5.) to 80,000 (3.75).	30	Shortwave & Television Corporation, 70 Brookline Avenue.
New York State.....	W2XBT	do.....	750	National Broadcasting Co. (Inc.).

Experimental, relay broadcasting, and visual broadcasting stations grouped by districts, alphabetically, by call signals

Call signal	District and station	Call signal	District and station
W1XG	First district: Boston, Mass. (portable).	W8XBA	Eighth district: Brighton, N. Y.
W2XDQ	Second district: Hoboken, N. J. (portable).	W10XAU	<i>Portable and aircraft</i> United States—throughout. NC-11151.
W2XDR	Wayne, N. J.	W10XAV	
W2XDT	New York State (portable).		

ALTERATIONS AND CORRECTIONS

COMMERCIAL LAND STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Fixed and Land Stations, published by the Berne bureau]

- AURORA, ILL.—Fy., add 6,215 (48.27).
 BOSTON, MASS., WEY.—Power, 30/2.
 BRAWLEY, CALIF.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 BROOKLYN, N. Y.—Power, 24/1.5.
 BROOKSVILLE, PA.—Power, 20/5.
 CHICAGO, ILL., WJA.—Fy., strike out 7,625 (39.34); add 8,810 (34.05), 10,010 (29.97).
 CHICAGO, ILL., WPDD.—Power, 28/5.
 DETROIT, MICH. (Belle Isle), WPDJ.—Power, 15/1.7.
 DETROIT, MICH., WKDT.—Power, 24.4/3.25.
 DUNDAS, ALASKA.—Read Dundas, Alaska radio; rates, 6 cents per word.
 FRESNO, CALIF., KGJI.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 HICKSVILLE, N. Y.—Fy., strike out 7,340 (40.87), 7,355 (40.79), 7,370 (40.71), 7,640 (39.27), 7,820 (38.36), 7,835 (38.29), 15,610 (19.218), 15,640 (19.182), 15,670 (19.145), 15,880 (18.892); add 6,920 (43.35), 8,810 (34.05), 10,010 (29.97).
 INDIU, CALIF., KGJB.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 KATALLA, ALASKA, radio.—Fy., strike out 268 (1,120), 274 (1,095), 460 (652); add 178 (1,685), 425 (705).
 KENAI, ALASKA, radio.—Rates, 6 cents per word.
 KVICHAK, ALASKA.—Fy., strike out 500 (600), 3,490 (86); add 3,160 (94.9); power, 42/2.5.
 LOS ANGELES, CALIF., KRM.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 MODESTO, CALIF., KGJG.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 NEW BRUNSWICK, N. J., WIA.—Fy., strike out 6,920 (43.35); add 7,370 (40.71).
 NEW YORK, N. Y., WOX.—Read St. George, N. Y. (Staten Island); fy., strike out 1,762 (179.43); add 2,530 (118.57).
 NUSHAGAK, ALASKA, KNJ.—Read Nushagak, Alaska, radio; rates, 6 cents per word.
 NUSHAGAK, ALASKA, KZV.—Fy., strike out 500 (600), 3,490 (86); add 3,160 (94.9); power, 42/2.5.
 NYAC, ALASKA.—Power, 18/1.2.
 QUADRA, ALASKA.—Read Quadra, Alaska, radio; rates, 6 cents per word.
 ROCHESTER, N. Y.—Power, 33/1.6.
 SACRAMENTO, CALIF., KRJ.—Type, strike out A2, A3; fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 SALINAS, CALIF.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 SAN FRANCISCO, CALIF., KRG.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 SANTA MARIA, CALIF., KGJE.—Fy., strike out 8,810 (34.05), 10,010 (29.97); add 7,625 (39.345), 7,640 (39.27).
 SELDOVIA, ALASKA, radio.—Type, strike out B; add A2; fy., strike out 480 (625); add 178 (1,685), 425 (705); hours, 8 to 9 a. m., 12 a. m. to 1 p. m., 4 to 6 p. m.
 STELTON, N. J.—Loc., changed to Linden, N. J. (near); class, add FX; type, add A1; fy., add 4,164 (72.04), 6,320 (47.46).
 TENAKEE, ALASKA, radio.—Power, 24/2.5.
 UYAK, ALASKA, KHV.—Read Uyak, Alaska, radio; rates, 6 cents per word.
 VIEW COVE, ALASKA.—Read View Cove, Alaska, radio; class, add FC; loc., 133° 01' 05" W., 55° 04' 45" N.; type, strike out B, add A1; fy., strike out 180 (1,665), 190 (1,575); add 178 (1,685); service, add PG; hours, X.

Portable

Third Radio Zone WFY.—Read Third Radio Zone No. 26.

Strike out all particulars of the following-named station: Washington, D. C. (Hoover Field).

COMMERCIAL SHIP STATIONS, ALPHABETICALLY, BY NAMES OF VESSELS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States edition of June 30, 1930, and to the International List of Ship Stations, published by the Berne bureau]

- ABRON.—Name changed to Point Chico.
 AFOGNAK.—Fy., strike out 460 (650).
 AJAX.—Type, A1, A2; power, 12/1; accts., R. M. C. A.
 AMIDA.—Fy., strike out 5,525 (54.3), 5,555 (54).
 ARAS.—Fy., strike out 5,525 (54.3), add 410 (730), 468 (640).
 BUCCANEER.—Fy., strike out 375 (800).
 CALIFORNIA (KUKV).—Fy., add 6,590 (45.52).
 CALIFORNIA (WMCM).—Fy., strike out 159 (1,885), 5,525 (54.3), 13,240 (22.66), add 11,110 (27).
 CAMDEN (KDKL).—Fy., strike out 5,555 (54).
 CAPTAIN WILLIAM.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 CLIFFORD F. MOLL.—Fy., strike out 500 (600).
 CONTINENTAL.—Type, A1; fy., 5,525 (54.3), 5,555 (54), 8,290 (36.19), 16,580 (18.094), 16,660 (18.007); power, 12.33/2.
 CORSAIR.—Fy., strike out 5,525 (54.3), add 375 (800).
 CRAMPTON ANDERSON.—Name changed to Allan Jackson.
 CRESSIDA.—Fy., strike out 5,525 (54.3), add 11,110 (27).
 DAVID P. FLEMING.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 DELIGHT.—Name changed to Ancha.
 DIO.—Name changed to Point Caleta.
 D. M. RENTON.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 DOCHET.—Name changed to Point Salinas.
 ECUADOR.—Fy., add 8,330 (36.01).
 EL SALVADOR.—Fy., add 5,555 (54).
 EXCHANGE.—Fy., strike out 5,525 (54.3), 5,555 (54).
 F. H. WICKETT.—Name changed to E. G. Seubert.
 FREDERIC EWING.—Name changed to C. J. Barkdull.
 G. N. WILSON.—Name changed to Consumers Power.
 GUATEMALA.—Fy., add 5,555 (54).
 HAIDA.—Fy., add 5,555 (54).
 HEREDIA.—Fy., strike out 11,050 (27.15).
 HERMOSA.—Fy., strike out 375 (800), 400 (750), 425 (705), 468 (640), 500 (600), add 8,330 (36.01), 11,110 (27), 16,860 (17.794).
 HUSSAR (WCEQ).—Type, A1, A2; fy., 143 (2,100), 151 (1,985), 153 (1,960), 157 (1,910), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 468 (640), 500 (600), 8,290 (36.19), 8,330 (36.01), 8,450 (35.5), 11,050 (27.15), 11,110 (27), 11,230 (26.71), 13,240 (22.66), 16,580 (18.094), 16,660 (18.007), 16,860 (17.794); power, 28/12 and 1; hours, strike out X, add N.
 JIMMIE K.—Fy., strike out 2,594 (115.65), add 2,584 (116.09); service, strike out P, add PG (phone only); rates, 25 cent for 3 minutes.
 JOHN N. STEWART.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 KATHARINE.—Type, add A3.
 LAKE ORMOC.—Fy., strike out 16,575 (18.099).
 LEVIATHAN.—Type, add A3; fy., add 3127.5 (95.9), 4,177.5 (71.8), 8,830 (33.98), 13,260 (22.62), 17,640 (17.007).
 LISTO.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 LOUIE BLACK.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 LUSITANIA.—Accts., Manuel G. Rosa.
 MANHATTAN ISLAND.—Name changed to Point Brava.
 MICHIGAN (KEGS).—Fy., add 6,590 (45.52).
 MILTON S. PATRICK.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.
 MIMI.—Fy., strike out 2,596 (115.56), add 2,740 (109.48).
 NAVIGATOR.—Fy., add 5,555 (54).
 NORTHERN LIGHT.—Fy., strike out 375 (800), 468 (640), 500 (600), add 11,050 (27.15), 11,110 (27), 16,580 (18.094).
 OLIVE K.—Fy., strike out 5,555 (54).

