CHAPTER XII

RADIO ACT OF 1912

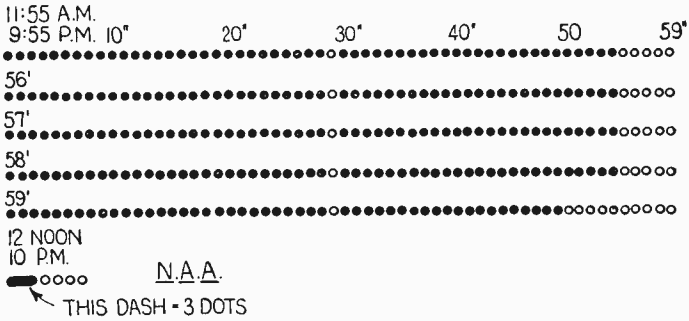
Miscellaneous Radio Information

List of Broadcasting Stations in United States and Canada

TIME SIGNALS

United States and Possessions

The stations listed below send time daily for five minutes, starting at five minutes before the time set opposite each station. Each tick of a standard clock is transmitted as a dot, omitting the 29th second of each minute, the last five seconds of each of the first four minutes, and finally the last ten seconds of the last minute. A dash is sent at the time given opposite the station.



Station	Call	Wave-Length	Time
Annapolis, Md.	NSS	17,000 Arc	Noon, 10.00 P.M. 75th meridian standard time.
Arlington, Va.	NAA	2,650 Spark	Noon, 10.00 P.M. 75th meridian standard time.
Key West, Fla.	NAR	1,500 Spark	Noon, 75th meridian standard time.
New Orleans, La.*	NAT	1,000 Spark	Noon, 75th meridian standard time.
Darien, C. Z.	NBA	10,110 Spark	5.00 A.M.; 1.00 P.M. 75th meridian standard time.

* Time signals not sent on Sundays and holidays.

Station	Call	Wave-Length	Time
Honolulu	NPM	800 Arc	from 23,55 to 24,00 GMT.
Cavite, Philippine Isl.	NPO	952 Spark	from 02,55 to 03,00 GMT and from 13,55 to 14,00 GMT.
Cavite, Philippine Isl.	NPO	5,000 Arc	from 01,55 to 02,00 and from 14,55 to 15,00 GMT.
Pt. Arguello, Cal.*	NPK	1,512 Spark	Noon, 120th meridian, west, standard time.
North Head, Wash.*	NPE	2,800 Spark	Noon, 120th meridian, west, standard time.
San Francisco, Cal.	NPG	2,400 Spark	Noon, 120th meridian, west, standard time.
San Francisco, Cal.	NPG	4,800 Arc	Noon, 120th meridian, west, standard time.
Great Lakes, Ill.*	NAJ	1,512 Spark	11.00 A.M., 90th meridian standard time.
Eureka, Cal.*	NPW	2,000 Spark	Noon, 120th meridian, west, standard time.
Balboa, Panama (undamped-Chopper)	NBA	7,000 Arc	5.00 A.M., 1.00 P.M., 75th meridian standard time.
Colon, Panama	NAX	1,500 Spark	5.00 A.M., 1.00 P.M., 75th meridian standard time.
San Diego, Cal.	NPL	2,400 Spark	Noon, 120th meridian, west, standard time.
San Diego, Cal.*	NPL	9,800 Arc	Noon, 120th meridian standard time.
Pearl Harbor, T. H.	NPM	11,200 Arc	180th meridian, mean noon.
Pearl Harbor, T. H.	NPM	600 Spark	180th meridian, mean noon.

SCHEDULE OF WEATHER REPORTS

United States and Possessions

Name of Station	Call Letter	Broadcasting Hour (75th Meridian Time)	Wave-Length
Arlington, Va.	NAA	10.30 A.M., Noon, 10 P.M.	2650
Key West, Fla.	NAR	10 P.M.	1500
Point Isabel, Tex.	NAY	12 Midnight	2350
Point Isabel, Tex.	NAY	Noon, 7 P.M.	2250

* Time signals not sent on Sundays and holidays.

Name of Station	Call Letter	Broadcasting Hour (75th Meridian Time)	Wave-Length
Great Lakes, Ill.*	NAJ	Noon, 10 P.M.	1500
San Juan, P. R.**	NAU	10 A.M., 9 P.M., 600 Spark and 5250 C.W.	
San Juan, P. R.	NAU	When issued and repeated at about 4-hour intervals	2750
Portland, Me.	NAB	Noon, 8 P.M.	1620
Boston, Mass.	NAD	11. A.M., 5 P.M.	2250
New York, N. Y.	NAH	10.30 A.M., 5 P.M.	1832
Philadelphia, Pa.	NAI	10.45 A.M., 5 P.M.	1948
Baltimore, Md.	NBZ	10.30 A.M., 4 P.M.	700
Norfolk, Va.	NAM	10.45 A.M., 4 P.M., 8 P.M.	1851
Charleston, S. C.,	NAO	10.30 A.M., 6 P.M.	2250
Savannah, Ga.	NEV	11 A.M., 6 P.M.	1813
Jacksonville, Fla.	NFI	11 A.M., 6 P.M.	450
St. Augustine, Fla.	NAP	11.30 A.M., 7 P.M.	1851
Miami, Fla.	NGE	11.30 A.M., 6 P.M.	1620
St. Petersburg, Fla.	NGL	11.30 A.M., 7 P.M.	2700
Pensacola, Fla.	NAS	11.45 A.M., 6 P.M.	2250
New Orleans, La.	NAT	11 A.M., 5 P.M.	1832
Galveston, Tex.	NKB	11.30 A. M., 6 P.M.	1813
Alpena, Mich.	NSM	10.45 A.M., 11.45 A.M., 4.45 P.M., 7.45 P.M.	1200
Buffalo, N. Y.	NNZ	10.45 A.M., 4.45 P.M.	1200
Cleveland, Ohio	NRH	11 A. M., 5.30 P.M.	1080
Chicago, Ill.	NUR	11 A.M., 5.30 P.M.	1200
Duluth, Minn.	NUX	10.45 A.M., 4.45 P.M.	2200
Guantanamo, Cuba	NAW	When issued and repeated at about 4-hour intervals	2750
Port au Prince, Haiti	NSC	When issued and repeated at about 4-hour intervals	2250
St. Thomas, V. I.	NBB	When issued and repeated at about 4-hour intervals	1688
St. Croix, V. I.	NNI	When issued and repeated at about 4-hour intervals	450
San Francisco, Cal.	NPH	Noon, 10 P.M., 120th Mer.	950
North Head, Wash.	NPE	Noon, 10 P.M., 120th Mer.	950
San Diego, Cal.	NPL	Noon, 10 P.M., 120th Mer.	950

* Distribution is made from this station from April 15th to December 20th.

**Distribution is made from this station from June to November, inclusive.

NOTE: Noon transmission for Arlington and Great Lakes are storm warnings, and 10 A.M. and when "issued transmission" for San Juan are hurricane warnings.

All afternoon and evening transmission listed above, beginning with Portland, Maine, and ending with St. Croix, V. I., are storm or hurricane warnings and advices.

ABBREVIATIONS USED IN WEATHER REPORTS

Atlantic Coast

Sydney, N. S. ..... S
Nantucket, Mass. ..... T
Breakwater, Delaware .....DB
Hatteras, N. C. ..... H
Charleston, S. C. C
Key West, Fla. ..... K
Pensacola, Fla. ..... P
Bermuda ..... B
St. Johns, N. F. ..... J
New York, N. Y. .....NY
Lynchburg, Va. .....LB
Cape Henry, Va. .....CH
Asheville, N. C. .....AV
Atlanta, Ga. .....AT
Jacksonville, Fla. .....JA
Tampa, Fla. .....TA
Mobile, Ala. .....MO
Burrwood, La. .....BW
Galveston, Tex. .....GV
Brownsville, Tex. .....BV
Fort Worth, Tex. .....FW
Corpus Christi, Tex. .....GV
Kingston, Jamaica .....KN
Turks Island .....TI
Havana, Cuba .....HA
Guantanamo Bay .....GO
Swan Island .....SI
San Juan, P. R. .....SJ
St. Thomas, Virgin Isls.....ST
Basseterre, St. Kitts .....BT
Roseau, Dominican Republic..RS
Bridgetown, Barbadoes .....BB
Santo Domingo, Dominican Republic .....SD
Puerto Plata, Dominican Republic .....SL
Castries, St. Lucia .....LU
Willemstadt, Curacao ..... W
Port of Spain, Trinidad .....PS

Great Lakes

Duluth, Minn. .....DU
Marquette, Mich. ..... M
Sault Ste. Marie, Mich..... U
Green Bay, Mich. ..... G
Chicago, Ill. .....CH
Alpena, Mich. L
Detroit, Mich. ..... D
Cleveland, Ohio V
Buffalo, N. Y. ..... F
Grand Haven, Mich. .....GH
Father Point, Can. .....FP
Montreal, Canada .....ML
St. Louis, Mo. .....SL
Little Rock, Ark. .....LR
Nashville, Tenn. .....NV
Cincinnati, Ohio .....CN

Pacific Coast

Tatoosh, Wash. ..... T
North Head, Wash. .....NH
Eureka, Cal. ..... E
San Francisco, Cal. .....SF
San Diego, Cal. .....SD

ARLINGTON WEATHER REPORT. 2,500 METERS N.A.A.

Sample Report: QSTdeNAA, USWB, So1081—To2261 DB 0251—H 00844—C 01261—K 004410—P 01243.

EXPLANATION

QST — General call
de — From
NAA — Arlington Station
USWB — U. S. Weather Bureau
S — Sydney, Nova Scotia
"010" — 30.10 inches, Barometer
"8" — Wind Northwest
"1" — Light air

T — Nantucket, R. I.
"022" — 30.22 inches, Barometer
"6" — Southwest wind
"1" — Light air

DB — Delaware Breakwater
"020" — 30.20 inches, Barometer
"5" — South wind.
"1" — Light air

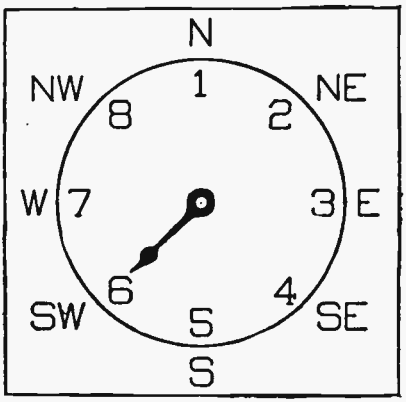
H — Cape Hatteras
"008" — 30.08 inches, Barometer
"4" — Southeast wind
"4" — Moderate breeze

C — Charleston, S. C.
"012" — 30.12 inches, Barometer
"6" — Southwest wind
"1" — Light air

K — Key West, Fla.
"004" — 30.04 inches, Barometer
"4" — Southeast wind
"10" — Whole gale.

