

The Current Regulatory Status of Television

FCC's Proposed New Rules to Govern Television

[Subject of Public Hearing January 15, 1940]

Sec. 4.61 *Defined.* The term "visual broadcast service" means a service rendered by stations broadcasting images for general public reception. There are two general classes of stations recognized in the visual broadcast service, namely; television broadcast stations and facsimile broadcast stations.

Sec. 4.71 *Defined.* The term "television broadcast station" means a station licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public. The transmission of the synchronized sound (aural broadcast) is considered an essential phase of television broadcast and one license will authorize both visual and aural broadcast as herein set forth.

(a) There shall be two types of experimental television stations, namely, "Experimental Research Stations" and "Experimental Program Stations" which shall be known as Class I and Class II stations, respectively.

Sec. 4.72 *Licensing requirements, necessary showing.*

(a) A license for a television Class I station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and experimentation in the technical phases of television broadcasting, not requiring a service directly to the public, which indicates reasonable promise of substantial contribution to the development of the television art.
2. That the program of research and experimentation will be conducted by qualified personnel.
3. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.
4. That the public interest, convenience and/or necessity will be served through operation of the proposed station.

(b) A license for a Class II station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of experimentation in the television broadcast service including scheduled programs which indicates reasonable promise of substantial contribution to the advancement of television broadcasting as a service to the public.
2. That the program of experimentation will be conducted by qualified personnel.
- 3.* That a minimum scheduled program service of five hours per week will be maintained throughout the license period.
4. That program material is available and will be utilized by the applicant in rendering broadcast service to the public.
5. That the applicant will install and operate adequate transmitting and studio equipment to render a satisfactory service to the public within the designated service area and with the television transmission standards recognized by the Commission for Class II television stations.
- 6.** That the operation with respect to fidelity of transmission, spurious emissions, carrier noise, safety provisions, etc., will be in accordance with the standards of good engineering practice applicable to television broadcasting stations in all phases not otherwise specifically included in these regulations.
7. That operation as proposed by the application will not result in objectionable interference to any other Class II station as determined by the standards of allocation applicable to television broadcast stations.
8. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.
9. That the public interest, convenience and/or necessity will be served through the operation of the proposed station.

Sec. 4.73 *Operation*

Class I and Class II stations: Charges.

(a) No charges either direct or indirect shall be made for either the production or transmission of either aural or visual programs by Class I television stations;

(b) No charges either direct or indirect shall be made for the transmission of either aural or visual programs by Class II television stations; however, Class II television broadcast stations may make charges to cover cost of program production, including advertising material, which programs may be transmitted as an experimental program service but without charge for such transmission;

(c) Quarterly reports shall be made to the Commission by Class II television broadcast stations of the charges and costs as well as of other pertinent information which may be of assistance to the Commission in evaluating the economic feasibility of television broadcasting as a regular service to the public on a commercial basis.

(d) The offering by any person of the facilities of any television broadcast station on a regular commercial basis is prohibited. The limited commercialization permitted under subsection (b) above shall not take precedence over the experimental service, but shall in fact be subordinated to it.

Class I stations:

Scope of Experimentation, Limitations and Restrictions.

(e) Class I stations shall operate to conduct research and experimentation for the development of the television broadcast art in its technical phases but shall not operate to render regularly scheduled broadcast service to the public.

(f) Class I stations will not be required to adhere to the television transmission standards recognized by the Commission for Class II television stations.

(g) No Class I station shall operate when interference would be caused by such operation to the regularly scheduled broadcast service of a Class II station.

Class II Stations:

Scope of Experimentation; Service Requirements.

(h) Class II stations shall operate to render scheduled television broadcast service for public consumption, and in connection therewith may carry out experiments with respect to program technique, determine power and antenna requirements for satisfactory broadcast service and perform all research and experimentation necessary for the advancement of television broadcasting as a service to the public.

* This provision modifies Section 4.4 as it applies to Class II television broadcast stations.

** The specifications for operation deemed necessary to meet the requirements of good engineering practice as applied to television stations will be published from time to time. These specifications will be altered as the art progresses and upon a showing being made that such changes are desirable in the public interest.

(i) Class II stations shall operate in accordance with the television transmission standards (scanning, synchronization, etc.) which the Commission recognizes for this class of station. The Commission will recognize a modification in these standards upon a showing by the applicant proposing the changes that it will be in the public interest to require all Class II stations to adopt the proposed changes.

(j) Class II stations shall make all equipment changes necessary for rendering the external transmitter performance required by the Commission.

(k) Class II stations shall maintain a minimum scheduled program service of five hours per week throughout the license period. (The Commission may modify this minimum schedule in accordance with the showing on the merits in individual cases.)

(l) In case of failure of a Class II station to render its minimum of scheduled program service per week, the renewal of the license therefor may be refused unless it be shown that the failure of program service was due to causes beyond the control of the licensee.

Sec. 4.74 *Frequency assignment.* (a) The following groups of channels are allocated for assignment to television broadcast stations licensed experimentally:

Group A	Group B	Group C
Channel No. 1 44,000-50,000 kc.	Channel No. 8 156,000-162,000 kc.	Any 6000
2 50,000-56,000	9 162,000-168,000 ¹	kc. band
3 66,000-72,000	10 180,000-186,000	above
4 78,000-84,000	11 186,000-192,000	300,000
5 84,000-90,000	12 204,000-210,000	kc. exclud-
6 96,000-102,000	13 210,000-216,000 ¹	ing band
7 102,000-108,000	14 234,000-240,000	400,000 to
	15 240,000-246,000	401,000 kc.
	16 258,000-264,000	
	17 264,000-270,000 ¹	
	18 282,000-288,000	
	19 288,000-294,000	

¹ See Secs. 4.4(c) and 4.154(a).

(b) Each Class II television broadcast station will be assigned only one channel from Groups A or B. Class I television stations may be assigned one or more channels as the program of experimentation requires. Both aural and visual carriers with side bands for modulation are authorized but no emissions shall result outside the authorized channel. The assignment of a channel to a Class II television broadcast station does not preclude the use of that channel by Class I stations although the Class II television station has priority for the use of the channel for scheduled program service.

(c) Groups B and C may be assigned to television stations to serve auxiliary purposes such as television relay stations and developmental mobile service. No mobile or portable station will be licensed for the purpose of transmitting television programs to the public directly.

(d) The assignment of frequency channels in Group A for Class II television broadcast stations will be limited as follows:*

Cities whose metropolitan districts exceed 1,000,000 population	3 channels
Cities whose metropolitan districts are not less than 500,000 population or more than 1,000,000 population	2 channels
Cities whose metropolitan districts are less than 500,000 population	1 channel

(e) A license for only one Class II television station, on a channel in Group A, will be granted to a person to serve in whole or substantial part the same service area.

(f) No Class II television broadcast station will be assigned a channel in Group A for time sharing operation unless it is shown that the service proposed can not be rendered on a channel in Group B.

Sec. 4.75 *Power.*

(a) The operating power of a Class I station shall not be in excess of that necessary to carry forward the program of research.

(b) The operating power of a Class II station shall not be in excess of that necessary to provide adequate service to the service area designated for the station.

Sec. 4.76 *Supplemental report with renewal application.*

A supplemental report shall be filed with and made a part of each application for renewal of license and shall include comprehensive reports on the following:

(a) *For Class I Television Broadcast Stations.*

1. Number of hours operated.
2. Full data on research and experimentation conducted.
3. Conclusions, tentative and final.
4. Program for further developments of the television broadcast service.
5. All developments and major changes in equipment.
6. Any other pertinent developments.