- PATRIA.**—Fy., strike out 11,050 (27.15), 11,110 (27), add 16,580 (18.094), 16,660 (18.007); power, 18/1.5; service, strike out P, add PG.
- PEACOCK.**—Fy., strike out 454 (660).
- PENNSYLVANIA (WMDS).**—Fy., strike out 5,525 (54.3), 5,555 (54).
- PRESIDENT ADAMS.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (42.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT CLEVELAND.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT FILLMORE.**—Fy., strike out 425 (705), 8,430 (35.59), add 153 (1,960), 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,100 (13.575), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT GARFIELD.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT HARRISON.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT HAYES.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT JACKSON.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT JEFFERSON.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT LINCOLN.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT MADISON.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT MCKINLEY.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT MONROE.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT PIERCE.**—Fy., add 5,615 (53.42), 6,590 (45.52), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT POLK.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT TAFT.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT VAN BUREN.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESIDENT WILSON.**—Fy., add 5,615 (53.42), 6,605 (45.42), 6,620 (45.32), 6,635 (45.215), 8,290 (36.19), 8,450 (35.5), 11,110 (27), 13,240 (22.66), 16,860 (17.794), 22,220 (13.501), 22,460 (13.357).
- PRESQUE ISLE.**—Fy., add 143 (2,100), 157 (1,910).
- RELANCE.**—Type, A1, fy., 5,525 (54.3), 5,555 (54), 8,290 (36.19), 8,330 (36.01), 8,450 (35.5), 11,050 (27.15), 11,110 (27), 11,230 (26.71), 13,240 (22.66), 16,580 (18.094), 16,660 (18.007), 16,860 (17.794); power, 13.2/1.5; service, PG; hours, X; rates, 8 cents per word; accts., R. M. C. A.
- RENE.**—Fy., strike out 5,525 (54.3), 5,555 (54), 8,330 (36.01), 16,580 (18.094).
- R. W. STEWART.**—Name changed to R. G. Stewart.
- SABOTAWAN.**—Name changed to Point Palmas.
- SALVATION LASS.**—Name changed to Delsud.
- SANDMASTER.**—Fy., add 143 (2,100), 157 (1,910); owner, Sensibar Transportation Co.; accts., owner.

SAVARONA.—Type, A1, A2; fy., 143 (2,100), 151 (1,985), 153 (1,960), 157 (1,910), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 468 (640), 500 (600), 8,290 (36.19), 8,330 (36.01), 8,450 (35.5), 11,050 (27.15), 11,110 (27), 11,230 (26.71), 13,240 (22.66), 16,580 (18.094), 16,660 (18.007), 16,860 (17.794); power, 26/12 and 1; service, PG; hours, N; rates, 8 cents per word.

SHOODIC.—Name changed to Delnorte.

SEABORN.—Fy., strike out 153 (1,960), 5,525 (54.3).

SHADOW K.—Fy., strike out 8,450 (35.5), add 3,112 (96.40), 6,590 (45.52), 11,050 (27.15), 11,110 (27), 13,240 (22.66); owner, Carl G. Fisher Co.; accts., owner.

SHASTA (WMDJ).—Fy., add 5,525 (54.3), 5,555 (54).

SPRAY III.—Fy., strike out 2,596 (115.56), add 2,740 (109.5).

SWIFT SCOUT.—Type, add A arc.

TEXAS (KEFZ).—Fy., strike out 8,450 (35.5), add 410 (730), 5,555 (54.), 6,590 (45.52), 8,330 (36.01), 11,110 (27), 16,860 (17.794).

THRASHER.—Type, add A3.

VENEZUELA.—Fy., add 5,555 (54).

VIRGINIA (WSBW).—Fy., strike out 5,525 (54.3), 8,330 (36.01), 11,050 (27.15), 11,230 (26.71), 13,240 (22.66).

VIVO.—Service, strike out P, add PG (phone only); rates, 25 cents for 3 minutes.

WARRIOR (KFSX).—Fy., strike out 5,525 (54.3), 16,580 (18.094), add 11,110 (27).

WILLIAM H. DOHENY.—Name changed to E. J. Bullock.

Strike out all particulars of the following-named stations: E. P. Co. No. 4, General, Socony 83, Virginia E.

COMMERCIAL AIRCRAFT STATIONS, ALPHABETICALLY, BY NAMES OF CRAFT

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1930, and to the International List of Aircraft Stations, published by the Berne bureau]

G-10118.—Type, A3; fy., 2,368 (126.68), 3,106 (96.58).

NC-336H.—Type, A1, A3; fy., 2,650 (113.20), 3,106 (96.58).

NC-435H.—Type, A3; fy., 3,106 (96.59), 3,160 (94.9), 3,166 (94.75), 3,172 (94.57), 3,178 (94.39), 5,570 (53.86), 5,660 (53).

NC-437H.—Type, A3; fy., 3,106 (96.59), 3,160 (94.9), 3,166 (94.75), 3,172 (94.57), 3,178 (94.39), 5,570 (53.86), 5,660 (53).

NC-439H.—Type, A3; fy., 3,106 (96.59), 3,160 (94.9), 3,166 (94.75), 3,172 (94.57), 3,178 (94.39), 5,570 (53.86), 5,660 (53).

NC-5999.—Licensee, Trans-American Airlines Corporation.

NC-7770.—Licensee, Trans-American Airlines Corporation.

NC-9157.—Licensee, Trans-American Airlines Corporation.

NC-9653.—Type, A3; fy., 3,106 (96.59), 3,160 (94.9), 3,166 (94.75), 3,172 (94.57), 3,178 (94.39), 5,570 (53.86), 5,660 (53).

NC-9655.—Type, A3; fy., 3,106 (96.59), 3,160 (94.9), 3,166 (94.75), 3,172 (94.57), 3,178 (94.39), 5,570 (53.86), 5,660 (53).

NC-9784.—Licensee, Trans-American Airlines Corporation.

Strike out all particulars of the following-named station: NC-1612.

GOVERNMENT LAND STATIONS, ALPHABETICALLY, BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Fixed and Land Stations, published by the Berne bureau]

ASTORIA, OREG. radio.—Transmits time signals 1657 to 1700 G. C. T. on 102 (2,939).

CAPE MALA, CANAL ZONE radio.—Read Cape Mala, Republic of Panama radio.

CAVITE, P. I.—Transmits weather and hydrographic warnings at 1230 G. C. T. on 56 (5,354), 8,872 (33.81), 17,744 (16.9).

GREAT LAKES, ILL.—Fy., change to read transmits time signals 1657 to 1700 and also transmits weather and hydrographic warnings 0400, 1618, 2200 G. C. T. on 122 (2,458).

HONOLULU, HAWAII (Pearl Harbor).—Fy., strike out 26.1 (11,490), add 38 (7,890), transmits time signals 2355 to 2400 G. C. T.

KEY WEST, FLA. radio.—Fy., 106 (2,828), transmits time signals 1657 to 1700 G. C. T.

PHILADELPHIA, PA.—Transmits weather 1548, 2200 G. C. T. on 104 (2,885).

SAN DIEGO, CALIF. (Chollas Heights).—Transmits time signals 1657 to 1700 G. C. T., both frequencies.

SAN FRANCISCO, CALIF. (Mare Island).—Transmits time signals 0255 to 0300, 0755 to 0800, 1655 to 1700 G. C. T. on 66 (4,543) and 108 (2,776); transmits time signals at 0755 to 0800 G. C. T. on 8,590 (34.90); no longer transmits weather on 8,590 (34.92); fy., add 4,385 (68.41) type A2 on this frequency transmits aviation weather at 0215 and 1415 G. C. T. and marine weather and hydrographic warnings at 0330 and 1530 G. C. T.; add 12,885 (23.28) type A1 on this frequency transmits time signals at 1655 to 1700 and 0255 to 0300 G. C. T.

ST. AUGUSTINE, FLA. radio.—Fy., strike out 128 (2,342); add 185 (1621) on this frequency transmits weather at 1700 G. C. T.

WASHINGTON, D. C. (Annapolis, Md.), also transmits aviation weather at 1305 G. C. T., on 8,030 (37.34).

WASHINGTON, D. C. (Arlington, Va.)—Replace 68 (4,409) by 64 (4,690).

GOVERNMENT SHIP STATIONS, ALPHABETICALLY, BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Ship Stations published by the Berne bureau]

DOROTHY.—Type, A2; fy., 375 (800), 425 (705), 468 (640), 500 (600).

SAVANNAH WYBD.—Correct call WYDB.

Strike out all particulars of the following-named vessel: S. C. 63.