P — Pensacola, Fla.
"012" — 30.12 inches, Barometer
"4" — Southeast wind
"3" — Gentle breezes.

BEAUFORT WIND INTENSITY SCALE



		Statute Miles Per Hour
0	Calm	0—8
1	Light Air	8
2	Light Breezes	18
3	Gentle Breezes	18
4	Moderate Breezes	23
5	Fresh Breezes	28
6	Strong Breezes	34
7	Moderate Gale	40
8	Fresh Gale	48
9	Strong Gale	56
10	Whole Gale	65
11	Storm	75
12	Hurricane	90

Statute Miles per Hour:—1.15 Nautical—M.P.H.

U. S. STATIONS SENDING MARKET REPORTS

Name of Station	Call Letters	Wave-Lengths Call-Work		Broadcasting Hours
Washington, D. C. ...	WWX	3800	3850	7.30 and 8.00 P.M.
Hazelhurst, N. Y. ..	WWU	3800	3400	
Bellefonte, Pa.	WWQ	3800	3450	
Cincinnati, Ohio	KDQC	3800	3600	9.00 and 11.00 A.M., 12.00
		3000		Noon, 7.30 and 8 P.M.
St. Louis, Mo.	KDEL	3800	3675	9.15, 11.30 A.M., 12.30, 3.30, 8.15 and 8.45 P.M.

Name of Station	Call Letters	Wave-Lengths Call-Work		Broadcasting Hours
Omaha, Neb.	KDEF	2900	4167	9.00, 11.00 A.M., 12.00 Noon, 2.00, 3.00, 5.30, 8.00 and 8.30 P.M.
North Platte, Neb...	KDHM	2900	3400	9.30 A.M., 12.00 Noon, 6.00 and 9.00 P.M.
Rock Springs, Wyo...	KDHN	2900	3200	9.00 A.M., 12.00 Noon, 6.30, 8.00 and 8.30 P.M.
Cheyenne, Wyo.	KDEG	2900	3740	
Salt Lake City, Utah.	KDEH	2200	3600	
Elko, Nevada	KDEJ	2200	3400	8.30 A.M., 12.00 Noon, 4.00 P.M.
Reno, Nevada.	KDEK	2200	2800	9.00 A.M., and 1.00 P.M.

Stations are also now being installed at Bryan, Ohio, and Iowa City, Iowa.

The above stations are all 2-KW Federal arc transmitters and are not only used for furnishing communications to the Air Mail Service, but they are also utilized in broadcasting agricultural market reports, and weather reports. Broadcasts are now being transmitted from the stations as shown above at the hours listed.

PRESS SCHEDULES OF SPARK STATIONS

Call	Station	Wave-Length Meters	Time
NAA	Washington, D. C.	2650	10 P.M., 75th meridian
NAR	Key West, Fla.	1500	10 P.M., 75th meridian
NAX	Colon, Panama	2400	10 P.M., 75th meridian
NPG	San Francisco, Cal.	600	1.15 A.M., local time
KHK	Honolulu, Hawaii	600	11.30 P.M., local time
NAH	New York, N. Y.	1500	9.00 P.M., 5 A.M., local time
NPL	San Diego, Cal.	2400	
BZM	St. Johns, N. F., ...	1500	7.30 A.M. (GMT)*
VCU	Barrington Passage, N. F..	1500	8.00 A.M. (GMT)
BZL	Demerara, British Guiana..	1300	6.00 A.M. (GMT)
BZN	Falklands	4300	3.30 A.M. (GMT)
BYZ	Malta (Rinella)	2650	9.00 A.M., 7.00 P.M. (GMT)
OAZ	San Cristobal, Peru	1500	2.00 A.M., 3.30 P.M. (GMT)

* Greenwich (England) mean time.

Call	Station	Wave-Length Meters	Time
BXY	Hong Kong, China	2000	9.45 P.M. (GMT)
BXW	Singapore	2000	9.15 P.M. (GMT)
BZE	Matara, Ceylon	2000	8.45 P.M. (GMT)
BZF	Aden, British Somaliland	2000	7.30 P.M. (GMT)
BZH	Seychelles	2000	9.45 P.M. (GMT)
BZG	Mauritius	2000	10.30 P.M. (GMT)
BZI	Durban, South Africa	2000	3.15 P.M. (GMT)
VMG	Apia, Samoa	2000	11.30 A.M. (GMT)
VLA	Awanui	2000	7.15 A.M. (GMT)
VLB	Awarua, Australia	2000	10.45 A.M. (GMT)
VID	Darwin, Australia	850	6.30 P.M. (GMT)
VKT	Naura, Australia	2200	7.00 P.M. (GMT)
VIP	Perth, Australia	1500	4.30 P.M. (GMT)
VJZ	Rabaul, Australia	2900	6.00 P.M. (GMT)
VIS	Sydney, Australia	2000	3.30 P.M. (GMT)
VIT	Tounsville, Australia	1000	4.30 P.M. (GMT)
VIF	Woodlark Isl., Australia	1000	5.00 P.M. (GMT)
UA	Nantes, France	2400	3.30 A.M., 3.45 P.M. (GMT)
FL	Paris, France	2500	3.00 P.M. (GMT)
YN	Lyons, France	5000	8.00 A.M. (GMT)

LIST OF ABBREVIATIONS USED IN RADIO CODE

Abbreviation	Question	Answer or Notice
PRB	Do you wish to communicate by means of the International Signal Code?...	I wish to communicate by means of the International Signal Code.
QRA	What ship or coast station is that?	This is .....
QRB	What is your distance? ..	My distance is....
QRC	What is your true bearing?	My true bearing is .. degrees.
QRD	Where are you bound for?.	I am bound for ....
QRF	Where are you bound from?	I am bound from ....
QRG	What line do you belong to?	I belong to the .... line.
QRH	What is your wave-length in meters?	My wave-length is .... meters.
QRJ	How many words have you to send?	I have .... words to send.
QRK	How do you receive me? ..	I am receiving well.
QRL	Are you receiving badly? Shall I send 20 . . . — . for adjustment?	I am receiving badly. Please send 20 . . . — . for adjustment.
QRM	Are you being interfered with?	I am being interfered with.
QRN	Are the atmospherics strong?	Atmospherics are very strong
QRO	Shall I increase power? ..	Increase power.
QRP	Shall I decrease power?	Decrease power.
QRQ	Shall I send faster?	Send faster.
QRS	Shall I send slower?	Send slower.
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?.....	I am ready. All right now.
QRW	Are you busy?	I am busy (or: I am busy with ...). Please do not interfere.
QRX	Shall I stand by?.....	Stand by. I will call you when required.

Abbreviation	Question	Answer or Notice
QRY	When will be my turn?....	Your turn will be No. ....
QRZ	Are my signals weak?	Your signals are weak.
QSA	Are my signals strong?....	Your signals are strong.
QSB	Is my tone bad?.....	The tone is bad.
	Is my spark bad?.....	The spark is bad.
QSC	Is my spacing bad?.....	Your spacing is bad.
QSD	What is your time?.....	My time is ....
QSF	Is transmission to be in alternate order or in series?	Transmission will be in alternate order.
QSG	.....	Transmission will be in series of 5 messages.
QSH	....	Transmission will be in series of 10 messages.
QSJ	What rate shall I collect for .....?.....	Collect ....
QSK	Is the last radiogram cancelled?	The last radiogram is cancelled.
QSL	Did you get my receipt?....	Please acknowledge.
QSM	What is your true course?	My true course is .. degrees.
QSN	Are you in communication with land?	I am not in communication with land.
QSO	Are you in communication with any ship or station; (or: with....)?	I am in communication with .... (through ....)
QSP	Shall I inform .... that you are calling him?	Inform .... that I am calling him.
QSQ	Is .... calling me?	You are being called by ....
QSR	Will you forward the radiogram?	I will forward the radiogram.
QST	Have you received the general call?	General call to all stations.
QSU	Please call me when you have finished (or: at .. o'clock)	Will call when I have finished.

Abbreviation	Question	Answer or Notice
QSV*	Is public correspondence being handled?	Public correspondence is being handled. Please do not interfere.
QSW	Shall I increase my spark frequency?	Increase your spark frequency.
QSX	Shall I decrease my spark frequency?	Decrease your spark frequency.
QSY	Shall I send on a wave-length of....meters? ...	Let us change to the wave-length of .. meters.
QSZ	.....	Send each word twice. I have difficulty in receiving you.
QTA	.....	Repeat the last radiogram.
QTB	.....	Send initials of each word to confirm check.
QTC	Have you anything for me?	I have .... msgs for you (or: I have something for you.)
QTE	What is my true bearing?	Your true bearing is .... degrees from ....
QTF	What is my position?	Your position is .... latitude, ...longitude.

* Public correspondence is any radio work, official or private, handled on commercial wave-lengths.

When an abbreviation is followed by a mark of interrogation, it refers to the question indicated for that abbreviation.

CAPACITY OF CONDENSERS

To find the capacity of condensers use the following formula:

$$C = \frac{A \times K}{4 \times 3.1416 \times T \times 900{,}000}$$

C = Capacity in microfarads.
A = Area in square centimeters of one set of plates or surface.
K = Dielectric constant or specific inductive capacity of the dielectric used. (Given under "Dielectric Constants.")
T = Thickness of the dielectric between the plates, surfaces measured in centimeters.

FORMULÆ

Capacity.

Capacity of two plates:

$$C = \frac{2248 \times K \times A}{T \times 10^9}$$

C is capacity in microfarads.
K is dielectric constant. See table.
A is area of plates in square inches.
T is thickness of dielectric in inches.

Capacity of condensers in parallel:

$$C = C_1 + C_2 + C_3 + C_4, \text{ etc.}$$

Capacity of condensers in series:

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4}, \text{ etc.}$$

Capacity necessary for any transformer:

$$C = \frac{KW \times 10^3}{E^2 \times f}$$

C is capacity in microfarads.
KW is killowatts of power.
E is secondary voltage.
f is frequency of spark discharge.

Inductance.

Inductance of single layer round coil (solenoid):

$$L = \frac{0.03948 \times A^2 \times N^2}{b} \times K \text{ Value of "K"}$$

L = inductance in cm.
A = radius of coil
N = number of turns
b = length of coil
K = is a constant. See table.

Ratio of $\frac{\text{Length}}{\text{Diameter}}$	"K"
1/10	0.9588
1/4	0.9016
1/2	0.8181
3/4	0.7478
1	0.6884
3/2	0.5950
2	0.5255
3	0.4292
4	0.3654
5	0.3198

TABLE OF "L" ÆRIAL DIMENSIONS

Height Above Ground (Feet)	No. of Strands	Spacing Between Strands (Feet)	Length of Strands (Feet)	Approx. Daylight Rec. Range (Miles)	Approx. Wave-Length with Maximum Length Aerial Given (Metres)
30	4	2½	60–80	75–125	151
40	4	2½–3	80–90	100–150	165
50	4–6	3	80–90	125–175	178
75	4–6	3	80–100	150–300	240

WAVE-LENGTHS OF ÆRIALS

To calculate the approximate natural wave-length of an ærial, the total length of the ærial in feet should be multiplied by the factor 4.5. This gives the natural wave-length of the ærial in feet. This result may be divided by 3.28 to obtain the wave-length in meters.