(b) *For Class II Television Broadcast Stations.*

1. Number of hours operated during which programs were transmitted classified as studio performances, special events (with appropriate description), films, etc.
2. Studio equipment used and any developments made during the license period.
3. Progress made in the advancement of television broadcasting as a service to the public.
4. Itemized financial data on cost of operation during the license period.
5. Field intensity measurements and visual and aural observations to determine the service area of the station (required for first report only and whenever changes are made which would tend to cause a change in the service area).

* This limitation upon the use of the channels for metropolitan districts having different populations can be departed from, providing the applicant shows that no other metropolitan district would be restricted to fewer channels than provided for by the table.

**Abstract of
Television Allocation Recommendations of RMA
Recommended for Adoption by
FCC Television Committee**

The following formula has been developed¹ for the calculation of the field intensity at a distance from a transmitter operating on frequencies above 40 Mc. and measurements have been made that indicate it is reasonably accurate.

$$E = \frac{.01052 \sqrt{W} H A F}{DN} \text{ microvolts per meter}$$

where W = Watts radiated (doublet)
H = Antenna height in feet
A = Receiving antenna height in feet
F = Frequency in megacycles
D = Distance in miles

Within the optical horizon the value of N is 2. Beyond the horizon the value of N is greater than 2, increasing with frequency. These formulas have been used to calculate the propagation curves (E vs distance) given in Appendix I which were used as a basis for the following recommendations:

RECOMMENDATIONS

It is recommended:

1. That the curves shown in this report* be used for the calculation of field intensity at a distance from a television station, 50 mc to apply to channels 1 and 2, 70 mc to apply to channels 3 and 4, and 100 mc to apply to channels 5, 6 and 7.

* Curves can be procured from FCC or RMA.

2. That, in considering the matter of protection to be given to stations for allocation purposes, the limit of the service area of a television station shall be the 500 uv/m contour and no protection shall be given outside of this contour.

3. That 46 decibels (200-1) be used as the ratio of desired to undesired signals on the same channel necessary for interference-free reception. This means that at the 500 uv/m contour of a station not more than 2.5 uv/m should be permitted from other stations on the same frequency.

4. That allocations be made in such manner as to provide service from a station which will fit the community (considering topography, population distribution, etc.) to which the station is assigned.

5. That in all allocations discrete steps of "equivalent power"² (100 kw, 10 kw, 1 kw and .1 kw) and effective heights³ (1500', 1000', 500', 250') be used as standards for authorizations; that during the development of the service operation at convenient power and height between the maxima authorized and the next lower step be permitted, time being allowed to stations to develop up to the maximum service required for the area to which it is assigned.

6. That, in allocating frequencies, certain channels be reserved for high-powered stations to render service to large, highly populated centers and their surrounding areas of economic dependence and that other channels be used for low-powered stations rendering service to smaller communities and concentrated centers of population.

7. That within the 500 uv/m contour of a desired station the field from the stations on the adjacent channels shall not exceed 50 uv/m. (In the New York area there are in existence two transmitters operating on adjacent channels at approximately common locations. It is believed that because of overlapping service areas, the discrimination of receivers will permit a ratio of 1:1. Other allocations should not be made similar to New York until adequate investigation can be made of this one case.)

**APPENDIX I
TRANSMISSION CHARACTERISTICS OF
FREQUENCIES USABLE FOR TELEVISION**

There has been prepared a group of charts showing calculated values of field strength for a radiated power of 10 kw and various heights of transmitter and frequencies. Calculations were made for heights of 250, 500, 1000 and 1500 feet at the transmitter. Curves were plotted for frequencies of 50, 70, 100, and 150 mc. A height of 30 feet was assumed for the receiving antenna. The calculations were made on the assumption that the field strength would be inversely proportional to the square of distance out to the optical horizon from the transmitter and that beyond that point the field strength falls off inversely proportional to distance raised to another exponent. This other exponent is larger than 2 and increases with frequency. A curve is included showing how this exponent varies with frequency. The value of this exponent has been determined from actual field strength measurements made at various distances and the calculations have been applied to a great number of curves plotted from field data along various radials, most of them from the Empire State Building. In general, the shape of the calculated curve is in good agreement with the shape of the observed data. The calculated curves do, however, represent the conditions to be expected at most favorable receiving locations. Experience has been that many receiving points will have values of field strength as much as 20 db below the calculated curves.

For obtaining points at other frequencies or heights it may be assumed that the field strength will be directly proportional to frequency, directly proportional to the square root of radiated power and directly proportional to height for all points within the optical horizon from the transmitter. The distance of the optical horizon may be calculated for smooth ground as being equal to the product of 1.22 times the square root of the transmitter height. The answer will be in miles and the height should be expressed in feet.

It is not considered that ground conductivity is as important a consideration

¹ Some Notes on Ultra High Frequency Propagation, RCA Review, Volume I, January 1937, and Notes on the Random Fading of 50 Megacycle Signals on Non-Optical Paths, Proceedings of the IRE, August 1939.

² See definition of "equivalent power."

³ Effective height is the height of the antenna above the average elevation of the area to be covered by the signal.

**Proposed Television Transmission Standards
Recommended by Radio Manufacturers Assn. to FCC**

- T-101 *Television Channel Width*
The standard television channel shall not be less than 6 megacycles in width.
- T-102 *Television and Sound Carrier Spacing*
It shall be standard to separate the sound and picture carriers by approximately 4.5 Mc. This standard shall go into effect just as soon as "single side band" operation at the transmitter is practicable. (The previous standard of approximately 3.25 Mc. shall be superseded.)
- T-103 *Sound Carrier and Television Carrier Relation*
It shall be standard in a television channel to place the sound carrier at a higher frequency than the television carrier.
- T-104 *Position of Sound Carrier*
It shall be standard to locate the sound carrier for a television channel 0.25 Mc. lower than the upper frequency limit of the channel.
- T-105 *Polarity of Transmission*
It shall be standard for a decrease in initial light intensity to cause an increase in the radiated power. (See Standard M9-121)
- T-106 *Frame Frequency*
It shall be standard to use a frame frequency of 30 per second and a field frequency of 60 per second, interlaced.
- T-107 *Number of Lines per Frame*
It shall be standard to use 441 lines per frame.
- T-108 *Aspect Ratio*
The standard picture aspect ratio shall be 4:3.
- T-109 *Percentage of Television Signal Devoted To Synchronization*
If the peak amplitude of the radio frequency television signal is taken as 100%, it shall be standard to use not less than 20% nor more than 25% of the total amplitude for synchronizing pulses.
- T-110 *Method of Transmission*
It shall be standard in television transmission that black shall be represented by a definite carrier level independent of light and shade in the picture.
- T-111 *Synchronizing*
The standard synchronizing signals shall be as shown on Drawing T-111.
- T-112 *Transmitter Modulation Capability*
If the peak amplitude of the radio frequency television signal is taken as 100%, it shall be standard for the signal amplitude to drop to 25% or less of peak amplitude for maximum white.
- T-113 *Transmitter Output Rating*
It shall be standard, in order to correspond as nearly as possible to equivalent rating of sound transmitters, that the power of television picture transmitters be nominally rated at the output terminals in peak power divided by four.
- T-114 *Relative Radiated Power for Picture and for Sound*
It shall be standard to have the radiated power for the picture approximately the same as for sound.

in the field of ultra high frequency propagation as it is in the consideration of standard broadcast frequency problems.