GOVERNMENT AIRCRAFT STATIONS, ALPHABETICALLY, BY NAMES OF CRAFT

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1930, and to the International List of Aircraft Stations, published by the Berne bureau].

Strike out all particulars of the following-named station: U. S. S. *Florida*.—Any aircraft attached to.

AIRWAY RADIOBEACON STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Stations Performing Special Services, published by the Berne bureau]

BELLEFONTE, PA.—Fy., strike out 302 (995), add 284 (1,055).

BUFFALO, N. Y. (Williamsville).—Identifying signal changed to B (—); fy., strike out 350 (855), add 266 (1,130).

CINCINNATI, OHIO (California).—Fy., strike out 272 (1,100), add 332 (905).

CLEVELAND, OHIO.—Identifying signal changed to K (—).

COLUMBIA, Mo.—Identifying signal changed to L (—); fy., strike out 266 (1,130), add 240 (1,250).

COLUMBUS, OHIO (Port Columbus).—Fy., strike out 266 (1,130), add 332 (905).

ELKO, NEV.—Identifying signal changed to K (—).

FORT MADISON, IOWA.—Identifying signal changed to W (—); fy., strike out 338 (890), add 240 (1,250).

FORT WORTH, TEX.—Identifying signal changed to W (—).

GOSHEN, IND.—Identifying signal changed to G (—); fy., strike out 332 (905), add 320 (940).

OAKLAND AIRPORT, CALIF. (Bay Farms Island).—Fy., strike out 326 (920), add 332 (905).

RICHMOND, VA. (Sandston).—Identifying signal changed to V (—).

SIDNEY, NEBR.—Fy., strike out 308 (975), add 326 (920).

SYRACUSE, N. Y. (Camillus).—Fy., strike out 260 (1,155), add 350 (855).

WASHINGTON, D. C. (Hunters Point, Va.)—Identifying signal change to G (—).

MARINE RADIOBEACON STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Stations Performing Special Services, published by the Berne bureau]

CAPE COD BAY, MASS.—Characteristic signal changed, transmits groups of 2 dashes, 1 dot, and 1 dash, thus:

— — — etc.	Silent
60 seconds	120 seconds

CHESAPEAKE LIGHTSHIP, VA.—Hours of operation changed, operates continuously during thick or foggy weather and daily in clear weather for the third 15 minutes of each hour.

SAVANNAH LIGHTSHIP, GA.—Fy., changed to 310 (968).

ASHTABULA LIGHT STATION, OHIO.—Characteristic of fog signal changed and new method of distance finding. Whenever both the radiobeacon and the sound fog signal are in operation at these stations the radiobeacon transmits a long, distinctive dash (3 seconds), the termination of which is coincident with the beginning of a long blast (4 seconds) of the sound signal. This long blast is followed by a 1-second silence and a 1-second blast, to indicate definitely to the observer the particular long blast which is sounded at the termination of the long dash. The number of seconds elapsing between hearing the termination of the long radio dash and the beginning of this long blast of the sound signal divided by five will give the approximate distance of the observer from the light station in statute miles. This distance thus derived should be correct within a limit of error of 10 per cent. During the operating minute of the radiobeacon the sound signal characteristic will be as follows: Silent 3 seconds (during radio dash), blast 4 seconds, silent 1 second, blast 1 second, silent 51 seconds. During the 2 minutes between operating minutes of the radiobeacon, the regular station characteristic of the fog signal, which has been changed to a blast of 4 seconds every 60 seconds, will be maintained. Hearing the long dash in the radiobeacon code of a station will indicate to the mariner the presence of fog conditions at that station.

BLUNTS REEF LIGHTSHIP, CALIF.—The diaphone fog signal has been synchronized with the radiobeacon to provide a means for any vessel equipped with a radiocompass to determine its distance as well as its direction from the lightship in foggy weather whenever it is within the sound range of the diaphone. At the middle of each of the 1-minute periods of its operation during foggy weather the radiobeacon will emit a long dash (2 seconds) which has been synchronized with one of the regular 2-seconds blasts of the sound in-air signal. As a means of identifying this particular blast it will be preceded by a 1-second blast separated from it by a 1-second silent interval. Since the long dash of the radiobeacon occurs in the middle of its operating period, its occurrence can be anticipated and the end of the dash accurately timed. By noting the elapsed time until the end of the double blast of the diaphone is heard and dividing this time in seconds by five the observer will obtain his distance in nautical miles from the lightship. The distance thus derived will be approximate, with a possible maximum error of 10 per cent. Under conditions favorable for the transmission of sound, one or more of the regular blasts of the diaphone may be heard between the long dash of the radiobeacon and the double blast of the diaphone, and care should be taken to mark only the time of the double blast. During clear weather operating periods and when operating distant fog or low visibility with the diaphone not in operation, the radiobeacon will not emit the long 2-seconds dash. This arrangement will serve to advise distant observers whether or not there is fog or low visibility in the immediate vicinity of the lightship.

RADIO-COMPASS STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and to the International List of Stations Performing Special Services, published by the Berne bureau]

CAPE MALA, CANAL ZONE.—*Read Cape Mala, Republic of Panama.*

Commercial and Government land, ship, aircraft, radiobeacon, and radio-compass stations, alphabetically, by call signals

KDKG, *read E. J. Bullock; KDOH,* *read Allan Jackson; KDVS,* *read Consumers Power; KEBD,* *read Point Chico; KEY,* *read Dundas, Alaska radio; KHV,* *read Uyak, Alaska radio; KIDQ,* *read Delnorte; KIJJ,* *read Point Palmas; KIMN,* *read Delsud; KIMR,* *read Point Salinas; KNJ,* *read Nusagak, Alaska radio; KOR,* *read Quadra, Alaska radio; KQOE,* *read Ancha; KSJ,* *read View Cove, Alaska radio; NGR,* *read Cape Mala, Republic of Panama radio; WEEN,* *read Linden, N. J. (near); WFOI,* *read Point Brava; WFY,* *read Third Radio Zone No. 26 (portable); WNEO,* *read Point Caleta; WOX,* *read St. George, N. Y. (Staten Island); WPCD,* *read C. J. Barkdull; WPCL,* *read R. G. Stewart; WROO,* *read E. G. Seubert; WYBD (Savannah), correct call WYDB; strike out all particulars following the call signals: KHACX, KVAO, NODN, NVMOT, WIDN, WIDY, WQDD, WRDM.*

BROADCASTING STATIONS, BY CALL SIGNALS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1930, and the International List of Broadcasting Stations, published by the Berne bureau]

- KFEL** (Denver, Colo.).—Loc., transmitter changed to Edgewater, Colo. (approximate), 105° 04' 00'' W., 39° 44' 30'' N.
KFWI (San Francisco, Calif.).—Licensee, Radio Entertainments (Ltd.).
KGB (San Diego, Calif.).—Licensee, Don Lee (Inc.).
KGKB (Brownwood, Tex.).—Loc., transmitter and studio changed to Tyler, Tex., 95° 29' 10'' W., 32° 30' 32'' N.; post-office address Tyler Commercial College.
KICK (Red Oak, Iowa).—Loc. (approximate) 95° 24' 00'' W., 41° 00' 20'' N.; post-office address 601 Summitt St.
KPJM (Prescott, Ariz.).—Licensee, A. P. Miller.
KQV (Pittsburgh, Pa.).—Licensee, KQV Broadcasting Co.
KSTP (Radio Center, Minn.).—Call incorrectly given as KTSP in Radio Service Bulletin for last month.
KTBI (Los Angeles, Calif.).—Call changed to KFAC.
WAAB (Lexington, Mass.).—Loc., transmitter changed to Quincy, Mass., 71° 00' 46'' W., 42° 18' 06'' N.
WBBM (Glenview, Ill.).—Licensee, WBBM Broadcasting Corporation.
WCHI (Batavia, Ill.).—Loc., transmitter changed to Deerfield, Ill. (approximate) 87° 51' 00'' W., 42° 10' 00'' N.
WDAH (El Paso, Tex.).—Licensee, W. S. Bledsoe & W. T. Blackwell.
WDBJ (Roanoke, Va.).—Licensee, Times-World Corporation.
WGBC (Memphis, Tenn.).—Consolidated with station WNBR, Memphis, Tenn.
WHFC (Cicero, Ill.).—Licensee, WHFC (Inc.).
WICC (Easton, Conn.).—Power, 250 night, 500 day.
WJBT (Glenview, Ill.).—Licensee, WBBM Broadcasting Corporation.
WKBN (Youngstown, Ohio).—Licensee, WKBN Broadcasting Corporation.
WMAZ (Macon, Ga.).—Fy., 1,180 (254.2); power, 500.
WOBU (Charleston, W. Va.).—Loc. (approximate) 81° 42' 00'' W., 38° 19' 00'' N.
WRAF (La Porte, Ind.).—Call changed to WFAM; licensee, South Bend Tribune.
WRBI (Oglethorpe University, Ga.).—Call changed to WJTL.