Let us take, for example, a flat-top ærial with a length of 100 feet, connected to a lead-in wire at one end 100 feet long. Then 100 feet plus 100 feet gives 200 feet, and this multiplied by 4.5 gives 900 feet as the natural wave-length. Divided by 3.28, we have 274 meters wave-length.

If the above antenna happened to be connected "T" type, then the effective radiating length of same would be

$$\frac{100}{2} \text{ plus } 100 = 150 \text{ feet.}$$

This value, multiplied by 4.5 gives 675 feet wave-length, which, divided by 3.28, gives 206 meters.

LOOP ANTENNÆ

Range of 4 Ft. Square Loop Aerial

Turns	Best Wave-Length	Meters
3	250	200–350
4	300	250–400
6	350	300–800
10	600	350–1000
20	1200	900–1800

Range of 6 Ft. Square Loop Aerial

2	220	180–400
6	500	400–900
10	700	600–1200
20	1400	1000–2000

Spacing for Loops

Size of Loop in Feet	Spacing in Inches
3	1/8
4	1/4
6	7/16
8	9/16
10	3/4
12	15/16

WAVE-LENGTHS AND FREQUENCIES

W.L.—Wave-Lengths in Meters. F.—Number of Oscillations per Second.

W.L.	F.
50	6,000,000
100	3,000,000
150	2,000,000
200	1,500,000
250	1,200,000
300	1,000,000
350	857,100
400	750,000
450	666,700
500	600,000
550	545,400
600	500,000
700	428,600
800	375,000
900	333,300
1000	300,000
1100	272,730
1200	250,000
1300	230,760
1400	214,380
1500	200,000
1600	187,500
1700	176,460
1800	166,670
1900	157,890
2000	150,000
2100	142,850
2200	136,360
2300	130,430
2400	125,000

W.L.	F.
2500	120,000
2600	115,380
2700	111,110
2800	107,140
2900	103,450
3000	100,000
4000	75,000
5000	60,000
6000	50,000
7000	41,800
8000	37,500
9000	33,300
10000	30,000
11000	27,300
12000	25,000
13000	23,100
14000	21,400
15000	20,000
16000	18,750

Explanation: A wave of 350 meters will oscillate (vibrate back and forth) at the rate of 857,100 times in every second.

ENGLISH AND METRIC EQUIVALENTS

1 metre = 39.37 inches
1 cm. = 0.3937 inches
1 foot = 30.48 cms. or 0.3048 meters.
1 inch = 2.54 cms.
1 meter = 100 cms.

DIELECTRIC CONSTANTS "K"

Air	1.	Mirror Glass	6.00
Compressed Air	1.004	Common Glass	3.5
Crown Glass	6.96	Mica	8.0
Flint Glass	7.00	Paper	2.5
Plate Glass	8.45	Paraffin	2.25

Mica, therefore, is the highest (best) insulator; it is eight times better than air.

ELECTRICAL UNITS

Resistance.

The unit of resistance is the ohm. Very large resistances, as for instance, insulation resistances, are more conveniently reckoned in Meg-Ohms and very small resistances in Micro-ohms.

1 Meg-ohm $= 10^6$ ohms $=$ 1 million ohms.
1 Micro-ohm $= 10^{-6}$ ohms $=$ 1 millionth of an ohm.

Current.

The unit of current is the ampere, small currents being reckoned in Milli-amperes or in Micro-amperes.

1 Milli-ampere $= 10^{-3}$ ampere $=$ 1 thousandth of an ampere.
1 Micro-ampere $= 10^{-6}$ ampere $=$ 1 millionth of an ampere.

Electro-Motive-Force.

The unit of E.M.F. is the volt, small potential differences being reckoned in Milli-volts or in Micro-volts.

1 Milli-volt $= 10^{-3}$ volts $=$ 1 thousandth of a volt.
1 Micro-volt $= 10^{-6}$ volts $=$ 1 millionth of a volt.

Quantity.

The unit of quantity is the coulomb, which equals the quantity of electricity conveyed by a current of one ampere flowing for one second.

Energy.

The unit of electrical energy is the joule.

Power.

The unit of power is the watt, large powers are best reckoned in Kilo-watts and very small powers in Micro-watts.

1 Kilo-watt $= 10^3$ watts $=$ 1 thousand watts.
1 Micro-watt $= 10^{-6}$ watt $=$ 1 millionth of a watt.
746 watts $=$ 1 H.P.

Capacity.

The unit of capacity is the Farad, smaller units being the micro-farad and the centimeter.

1 Micro-farad $= 10^{-6}$ farads $=$ 1 millionth of a farad.
900,000 cms $=$ 1 micro-farad.
1 jar $=$ 1,000 cms.
1 Billi-farad $=$ 900 cms.

Inductance.

The unit of inductance is the henry, smaller units being the milli-henry, the micro-henry and the centimeter.

1 Milli-henry $= 10^{-3}$ henry $=$ 1 thousandth of a henry.
1 Micro-henry $= 10^{-6}$ henry $=$ 1 millionth of a henry.
1,000 cms. $=$ 1 micro-henry.
1 Coil $=$ 25,000 cms.

COPPER WIRE TABLES.

Gauge	Diameter	Capacity	Ohms			Feet		Pounds	
B. & S. No.	in 1000ths	in Amp.	Per 1000 Feet	Per Mile	Per Pound	Per Pound	Per Ohm	Per 1000 Ft.	Per Ohm
0000	.460	312.	.04906	.25903	.000077	1.56122	20497.7	640.51	12987.
000	.40964	262.	.06186	.32664	.00012	1.9687	16255.27	507.95	8333.
00	.3648	220.	.07801	.41187	.00019	2.4824	12891.37	402.83	5263.
0	.32486	185.	.09831	.51909	.00031	3.1303	10223.08	319.45	3225.
1	.2893	156.	.12404	.65490	.00049	3.94714	8107.49	253.34	2041.
2	.25763	131.	.1563	.8258	.00078	4.97722	6429.58	200.91	1282.
3	.22942	110.	.19723	1.0414	.00125	6.2765	5098.61	159.32	800.
4	.20431	92.3	.24869	1.313	.00198	7.9141	4043.6	126.35	505.
5	.18194	77.6	.31361	1.655	.00314	9.97983	3206.61	100.20	318.
6	.16202	65.2	.39546	2.088	.00499	12.5847	2542.89	79.462	200.
7	.14428	54.8	.49871	2.633	.00792	15.8696	2015.51	63.013	126.
8	.12849	46.1	.6529	3.3	.0125	20.0097	1599.3	49.976	80.
9	.11443	38.7	.7892	4.1	.0197	25.229	1268.44	39.636	50.
10	.10189	32.5	.8441	4.4	.0270	31.8212	1055.66	31.426	37.
11	.090742	27.3	1.254	6.4	1.0501	40.1202	797.649	24.924	20.
12	.080808	23.	1.580	8.3	.079	50.5906	632.555	19.766	12.65
13	.071961	19.3	1.995	10.4	.127	63.7948	501.63	15.674	7.87
14	.064084	16.2	2.504	13.2	.200	80.4415	397.822	12.435	5.00
15	.057068	13.6	3.172	16.7	.320	101.4365	315.482	9.859	3.12
16	.05082	11.5	4.001	23.	.512	127.12	250.184	7.819	1.95
17	.045257	9.6	5.04	26.	.811	161.29	198.409	6.199	1.23
18	.040303	8.1	6.36	33.	1.29	203.374	157.35	4.916	.775
19	.03589	.....	8.25	43.	2.11	256.468	124.777	3.899	.473
20	.031961	.....	10.12	53.	3.27	323.399	98.9533	3.094	.305
21	.028462	.....	12.76	68.	5.20	407.815	78.473	2.452	.192
22	.025347	.....	16.25	85.	8.35	514.198	62.236	1.945	.119
23	.022571	.....	20.30	108.	13.3	648.452	49.3504	1.542	.075
24	.0201	.....	25.60	135.	20.9	817.688	39.1365	1.223	.047
25	.0179	.....	32.2	170.	33.2	1031.038	31.0381	.9699	.030
26	.01594	.....	40.7	214.	52.9	1300.180	24.6131	.7692	.0187
27	.014195	.....	51.3	270.	84.2	1669.49	19.5191	.6099	.0118
28	.012641	.....	64.8	343.	134.	2067.364	15.4793	.4837	.0074
29	.011257	.....	81.6	432.	213.	2606.959	12.2854	.3835	.0047
30	.010025	.....	103.	538.	338.	3287.084	9.7355	.3002	.0029
31	.008928	.....	130.	685.	539.	4414.49	7.72143	.2413	.0018
32	.00795	.....	164.	865.	856.	5226.915	6.12243	.1913	.0011
33	.00708	.....	206.	1088.	1357.	6590.41	4.85575	.1517	.00076
34	.006304	.....	260.	1389.	2166.	8312.8	3.84966	.1204	.00046
35	.005614	.....	328.	1820.	3521.	10481.77	3.05305	.0956	.00028
36	.005	.....	414.	2200.	5469.	13214.16	2.4217	.0757	.00018
37	.004453	.....	523.	2765.	8742.	16659.97	1.92086	.06003	.00011
38	.003965	.....	660.	3486.	13772.	21013.25	1.52292	.04758	.00007
39	.003531	.....	832.	4395.	21896.	26496.237	1.20777	.03755	.00004
40	.003144	....	1049.	5542.	34823.	33420.63	0.97984	.02992	.000029

FEET PER POUND OF INSULATED MAGNET WIRE

Number B. & S. Gauge	Single Cotton	Double Cotton	Single Silk	Double Silk	Enameled
20	311	298	319	312	320
21	389	370	403	389	404
22	488	461	503	493	509
23	612	584	636	631	642
24	762	745	800	779	810
25	957	903	1005	966	1019
26	1192	1118	1265	1202	1286
27	1488	1422	1590	1543	1620
28	1852	1759	1972	1917	2042
29	2375	2207	2570	2485	2570
30	2860	2534	3145	2909	3240
31	3800	2768	3943	3683	4082
32	4375	3737	4950	4654	5132
33	5390	4697	6180	5689	6445
34	6500	6168	7740	7111	8093
35	8050	6737	9600	8534	10197
36	9820	7877	12000	10039	12813
37	11860	9309	15000	10666	16110
38	14300	10636	18660	14222	20274
39	17130	11907	23150	16516	25519
40	21590	14222	28700	21333	32107