Large obstructions can be expected to have a serious effect upon propagation at these frequencies. Receiving sites situated behind large buildings or mountains can be expected to be seriously handicapped. In many such cases the handicap can be overcome by situating the antenna at a more favorable location and bringing the signal to the receiver through a transmission line.

Large areas of water will, in general, reduce the field strength received by horizontal polarization. In this one respect, horizontal polarization is affected worse than vertical polarization.

Another factor is the matter of field strength in variation. At distances beyond 20 or 30 miles and especially at distances beyond the horizon, the field strength is subject to a variability caused by changes of the index of refraction of the atmosphere. These variations of field strength are more pronounced in the summertime than in the winter. As a general rule the tendency is toward higher field strengths at night than in the daytime. These variabilities are generally less pronounced on a high antenna than on a low antenna.

**APPENDIX II
ASSUMED RADII OF SERVICE OF TELEVISION TRANSMITTERS
ON CHANNELS AS INDICATED
(Location of 500 uv/m contour)**

Antenna Height	Channels	Station Maximum Power			
		100 kw.	10 kw.	1 kw.	0.1 kw.
1000 ft.	1, 2	65	50	30	18
	3, 4	65	50	35	20
	5, 6, 7	65	50	40	23
500 ft.	1, 2	45	33	22	12
	3, 4	45	35	25	15
	5, 6, 7	45	37	28	18
250 ft.	1, 2	31	24	17	9
	3, 4	31	24	18	10
	5, 6, 7	31	24	20	12

**ASSUMED RADII OF INTERFERENCE OF TELEVISION TRANSMITTERS ON CHANNELS AS INDICATED
(Location of 2.5 uv/m contour)**

Antenna Height	Channels	Station Maximum Power			
		100 kw.	10 kw.	1 kw.	0.1 kw.
1000 ft.	1, 2	250	185	136	100
	3, 4	220	165	128	95
	5, 6, 7	185	145	115	90
500 ft.	1, 2	175	130	95	70
	3, 4	155	120	90	70
	5, 6, 7	135	105	85	65
250 ft.	1, 2	120	90	65	50
	3, 4	100	80	60	50
	5, 6, 7	90	70	55	45

Full Text of

North American Regional Broadcasting Agreement

(Allocations Treaty Adopted at Havana, December 13, 1937)

Governments Participating—Canada, Cuba, Dominican Republic, Haiti, Mexico and United States

1

Purpose and Scope of This Agreement

1. *Purpose of Agreement*—The purpose of this Agreement is to regulate and establish principles covering the use of the standard broadcast band in the North American Region so that each country may make the most effective use thereof with the minimum technical interference between broadcast stations.

2. *North American Region*—The North American Region (hereinafter referred to as "Region") for the purpose of this Agreement shall be deemed to include and to consist of the following countries: Canada, Cuba, Dominican Republic, Haiti, Mexico, Newfoundland, and United States of America.

3. *Standard broadcast band*—The standard broadcast band shall be deemed to be the band of frequencies extending from 550 to 1600 kc, both inclusive, both 550 kc. and 1600 kc. being the carrier frequencies of broadcasting channels as hereinafter defined. The Governments agree, subject to the provisions of Article 7 of the General Radio Regulations annexed to the International Telecommunications Convention Madrid, 1932, that this band of frequencies shall be allocated exclusively to broadcasting in the Region.

4. *Sovereign right to use channels*—The sovereign right of all countries, parties to this Agreement, to the use of every channel in the standard broadcast band is recognized. The Governments recognize, however, that until technical developments reach a state permitting the elimination of radio interference of international character, a regional arrangement between them is necessary in order to promote standardization and to minimize interference.

5. *Regional character of Agreement*—The Governments recognize that this Agreement, and each provision thereof, is a regional arrangement within the meaning of, and authorized by the International Telecommunications Convention and the General Radio Regulations annexed thereto.

Following is the complete text of the treaty governing the distribution of the 106 channels in the broadcast band, ranging from 550 to 1600 kc., drawn up at the Inter-American Radio Conference in Havana, Nov. 1 to Dec. 13, 1937. The treaty became valid when the four principal nations (United States, Canada, Mexico and Cuba) ratified it. It provides that it may be made effective one year after ratification, to remain in force for five years. Cuba ratified Dec. 22, 1937; the United States, June 15, 1938; Canada, Nov. 29, 1938; Mexico, Dec. 23, 1939. Effective date is to be ordered some time in 1940 by agreement of the signatory administrations.

station, the field intensity of an undesired station (or the root-mean-square value of field intensities of two or more stations on the same frequency) exceeds for ten (10) percent or more of the time the values hereinafter set forth in this Agreement.

7. *Power*—The power of a radio transmitter is the power supplied to the antenna. The power in the antenna of a modulated-wave transmitter shall be expressed in two numbers, one indicating the power of the carrier frequency supplied to the antenna, and the other the actual maximum percentage of modulation.

8. *Spurious radiation*—A spurious radiation from a transmitter is any radiation outside the frequency band of emission normal for the type of transmission employed, including any harmonic modulation products, key clicks, parasitic oscillations and other transient effects.

9. *English, French and Spanish equivalents*—It is agreed that, as used in this Agreement, the French and Spanish words below set forth are respectively the equivalent of, and mean the same as, the English terms opposite which they appear:

English	French	Spanish
Clear channel	fréquence libre	Canal despejado
Objectionable interference	Brouillage nuisible	Interferencia objetable

Classes of Channels and Allocation Thereof

1. *Three classes*—The 106 channels in the standard broadcast band are divided into three principal classes—clear, regional and local.

2. *Clear channel*—A clear channel is one on which the dominant station or stations render service over wide areas and which are cleared of objectionable interference, within their primary service areas and over all or a substantial portion of their secondary service areas.

3. *Regional channel*—A regional channel is one on which several stations may operate with powers not in excess of 5 kw. The primary service area of a station operating on any such channel may be limited, as a consequence of interference, to a given field intensity contour.

4. *Local channel*—A local channel is one on which several stations may operate with powers not in excess of 250 watts. The primary service area of a station operating on any such

channel may be limited, as a consequence of interference, to a given field intensity contour.

5. *Number of channels of each class*—The number of channels of each class shall be as follows:

Clear channels	59
Regional channels	41
Local channels	6

106

6. *Allocation of specific channels to each class*—The channels are allocated to the several classes as follows:

Clear channels. The following channels are designated as clear channels: 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 800 810 820 830 840 850 860 870 880 890 900 940 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1160 1170 1180 1190 1200 1210 1220 1500 1510 1520 1530 1540 1550 1560 1570 and 1580.

Regional channels. The following channels are designated as regional channels: 550 560 570 580 590 600 610 620 630 790 910 920 930 950 960 970 980 1150 1250 1260 1270 1280 1290 1300 1310 1320 1330 1350 1360 1370 1380 1390 1410 1420 1430 1440 1460 1470 1480 1590 1600.

Local channels. The following channels are designated as local channels: 1230 1240 1340 1400 1450 and 1490 kc.

7. *Use of regional and local channels by countries*—All countries may use all regional and all local channels, subject to the power limitations and standards for prevention of objectionable interference set forth in this Agreement.

8. *Priority of use of clear channels by countries*—

(a) The clear channels are assigned for priority of use by Class I and II stations in the several countries in accordance with the table set forth in Appendix I.