EXPERIMENTAL 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, 1930]

- ALASKA:** Libbyville (K7XD).—Strike out all particulars.
MARYLAND: Baltimore (W3XE).—Strike out all particulars.
NEW JERSEY: Mendham (W3XR).—Fy., add 278 (1,080), 60,000 (5.) to 400,000 (.75).
NEW YORK:
 Long Island City (W2XAR).—Fy., add 23,100 (12.987), 25,700 (11.673), 26,000 (11.538), 27,100 (11.07), 34,600 (8.67), 41,000 (7.317), 51,400 (5.837), 60,000 (5.) to 400,000 (.75) and above 401,000 (.74).
 New York (W2XDM).—Read New York, N. Y. (portable).
 New York (W2XDN).—Read New York, N. Y. (portable).
OHIO: West Dover (W8XJ).—Fy., strike out 1,608 (186.57), 2,734 (109.73), 4,108 (73.02), 6,335 (47.35), 3,166 (94.76).

Portable

- CALIFORNIA:** Oakland (W6XG).—No longer portable.
NEW JERSEY: New Jersey (W2XDE).—Fy., strike out 1,672 (179.43).
NEW YORK: New York (W2XBS).—No longer portable; fy., strike out 2,000 (150).

Aircraft

- NC-417H** (W10XAA).—Fy., add 60,000 (5.) to 400,000 (.75).
NC-952V (W2XBX).—Fy., add 3,106 (96.59), 60,000 (5.) to 400,000 (.75).

RELAY BROADCASTING 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, 1930]

- MASSACHUSETTS:** East Springfield (W1XAZ).—Fy., strike out 2,398 (125.1).

VISUAL BROADCASTING 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, 1930]

ILLINOIS: Chicago (W9XAP).—Fy., strike out 2,750 (109.1) to 2,850 (105.3).

MARYLAND: Silver Springs (W3XK).—Fy., strike out 2,850 (105.3), to 2,950 (101.7).

NEW YORK, N. Y. (W2XCR).—Fy., strike out 2,750 (109.1) to 2,850 (105.3).

Portable

NEW JERSEY: Jersey City (W2XAP).—Read Passaic, N. J. (portable); fy., strike out 2,750 (109.1) to 2,850 (105.3).

MISCELLANEOUS

CHANGES IN THE LIST OF VESSELS EQUIPPED WITH A RADIO COMPASS

The following-named vessels are additions to the lists published in Commercial and Government Radio Stations of the United States, edition June 30, 1930, and the International List of Ships Stations published by the Berne bureau:

Name	Call signal	Owner	Name	Call signal	Owner
COMMERCIAL			GOVERNMENT— continued		
Savarona.....	WCEP	Savarona Ship Corp.	Langley.....	NEQC	U. S. Navy—Contd.
Walter D. Noyes..	WJCY	Mystic S. S. Co.	Louisville.....	NIFT	Do.
GOVERNMENT			Medusa.....	NEMO	Do.
Alden.....	NULK	U. S. Navy.	Minneapolis.....	NACF	Do.
Arctic.....	NARF	Do.	New Orleans.....	NABJ	Do.
Argonne.....	NISK	Do.	Northampton.....	NEFK	Do.
Astoria.....	NACD	Do.	Ogala.....	NEPJ	Do.
Augusta.....	NIDF	Do.	Paducah.....	NESC	Do.
Bagaduce.....	NAZP	Do.	Patoka.....	NUGN	Do.
Blakely.....	NIQZ	Do.	Pelican.....	NEFK	Do.
Brazos.....	NIFK	Do.	Portland.....	NACB	Do.
Bridge.....	NESF	Do.	Ramapo.....	NUGP	Do.
Bushnell.....	NEFS	Do.	Ranger.....	NABF	Do.
Canopus.....	NIRX	Do.	Rigel.....	NURG	Do.
Chaumont.....	NISV	Do.	Salinas.....	NUGR	Do.
Chester.....	NAFV	Do.	San Francisco.....	NLIZ	Do.
Chicago.....	NAGM	Do.	Sapelo.....	NUGS	Do.
Crowninshield.....	NADF	Do.	Sirius.....	NUPP	Do.
Dupont.....	NIRF	Do.	Wiekas.....	NATJ	Do.
Henderson.....	NESD	Do.	Wright.....	NIRN	Do.
Holland.....	NIRM	Do.			
Indianapolis.....	NABD	Do.			

GENERAL ORDERS OF THE FEDERAL RADIO COMMISSION

Additional frequencies allocated to aeronautical and aircraft services—Brown chain (General Order No. 112, May 4, 1931).—It is ordered: That General Order No. 99 be, and it is hereby amended in the following particulars: The frequencies hereinafter mentioned are hereby added to those already assigned the Southern Transcontinental Chain and Feeders (Brown):

(a) Mobile service.—3004 kc/s.—unlimited hours—to be used west and north of Chicago, Ill.; 5375 kc/s.—day only—to be used west and north of Chicago, Ill.

(b) Fixed service.—2680 kc/s.—unlimited hours—to be used west and north of Chicago, Ill.

Radio operators required to be on duty at location of transmitter except under certain conditions where transmitter is remotely controlled (General Order No. 113, May 11, 1931).—It is ordered that—

I. All stations licensed under the radio act of 1927 shall keep the licensed operator or operators of the grade specified by the Secretary of Commerce on duty during all periods of actual operation at the place where the radio transmitting apparatus is located; provided, however, that in the case of a remotely controlled transmitter delivering power to the antenna not in excess of 1,000 watts, operating on frequencies other than those in the broadcast band (550 to 1,500 kc.), the commission may authorize such operator or operators to be on

duty at the control station during all periods of operation of the station if and when

(1) The transmitter can be properly operated in accordance with the terms of the station's license;

(2) The transmitter will be monitored from the control station with apparatus which will permit placing the transmitter in an inoperative condition in the event there is a deviation from the terms of the license, in which case the radiation of the transmitter shall be suspended immediately until corrective measures are effectively applied to place the transmitter in proper condition for operation in accordance with the terms of the station license;

(3) The separation between the transmitter and the remote-control station does not exceed 5 miles by air-line distance; and

(4) The transmitter is so located or housed that it is not accessible to other than duly authorized persons.

II. A licensed operator in charge of the transmitter on duty as specified hereinabove may be employed at the discretion of the licensee for additional operator's duties commensurate with the grade of operator's license which he holds.

III. The person manipulating the transmitting key of a manually operated radiotelegraph mobile or amateur transmitting station shall be a regularly licensed operator. The licensees of other stations which are operated under the constant supervision of duly licensed operators may permit any person or persons, whether licensed or not, to transmit by voice or otherwise, in accordance with the type or types of emissions specified by their respective licenses.

Application for renewal of station licenses required to be filed sixty days prior to date of expiration and at other specified times when ordered. Licensee penalized for failure to do so (General Order No. 114, May 15, 1931).—It is ordered:

SECTION 1. Unless otherwise directed by the commission all applications for renewal of license shall be filed so as to be received at the office of the supervisor of radio in charge of the district in which the station is located at least 60 days prior to the expiration date of the license sought to be renewed. Where an applicant for renewal of license fails to meet these requirements and as a result thereof the commission fails to take action upon any such application before the expiration date of the license sought to be renewed, the licensee shall cease operating in accordance with the terms of said license and no temporary extension thereof will be granted pending decision of the commission on said delinquent application.

SEC. 2. In all cases where an application for renewal of license is regarded as essential to the proper conduct of a hearing or investigation by the commission and the commission as a result thereof specifically directs that the same be filed on or before a date certain, such application shall be filed so as to be received at the office of the supervisor of radio in charge of the district in which the station is located within the time specified by the commission. Upon the failure of any licensee to file an application within such time as the commission shall prescribe by specific direction or such extension thereof as the commission may grant upon proper showing, the commission shall proceed with the hearing upon the premise and assumption that said delinquent licensee does not desire or intend to make application for renewal of its existing license; said delinquent licensee shall be defaulted in the matter of said hearing and no renewal of license will be granted or issued to it.

SEC. 3. That General Order No. 89 be and the same is hereby repealed.

This order shall be effective on the day first above written.

Regulations governing the determination of the power of broadcasting stations (General Order No. 115, May 25, 1931).—It is ordered: That General Order No. 91 be and the same is hereby amended to read as follows:

SECTION 1. The maximum rated carrier power of all broadcast transmitters installed after this date shall be determined by the authorized power as given in Table I of this section. The maximum rated carrier power shall be determined as provided in section 2 of this general order.