TABLE OF INSULATED MAGNET WIRE

Size B. & S. Gauge	Turns per Linear Inch				
	Enameled	Single Cotton	Double Cotton	Single Silk	Double Silk
20	29	25	23	27	26
21	32	28	26	31	29
22	36	31	28	34	32
23	41	34	31	38	36
24	45	37	33	42	39
25	51	41	36	47	43
26	56	45	39	52	46
27	64	49	42	57	52
28	71	54	45	63	56
29	79	58	48	70	62
30	88	64	57	77	67
31	100	69	58	85	72
32	112	75	60	93	78
33	134	81	64	102	84

Size B. & S. Gauge	Turns per Linear Inch				
	Enameled	Single Cotton	Double Cotton	Single Silk	Double Silk
34	140	87	68	112	91
35	156	94	73	120	97
36	173	101	78	130	104
37	201	108	84	141	110
38	225	115	89	151	117
39	256	122	95	163	123
40	288	130	102	178	129

DOUBLE COTTON-COVERED MAGNET WIRE

Size B. & S. Gauge	No. Turns per Linear Inch	Size B. & S. Gauge	No. Turns per Linear Inch
0000	1.70	7	6.08
000	2.00	8	6.80
00	2.32	9	7.64
0	2.65	10	8.51
1	2.99	11	9.56
2	3.36	12	10.60
3	3.80	13	11.88
4	4.28	14	13.10
5	4.83	15	14.68
6	5.44	16	16.35

TUNING COIL DATA

No. of Wire B. & S. Gauge	Diameter of Core in Inches	Feet of Wire per Inch of Winding	Wave-Length in Meters per Inch of Winding	Turns of Wire per Inch of Winding	No. of Wire on Loose Coupler Secondary	Length of Primary and Secondary	Wave-Length in Meters of Loose Couplers
26	2 in.	30	37	58	..	....	....
28	2 in.	38	46	73	..	....	....
24	3 in.	36	44	46	..	....	....
*26	3 in.	46	56	58	34	4 in.	700
*24	4 in.	48	59	46	32	5 in.	800
*22	5 in.	49	60	37	30	6 in.	1000
*22	6 in.	58	70	37	30	6 in.	1200
20	7 in.	55	67	30	..	....	....
20	8 in.	63	77	30	..	....	....

NOTE—To find the wave-length in meters of any tuning coil, multiply its length in inches by length in meters per inch of winding.

* Indicates windings suitable for loose coupler primaries.

The data in this table were compiled for WINDINGS OF ENAMELED WIRE ONLY.

Wave-length in meters in above table equals length of wire on tuning coil in meters multiplied by 4 (not for couplers).

VARIOCOUPLER VALUES

With a Secondary of 2¼ inches in diameter, shunted by .0005 m. f. Condenser, the following wave-lengths are obtainable:

10 turns..... 80 to 220 meters
20 turns.....120 to 350 meters
30 turns.....150 to 420 meters
40 turns.....175 to 550 meters

THE RADIO LAW OF 1912

An Act to regulate radio communication, approved August 13, 1912.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided,* That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a license shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce. Any person, company or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or

device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2. That every such license shall be in such form as the Secretary of Commerce shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave-length or the wave-lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every license shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

SEC. 3. That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said license for a period to be fixed by the Secretary of Commerce not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision

shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offense: *Provided,* That in case of emergency the Secretary of Commerce may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship Act of June twenty-fourth, nineteen hundred and ten.

SEC. 4. That for the purpose of preventing or minimizing interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce may grant special temporary licenses to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave-lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS

NORMAL WAVE-LENGTH

First. Every station shall be required to designate a certain definite wave-length as the normal sending and receiving wave-length of the station. This wave-length shall not exceed six hundred meters or it shall exceed one thousand six hundred meters. Every coastal station open to general public service shall at all times be ready to receive messages of such wave-lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wave-lengths, one of three hundred meters and one of six hundred meters, as required by the international convention in

force: *Provided,* That the Secretary of Commerce may, in his discretion, change the limit of wave-length reservation made by regulations first and second to accord with any international agreement to which the United States is a party.

OTHER WAVE-LENGTHS

Second. In addition to the normal sending wave-length all stations, except as provided hereinafter in these regulations, may use other sending wave-lengths: *Provided,* That they do not exceed six hundred meters or that they do exceed one thousand six hundred meters: *Provided further,* That the character of the waves emitted conforms to the requirements of regulations third and fourth following.

USE OF A "PURE WAVE"

Third. At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave-lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed ten per centum of that in the greatest.

USE OF A "SHARP WAVE"

Fourth. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

USE OF "STANDARD DISTRESS WAVE"

Fifth. Every station on shipboard shall be prepared to send distress calls on the normal wave-length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave-length.

SIGNAL OF DISTRESS

Sixth. The distress call used shall be the international signal of distress . . . — — — . . .

USE OF "BROAD INTERFERING WAVE" FOR DISTRESS SIGNALS

Seventh. When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

DISTANCE REQUIREMENT FOR DISTRESS SIGNALS

Eighth. Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations fifth and sixth with sufficient power to enable them to be

received by day over sea a distance of one hundred nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

"RIGHT OF WAY" FOR DISTRESS SIGNALS

Ninth. All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

REDUCED POWER FOR SHIPS NEAR A GOVERNMENT STATION

Tenth. No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

INTERCOMMUNICATION

Eleventh. Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period not less than two minutes, with the receiver tuned to receive messages of three hundred meter wave-lengths.

DIVISION OF TIME

Twelfth. At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations can not be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wave-lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

GOVERNMENT STATIONS TO OBSERVE DIVISION OF TIME

Thirteenth. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

USE OF UNNECESSARY POWER

Fourteenth. In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

GENERAL RESTRICTIONS ON PRIVATE STATIONS

Fifteenth. No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave-length exceeding two hundred meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce contained in the license of the station: *Provided,* That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of one hundred dollars or twenty-five dollars, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

SPECIAL RESTRICTIONS IN VICINITIES OF GOVERNMENT STATIONS

Sixteenth. No station of the character mentioned in regulation fifteenth situated within five nautical miles of a naval or military station shall use a transmitting wave-length exceeding two hundred meters or a transformer input exceeding one-half kilowatt.

SHIP STATIONS TO COMMUNICATE WITH NEAREST SHORE STATIONS

Seventeenth. In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this can not

be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

LIMITATIONS FOR FUTURE INSTALLATIONS IN VICINITIES OF GOVERNMENT STATIONS

Eighteenth. No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations, to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of nineteen hundred and six and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of nineteen hundred and six and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within one hundred nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

SECRECY OF MESSAGES

Nineteenth. No person or persons engaged in or having knowledge of the operation of any station or stations, shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorized agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any

person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punished by a fine of not more than two hundred and fifty dollars or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

PENALTIES

For violation of any of these regulations, subject to which a license under sections one and two of this Act may be issued, the owner of the apparatus shall be liable to a penalty of one hundred dollars, which may be reduced or remitted by the Secretary of Commerce, and for repeated violations of any of such regulations, the license may be revoked.

For violation of any of these regulations, except as provided in regulation nineteenth, subject to which a license under section three of this Act may be issued, the operator shall be subject to a penalty of twenty-five dollars, which may be reduced or remitted by the Secretary of Commerce, and for repeated violations of any such regulations, the license shall be suspended or revoked.

SEC. 5. That every license granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not willfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

SEC. 6. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

SEC. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one

thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

SEC. 8. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections four and seven of this Act and so much of section five as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9. That the trial of any offense under this Act shall be in the district in which it is committed, or if the offense is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10. That this Act shall not apply to the Philippine Islands.

SEC. 11. That this Act shall take effect and be in force on and after four months from its passage.

Approved, August 13, 1912.

U. S. BROADCASTING STATIONS

(Corrected to September 1, 1922)

Call Letters	Name	City	State	Wave-Length
KDKA	Westinghouse El. & Mfg. Co.	East Pittsburgh	Pa.	360
KDN	Leo J. Meyberg Co.	San Francisco	Calif.	360-485
KDPM	Westinghouse Elec. & Mfg. Co.	Cleveland	Ohio	360
KDPT	Southern Electrical Co.	San Diego	Calif.	360
KDYL	Telegram Publishing Co.	Salt Lake City	Utah	360
KDYM	Savoy Theatre	San Diego	Calif.	360
KDYN	Great Western Radio Corp.	Redwood City	Calif.	360
KDYO	Carlson & Simpson	San Diego	Cal.	360
KDYQ	Ore. Inst. of Technology	Portland	Ore.	485
KDYR	Pasadena Star-News Pub. Co	Pasadena	Calif.	360
KDYS	The Tribune	Great Falls	Mont.	360
KDYU	Herald Publishing Co.	Klamath Falls	Ore.	360
KDYV	Cope & Cornwell Co.	Salt Lake City	Utah	360
KDYW	Smith, Hughes & Co.	Phoenix	Ariz.	360
KDYX	Star Bulletin	Honolulu	Hawaii	360
KDYY	Rocky Mt. Radio Corp.	Denver	Colo.	360

Call Letters	Name	City	State	Wave-Length
KDZA	Arizona Daily Star	Tucson	Ariz.	360
KDZB	Frank E. Siefert	Bakersfield	Calif.	360
KDZD	W. R. Mitchell	Los Angeles	Calif.	360
KDZE	The Rhodes Co.	Seattle	Wash.	360
KDZF	Auto Club of Southern Calif.	Los Angeles	Calif.	360
KDZG	Cyrus Pierce & Co.	San Francisco	Calif.	360
KDZH	Fresno Evening Herald	Fresno	Calif.	360
KDZI	Electric Supply Co.	Wenatchee	Wash.	360
KDZJ	Excelsior Radio Co.	Eugene	Ore.	360
KDZK	Nevada Mach. & Electric Co.	Reno	Nev.	360
KDZL	Rocky Mt. Radio Corp.	Ogden	Utah	360
KDZM	Hollingworth, E. H.	Centralia	Wash.	360
KDZN	Western Radio Corp.	Denver	Colo.	360
KDZP	Newbery Electric Corp.	Los Angeles	Calif.	360
KDZQ	Motor Generator	Denver	Colo.	360
KDZR	Bellingham Publishing Co.	Bellingham	Wash.	360
KDZT	Seattle Radio Assoc.	Seattle	Wash.	360
KDZW	Claude W. Gerdes	San Francisco	Calif.	360
KDZX	Glad Tidings Tabernacle	San Francisco	Calif.	360
KDZZ	Kinney Bros. & Sipprell	Everett	Wash.	360
KFAB	Pacific Radiophone Co.	Portland	Ore.	360
KFAC	Glendale Daily Press	Glendale	Calif.	360
KFAD	McArthur Bros. Mercantile Co.	Phoenix	Ariz.	360
KFAE	State College of Washington	Pullman	Wash.	360
KFAF	Western Radio Corp.	Denver	Colo.	360
KFAJ	University of Colorado	Boulder	Colo.	360
KFAN	The Electric Shop	Moscow	Idaho	360
KFAP	Standard Publishing Co.	Butte	Mont.	360
KFAQ	City of San José	San José	Calif.	360
KFAR	Studio Lighting Service Co.	Hollywood	Calif.	360
KFAS	Reno Motor Supply Co.	Reno	Nevada	360
KFAT	S. T. Donohue	Eugene	Ore.	360
KFAU	High School	Boise	Idaho	360-485
KFAV	Cooke & Chapman	Venice	Calif.	360