(b) Each such channel shall be used in a manner conforming to the best engineering practice with due regard to the service to be rendered by the dominant stations operating thereon, as set forth elsewhere in this Agreement. If, for one year within the term of this Agreement, a country fails to make any use of a clear channel thus assigned to it, the channel shall be considered open for use by the other countries, parties to this Agreement, pursuant to such arrangement as may be agreed upon by their respective administrations and without any necessity for revision of this Agreement.

(c) No country to which a clear channel has been thus assigned shall permit, or agree to permit, any other country to use such channel in a manner not in conformity with this Agreement without first giving 60 days (calendar days) advance notice of its intention so to do to all other countries, parties to this Agreement. If during this period of 60 days (calendar days) any other country shall present objections to such proposed use of the channel, the country to which the clear channel has been assigned shall not permit, or agree to permit, such proposed use until the difference presented by the objection has been amicably resolved.

(d) If within the period of this Agreement the country to which a clear channel has been assigned shall have made use of the channel but not in the manner above prescribed or not to the extent required by the provisions of this Agreement, such country shall be considered as having relinquished that portion of the rights which it has not used and at the expiration of this Agreement the other countries party thereto shall have the right, if they see fit, to withdraw the unused privileges from such country and to reassign them to any or all of the other interested countries.

Classes of Stations and Use of The Several Classes of Channels

1. *Classes of stations*—Broadcast stations are divided into four principal

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Changes of Channel Assignments Under the Havana Treaty

A broadcast station assigned to a channel in Column 1 will be changed to the channel on the same horizontal line in Column 2 to comply with North American Regional Broadcasting Agreement (see note). Figures indicate kilocycles.

Col. 1	Col. 2	Col. 1	Col. 2	Col. 1	Col. 2
560	550	910	*	1260	1290
560	560	920	950	1270	1300
570	570	930	960	1280	1310
580	580	940	970	1290	1320
590	590	950	980	1300	1330
600	600	960	*	1310	1340
610	610	970	1000	1320	1350
620	620	980	1020	1330	1360
630	630	990	1030	1340	1370
640	640	1000	1040	1350	1380
650	650	1010	690, 740,	1360	1390
660	660		990 or 1050	1370	1400
670	670	1020	1060	1380	1410
680	680	1030	*	1390	1420
690	*	1040	1080	1400	1430
700	700	1050	1070	1410	1440
710	710	1060	1090	1420	1450
720	720	1070	1100	1430	1460
730	*	1080	1110	1440	1470
740	750	1090	1120	1450	1480
750	760	1100	1130	1460	1500
760	770	1110	1140	1470	1510
770	780 or 1110	1120	1150	1480	1520
780	790	1130	1160	1490	1530
790	810	1140	1070 or 1170	1500	1490
800	820	1150	1180	1510	*
810	830	1160	1170 or 1190	1520	*
820	840	1170	1200	1530	1590
830	850	1180	1170 or 1200	1540	*
840	*	1190	1210	1550	1600
850	870	1200	1230	1560	*
860	880	1210	1240	1570	*
870	890	1220	1250	1580	*
880	910	1230	1260	1590	*
890	920	1240	1270	1600	*
900	930	1250	1280		

*Not assigned in U. S.

Some changes in individual cases not in accordance with the above change of channels may be necessary to avoid interference on adjacent channels or other considerations.

II Technical

A. Definitions

1. *Broadcast station*—A station the emissions of which are primarily intended to be received by the general public.

2. *Broadcast channels—550 to 1600 kc.*—A broadcast channel is a band of frequencies ten (10) kc. in width, with the carrier frequency at the center. Channels shall be designated by their assigned carrier frequencies. Carrier frequencies assigned to broadcast stations shall begin at 550 kc. and be in successive steps of 10 kc. No intermediate frequency shall be assigned as the carrier frequency of any broadcast station.

3. *Service areas:*
(a) *Primary service area*—The primary service area of a broadcast station is the area in which the ground wave is not subject to objectionable interference or objectionable fading.

(b) *Secondary service area*—The secondary service area of a broadcast station is the area served by the sky wave and not subject to objectionable interference. The signal is subject to intermittent variations in intensity.

4. *Dominant stations*—A "dominant" station is a Class I station, as hereinafter defined, operating on a clear channel.

5. *Secondary station*—A "secondary" station is any station except a Class I station operating on a clear channel.

6. *Objectionable interference*—Objectionable interference is the degree of interference produced when, at a specified boundary or field intensity contour with respect to the desired

Full Text of North American Regional Broadcasting Agreement

(Continued from page 362)

pal classes, to be designated Class I, Class II, Class III, and Class IV, respectively.

2. *Definitions of classes*—The four classes of broadcast stations are defined as follows:

Class I: A dominant station operating on a clear channel and designed to render primary and secondary service over an extended area and at relatively long distances. Class I stations are subdivided into two classes:

Class I-A: A Class I station which operates with power of 50 kw or more and which has its primary service area, within the limits of the country in which the station is located, free from objectionable interference from other stations on the same and adjacent channels, and its secondary service area, within the same limits, free from objectionable interference from stations on the same channel, in accordance with the engineering standards hereinafter set forth.

Class I-B: A Class I station which operates with power of not less than 10 kw or more than 50 kw and which has its primary service area free from objectionable interference from other stations on the same and adjacent channels and its secondary service area free from objectionable interference from stations on the same channel, in accordance with the engineering standards hereinafter set forth.

(a) When two Class I-B stations on the same channel are separated by a distance of 2800 miles or more, neither station shall be required to install a directional antenna.

(b) When two Class I-B stations on the same channel are separated by a distance of more than 1800 miles and less than 2800 miles, it will, in the absence of proof to the contrary, be assumed that each station is free of objectionable interference caused by the other and neither shall be required to install directional antennae or take other precautions to avoid such interference. In case the existence of objectionable interference is proved, the governments concerned will consult with each other regarding the desirability and practicality of installation of directional antennae or the taking of other precautions to eliminate the interference and will determine by special arrangement the measures, if any, to be taken.

(c) When two Class I-B stations on the same channel are separated by a distance less than 1800 miles, it will, in the absence of proof to the contrary, be assumed that the installation of directional antennae or the taking of other precautions to avoid interference is necessary, and the governments concerned will consult with each other and will take such measures as may be agreed upon between them to the end that the objectionable interference may be reduced or eliminated.

Class II: A "secondary" station which operates on a clear channel and is designed to render service over a primary service area which, depending on geographical location and power used, may be relatively large, but which is limited by and subject to such interference as may be received from Class I stations. A station of this class shall operate with power of not less than 0.25 kw. or more than 50 kw. Whenever necessary a Class II station shall use a directional antenna or other means to avoid interference, in accordance with the engineering standards hereinafter set forth, with Class I stations and with other Class II stations.

Class III: A station which operates on a regional channel and is designed to render service primarily to a metropolitan district and the rural area contained therein and contiguous thereto. Class III stations are subdivided into two classes:

Class III-A: A Class III station which operates with power not less than one kilowatt or more than five kilowatts and the service area of which is subject to interference in ac-

cordance with the engineering standards hereinafter set forth.

Class III-B: A Class III station which operates with a power not less than 0.5 kw or more than 1 kw night and 5 kw daytime and the service area of which is subject to interference in accord with the engineering standards hereinafter set forth:

Class IV: A station using a local channel and designed to render service primarily to a city or town and the suburban and rural areas contiguous thereto. The power of a station of this class shall not be less than 0.1 kw or more than 0.25 kw and its service area is subject to interference in accord with the engineering standards hereinafter set forth.