TABLE I

Authorized power	Maximum rated carrier power allowed to be installed (watts)
(a) 5 to 100 watts	100
100 watts-night and 250 watts-day	250
(b) 250 to 1,000 watts	1,000
2,500 to 5,000 watts	5,000

(c) The maximum rated carrier power of transmitters hereafter installed in stations with an authorized power of over 5,000 watts shall be not more than twice the authorized power. Applicants requesting power from 5 to 50 watts, or from 250 to 500 watts, inclusive, may be allowed to install transmitters of the same maximum rated carrier power as the authorized power.

SEC. 2. The maximum rated carrier power of all broadcast transmitters shall be determined by the installed vacuum tube capacity of the last radio stage (that is oscillator or radio-frequency power amplifier which supplies power to the antenna), depending on the system of modulation employed.

(a) The maximum rated carrier power of transmitters employing high-level modulation shall be considered the same as the total installed tube power capacity of the last radio stage as determined by Table II.

(b) The maximum rated carrier power of transmitters employing low-level modulation shall be considered as one-fourth the total installed tube power capacity of the last radio stage as determined by Table II.

(c) The maximum rated carrier power of transmitters employing grid bias modulation on the last radio stage shall be considered the same as the total installed tube power capacity of the last radio stage as determined by Table III.

(d) If the methods of rating in paragraphs (a), (b), and (c) of this section do not give an even power rating, the nearest rating recognized in the commission's plan of allocation will be accepted.

(e) The power capacity of standard vacuum tubes commonly used in broadcast transmitters having a power rating of 50 watts and above as oscillators, class 3 or class C amplifiers, is fixed and approved as set out in Tables II and III hereafter set out in this section. Any vacuum tube of a type number and power rating not listed in Tables II or III may be specified and accepted on an application to the commission, provided the manufacturer's complete maximum and normal operating constants as oscillator or class 3 or class C amplifier and for class of service for which vacuum tube is specified in the application and complete curves which are considered necessary to determine the complete characteristics of the vacuum tube are submitted to and approved by the commission.

TABLE II

Power rating (watts)	De Forest Type No.	RCA-Radiotron type No.	Western Electric Type No.	Power rating (watts)	De Forest Type No.	RCA-Radiotron Type No.	Western Electric Type No.
50-----	503-A----- 511----- 545-----	UV-203-A----- UV-211----- UV-845-----	211-D----- 211-E----- 242-A----- 248-A----- 262-A-----	1,000----- 5,000-----	520-B----- 520-M----- 521-----	UV-851----- RCA-1652-----	228-A-----
75-----	552----- 580-----	UX-852----- UX-860-----		10,000-----	507----- 548----- 563-----	UV-207----- UV-848----- UV-863----- UV-868-----	220-B-----
250-----	504----- 504-A-----	UV-204-A-----	212-D-----	20,000----- 35,000-----			232-A-----
350-----	549-----	UV-849-----		100,000-----		UV-862-----	
500-----	561-----	UV-861-----	270-A-----				

TABLE III

Power rating (watts)	De Forest Type No.	RCA-Radiotron Type No.	Western Electric Type No.
50-----			270-A-----

SEC. 3. No licensee shall change the number of vacuum tubes or change to vacuum tubes of different power rating in the last radio stage or change the system of modulation except upon authority from the commission.

SEC. 4. The operating carrier power of broadcast stations shall be determined from the antenna input power either (a) by direct measurement or (b) by indirect measurement by means of the plate input power of the last radio stage.

(a) The antenna input power determined by direct measurement is the square of the antenna current times the antenna resistance at the place where the current is measured and at the operating frequency. The direct measurement of

the antenna input power will be accepted as operating power provided the data on the antenna resistance measurements are submitted under oath, giving detailed description of the method used and the data taken. The antenna current shall be measured by an ammeter of accepted accuracy. This data must be submitted to and approved by the commission before any licensee will be authorized to operate by this method of power determination.

Any licensee authorized by the commission to determine the operating power by direct measurement of antenna input power shall not make any changes in the antenna system except upon authority from the commission.

(b) The antenna input power shall be determined by indirect measurement from the plate input power of the last radio stage by multiplying plate voltage by the total plate current of the last radio stage and by the proper percentage given in Tables IV, V, or VI, in accordance with the power and system of modulation used.

The operating power of transmitters employing high-level modulation shall be computed from the maximum rated carrier power of the transmitter as determined by section 2 of this order and the plate input power in accordance with Table IV.

TABLE IV

Maximum rated carrier power of transmitters as determined by section 2	The operating power shall be this per cent of the total plate input.
5 to 100 watts.....	50 per cent.
250 to 1,000 watts.....	60 per cent.
2,500 to 50,000 watts.....	65 per cent.

The operating power of transmitters employing low-level modulation shall be computed from the maximum percentage of satisfactory modulation and the total plate input power in accordance with Table V. No distinction will be recognized between transmitters of different powers.

TABLE V

Maximum percentage of satisfactory modulation	The operating power shall be this per cent of the total plate input
100 to 86 per cent.....	33½ per cent
85 to 75 per cent.....	40 per cent

The operating power of transmitters employing grid bias modulation in the last radio stage shall be computed from the maximum percentage of satisfactory modulation and the total plate input power in accordance with Table VI. No distinction will be recognized between transmitters of different powers.

TABLE VI

Maximum percentage of satisfactory modulation	The operating power shall be this per cent of the total plate input
100 to 86 per cent.....	22½ per cent
85 to 75 per cent.....	27 per cent

In computing the operating power of stations by indirect measurement, the above percentages shall apply in all cases and no distinction will be recognized due to the operating power being less than the maximum rated carrier power.

SEC. 5. The operating power of broadcast stations determined by the radiated power computed from field intensity measurements may be accepted in lieu of antenna input power, provided a sufficient number of measurements are taken to insure accuracy and an analysis of the antenna system is submitted indicating the relative distribution of the radiation (that is, ground and sky wave radiation). The data on the antenna resistance, complete description of the antenna system with dimensions and method of taking field intensity measurements and of relating these measurements to the operating power shall be submitted to and approved by the commission before any licensee will be authorized to operate by this method of power determination.

Any licensee authorized by the commission to determine the operating power from radiated power shall not make any changes in the antenna system except upon the authority from the commission.

SEC. 6. All broadcast stations shall be required to maintain their operating power in exact accordance with their licensed power at all times during the broadcast day and no departure from the licensed power will be permitted in any case except upon specific authorization from the commission.

SEC. 7. Unless specifically authorized by the commission to do otherwise, all broadcast licensees shall compute their operating power by the antenna input indirect measurement, and any broadcast licensee which has at any time been authorized by the commission to compute its operating power by any other method (that is, antenna input direct measurement or radiated power measurement) shall upon making any change in its antenna system or in the antenna current measuring instruments, revert to the use of the antenna input indirect measurement until further order of the commission.

SEC. 8. (a) All broadcast stations shall be equipped with indicating instruments of accepted accuracy to measure the antenna current, direct-plate circuit voltage, and the direct-plate circuit current on the last radio stage.

(b) These indicating instruments shall not be changed or replaced except upon authority from the commission.

This order shall be effective on the day first above written.

Definition of technical terms used in General Order No. 115, May 25, 1931, relative to power of broadcasting stations

1. *Authorized or licensed power.*—The power assigned by the commission and specified in the instrument of authorization.

2. *Maximum rated carrier power.*—Determined by the design of the transmitter and orders of the commission and is independent of operating power except that generally it is the greatest power at which the transmitter can be satisfactorily operated.

3. *Operating power.*—The power that is actually transmitted by the station. It must be determined by one of the several methods set out in General Order No. 115 and must agree with the authorized or licensed power.

4. *Plate input power.*—The product of the direct plate voltage applied to the tubes in the last radio stage and the total direct plate current of these tubes, measured under conditions of no modulation.

5. *Radiated power.*—The total power radiated from the antenna at all angles. In the absence of actual measurements, it is considered to be 50 per cent of the antenna input power for all computations.

6. *Antenna input power or antenna power.*—Product of the total antenna resistance and the square of the antenna current.

7. *Last radio stage.*—The oscillator or radio-frequency power amplifier stage which supplies the power to the antenna.

8. *Modulation.*—The superimposing of audio-frequency power on radio-frequency power resulting in the generation of side bands or varying the peak amplitude of the output current and voltage. May be accomplished by several methods.

9. *System of modulation.*—Determined by stage modulated, the method, and subsequent amplification.

10. *Modulator.*—The last audio-frequency amplifier stage which modulates a radio stage by plate modulation or otherwise.

11. *Modulated stage.*—The radio-frequency amplifier stage which is coupled to the modulator and is modulated by one of the several methods.