Call Letters	Name	City	State	Wave-Length
KFAW	Register Radio Den Radiophone	Santa Ana	Calif.	360
KFAY	W. J. Virgin Milling Co.	Central Point	Ore.	360
KFBA	Ramey & Bryant Radio Co.	Lewiston	Idaho	360
KFBB	F. A. Buttrey & Co.	Havre	Mont.	360
KFBC	Normal Heights Sta., W. K. Azbill	San Diego	Calif.	360
KFBD	Clarence V. Welch	Hanford	Calif.	360
KFBE	R. H. Horn, Cline's Electric Shop	San Luis Obispo	Calif.	360
KFBF	Butte School of Telegraphy	Butte	Mont.	360
KFBG	First Presbyterian Church	Tacoma	Wash.	360
KFBH	Thomas Musical Co.	Marshfield	Ore.	360
KFBJ	Idaho Radio Supply Co.	Boise	Idaho	360
KFBK	Kimball-Upson Co.	Sacramento	Calif.	360
KFBL	Leese Bros.	Everett	Wash.	360
KFBM	Cook & Foster	Astoria	Ore.	360
KFBN	Borch Radio Corp.	(portable)	Calif.	360
KFC	Northern Radio & Elec. Co.	Seattle	Wash.	360
KFDB	John D. McKee	San Francisco	Calif.	360
KFI	Carl C. Anthony	Los Angeles	Calif.	360
KFU	The Precision Shop	Gridley	Calif.	360
KFV	Foster Bradbury Radio Store	Yakima	Wash.	360
KFZ	Doerr-Mitchell Elec. Co.	Spokane	Wash.	360
KGB	Wm. H. Mullins Elec. Co.	Tacoma	Wash.	360
KGC	Elec. Lighting & Elec. Co.	Hollywood	Calif.	360
KGF	Pomona Fixture & Wiring Co.	Pomona	Calif.	360
KGG	Hallock & Watson Radio Serv.	Portland	Ore.	360
KGN	Northwest Radio Mfg. Co.	Portland	Ore.	360
KGO	Altadena Radio Laboratory	Altadena	Calif.	360
KGU	Marion H. Mulrony	Honolulu	Hawaii	360
KGW	Oregonian Publishing Co.	Portland	Ore.	360

Call Letters	Name	City	State	Wave-Length
KGY	St. Martin's College (Rev. S. Ruth)	Lacey	Wash.	360
KHD	C. F. Aldrich Marble and Granite Co.	Colorado Springs	Colo.	485
KHJ	C. R. Kierulff & Co.	Los Angeles	Calif.	360
KHQ	Louis Wasmer	Seattle	Wash.	360
KJC	Standard Radio Co.	Los Angeles	Calif.	360
KJJ	The Radio Shop	Sunnyvale	Calif.	360
KJQ	C. O. Gould	Stockton	Calif.	360
KJR	Vincent I. Kraft	Seattle	Wash.	360-485
KJS	Bible Inst. of Los Angeles	Los Angeles	Calif.	360
KLB	J. J. Dunn & Co.	Pasadena	Calif.	360
KLN	Hotel Del Monte	Del Monte	Calif.	360
KLP	Colin B. Kennedy	Los Altos	Calif.	360
KLS	Warner Brothers	Oakland	Calif.	360
KLX	Tribune Publishing Co.	Oakland	Calif.	360
KLZ	Reynolds Radio Co.	Denver	Colo.	360
KMC	Lindsay Weatherill & Co.	Riedley	Calif.	360
KMJ	San Joaquin Lt. & Power Co.	Fresno	Calif.	360
KMO	Love Electric Co.	Tacoma	Wash.	360
KNI	T. W. Smith	Eureka	Calif.	360
KNJ	Roswell Public Service Co.	Roswell	N.M.	360-485
KNN	Bullock's	Los Angeles	Calif.	360
KNR	Beacon Light Co.	Los Angeles	Calif.	360
KNT	North Coast Products Co.	Aberdeen	Wash.	360
KNV	Radio Supply Co.	Los Angeles	Calif.	360
KNX	Electric Ltg. Supply Co.	Los Angeles	Calif.	360
KOA	Y.M.C.A.	Denver	Colo.	485
KOB	N.M. College Agr. & Mch. Arts	State College	N.M.	360-485
KOE	Spokane Chronicle	Spokane	Wash.	360
KOG	Western Radio Electric Co.	Los Angeles	Calif.	360
KOJ	University of Nevada	Reno	Nev.	360
KON	Holzwasser, Inc.	San Diego	Calif.	360
KOP	Detroit Police Dep't	Detroit	Mich.	360
KOQ	Modesto Evening News	Modesto	Calif.	360
KPO	Hale Brothers	San Francisco	Calif.	360
KQI	Univ. of California	Berkeley	Calif.	360

Call Letters	Name	City	State	Wave-Length
KQL	Arno H. Kluge	Los Angeles	Calif.	360
KQP	Blue Diamond Electric Co.	Hood River	Ore.	360-485
KQT	Elec. Power & Appliance Co.	Yakima	Wash.	360
KQV	Doubleday-Hill Elec. Co.	Pittsburgh	Pa.	360
KQW	Charles D. Herrold	San José	Calif.	360
KQY	Stubbs Electric Co.	Portland	Ore.	360
KRE	Maxwell Electric Co.	Berkeley	Calif.	360
KSC	O. A. Hale & Co.	San José	Calif.	360
KSD	Post Dispatch	St. Louis	Mo.	360
KSL	The Emporium	San Francisco	Calif.	360
KSS	Prest & Dean Radio Co.	Long Beach	Calif.	360
KTW	First Presbyterian Church	Seattle	Wash.	360
KUO	Examiner Printing Co.	San Francisco	Calif.	360-485
KUS	City Dye Works & Laundry Co.	Los Angeles	Calif.	360
KUY	Coast Radio Co.	El Monte	Calif.	360
KVQ	J. C. Hobrecht	Sacramento	Calif.	360
KWG	Portable Wireless Tele. Co.	Stockton	Calif.	360
KWH	Los Angeles Examiner	Los Angeles	Calif.	360
KXD	Herald Publishing Co.	Modesto	Calif.	360
KXS	Braun Corp.	Los Angeles	Calif.	360
KYF	Thearle Music Co.	San Diego	Calif.	360
KYG	Willard P. Hawley, Jr.	Portland	Ore.	360
KYI	Alfred Harrell	Bakersfield	Calif.	360
KYJ	Leo J. Meyberg Co.	Los Angeles	Calif.	360-485
KYW	Westinghouse Elec. & Mfg. Co.	Chicago	Ill.	360-485
KYY	Radio Telephone Shop	San Francisco	Calif.	360
KZC	Pub. Mkt. & Mkt. Stores Co.	Seattle	Wash.	360
KZI	Irving S. Cooper	Los Angeles	Calif.	360
KZM	Preston D. Allen	Oakland	Calif.	360-485
KZN	The Deseret News	Salt Lake City	Utah	360-485
KZV	Wenatchee Battery & Motor Co.	Wenatchee	Wash.	360

Call Letters	Name	City	State	Wave-Length
KZY	Atl. & Pac. Radio Supply Co.	Oakland	Calif.	360
WAAB	Times Picayune	New Orleans	La.	360
WAAC	Tulane University	New Orleans	La.	360
WAAD	Ohio Mechanics Institute	Cincinnati	Ohio	360
WAAE	St. Louis Chamber of Commerce	St. Louis	Mo.	360
WAAF	Union Stock Yds. & Transit Co.	Chicago	Ill.	360-485
WAAG	Elliott Electric Co.	Shreveport	La.	360
WAAH	Commonwealth Electric Co.	St. Paul	Minn.	360
WAAJ	Eastern Radio Institute	Boston	Mass.	360
WAAK	Gimbel Brothers	Milwaukee	Wis.	360
WAAL	Minn. Tribune & A. Beamish Co.	Minneapolis	Minn.	360
WAAM	I. R. Nelson Co.	Newark	N.J.	360
WAAN	University of Missouri	Columbia	Mo.	360
WAAO	Radio Service Co.	Charlestown	W. Va.	360
WAAP	Otto W. Taylor	Wichita	Kans.	360
WAAQ	New England Motor Sales Co.	Greenwich	Conn.	360
WAAR	Groves Thornton Hdwe. Co.	Huntington	W. Va.	360
WAAS	Georgia Radio Co.	Decatur	Ga.	360
WAAV	Athens Radio Co.	Athens	Ohio	360
WAAW	Omaha Grain Exchange	Omaha	Neb.	360
WAAX	Radio Service Corp.	Crafton	Pa.	360
WAAY	Yahrling Rayner Music Co.	Youngstown	Ohio	360
WAAZ	Hollister-Miller Motor Co.	Emporia	Kans.	360
WAH	Midland Refining Co.	El Dorado	Kans.	360-485
WBAA	Purdue University	West Lafayette	Ind.	360
WBAB	Andrew J. Potter	Syracuse	N.Y.	360
WBAD	Sterling Electric Co.	Minneapolis	Minn.	360
WBAE	Bradley Polytechnic Inst.	Peoria	Ill.	360-485
WBAF	Fred M. Middleton	Moorestown	N.J.	360
WBAG	Diamond State Fibre Co.	Bridgeport	Pa.	360-485
WBAH	The Dayton Co.	Minneapolis	Minn.	360
WBAJ	Marshall-Gerken Co.	Toledo	Ohio	360