3. *Change of class*—If a station or stations in Class III-B located in any country can, through the use of directional antennae or otherwise, so reduce the interference caused or received by such station or stations to the field contour to which interference to stations in Class III-A is allowed, such station or stations shall automatically be classified and included in Class III-A and shall thereafter be so recognized and treated by the Administrations of all countries within the Region.

4. *Use of clear channels:*

(a) In principle and subject only to the exception hereinafter set forth, Class I stations shall be assigned only to clear channels.

(b) Class II stations may be assigned to clear channels only on condition that objectionable interference will not be caused to any Class I stations. Where any country has priority of use of a clear channel for any class I-A station, no other country shall assign any Class II station to that channel for nighttime operation (from sunset to sunrise at the location of the Class II station) unless such Class II station is located not less than 650 miles from the nearest border of the country in which the Class I-A station is located; provided, however, that where an assignment for a Class II station is specifically stated in Appendix I, such assignment shall be deemed as authorized under the limitations therein set forth.

5. *Use of regional channels:*

(a) In general only Class III-A and Class III-B stations shall be assigned to regional channels.

(b) On condition that interference be not caused to any Class III-A or Class III-B station, and subject to such interference as may be received from Class III-A or Class III-B stations, Class IV stations may be assigned to regional channels.

(c) Because of their geographical location with respect to the North American continent, special consideration will be given to the use by Cuba, the Dominican Republic, Haiti and Newfoundland of stations of Classes I and II assigned to certain regional channels under certain conditions, with respect to power and precautions to avoid objectionable interference as set forth in Appendix VII.

6. *Use of local channels*—Only Class IV stations shall be assigned to local channels.

D. Service and Interference

1. *Satisfactory signal*—It is recognized that, in the absence of interference from other stations and in regions where the natural electrical noise level is not abnormally high, a signal of 100 microvolts per meter constitutes a usable signal in rural and sparsely settled areas but that, because of the higher electrical noise levels in more thickly populated communities, greater field intensities (ranging as high as 25 millivolts or more in cities) are necessary to render satisfactory service. It is further recognized that it is not possible to accord protection to stations from objectionable interference over the entire areas over which their signals are or may be above the electrical noise level, particularly at night, and that it is necessary to specify boundaries

or contours at or within which stations are protected from objectionable interference from other stations.

2. *Areas protected from objectionable interference*—The boundaries or contours at and within which the several classes of stations shall be protected from objectionable interference are as set forth in Appendix II. No station, however, need be protected from objectionable interference at any point outside the boundaries of the country in which such station is located.

With respect to the root-mean-square values of interfering field intensities referred to herein, it shall be understood to apply in determining the interference between existing stations and no station thereafter assigned the channel shall increase the root-mean-square value of the interfering field intensity above the maximum specified in the attached tables.

3. *Objectionable interference on the same channel*—Objectionable interference shall be deemed to exist to a station when, at the boundary or field intensity contour specified in Appendix II with respect to the class to which the station belongs, the field intensity of an interfering station (or the root-mean-square value of the field intensities of two or more interfering stations) operating on the same channel, exceeds for ten (10) percent or more of the time the value of the permissible interfering signal set forth opposite such class in Appendix II.

4. *Interference to dominant clear channel stations*—A station shall be considered as not capable of causing objectionable interference to a Class I clear channel station on the same frequency when it is separated from the dominant clear channel station by a difference of 70 degrees or more of longitude.

5. *Objectionable interference on adjacent channels*—It is recognized, in principle, that objectionable interference may be caused to a desired station when, at or within the specified contours of a desired station, the field intensity of the ground wave of an undesired station operating on an adjacent channel (or the root-mean-square value of the field intensities of two or more such undesired stations operating on the same adjacent channel) exceeds a value determined by the following ratio:

Separation between channels	Minimum permissible ratio of desired to undesired signals
10 kc.	1 to 0.5
20 kc.	1 to 1
30 kc.	1 to 50

For convenient reference, the maximum permissible values of interfering signals on such adjacent channels at specified contours are set forth in Appendix III, Table I.

6. *Application of standards to existing stations:*

(a) For the purpose of estimating objectionable interference, all stations (other than those of Class II) shall be assumed to use the maximum power permitted to their respective classes. In this connection, the power of Class I-A stations shall be considered to be 50 kw. or the actual power, if higher.

(b) After this agreement has been placed in operation a station thereafter assigned a channel already assigned to other stations shall not be considered as preventing existing stations from increasing their power to the maximum allowed their class, even though such power increase may limit the newly assigned station to a field intensity contour of higher value than that permitted its class.

7. *Frequency stability*—The operating frequency of each broadcast station shall be maintained to within 50 cycles of the assigned frequency until January 1, 1939, and thereafter the frequency of each new station or each station where a new transmitter is installed shall be maintained within 20 cycles of the assigned frequency,

and after January 1, 1942, the frequency of all stations shall be maintained within 20 cycles of the assigned frequency.

8. *Spurious radiation*—The governments shall endeavor to reduce and, if possible, eliminate spurious radiations from broadcast stations. Such radiations shall be reduced in all cases until they are not of sufficient intensity to cause interference outside the frequency band required for the type of emission employed. With respect to type A-3 emissions (radio-telephony) the transmitter should not be modulated in excess of its modulation capability to the extent that interfering spurious radiations occur, and, with respect to amplitude modulation, the operating percentage of modulation should not be less than seventy-five (75) percent on peaks of frequent recurrence. Means should be employed to insure that the transmitter is not modulated in excess of its modulation capability.

E. Determination of Presence of Objectionable Interference

1. *Antenna performance*—For the purpose of calculating the presence and the degree of objectionable interference, stations of the several classes shall be assumed to produce effective field, corrected for absorption, for one kilowatt of input power to the antenna, as follows:

Class of Station	At One Mile	At One Kilometer
I	225 mv/m	362 mv/m
II and III	175 mv/m	282 mv/m
IV	150 mv/m	241 mv/m

In case a directional antenna is employed, the interfering signal of a broadcasting station will vary in different directions. To determine the interference in any direction, in the absence of actual interference measurements, the horizontal and vertical field intensity patterns of the directional antenna must be calculated and by comparing the appropriate vectors in the horizontal or vertical pattern with that of a nondirectional with the same effective field, the interfering signal toward any other station can be expressed in terms of kilowatts. This rating in kilowatts shall be applied in the use of mileage separation tables or in computing distances from the propagation curves or tables.

2. *Power*—The power of a station shall, for the purposes of notifications required by this Agreement, be determined in one of the following manners:

(a) By taking the product of the square of the antenna current and the antenna resistance (antenna input power).

(b) By determination of the station's effective field intensity, corrected for absorption, by making sufficient field intensity measurements on at least eight radials as nearly equally spaced as practicable and by relating the field intensity thus determined to the effective field intensity of a station having the antenna efficiency stipulated above for its class.

3. *Methods of determining the presence of objectionable interference*—The existence or absence of objectionable interference from stations on the same or adjacent channels shall be determined by one of the following methods:

(a) By actual measurements contained in the method hereinafter prescribed; or, with the mutual consent of the countries concerned:

(b) By reference to the propagation curves in Appendices IV and V, or

(c) By reference to the distance tables set forth in Appendix VI.