12. *Percentage of modulation.*—The ratio of the amplitude of the difference between the maximum or minimum rectified antenna current during modulation and the rectified carrier under conditions of no modulation to the rectified carrier under conditions of no modulation, multiplied by 100. If the positive and negative modulation are of different percentages, the one giving the lesser percentage is considered as determining.

13. *Maximum percentage of satisfactory modulation.*—Defined as the greatest percentage that may be obtained by supplying sound energy to the station microphone without over 10 per cent combined audio-harmonics in the output being generated by the entire transmitter.

14. *High level modulation.*—The plate circuit of the last radio stage is modulated.

15. *Low level modulation.*—A stage before the last radio stage is modulated and the last stage operates only as a linear power amplifier.

16. *Grid bias modulation in the last radio stage.*—The grid bias voltage of the stage which supplies power to the antenna is controlled at audio frequency. If such modulation is employed in other than the last radio stage, it is low level modulation.

17. *Antenna resistance.*—The total resistance of the antenna system at the operating frequency and at the place of measuring the antenna current.

ADDRESS OF DENVER OFFICE CHANGED

All communications for the radio inspector at the suboffice of the ninth radio district in Denver, Colo., should be addressed to 538 Customhouse. The designation of the building previously occupied, as "customhouse," has been discontinued in view of the fact that the building now occupied has been given that name.

SECOND MEETING OF THE INTERNATIONAL TECHNICAL CONSULTING COMMITTEE ON RADIO COMMUNICATIONS

A meeting of the International Technical Consulting Committee on Radio Communications (C. C. I. R.) is now being held in Copenhagen, Denmark (May 27 to June 8, 1931).

The establishment of the C. C. I. R. was authorized by article 17 of the international radiotelegraph convention, signed at Washington, November 25, 1927.

Article 33 of the General Regulations referred to in article 17 charge the committee with its duties and limits its functions.

In accordance with paragraph 3 of article 33, the first meeting of the committee was held at The Hague from September 18 to October 2, 1929. That meeting left seven unanswered questions as subjects to be discussed at the second meeting at Copenhagen. Fourteen other subjects have been added to the original seven. In the list which follows, the name of the government proposing a subject is indicated in parentheses for each one after the original seven.

1. What are the most suitable methods, from a technical standpoint, to insure the good organization of a commercial radiotelephone service, especially long distance, connecting mobile stations—and particularly passenger-carrying vessels—to the public telephone networks?
2. Coordination of radiotelephony between fixed stations with the telephony on the land networks, particularly as concerns the following questions:
 - (a) What is the most suitable method for measuring noise levels under the special conditions of a radiotelephone circuit?
What should be the maximum tolerable limit of the noise level measured by this method?
 - (b) What instrument would be suitable to permit the special operator who is situated at the junction point between the radiophone connection and the metallic circuit to measure the voice level?
3. The study and perfecting of methods technically available for maintaining constant the stability of a transmitter.
4. The study and perfecting of methods for the comparison of frequency standards.
5. Calibration of wave meters.
6. The study of methods to be adopted to reduce interference in the bands shared by fixed and mobile stations above 6,000 kc/s. (wave lengths below 50 m.).
7. The study of technical possibilities of reducing the frequency band occupied by a transmitter, by the partial suppression of the frequency band transmitted (that is, the emission of a single side band only or of a side band and the carrier wave) for various types of transmission and types of service.
8. What measures are necessary to suppress harmonics of transmitters, and what is the permissible tolerance for the intensity of these harmonics? (Germany.)
9. What tolerance of overmodulation can one permit in telephone transmitters? (Germany.)
10. It would be desirable that the significance of the term "efficiency value of the current" appearing in the definition of the power of a transmitter, given by the C. C. I. R. in opinion No. 5 at its first meeting, and the manner of measuring this value be clearly and precisely stated. (Germany.)
11. What bands of waves, in accordance with recent progress in radio technique, are the most appropriate for the particular needs the various radio services must meet, taking into account wave-propagation factors? (Spain.)
12. Methods to be followed to cancel negative currents in arc transmitters. (Poland.)
13. Methods to be followed to cancel parasitic currents in receivers. (Poland.)
14. It is desirable to reserve some frequency bands exclusively for intercontinental long distance radiotelephone. (Dutch Indies.)
15. It would be desirable to modify the second opinion expressed by the C. C. I. T. (telephony) concerning the coordination of radiotelephony and telephony with wire in the international telephone service, which opinion is added as an annex to opinion No. 29 expressed at the first meeting of the C. C. I. R. at The Hague; in this sense as in the case of unfavorable radio electric conditions, it would be permissible to make prolongations in the radiophone connection by circuits of four wires. (Dutch Indies.)
16. Precision with which frequencies in kc/s. and wave lengths in meters should figure in the list of frequencies and in the other official documents published by the International Bureau of the Telegraph Union. (Italy.)
17. Revision and clarification of the table of frequency tolerances given in the fourteenth recommendation of the first meeting of the C. C. I. R. at The Hague. (United States.)
18. Revision and classification of the nineteenth recommendation of the C. C. I. R. at The Hague relative to the information to be published by the International Bureau. (United States.)
19. The relation of the selectivity and frequency stability of radio receiving systems used for various classes of service to the frequency separation between transmitting stations. (United States.)
20. The study of technical possibilities for suppressing emissions which are not essential to the type of communications conducted by stations of various classes. (United States.)
21. Formulation of the proposals of the C. C. I. R. to be submitted to the radio conference at Madrid (Denmark.)

BROADCASTING STATION FREQUENCY MEASUREMENTS DURING APRIL

The Radio Division of the Department of Commerce during the month of April measured the frequency (kilocycles-wave lengths) of 314 broadcasting stations located in practically all sections of the United States. The frequencies of these stations were measured for an aggregate of 6,359 times.

As only 314 stations out of the 612 broadcasting stations in the United States and detached territories were measured, it must be borne in mind that many of those not measured undoubtedly are as efficient as those given in the lists hereunder.

UNDER 50 CYCLES

Call signal	Transmitter location, studio location in parentheses	Call signal	Transmitter location, studio location in parentheses
KFDM	Beaumont, Tex.	WGY	Schenectady, N. Y.
KFEQ	St. Joseph, Mo.	WHAP	Carlstadt, N. J. (New York, N. Y.).
KFH	Wichita, Kans.	WHB	Kansas City, Mo.
KFKX	} Bloomingdale Township, Ill. (Chicago).	WHO	Des Moines, Iowa.
KYW		WIBW	Topeka, Kans.
KFQU	Alma-Holy City, Calif.	WILL	Urbana, Ill.
KFRG	San Francisco, Calif.	WJAG	Norfolk, Nebr.
KFSD	San Diego, Calif.	WKBH	La Crosse, Wis.
KFUO	Clayton, Mo.	WKBI	Chicago, Ill.
KFVD	Culver City, Calif.	WKBN	Youngstown, Ohio.
KFXF	Denver, Colo.	WKRO	Cincinnati, Ohio.
KFYR	Bismarck, N. Dak.	WKZO	Berrien Springs, Mich.
KGNF	North Platte, Nebr.	WLBX	Long Island City, N. Y.
KGW	Portland, Oreg.	WLBZ	Bangor, Me.
KHQ	Spokane, Wash.	WLS	Downers Grove, Ill. (Chicago).
KJR	Seattle, Wash.	WMCA	Hoboken, N. J. (New York, N. Y.).
KMMJ	Clay Center, Nebr.	WMSG	New York, N. Y.
KMO	Tacoma, Wash.	WMT	Waterloo, Iowa.
KRSC	Seattle, Wash.	WNAX	Yankton, S. Dak.
KUOA	Fayetteville, Ark.	WOC	Davenport, Iowa.
WAAW	Omaha, Nebr.	WOR	Kearny, N. J. (Newark).
WABC	} New York, N. Y.	WOW	Omaha, Nebr.
WBOQ		WPAW	} Cliffside, N. J. (New York, N. Y.).
WCAH	Columbus, Ohio (Fort Hayes).	WQAO	
WCBM	Baltimore, Md.	WPBW	Pawtucket, R. I.
WCCO	Anoka, Minn. (Minneapolis).	WPCC	Chicago, Ill.
WCFL	Chicago, Ill.	WPTF	Raleigh, N. C.
WCSH	Scarboro, Me. (Portland).	WRJN	Racine, Wis.
WDAF	Kansas City, Mo.	WRUF	Gainesville, Fla.
WEAF	Bellmore, N. Y. (New York, N. Y.).	WSAR	Fall River, Mass.
WEAN	Providence, R. I.	WSB	Atlanta, Ga.
WEI	Weymouth, Mass. (Boston).	WSBC	Chicago, Ill.
WENR	} Downers Grove, Ill. (Chicago).	WSEN	Columbus, Ohio
WBCN		WTAG	Worcester, Mass.
WFAA	Grapevine, Tex. (Dallas).	WTAM	Breckesville Village, Ohio (Cleveland).
WFBL	Collamer, N. Y. (Syracuse).	WTIC	Avon, Conn. (Hartford).
WGES	Chicago, Ill.	WWVA	Wheeling, W. Va.
WGR	Amherst, N. Y. (Buffalo).	WXYZ	Detroit, Mich.