Call Letters	Name	City	State	Wave-Length
WBAM	I. B. Rennyson	New Orleans	La.	360
WBAN	Wireless Phone Corp.	Paterson	N.J.	360
WBAO	James Millikin University	Decatur	Ill.	360
WBAP	Wortham-Carter Pub. Co.	Fort Worth	Tex.	360-485
WBAQ	Myron L. Harmon	South Bend	Ind.	360
WBAU	Republican Publishing Co.	Hamilton	Ohio	360
WBAV	Erner & Hopkins	Columbus	Ohio	360
WBAW	Marietta College	Marietta	Ohio	360
WBAX	John H. Stenger, Jr.	Wilkes-Barre	Pa.	360
WBAY	American Tel. & Tel. Co	New York	N.Y.	360
WBAZ	Times Dispatch Pub. Co.	Richmond	Va.	360
WBL	T. & H. Radio Co.	Anthony	Kans.	360
WBS	D. W. May, Inc.	Newark	N.J.	360
WBT	Southern Radio Corp.	Charlotte	N.C.	360-485
WBU	City of Chicago	Chicago	Ill.	360
WBZ	Westinghouse Elec. & Mfg. Co.	Springfield	Mass.	360
WCAB	Newberg News Ptg. & Pub. Co.	Newberg	N. Y.	360
WCAC	John Fink Jewelry Co.	Fort Smith	Ark.	360
WCAD	St. Lawrence University	Canton	Ohio	360
WCAE	Kaufman & Baer Co.	Pittsburgh	Pa.	360
WCAG	Daily States Pub. Co.	New Orleans	La.	360
WCAH	Entrekin Electric Co.	Columbus	Ohio	360
WCAJ	Nebraska Wesleyan Univ.	University Place	Neb.	360-485
WCAK	Alfred P. Daniel	Houston	Texas	360
WCAL	St. Olaf College	Northfield	Minn.	360
WCAM	Villanova College	Villanova	Pa.	360
WCAN	Southeastern Radio Tel. Co.	Jacksonville	Fla.	360
WCAO	Sanders & Stayman Co.	Baltimore	Md.	360
WCAP	Central Radio Service	Decatur	Ill.	360
WCAQ	Tri-State Radio Mfg. & Sup. Co.	Defiance	Ohio	360
WCAR	Alamo Radio Electric Co.	San Antonio	Texas	360
WCAS	Wm. H. Dunwoody Indust. Inst.	Minneapolis	Minn.	360
WCAT	So. Dakota School of Music	Rapid City	S. Dak.	485

Call Letters	Name	City	State	Wave-Length
WCAU	Philadelphia Radiophone Co.	Philadelphia	Pa.	360
WCAV	J. C. Dice Electric Co.	Little Rock	Ark.	360
WCAW	Q. Herald & Quincy Elec. Sup. Co.	Quincy	Ill.	360
WCAX	University of Vermont	Burlington	Vt.	360
WCAY	Kesselman O'Driscoll Co.	Milwaukee	Wis.	360
WCAZ	R. E. Compton & Q. Whig General	Quincy	Ill.	360
WCE	Findley Electric Co.	Minneapolis	Minn.	360
WCJ	A. C. Gilbert	New Haven	Conn.	360
WCK	Stix-Baer-Fuller	St. Louis	Mo.	360
WCM	University of Texas	Austin	Tex.	360-485
WCN	Clark University	Worcester	Mass.	360-485
WCX	Detroit Free Press	Detroit	Mich.	360-485
WDAA	Ward Belmont School	Nashville	Tenn.	360
WDAB	H. C. Summers & Son	Portsmouth	Ohio	360
WDAC	Illinois Watch Co.	Springfield	Ill.	485
WDAD	Wm. L. Harrison	Lindsborg	Kans.	360
WDAE	Tampa Daily Times	Tampa	Fla.	360-485
WDAF	Kansas City Star	Kansas City	Mo.	360
WDAG	J. Lawrence Martin	Amarillo	Texas	360
WDAH	Mine & Smelter Supply Co.	El Paso	Texas	360
WDAI	Hughes Electrical Corp.	Syracuse	N. Y.	360
WDAJ	Atlanta & West Point R. R. Co.	College Park	Ga.	360
WDAK	The Courant	Hartford	Conn.	360
WDAL	Florida Times Union	Jacksonville	Fla.	360-485
WDAN	Glenwood Radio Corp.	Shreveport	La.	360
WDAO	Automotive Electric Co.	Dallas	Texas	360
WDAP	Mid-West Radio Central, Inc.	Chicago	Ill.	360
WDAQ	Hartman Riker Elec. & Mch. Co.	Brownsville	Pa.	360
WDAR	Lit Bros.	Philadelphia	Pa.	360
WDAS	Samuel A. Waite	Worcester	Mass.	360
WDAT	Delta Electric Co.	Worcester	Mass.	360
WDAU	Slocum & Kilburn	New Bedford	Mass.	360
WDAV	Muskogee Daily Phoenix	Muskogee	Okla.	360

Call Letters	Name	City	State	Wave-Length
WDAW	Georgia Rwy. & Power Co.	Atlanta	Ga.	360-485
WDAX	First National Bank	Centerville	Iowa	360
WDAY	Kenneth M. Hance	Fargo	N. Dak.	360-485
WDM	Church of the Covenant	Washington	D. C.	
WDT	Ship Owners' Radio Service	New York	N.Y.	360
WDV	Yeiser, John O., Jr.	Omaha	Neb.	360
WDY	Radio Corp. of America	Roselle Park	N.J.	360
WDZ	James L. Bush	Tuscola	Ill.	360
WEAA	Fallian & Lathrop	Flint	Mich.	360
WEAB	Standard Radio Equip. Co.	Fort Dodge	Iowa	360
WEAC	Baines Elec. Serv. Co.	Terre Haute	Ind.	360
WEAD	N. W. Kansas Radio Supply Co.	Atwood	Kan.	360
WEAE	Virginia Polytechnic Inst.	Blacksburg	Va.	360
WEAF	Western Electric Co.	New York	N.Y.	360
WEAG	Nichols-Hineline-Bassett Lab.	Edgewood	R.I.	360
WEAH	W. Bd. of Trd. & Lander Radio Co.	Wichita	Kan.	360-485
WEAI	Cornell University	Ithaca	N.Y.	360
WEAJ	Univ. of So. Dakota	Vermilion	S. Dak.	360
WEAK	Julius B. Abercrombie	St. Joseph	Mo.	360
WEAM	Boro of North Plainfield	No. Plainfield	N.J.	360
WEAN	Shepard Co.	Providence	R.I.	360
WEAO	Ohio State University	Columbus	Ohio	360-485
WEAP	Mobile Radio Co.	Mobile	Ala.	360
WEAQ	Y.M.C.A.	Berlin	N.H.	360
WEAR	Baltimore Amer. & News Pub. Co.	Baltimore	Md.	360
WEAS	Hecht Co.	Washington	D.C.	360
WEAT	John J. Fogarty	Tampa	Fla.	360
WEAU	Davidson Bros. Co.	Sioux City	Iowa	360
WEAV	Sheridan El. Serv. Co.	Rushville	Neb.	360
WEAW	Arrow Radio Laboratories	Anderson	Ind.	360
WEAX	T. J. M. Daly	Little Rock	Ark.	360-485
WEAY	Will Horwitz, Jr.	Houston	Texas	360

Call Letters	Name	City	State	Wave-Length
WEAZ	Donald Redmond	Waterloo	Iowa	360
WEB	Benwood Co.	St. Louis	Mo.	360
WEH	Midland Refining Co.	Tulsa	Okla.	360-485
WEV	Hurlburt-Still Electrical Co.	Houston	Tex.	360-485
WEW	St. Louis University	St. Louis	Mo.	360-485
WEY	Cosradio Co.	Wichita	Kan.	360-485
WFAA	A. H. Belo & Co.	Dallas	Tex.	360-485
WFAB	Carl F. Woese	Syracuse	N.Y.	360
WFAC	Superior Radio Co.	Superior	Wis.	360
WFAD	Watson Weldon Motor Sup. Co.	Salina	Kan.	360
WFAF	H. C. Spratley Co.	Poughkeepsie	N.Y.	360
WFAG	Radio Engineering Laboratory	Waterford	N.Y.	360
WFAH	Electric Supply Co.	Port Arthur	Texas	360
WFAJ	Hi Grade Wireless Instr. Co.	Asheville	N.C.	360
WFAK	Domestic Electric Co.	Brentwood	Mo.	360
WFAL	Houston Chronicle Pub. Co.	Houston	Tex.	360-485
WFAM	Times Pub. Co.	St. Cloud	Minn.	360
WFAN	Hutchinson Elec. Serv. Co.	Hutchinson	Minn.	360-485
WFAP	Brown's Business College	Peoria	Ill.	360
WFAQ	Mo. Wesleyan College & Cameron Radio Co.	Cameron	Mo.	360
WFAR	Hall & Stubs	Stamford	Me.	360
WFAS	United Radio Corp.	Ft. Wayne	Ind.	360
WFAT	Daily Argus Leader	Sioux Falls	S. Dak.	360
WFAU	Edwin C. Lewis	Boston	Mass.	360
WFAV	University of Nebraska	Lincoln	Nebr.	360-485
WFAW	Miami Daily Metropolis	Miami	Fla.	360
WFAX	Arthur L. Kent	Binghamton	N.Y.	360
WFAY	Daniels Radio Supply Co.	Independence	Kan.	360
WFAZ	South Carolina Radio Shop	Charleston	S.C.	360
WFI	Strawbridge & Clothier	Philadelphia	Pa.	360-485
WFO	Rike-Kumler Co.	Dayton	Ohio	360-485
WGAB	Q.R.V. Radio Co.	Houston	Texas	360

Call Letters	Name	City	State	Wave-Length
WGAC	Orpheum Radio Stores Co.	Brooklyn	N.Y.	360
WGAD	Spanish American School of Radio-Telegraphy	Ensenada	P.R.	360
WGAF	Goller Radio Service	Tulsa	Okla.	360
WGAH	New Haven Electric Co.	New Haven	Conn.	360
WGAJ	W. H. Goss	Shenandoah	Iowa	360
WGAK	Macon Electric Co.	Macon	Ga.	360
WGAL	Lancaster Elec. Supply & Const. Co.	Lancaster	Pa.	360
WGAM	Orangeburg Radio Equipment Co.	Orangeburg	S.C.	360
WGAN	Cecil E. Lloyd	Pensacola	Fla.	360
WGAQ	Glenwood Radio Corp.	Shreveport	La.	360
WGAR	Southwest American	Fort Smith	Ark.	360
WGAS	The Ray-Di-Co Organization	Chicago	Ill.	360
WGAT	American Legion, Dept. of Nebraska	Lincoln	Neb.	360
WGAU	Marcus G. Limb	Wooster	Ohio	360
WGAW	Ernest C. Albright	Altoona	Pa.	360
WGAY	North Western Radio Co.	Madison	Wis.	360
WGAZ	The South Bend Tribune	South Bend	Ind.	360
WGF	The Register & Tribune	Des Moines	Iowa	360-485
WGH	Montgomery Light & Power Co.	Montgomery	Ala.	360-485
WGI	Amer. Radio Research Corp.	Medford Hillside	Mass.	360
WGL	Thomas F. J. Howlett	Philadelphia	Pa.	360
WGR	Federal Tel. & Tel. Co.	Buffalo	N.Y.	360-485
WGU	The Fair	Chicago	Ill.	360
WGV	Interstate Electric Co.	New Orleans	La.	360
WGY	General Electric Co.	Schenectady	N.Y.	360
WHA	University of Wisconsin	Madison	Wis.	360-485
WHAA	State University of Iowa	Iowa City	Iowa	360
WHAB	Clark W. Thompson	Galveston	Texas	360-485
WHAC	Cole Bros. Electric Co.	Waterloo	Iowa	360
WHAD	Marquette University	Milwaukee	Wis.	360
WHAE	Automotive Electric Service Co.	Sioux City	Iowa	360