4. *Actual proof of existence or absence of objectionable interference*—The existence or absence of objectionable interference may be proved by field intensity measurements or recordings made with suitable apparatus, duly calibrated, by Government

Full Text of North American Regional Broadcasting Agreement

Engineers or other engineers as may be mutually acceptable to the Governments concerned. Such field intensity measurements shall be made in the manner and for the periods of time mutually agreed upon by the Governments concerned.

The contracting Governments agree to facilitate the making of the measurements by requiring the stations involved to remain silent or operate in the manner deemed necessary, and at such times as not to interrupt regular schedules.

5. Proof based on propagation curves and distance tables:

(a) *Sky wave curves*—In computing the distance to the 50 per cent sky wave field intensity contour of a Class I station of a given power, and also in computing the 10 percent sky-wave field intensity of an alleged interfering station, of any class and given power, at a specified distance, there may be made of the appropriate graphs set forth in Appendix V, entitled "Average Sky Wave Field Intensity Corresponding to the Second Hour after Sunset in the Recording Station, 100 Millivolt per Meter at One Mile (161 at one kilometer)".

(b) *Ground wave curves*—The distance to any specified ground wave field intensity contour may be determined from appropriate ground wave curves plotted for the frequency under consideration and the conductivity and dielectric constant of the earth between the station and desired contour. The frequency and the conductivity of the earth must be considered in every case and where the distance is great due allowance must be made for loss due to curvature of the earth. A family of curves is necessary for this purpose. A graph for a conductivity of 10-13 is set forth in Appendix IV, entitled "Ground Wave

Field vs. Distance for One Kilowatt Radiated From Short Antenna". Three frequencies in the standard broadcast band are given. For other frequencies and soil conditions (conductivity and dielectric constant) other curves are required. A conductivity of 10-13 is considered average and is used throughout in determining the ground wave value for computing the mileage separation tables.

(c) *Distance tables*—Table I shows the required day separation in miles between broadcast stations on the same channel. Table II gives the required distance in miles from the boundary of a country in which a Class I-A station is located for the daytime operation of a Class II station on the same channel in another country. Table III gives the required separation in miles between broadcast stations on adjacent channels during both daytime and nighttime. Table IV gives the required night separation in miles between broadcast stations operating on the same channel. The assumed conditions of operation are given in Appendix VI.

The tables are based upon the use of nondirectional antennas but, in case a directional antenna is employed at a particular station, it will be necessary to consider the radiation distribution of the directional antenna involved and to modify the mileage separation accordingly. The night separation tables for stations on the same frequency are computed from the skywave curve given in Appendix V. These curves are based on extensive measurements of the skywave produced by broadcasting stations and shall be considered as accurate in all cases unless proof to the contrary is available as set out in Section E 4. The mileage separation tables for the same channel during daytime and for

adjacent channels day and night are computed from the groundwave curve in Appendix IV. Tables apply only in case the frequency is 1000 kc and the assumed soil conductivity and dielectric constant prevail. Since these values vary in every case the tables for daytime and adjacent channel separation cannot be used except as a general guide. In any case under consideration an estimate of the mileage separation required may be made from the operating frequency and known or assumed soil conditions. To determine the interference accurately, measurements must be made in accordance with Section E 4 on the frequency under consideration or on another frequency and from the curves the values may be determined for the desired frequency.

F. Miscellaneous

1. *Engineering standards*—The engineering standards set forth in this Agreement are subject to revision when justified by technical advances in the art, with the mutual consent of the governments parties to this Agreement.

Attachments:

Appendix I—Priority of use of clear channels for Class I and II stations.

Appendix II—Protected service and interference.

Appendix III—Adjacent channel interference.

Appendix IV—Ground wave graphs.

Appendix V—Sky wave graphs.

Appendix VI—Mileage separation tables.

Appendix VII—Engineering requirements for use of regional channels by Class II stations.

III

Notification and Effect Thereof

1. *Initial notification*—Each Government shall, as soon as possible af-

ter ratification of this Agreement, and in any event not later than 180 days prior to the effective date thereof, transmit to the other Governments:

(a) A complete list of all broadcast stations actually in operation in its country in the standard broadcast band both as of the date of the signing of this Agreement and as of the date of transmitting said list, showing with respect to each station its call signal, location, frequency, power, and antenna characteristics together with all changes authorized to be made with respect to said stations on or before the effective date of this Agreement, and the classification claimed for each such station.

(b) A complete list of all changes authorized to be made with respect to said stations after the effective date of this Agreement, the dates on or before which such changes are to be consummated, and the classification claimed for each such station under this Agreement when the proposed change has been consummated.

(c) A complete list of all new broadcast stations authorized but not yet in operation, showing with respect to each such station its call signal, location, frequency, power and antenna characteristics, the date and or before which each such station shall commence operation, and the classification claimed for it under this Agreement.

(d) The Governments agree that prior to the effective date of this Agreement, they will, so far as possible, resolve all conflicts that may arise between them as a result of the foregoing initial listings, and that, notwithstanding some such conflicts may

(Continued on page 366)

ENGINEERING SERVICES FOR RADIO STATIONS

Allocation Engineering

Frequency Surveys

Equipment Studies

Engineering Counsel

Antenna Designs
of all Types

Particular Consideration to Directional
Characteristics

Counsel on Station Construction
Location of Station Sites

Field Intensity Measurements

General Communication Problems

Engineering Consultants
Before

Federal Communications Commission

McNARY and CHAMBERS

NATIONAL PRESS BUILDING

NATIONAL 4048

WASHINGTON, D. C.

James C. McNary

Joseph A. Chambers

Full Text of North American Regional Broadcasting Agreement

(Continued from page 365)

remain unresolved, they will cooperate to the end that there be no delay in putting the provisions of this Agreement into full force and effect on that date.

(e) In resolving conflicts in the use of clear channels, and in the listing of Class I and Class II stations, the provisions of this Agreement and particularly of Appendix I shall be controlling. In resolving conflicts in the use of regional and local channels, and in the listing of Class III and Class IV stations, priority of use shall be recognized in each country with respect to stations which at the time of signing of this Agreement are in actual operation, which in substance conform to the definitions of said classes as set forth in this Agreement, and with respect to which no substantial change is made or proposed; a change of frequency in order to conform to the designation of channels in this Agreement shall not be deemed a substantial change.

2. *Subsequent notifications*—After the effective date of this Agreement and throughout the period during which it shall remain in effect, each Government shall promptly notify the other Governments by registered letter of all further changes in existing broadcast stations and of all further new broadcast stations, together with similar information with regard to each such change or new station, and the proposed date on which each such change is to go into effect and on which each such new station is to actually commence operation.

3. *Effect of notification*—Each government may, within 30 days of receiving notification of any proposed change in the assignment of an existing station or of the authorization of a new station in another country, not-

ify the Government of the latter country of any objection it may have thereto under the terms of this Agreement.

4. *Conflict between notifications*—To be valid, notifications of changes in the assignments of existing stations, or of authorizations of new stations, must be such that the assignments proposed therein are in accordance with this Agreement and are such as not to involve objectionable interference to existing stations in other countries, assigned and operating in accordance with this Agreement. As between two or more notifications of changes or authorizations of new stations proceeding from different countries, after the effective date of this Agreement, priority in the date of mailing of notification shall govern.

5. *Cessation of effect*—(a) A notification of a proposed change in the assignment of an existing station or of an authorization of a new station shall cease to have any force and effect if, within one year of the date thereof such change shall not have been actually consummated or such new station shall not have actually commenced continuous operation.