(UNDER 100 CYCLES)

KFAB	Lincoln, Nebr.	WDBJ	Roanoke, Va.
KFBB	Great Falls, Mont.	WEHS	Evanston, Ill.
KFI	Los Angeles, Calif.	WFIW	Hopkinsville, Ky.
KFNF	Shenandoah, Iowa.	WGST	Atlanta, Ga.
KFOR	Lincoln, Nebr.	WJAS	Pittsburgh, Pa.
KFOX	Long Beach, Calif.	WJAX	Jacksonville, Fla.
KGER	Do.	WJSV	Mt. Vernon Hills, Va. (Alexandria).
KGGF	Picher, Okla.	WJZ	Bound Brook, N. J. (New York, N. Y.).
KGO	Oakland, Calif. (San Francisco).	WKAR	Lansing, Mich.
KLS	Oakland, Calif.	WLEY	Lexington, Mass.
KMBC	Independence, Mo. (Kansas City).	WLIT	Philadelphia, Pa.
KMOX	St. Louis, Mo.	WLWL	Kearny, N. J. (New York, N. Y.).
KMPC	Beverly Hills, Calif.	WMAL	Washington, D. C.
KPO	San Francisco, Calif.	WMAQ	Addison, Ill. (Chicago).
KSCJ	Sioux City, Iowa.	WMBC	Detroit, Mich.
KSD	St. Louis, Mo.	WNYC	New York, N. Y.
KTAR	Phoenix, Ariz.	WOL	Washington, D. C.
KTM	Santa Monica, Calif. (Los Angeles).	WOQ	Kansas City, Mo.
KTRH	Houston, Tex.	WPG	Atlantic City, N. J.
KWKH	Kennonwood, La. (Shreveport).	WRAX	Philadelphia, Pa.
WAAF	Chicago, Ill.	WRVA	Mechanicsville, Va. (Richmond).
WAAW	Newark, N. J.	WSM	Nashville, Tenn.
WBAK	Harrisburg, Pa.	WSMB	New Orleans, La.
WBCM	Hampton Township, Mich. (Bay City).	WSUI	Iowa City, Iowa.
WCAO	Baltimore, Md.	WTAQ	Township of Washington, Wis. (Eau Claire).
WCBA	Allentown, Pa.	WTMJ	Brookfield, Wis. (Milwaukee).
WCRW	Chicago, Ill.	WWL	New Orleans, La.

UNDER 200 CYCLES

Call signal	Transmitter location, studio location in parentheses	Call signal	Transmitter location, studio location in parentheses
KBPS	Portland, Oreg.	WDAY	Fargo, N. Dak.
KEA	Do.	WDBO	Orlando, Fla.
KFBK	Sacramento, Calif.	WDEL	Wilmington, Del.
KFJR	Portland, Oreg.	WEAO	Columbus, Ohio.
KFPY	Spokane, Wash.	WEXL	Royal Oak, Mich.
KFRU	Columbia, Mo.	WFI	Philadelphia, Pa.
KFWB	Hollywood, Calif.	WFLA	Clearwater, Fla. (additional studio in St. Petersburg).
KGA	Spokane, Wash.	WSUN	
KGBZ	York, Nebr.	WGAR	Akron, Ohio.
KGDM	Stockton, Calif.	WGN	Elgin, Ill. (Chicago).
KGFI	Los Angeles, Calif.	WLIB	
KGFW	Ravenna, Nebr.	WHAM	Victor Township, N. Y. (Rochester).
KGIR	Butte, Mont.	WHDH	Gloucester, Mass. (Boston).
KIDO	Boise, Idaho.	WHFC	Cicero, Ill.
KLZ	Denver, Colo.	WHP	Lemoyme, Pa. (Harrisburg).
KMA	Shenandoah, Iowa.	WIBA	Madison, Wis.
KMJ	Fresno, Calif.	WIBO	Desplaines, Ill. (Chicago).
KNX	Los Angeles, Calif. (Hollywood).	WIMM	Carrcroft, Edge Moor, Del.
KOA	Denver, Colo.	WISN	Milwaukee, Wis.
KOB	State College, N. Mex.	WJAR	Providence, R. I.
KOIL	Council Bluffs, Iowa.	WJAY	Cleveland, Ohio.
KPCB	Seattle, Wash.	WJAZ	Mt. Prospect, Ill. (Chicago).
KRLD	Dallas, Tex.	WKBF	Sylvan Lake Village, Mich. (Detroit).
KROW	Richmond, Calif. (Oakland).	WKBO	Clermont, Ind. (Indianapolis).
KSO	Clarinda, Iowa.	WKY	Jersey City, N. J.
KTAB	Oakland, Calif. (San Francisco).	WLBW	Oklahoma City, Okla.
KTBR	Portland, Oreg.	WLTH	Oil City, Pa.
KTSS	Hot Springs, Ark.	WLW	Brooklyn, N. Y.
KVI	Des Moines, Wash. (Tacoma).	WMAK	Mason, Ohio (Cincinnati).
KVOO	Tulsa, Okla.	WMBD	Grand Island, N. Y. (Buffalo).
KWJJ	Portland, Oreg.	WMBI	Peoria Heights, Ill.
KWK	Kirkwood, Mo. (St. Louis).	WMC	Addison, Ill. (Chicago).
KYA	San Francisco, Calif.	WMPC	Bartlett, Tenn. (Memphis).
WAAB	Lexington, Mass. (Boston).	WNAO	Lapeer, Mich.
WAIU	Columbus, Ohio.	WOAI	Quincy, Mass. (Boston).
WBAP	Grapevine, Tex. (Fort Worth).	WODX	Selma, Tex. (San Antonio).
WBMM	Glenview, Ill. (Chicago).	WOKO	Springhill, Ala. (Mobile).
WJBT		Needham, Mass.	WOS	Mount Beacon, N. Y. (Poughkeepsie).
WBSO	Charlotte, N. C.	WOWO	Jefferson City, Mo.
WBT	Millis Township, Mass. (Boston).	WPEN	Fort Wayne, Ind.
WBZ	Boston, Mass.	WRC	Philadelphia, Pa.
WBZA	Lincoln, Nebr.	WSPD	Washington, D. C.
WCAJ	Camden, N. J.	WSSH	Toledo, Ohio.
WCAU	Byberry, Pa. (Philadelphia).	WTAD	Boston, Mass.
WCHI	Deerfield, Ill. (Chicago).	WVAE	Quincy, Ill.
WCKY	Crescent Springs, Ky. (Covington).	WWJ	Hammond, Ind.
WOOD	Harrisburg, Pa.		Detroit, Mich.

The following table offers a comparison of the measurements made during the months beginning with December, 1930:

	Number measured	Under 50	Under 100	Under 200	Over 200
December	339	-----	35 (13.5%)	66 (16.5%)	238 (70%)
January	363	-----	54 (15%)	102 (27%)	207 (58%)
February	367	-----	99 (27%)	55 (15%)	213 (58%)
March	337	65 (19.3%)	63 (18.8%)	77 (22.8%)	132 (39.1%)
April	314	72 (22.9%)	54 (17.2%)	92 (29.3%)	96 (30.6%)

TABLE OF AIR-LINE DISTANCES IN STATUTE MILES

From/To—	Carson, Nev.	Charleston, W. Va.	Cheyenne, Wyo.	Concord, N. H.	Dover, Del.	Hartford, Conn.	Indianapolis, Ind.	Jackson, Miss.	Madison, Wis.	Montgomery, Ala.	Montpelier, Vt.	Providence, R. I.	Raleigh, N. C.	Topeka, Kans.	Trenton, N. J.
Carson, Nev. ....	.....	2,040	800	2,488	2,346	2,451	1,782	1,717	1,595	1,922	2,425	2,513	2,248	1,288	2,367
Charleston, W. Va.	2,040	.....	1,243	825	334	529	262	638	521	489	622	591	242	758	359
Cheyenne, Wyo.	800	1,243	.....	1,699	1,546	1,656	984	1,012	801	1,187	1,640	1,719	1,458	504	1,568
Concord, N. H.	2,488	825	1,699	.....	348	115	792	1,262	898	1,097	90	95	637	1,284	265
Dover, Del.	2,346	334	1,546	348	.....	234	569	948	769	763	384	284	289	1,078	84
Hartford, Conn.	2,451	529	1,656	115	234	.....	718	1,163	856	990	173	65	523	1,221	153
Indianapolis, Ind.	1,782	262	984	792	569	718	.....	563	283	511	762	783	495	510	603
Jackson, Miss.	1,717	638	1,012	1,262	948	1,163	563	.....	746	227	1,258	1,223	703	558	1,016
Madison, Wis.	1,595	521	801	898	769	856	283	746	.....	758	842	918	762	430	779
Montgomery, Ala.	1,922	489	1,187	1,097	763	990	511	227	758	.....	1,105	1,046	497	699	839
Montpelier, Vt.	2,425	622	1,640	90	384	173	762	1,258	842	1,105	.....	178	667	1,241	301
Providence, R. I.	2,513	591	1,719	95	284	65	783	1,223	918	1,046	178	.....	570	1,286	207
Raleigh, N. C.	2,248	242	1,458	637	289	523	495	703	762	497	667	570	.....	960	372
Topeka, Kans.	1,288	758	504	1,284	1,078	1,221	510	558	430	699	1,241	1,286	960	.....	1,113
Trenton, N. J.	2,367	359	1,568	265	84	153	603	1,016	779	839	301	207	372	1,113	.....