Call Letters	Name	City	State	Wave-Length
WHAF	Radio Electric Co.	Pittsburgh	Pa.	360
WHAG	University of Cincinnati	Cincinnati	Ohio	360
WHAH	John T. Griffin	Joplin	Mo.	360
WHAI	Radio Equipment & Mfg. Co.	Davenport	Iowa	360
WHAJ	Bluefield Daily Telegraph	Bluefield	W. Va.	360
WHAK	Roberts Hdwe. Co.	Clarksburg	W. Va.	360
WHAL	Phillips Jeffery & Derby	Lansing	Mich.	360
WHAM	University of Rochester	Rochester	N.Y.	360
WHAN	Southwestern Radio Co.	Wichita	Kansas	360
WHAO	Frederic A. Hill	Savannah	Ga.	360
WHAP	Dewey L. Otta	Decatur	Ill.	360
WHAQ	Semmes Motor Co.	Washington	D.C.	360
WHAR	Paramount Radio & Elec. Co.	Atlantic City	N.J.	360
WHAS	Courier-Journal and Louisville Times	Louisville	Ky.	360-485
WHAT	Yale Democrat - Yale Telephone Co.	Yale	Okla.	360
WHAU	Corinth Radio Supply Co.	Corinth	Miss.	360
WHAV	Wilmington Elec. Specialty Co., Inc.	Wilmington	Del.	360
WHAW	Pierce Electric Co.	Tampa	Fla.	360
WHAX	Holyoke Street Ry. Co.	Holyoke	Mass.	360
WHAY	The Huntington Press	Huntington	Ind.	360-485
WHAZ	Rensselaer Polytechnic Inst.	Troy	N.Y.	360
WHB	Sweeney School Co.	Kansas City	Mo.	360-485
WHD	West Virginia University	Morgantown	W. Va.	360
WHK	Warren R. Cox	Cleveland	Ohio	360
WHN	Ridgewood Times Ptg. & Pub. Co.	Ridgewood	N.Y.	360
WHQ	Rochester Times Union	Rochester	N.Y.	360-485
WHU	Wm. B. Duck Co.	Toledo	Ohio	360
WHW	Stuart W. Seeley	East Lansing	Mich.	485
WIAA	Waupoca Civic & Commerce Assoc.	Waupaca	Wis.	360
WIAB	Joslyn Automobile Co.	Rockford	Ill.	360
WIAC	Galveston Tribune	Galveston	Tex.	360
WIAD	Ocean City Yacht Club	Ocean City	N.J.	360

Call Letters	Name	City	State	Wave-Length
WIAE	Mrs. Robert E. Zimmerman	Vincon	Iowa	360
WIAF	Gustav A. De Cortin	New Orleans	La.	360
WIAG	Matthews Elec. Supply Co.	Birmingham	Ala.	360
WIAH	Continental Radio & Mfg. Co.	Newton	Iowa	360
WIAI	Heer Stores Co.	Springfield	Mo.	360
WIAJ	Fox River Valley Radio Co.	Nunah	Wis.	360
WIAK	Daily Journal-Stockman	Omaha	Neb.	360-485
WIAL	Standard Service Co.	Norwood	Ohio	360
WIAN	Chronicle & News	Allentown	Pa.	360
WIAO	School of Eng. of Milwaukee and Wisconsin News	Milwaukee	Wis.	360
WIAP	Radio Development Corp.	Springfield	Mass.	360
WIAQ	Chronicle Publishing Co.	Marion	Ind.	360
WIAR	J. A. Rudy & Sons	Paducah	Ky.	360
WIAS	Burlington Hawkeye & Home Electric Co.	Burlington	Iowa	360
WIAT	Leon T. Noel	Tarkio	Mo.	360
WIAU	American Trust & Savings Bank	Le Mars	Iowa	360
WIAV	New York Radio Laboratories	Binghamton	N.Y.	360
WIAW	Saginaw Radio & Electric Co.	Saginaw	Mich.	360
WIAX	Capital Radio Co. (Paul C. Rohwer)	Lincoln	Neb.	360
WIAY	Woodward & Lothrop	Washington	D.C.	360
WIAZ	Electric Supply Sales Co.	Miami	Fla.	360
WIK	K. & L. Electric Co.	McKeesport	Pa.	360
WIL	Continental Elec. Sup. Co.	Washington	D.C.	360
WIP	Gimbel Brothers	Philadelphia	Pa.	360
WIZ	Cincinnati Radio Mfg. Co.	Cincinnati	Ohio	360-485
WJAB	American Radio Co.	Lincoln	Neb.	360
WJAC	Redell Co.	Joplin	Mo.	360
WJAD	Jackson's Radio Engineering Laboratories	Waco	Texas	360

Call Letters	Name	City	State	Wave-Length
WJAE	The Texas Radio Syndicate	San Antonio	Texas	360
WJAF	Muncie Press-Smith Electric	Muncie	Ind.	360
WJAG	Norfolk Daily News	Norfolk	Neb.	360
WJAH	Central Park Amusement Co.	Rockford	Ill.	360
WJAJ	Y.M.C.A.	Dayton	Ohio	360
WJAK	White Radio Laboratory	Stockdale	Ohio	360
WJAL	Victor Radio Corp.	Portland	Me.	360
WJAM	D. M. Perham	Cedar Rapids	Iowa	360
WJAN	Peoria Star-Peoria Radio Sales Co.	Peoria	Ill.	360
WJAP	Kelley-Duluth Co.	Duluth	Minn.	360
WJAQ	Capper Publications	Topeka	Kansas	360
WJAR	The Outlet Co. (J. Samuels & Bro.)	Providence	R. I.	360
WJAS	Pittsburgh Radio Supply Co.	Pittsburgh	Pa.	360
WJAT	Kelley-Vawter Jewelry Co.	Marshall	Mo.	360
WJAU	Yankton College	Yankton	S. Dak.	360
WJAX	Union Trust Co.	Cleveland	Ohio	360
WJAZ	Chicago Radio Laboratory	Chicago	Ill.	360
WJD	Richard H. Howe	Granville	Ohio	360
WJH	White & Boyer Co.	Washington	D.C.	360
WJK	Service Radio Equip. Co.	Toledo	Ohio	360
WJT	Electric Equipment Co.	Erie	Pa.	360
WJX	DeForest Radio Tel. & Tel. Co.	New York	N.Y.	360
WJZ	Westinghouse Elec. & Mfg. Co.	Newark	N.J.	360
WKAA	H. F. Paap	Cedar Rapids	Iowa	200-360-485
WKAC	Star Publishing Co.	Lincoln	Neb.	360
WKAD	Chas. Looff	East Providence	R. I.	360
WKAF	W. S. Radio Supply Co.	Wichita Falls	Texas	360
WKAG	Edwin T. Bruce, M.D.	Louisville	Ky.	360
WKAH	Planet Radio Co.	West Palm Beach	Fla.	360

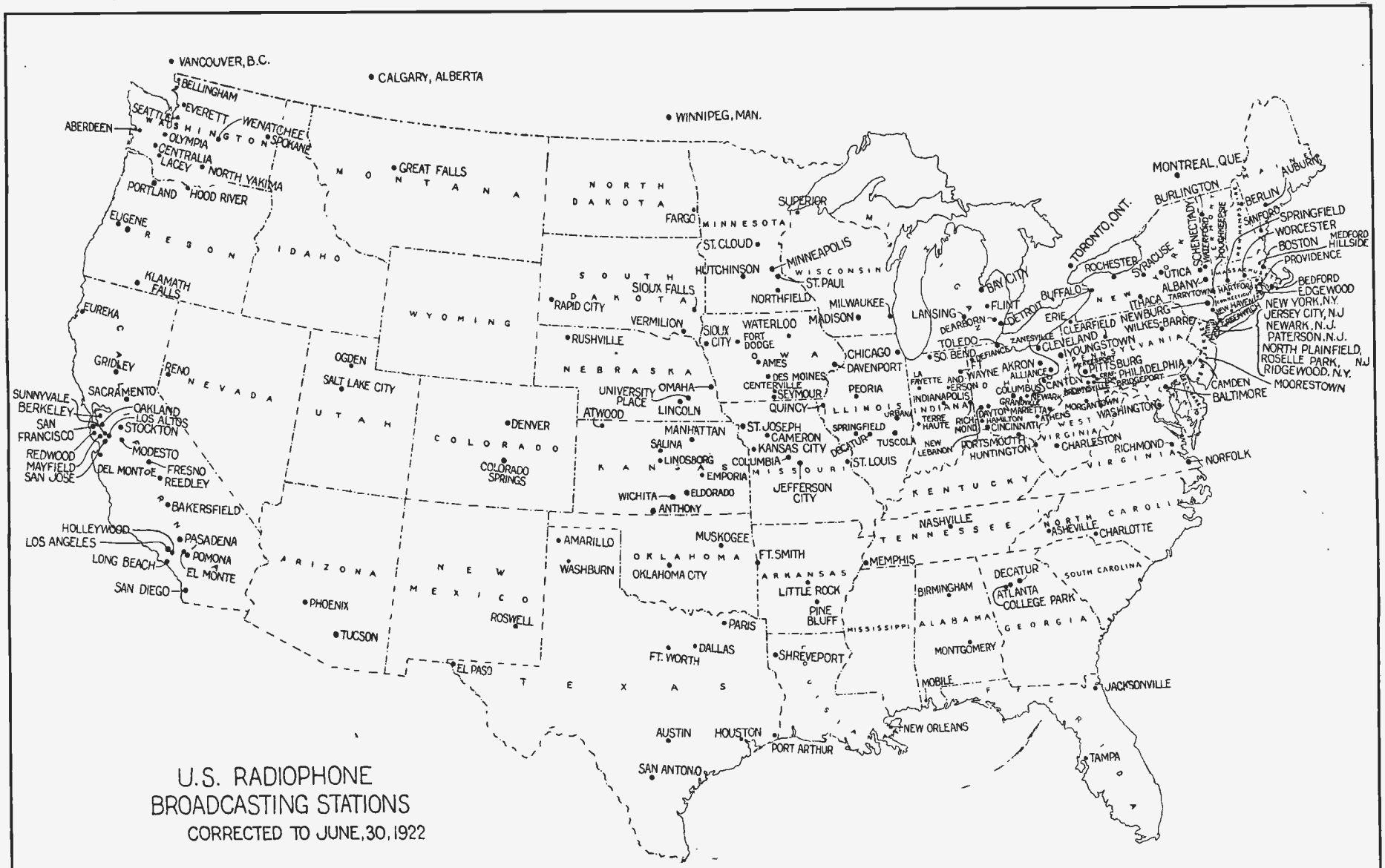
Call Letters	Name	City	State	Wave-Length
WKAJ	Fargo Plumbing and Heating Co.	Fargo	N. Dak.	360
WKAK	Okfuskee County News	Okemah	Okla.	360
WKAL	Gray & Gray	Orange	Texas	360
WKAM	Hastings Daily Tribune	Hastings	Neb.	360
WKAN	Alabama Radio Mfg. Co.	Montgomery	Ala.	360
WKAP	Dutee W. Flint	Cranston	R. I.	360
WKAQ	Radio Corp. of Porto Rico	San Juan	P. R.	360
WKAR	Michigan Agricultural College	East Lansing	Mich.	360
WKAS	L. E. Lines Music Co.	Springfield	Mo.	360
WKAT	Frankfort Morning Times	Frankfort	Ind.	360-485
WKAV	Laconia Radio Club	Laconia	N. H.	360
WKAW	Turner Cycle Co.	Beloit	Wis.	360
WKAX	Wm. A. MacFarland	Bridgeport	Conn.	360
WKAY	Brenau College	Gainesville	Ga.	360
WKAZ	London's Music and Jewelry Co.	Wilkes Barre	Pa.	360
WKC	Joseph M. Zamoiski Co.	Baltimore	Md.	360
WKN	Riechman Crosby Co.	Memphis	Tenn.	360-485
WKY	Oklahoma Radio Shop	Oklahoma City	Okla.	360-485
WLAB	George F. Grossman	Carrollton	Mo.	360
WLAC	North Carolina State College	Raleigh	N. C.	360
WLAD	Arvanette Radio Supply Co.	Hastings	Neb.	360
WLAF	Johnson Radio Co.	Lincoln	Neb.	360
WLAH	Samuel Woodworth	Syracuse	N. Y.	360
WLAJ	Waco Electrical Supply Co.	Waco	Texas	360
WLB	University of Minnesota	Minneapolis	Minn.	360-485
WLK	Hamilton Mfg. Co.	Indianapolis	Ind.	360-485
WLW	Crosley Mfg. Co.	Cincinnati	Ohio	360-485
WMAD	Atchinson County Mail	Rock Port	Mo.	360
WMAH	General Supply Co.	Lincoln	Neb.	360
WMAM	Beaumont Radio Development Co.	Beaumont	Texas	360
WMB	Auburn Electrical Co.	Auburn	Me.	360