(b) In special cases in which circumstances beyond the control of the Administration concerned have prevented the completion of the change or the construction of the new station, the term of the original notification may be extended for a period of six months.

6. *Berne Bureau*—The foregoing notifications shall be made independently of and in addition to those which, under current practice, are sent to the Bureau of the International Telecommunications Union.

IV

Arbitration

In case of disagreement between two or more contracting Governments concerning the execution of this Agreement the dispute, if it is not settled through diplomatic channels, shall be submitted to arbitration at the request of one of the Governments in disagreement. Unless the parties in disagreement agree to adopt a procedure already established by treaties concluded between them for the settlement of international disputes, the procedure shall be that provided for in Article 15 of the International Telecommunications Convention of Madrid, 1932.

V

Ratification, Execution and Denunciation

1. *Ratification*—To be valid this Agreement must be ratified by Canada, Cuba, Mexico and the United States of America.

If and when three of said four countries shall have ratified and the fourth shall, through unavoidable circumstances, have been unable to ratify but shall have signified to those countries that have ratified its readiness, pending ratification and as an administrative measure, to put the provisions of this Agreement (including the contents of Appendix I) into effect in whole or in part, then such country, together with those countries which shall have ratified, may, by administrative agreement between them, fix a definite date on which they shall give effect to such provisions, which date shall preferably be one year from the date of such administrative agreement.

The ratification must be deposited, as soon as possible, through diplomatic channels, in the archives of the Government of Cuba. This same Government shall, through diplomatic channels, notify the other signatory Governments of the ratifications as soon as they are received.

2. *Effect of ratification*—This Agreement shall be valid only as between such countries as shall have ratified it.

3. *Execution*—The contracting Governments undertake to apply the provisions of this Agreement, and to take steps necessary to enforce said provisions upon the private operating agencies recognized or authorized by them to establish and operate broadcast stations within their respective countries.

4. *Denunciation*—Each contracting Government shall have the right to denounce this Agreement by a notification addressed, through diplomatic channels, to the Government of Cuba, and announced by that Government, through diplomatic channels, to all the other contracting Governments. This denunciation shall take effect at the expiration of the period of one year from the date on which the notification was received by the Government of Cuba. This effect shall apply only to the author of the denunciation. This Agreement shall remain in force for the other contracting Governments but only as between such Governments.

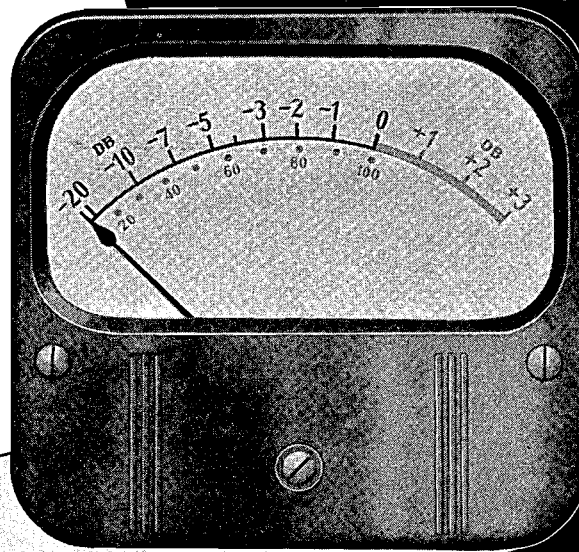
VI

Effective Date and Term of the Agreement

1. Except for the provisions of Section 1 of Part III, Section 1 of Part V, and paragraph 3 of Table VI of

(Continued on page 367)

**HIGH LEVEL
MONITORING**
minus
EYE FATIGUE



WESTON

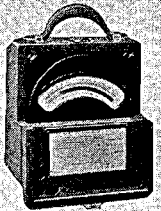
TYPE 30

**VOLUME LEVEL
INDICATOR**

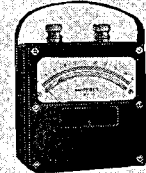
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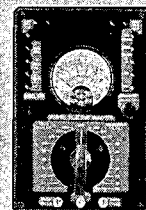
Model 430
Portable
AC-DC
Instruments



Model 763
Direct-
Reading
Ohmmeter



Model 655
Volt-Ohm-
Milliammeter



Appendices and Tables: Allocation Provisions of Havana Agreement

APPENDIX I

Under the provisions of Section II of this Agreement each country may use all the 106 channels when technical conditions with respect to interference to established stations are such as to render such use practicable. However, priority of use on specified clear channels is recognized for the following number of Class I and II stations in each country.

TABLE I

Canada	14
Cuba	9*
Dominican Republic	1
Haiti	1
Mexico	15
Newfoundland	2*
United States	63

*See Table V for special arrangements provided for Cuba and Newfoundland.

These stations and the conditions of their operation are as specified in Tables II, III, IV, V, VI, VII and VIII following herewith.

TABLE II
Class I-A Stations

(Canada, Cuba, and Mexico)

Frequency	Location of Stations
690	Quebec, Canada
730	Mexico, D. F.
740	Ontario, Canada
800	Sonora, Mexico
860	Ontario, Canada
900	Mexico, D. F.
990	Manitoba, Canada
1010	Alberta, Canada
1050	Nuevo Leon, Mexico
1220	Yucatan, Mexico
1540	Santa Clara, Cuba
1570	Nuevo Leon, Mexico
1580	Quebec, Canada

TABLE III
Class I-B Stations

Frequency	Location of Stations	Power Limitation (Kw.)	Requirements as to directional antennas
810	New York, U. S. A.	—	None
810	California, U. S. A.	—	To be determined
940	Quebec, Canada	5 kw. min. permissible	Determine from operation
940	Mexico, D. F.	—	Determine from operation
1000	Jalisco, Mexico	20	To be determined
1000	Washington, U. S. A.	—	To be determined
1000	Illinois, U. S. A.	—	To be determined
1010	Havana, Cuba	—	Determine from operation
1060	Mexico, D. F.	—	To be determined
1060	Pennsylvania, U. S. A.	—	To be determined
1070	Maritime Provinces, Canada	—	None
1070	California, U. S. A.	—	None
1080	Connecticut, U. S. A.	—	To be determined
1080	Texas, U. S. A.	—	To be determined
1090	Baja Calif., Mexico	—	To be determined
1090	Maryland, U. S. A.	—	To be determined
1090	Arkansas, U. S. A.	—	To be determined
1110	North Carolina, U. S. A.	—	To be determined
1110	Nebraska, U. S. A.	—	To be determined
1130	British Columbia, Canada	5 kw. min. permissible	None
1130	New York-New Jersey, U. S. A.	—	None
1140	Chihuahua, Mexico	—	To be determined
1140	Virginia, U. S. A.	—	To be determined
1170	Oregon, U. S. A.	—	To be determined
1170	Oklahoma, U. S. A.	—	To be determined
1170	West Virginia, U. S. A.	—	To be determined
1190	Sinaloa, Mexico	—	To be determined
1190	Indiana, U. S. A.	—	To be determined
1550	Ontario, Canada	—	Determine from operation
1550	Vera Cruz, Mexico	20	Determine from operation
1560	Havana, Cuba	—	.....