NOTE.—A table giving the air-line distances between 50 cities other than those shown above may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

RADIO TRANSMISSIONS OF STANDARD FREQUENCY, JULY, AUGUST, SEPTEMBER, 1931

The Bureau of Standards announces a new schedule of radio transmissions of standard frequencies. This service may be used by broadcasting and other stations in adjusting their transmitters to exact frequency and by the public in calibrating frequency standards and transmitting and receiving apparatus. The signals are transmitted from the bureau's station WWV, Washington, D. C., every Tuesday afternoon and evening. They can be heard and utilized by stations equipped for continuous-wave reception at distances up to about 1,000 miles from Washington, and some of them at all points in the United States. The time schedules are different from those used in transmissions prior to this July.

There are two classes of transmissions provided: One, transmission of the highest accuracy at 5,000 kc/s. for two hours afternoon and two hours evening on three Tuesdays in each month; the other, transmissions of a number of frequencies in 2-hour periods in the afternoon and evening, one Tuesday a month. The transmissions are by continuous-wave radio telegraphy. The 5,000-kc. transmissions consist mainly of a continuous CW transmission, giving a continuous whistle in the receiving phones. The first five minutes of this transmission consist of the general call (CQ de WWV) and announcement of the frequency. The frequency and the call letters of the station (WWV) are given every 10 minutes thereafter. The transmissions of the other type are also by continuous-wave radiotelegraphy.

A complete frequency transmission includes a "general call," "standard frequency signal," and "announcements." The general call is given at the beginning of each 18-minute period and continues for about two minutes. This includes a statement of the frequency. The standard frequency signal is a series of very long dashes with the call letters (WWV) intervening; this signal continues for about eight minutes. The announcements follow and contain a statement of the frequency being transmitted and of the next frequency to be transmitted. There is then a 6-minute interval while the transmitting set is adjusted for the next frequency.

Information on how to receive and utilize the signals is given in Bureau of Standards Letter Circular No. 280, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even though only a few frequencies are received (or even only a single one), persons can obtain as complete a frequency meter calibration as desired by the methods of generator harmonics.

The 5,000-kc. transmissions are from a transmitter of 1-kilowatt power; they occur every Tuesday except the first in each month. The other transmissions are from a transmitter of one-half kilowatt power; they are given on the first Tuesday of every month.

5,000-kilocycle transmissions

2 TO 4 P. M. AND 10 P. M. TO 12 MIDNIGHT, EASTERN STANDARD TIME

July	August	Sep- tember
14	11	8
21	18	15
28	25	22
-----	-----	29

MULTIFREQUENCY TRANSMISSIONS

Eastern standard time		Frequencies in kilocycles		
		July 7	August 4	Sep- tember 1
<i>P. m.</i>	<i>P. m.</i>			
2. 00	10. 00	1, 600	3, 600	6, 400
2. 18	10. 18	1, 800	4, 000	7, 000
2. 36	10. 36	2, 000	4, 400	7, 600
2. 54	10. 54	2, 400	4, 800	8, 200
3. 12	11. 12	2, 800	5, 200	8, 800
3. 30	11. 30	3, 200	5, 800	9, 400
3. 48	11. 48	3, 600	6, 400	10, 000

The frequencies in the 5,000-kc. transmissions are piezo controlled, and are accurate to much better than a part in a million. The frequencies in the multi-frequency transmissions are manually controlled, and are accurate to a part in a hundred thousand.

Since the start of the 5,000-kc. transmissions the Bureau of Standards has been receiving reports regarding the reception of these transmissions and their use for frequency measurements from nearly all parts of the United States, including the Pacific coast and Alaska. The bureau is desirous of receiving more reports on these transmissions, especially because radio transmission phenomena change with the season of the year. The data thus far obtained cover the first six months of 1931, and give information regarding approximate field intensity, fading, and the suitability of the transmissions for frequency measurements.

It is suggested that in reporting upon the field intensity of these transmissions the following designations be used where field intensity measurements apparatus is not at hand: (1) Hardly perceptible, unreadable; (2) weak, readable now and then; (3) fairly good, readable with difficulty; (4) good, readable; and (5) very good, perfectly readable.

A statement as to whether fading is present or not is desired, and if so, its characteristics, such as whether slow or rapid and time between peaks of signal intensity. Statements as to the type of receiving set used in reporting on the transmissions and the type of antenna used are likewise desired. The bureau would also appreciate reports on the use of the transmissions for purposes of frequency measurement or control.

Reports on the reception of the transmissions should be addressed to Bureau of Standards, Washington, D. C.

KENNELLY-HEAVISIDE LAYER HEIGHT MEASUREMENTS

The Bureau of Standards carries on a series of studies of the height of the Kennelly-Heaviside layer. The height of this layer above the earth's surface varies from 40 to 400 miles, and is the principal factor determining the distance of transmission of radio waves on different high frequencies. The study of this height is the most powerful means available of studying the vagaries of radio transmission. Considerable work has been done on the measurement of layer heights by the echo (or reflection or group retardation) method. With this method a very brief and sharp radio-frequency pulse (of a few ten-thousandths second duration) is transmitted 30 times per second from a transmitter to a receiver about 10 miles away. If the waves travel only along the ground a single pulse is obtained at the receiving station each thirtieth of a second. If, however,

a part of the waves travel upward and the Kennelly-Heaviside layer reflects or refracts them back to the receiver, two or more pulses are received instead of one. The sky-wave pulses are retarded behind the ground-wave pulse because they have traveled a longer path. The amount of this retardation is usually from a few ten-thousandths of a second to a few thousandths of a second. At the receiving station the pulses are photographed on the moving film of an oscillograph, and the time retardation of the delayed pulses thus measured. From the time retardation and the known velocity of propagation in free space the effective height of the reflecting or refracting layer is determined.

Beginning June 1, the bureau will issue a weekly bulletin giving KHL heights. This will be broadcast by radio telegraphy from the Arlington naval radio station, as a part of the Ursigram bulletins of cosmic data compiled by Science Service and distributed by that organization in mimeographed form to interested scientists.

Apparatus for this work has not been highly developed previously. For satisfactory work the transmitter should send out a strong pulse lasting a ten-thousandth second, and the receiving equipment, including the oscillograph, should be capable of receiving this without distortion or widening of the pulse. The Bureau of Standards has been developing such apparatus. This includes the development of a transmitter with suitable pulse-making equipment, special receiving sets and amplifiers. A continuous automatic recorder of Kennelly-Heaviside heights has also been devised, and will permit the issuing of daily bulletins of the height if found desirable. It is expected that papers will be published during the present year describing the apparatus. When such papers are published announcements will be made in these columns.

CHARACTERISTICS OF AIRPLANE ANTENNAS FOR RADIO RANGE BEACON RECEPTION

In a paper of the above title, by H. Diamond and G. L. Davies, Research Paper No. 313, Bureau of Standards Journal of Research, May, 1931, results are given of a theoretical and experimental study of a number of types of airplane antennas, to determine whether an antenna could be devised which would have the desirable electrical characteristics of the vertical pole antenna with none of its mechanical difficulties. The received voltage, course error, and localizing effect are calculated for each of several types of antennas, and the results of these calculations checked by experimental work. The study shows that a symmetrical T antenna, either transverse or longitudinal, with a vertical lead-in, is immune to course errors and gives the same received voltage as a vertical pole antenna with very much less physical height.

Reprint copies of this paper will be available within a few weeks and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price will be quoted by that office on application.

U. S. GOVERNMENT PRINTING OFFICE: 1931