Call Letters	Name	City	State	Wave-Length
WMC	Columbia Radio Co.	Youngstown	Ohio	360
WMH	Precision Equipment Co.	Cincinnati	Ohio	360-485
WMU	Doubleday-Hill Electric Co.	Washington	D.C.	360
WNAL	R. J. Rockwell	Omaha	Neb.	360
WNJ	Shotton Radio Mfg. Co.	Albany	N.Y.	360
WNO	Wireless Tel. Co. of Hudson County	Jersey City	N.J.	360
WOC	Palmer School of Chiropractic	Davenport	Iowa	360-485
WOE	Buckeye Radio Service Co.	Akron	Ohio	360
WOH	Hatfield Electric Co.	Indianapolis	Ind.	360
WOI	Iowa State College	Hines	Iowa	360-485
WOK	Pine Bluff Co.	Pine Bluff	Ark.	360
WOO	John Wanamaker	Philadelphia	Pa.	360
WOQ	Western Radio Co.	Kansas City	Mo.	360-485
WOR	L. Bamberger & Co.	Newark	N.J.	360
WOS	Mo. State Marketing Bureau	Jefferson City	Mo.	485
WOU	Metropolitan Utilities District	Omaha	Neb.	360-485
WOZ	Palladium Printing Co.	Richmond	Ind.	360-485
WPA	Fort Worth Record	Ft. Worth	Tex.	360-485
WPE	Central Radio Co.	Kansas City	Mo.	360
WPG	Nushawg Poultry Farm	New Lebanon	Ohio	360
WPI	Electric Supply Co.	Clearfield	Pa.	360
WPJ	St. Joseph's College	Philadelphia	Pa.	360
WPL	Fergus Electric Co.	Zanesville	Ohio	360
WPM	Thomas J. Williams	Washington	D.C.	360
WPO	United Equipment Co.	Memphis	Tenn.	360
WRK	Doron Bros. Electric Co.	Hamilton	Ohio	360
WRL	Union College	Schenectady	N.Y.	360
WRM	University of Illinois	Urbana	Ill.	360
WRP	Federal Inst. of Radiotel.	Camden	N.J.	360
WRR	D. Police & Fire Signal Dept.	Dallas	Tex.	360-485
WRW	Tarrytown Radio Research Lab.	Tarrytown	N.Y.	360
WSB	Atlanta Journal	Atlanta	Ga.	360-485
WSL	J. & M. Electric Co.	Utica	N.Y.	360

Call Letters	Name	City	State	Wave-Length
WSN	Ship Owners' Radio Service	Norfolk	Va.	360
WSV	L. M. Hunter & G. L. Carrington	Little Rock	Ark.	360
WSX	Erie Radio Co.	Erie	Pa.	360
WSY	Alabama Power Co.	Birmingham	Ala.	360
WTG	Kansas State Agric. College	Manhattan	Kans.	485
WTK	Paris Radio Electric Co.	Paris	Texas	360
WTP	George M. McBride	Bay City	Mich.	360
WWB	Daily News Printing Co.	Canton	Ohio	360
WWI	Ford Motor Co.	Dearborn	Mich.	360
WWJ	Detroit News	Detroit	Mich.	360-485
WWL	Loyola University	New Orleans	La.	360
WWT	McCarthy Bros. & Ford	Buffalo	N.Y.	360
WWZ	John Wanamaker	New York	N.Y.	360

CANADIAN BROADCASTING STATIONS

Call Letters	Name	City	Province	Wave-Length
CFAC	Calgary Daily Herald	Calgary	Alta.	
CFCA	Toronto Daily Star	Toronto	Ont.	420
CFCB	Daily Province	Vancouver	B.C.	440
CHCF	Marconi W. Co. of Can., Ltd.	Montreal	Que.	440
CHBC	The Morning Albertan	Calgary	Alta.	410
CHCB	Marconi Co.	Toronto	Ont.	440
CHVC	Metropolitan Motors Co.	Toronto	Ont.	420
CJCA	Edmonton Journal	Edmonton	Alta.	420
CJCB	News Publishing Co., Ltd.	Nelson	B.C.	420
CJCD	T. Eaton Co.	Toronto	Ont.	410
CJCF	Daily Record	Kitchener	Ont.	
CJGC	London Free Press	London	Ont.	
CJNC	Tribune Newspaper Co.	Winnipeg	Man.	420
CKAC	La Presse	Montreal	Quebec	430
CKCE	Can. Independent Tel. Co.	Toronto	Ont.	450
CKCK	Regina Leader	Regina	Sask.	420
3JZ	Marconi W. Tel. Co.	Toronto	Ont.	1200


VANCOUVER, B.C.
CALGARY, ALBERTA
WINNIPEG, MAN.
MONTREAL, QUE.
TORONTO, ONT.
BELLINGHAM
EVERETT
SEATTLE
WENATCHEE
SPOKANE
ABERDEEN
OLYMPIA
CENTRALIA
LACEY
NORTH YAKIMA
PORTLAND
HOOD RIVER
EUGENE
KLAMATH FALLS
EUREKA
GREAT FALLS
FARGO
SUPERIOR
ST. CLOUD
MINNEAPOLIS
HUTCHINSON
ST. PAUL
NORTHFIELD
SIOUX FALLS
RAPID CITY
VERMILION
SIOUX CITY
WATERLOO
FORT DODGE
AMES
MADISON
MILWAUKEE
CHICAGO
DAVENPORT
RUSHVILLE
OGDEN
SALT LAKE CITY
GRIDLEY
RENO
SACRAMENTO
SUNNYVALE
BERKELEY
OAKLAND
LOS ALTOS
SAN FRANCISCO
STOCKTON
REDWOOD
MAYFIELD
SAN JOSE
MODESTO
DEL MONTE
FRESNO
REEDLEY
BAKERSFIELD
HOLLEYWOOD
LOS ANGELES
PASADENA
POMONA
LONG BEACH
EL MONTE
SAN DIEGO
PHOENIX
TUCSON
ROSWELL
EL PASO
DENVER
COLORADO SPRINGS
OMAHA
UNIVERSITY PLACE
LINCOLN
ATWOOD
MANHATTAN
SALINA
LINDSBORG
EMPORIA
WICHITA
ELDORADO
ANTHONY
ST. JOSEPH
CAMERON
KANSAS CITY
SPRINGFIELD
DECATUR
TUSCOLA
ST. LOUIS
COLUMBIA
JEFFERSON CITY
QUINCY
SEYMOUR
CENTERVILLE
DES MOINES
PEORIA
AMARILLO
WASHBURN
MUSKOGEE
OKLAHOMA CITY
FT. SMITH
LITTLE ROCK
PINE BLUFF
PARIS
FT. WORTH
DALLAS
SHREVEPORT
AUSTIN
HOUSTON
PORT ARTHUR
SAN ANTONIO
NEW ORLEANS
MEMPHIS
NASHVILLE
MOBILE
MONTGOMERY
BIRMINGHAM
DECATUR
ATLANTA
COLLEGE PARK
JACKSONVILLE
TAMPA
CHARLESTON
RICHMOND
NORFOLK
ASHEVILLE
CHARLOTTE
HUNTINGTON
PORTSMOUTH
WASHINGTON
BALTIMORE
CAMDEN
PHILADELPHIA
PITTSBURG
CLEVELAND
YOUNGSTOWN
AKRON
CANTON
COLUMBUS
DAYTON
CINCINNATI
INDIANAPOLIS
TERRE HAUTE
LAFAYETTE
FORT WAYNE
SOUTH BEND
TOLEDO
DETROIT
LANSING
FLINT
BAY CITY
BUFFALO
ERIE
ROCHESTER
SYRACUSE
UTICA
ALBANY
ITHACA
NEWBURG
WILKES-BARRE
HARTFORD
SPRINGFIELD
WORCESTER
BOSTON
PROVIDENCE
BURLINGTON
BERLIN
SINFORD
AUBURN
NEW YORK, N.Y.
JERSEY CITY, N.J.
NEWARK, N.J.
PATERSON, N.J.
NORTH PLAINFIELD, N.J.
ROSELLE PARK, N.J.
RIDGEWOOD, N.Y.
MOORESTOWN
EDGEWOOD
BEDFORD
MEDFORD HILLSIDE
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
COLORADO
UTAH
NEVADA
IDAHO
OREGON
WASHINGTON
KANSAS
OKLAHOMA
TEXAS
NEW MEXICO
ARIZONA
MINNESOTA
WISCONSIN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MICHIGAN
U.S. RADIOPHONE
BROADCASTING STATIONS
CORRECTED TO JUNE, 30, 1922