Text of the Havana Treaty

(Continued from page 366)

Appendix I annexed hereto (which provisions shall go into effect immediately upon this Agreement becoming valid), this Agreement shall become effective one year after the date it shall have been ratified by the fourth of those Governments whose ratification is requisite to the validity of this Agreement. The Governments will cooperate to the end that, wherever possible, the provisions of this Agreement shall be carried out in advance of said effective date.

2. This Agreement shall remain in effect for a period of five years after said effective date.

VII Adherence

This Agreement shall be open to adherence in the name of Newfoundland.

In witness whereof the respective plenipotentiaries have signed the Agreement in triplicate, one copy in English, one in Spanish, and one copy in French, each of which shall remain deposited in the archives of the Government of Cuba and a copy of each of which shall be forwarded to each Government.

Done at Habana, Cuba, December 13, 1937.

TABLE IV
Class II Stations

Frequency	Location of stations	Power Limitation (Kw.)	Requirements as to directional antennas
640	Newfoundland	—	None
690	Kansas-Oklahoma, U. S. A.	—	To be determined ^a
740	Calif., U. S. A.	—	To be determined ^b
800	Ontario, Canada	5	To be determined
810	Tamaulipas (Tampico) Mexico	50	To be determined
900	Quebec, Canada	5	To be determined
990	Tennessee, U. S. A.	—	To be determined ^c
1000	Oriente, Cuba	10	To be determined
1050	New York, U. S. A.	—	To be determined
1060	Alberta, Canada	10	To be determined
1070	Alabama, U. S. A.	—	To be determined
1080	Manitoba, Canada	15	To be determined
1080	Haiti	10	To be determined
1110	Mexico, D. F.	20	To be determined
1130	Louisiana, U. S. A.	—	To be determined
1170	Dominican Republic	10	To be determined
1190	Havana, Cuba	15	To be determined

^a Permissible to increase field intensity above 25 uv/m (10% skywave) west of Minnesota on Canadian border.

^b Same as ^a except west of North Dakota.

^c Same as ^a except east of Minnesota. Also 650 miles from border requirement waived.

TABLE V
Class II Stations^a on Regional Channels
(Cuba and Newfoundland)

Frequency	Location of Stations	Maximum Power in kw.
560	Newfoundland	10
570	Santa Clara, Cuba	15
590	Havana, Cuba	25
630	Havana, Cuba	15
1270	Havana, Cuba	10

^a These stations shall use directional antennas to prevent objectionable interference to the Class III stations on the channel in accordance with Appendix VII.

TABLE VI

Special Conditions Affecting the United States

The 24 Class I and II stations in the United States which use clear channels with other countries party to this agreement are given in Tables III and IV.

The remaining 39 Class I and II stations of the United States will be assigned the following clear channels:

640 650 660 670 680 700 710 720 750 760 770 780 820 830 840 850 870 880 890 1020 1030 1040 1100 1120 1160 1180 1200 1210 1500 1510 1520 1530

It is recognized that the United States must make extensive adjustments in the assignments of its existing stations in order to make possible the carrying out of this Agreement, that these adjustments will require approximately a year, and that it is not possible for the United States at this time to specify on which of the said 32 channels it will have priority of use for Class I-A stations, Class I-B stations and Class II stations respectively, nor the locations of such stations, power and other information with respect thereto. The United States may assign Class I-A stations to at least 25 of said channels. The United States agrees that ninety days before the effective date of this Agreement it will communicate this information to each of the other countries parties to this Agreement, and such information, when communicated, shall be considered part of this Agreement as if fully set forth herein.

Nothing stated in this Agreement shall be construed to preclude the United States of America from asserting, and enjoying recognition of, priority of use with reference to certain other Class II stations (not included in the 63 stations mentioned in Table I) which are now in actual operation in the band 640-1190 kc. and which are known under the Regulations of the Federal Communications Commission as "limited time stations" and "daytime stations" (having hours of operation limited to sunset taken either at their respective locations or at the locations of the respective dominant stations on clear channels and in some cases including hours not actually used by said dominant stations) which stations may, so far as permitted by the terms of this Agreement and the engineering standards herein set forth, be given assignments substantially equivalent to those they now enjoy.

TABLE VII

Special Conditions Regarding the Use of 1010 kc. by Cuba and Canada

With regard to the use of the clear channel of 1010 kc by a Class I-A station in Canada, and by a Class I-B station in Cuba, both countries mutually agree that the interfering signal shall not exceed for 10 per cent of the time or more the value of 50 microvolts per meter at the following points of measurement: in Cuba at any point east of the province of Camaguey, and in Canada at any point west of the province of Manitoba.

TABLE VIII

Special Conditions Affecting Canada

Nothing stated in this Agreement shall be construed to preclude Canada from asserting priority of use with reference to certain Class III and IV stations now in operation in Canada on existing clear and regional channels which through this Agreement will become of a class of channel which may not permit their use by Class III and IV stations.

(Continued on page 368)

Appendices and Tables: Allocation Provisions of Havana Agreement

(Continued from page 367)

PROTECTED SERVICE CONTOURS AND PERMISSIBLE INTERFERENCE SIGNALS FOR BROADCAST STATIONS

APPENDIX II

TABLE I

Class of station	Class of channel used	Permissible power	Boundary or signal intensity contour of area protected from objectionable interference ^a		Permissible interfering signal ^b	
			Day	Night	Day	Night ^c
I A	Clear	50 kw or more	Boundary of country in which station is located		5 uv/m	25 uv/m ^d
I B	Clear	10 kw to 50 kw	100 uv/m	500 uv/m (50% sky wave)	5 uv/m	25 uv/m
II	Clear ^d	0.25 kw to 50 kw	500 uv/m ^e	2500 uv/m ^e (Ground wave)	25 uv/m ^e	125 uv/m ^e
III A	Regional	1 kw to 5 kw	500 uv/m	2500 uv/m (Ground wave)	25 uv/m	125 uv/m
III B	Regional	0.5 kw to 1 kw night and 5 kw day	500 uv/m	4000 uv/m (Ground wave)	25 uv/m	200 uv/m
IV	Local	0.1 kw to 0.25 kw	500 uv/m	4000 uv/m (Ground wave)	25 uv/m	200 uv/m

^a In accordance with other provisions in this Agreement this freedom of interference does not apply outside the boundaries of the country in which the station is located.

^b From other stations on same channel only. For adjacent channels see Appendix III, Table I.

^c Sky wave field intensity exceeded for 10% of the time.

^d No Class II station shall be assigned to the same channel as a Class I-A station for nighttime operation (from sunset to sunrise) less than 650 miles of the nearest border of the country in which the Class I-A station is located.

^e These values are with respect to interference from all stations except Class I, which stations may cause interference to a field intensity contour of higher value. However, it is recommended that Class II stations be so located that the interference received from Class I stations will not exceed these values. If the Class II stations are limited by Class I stations to higher values, then such values shall be the standard established with respect to interference from all other classes of stations.

APPENDIX III

TABLE I

ADJACENT CHANNEL INTERFERENCE

Channel separation between desired and undesired stations	Maximum ground wave field intensity of undesired station
10 kc	0.25 mv/m
20 kc	5.0 mv/m
30 kc	25.0 mv/m

The undesired ground wave signal shall be measured at or within the 0.5 mv/m ground wave contour of the desired station. These values apply to all classes of stations both day and night and are based on ground waves only. No adjacent channel interference is considered on the basis of an interfering sky wave.

APPENDIX VI

Mileage Separation Tables

The required separations between broadcasting stations as tabulated below are based upon the following conditions:

1. The use of nondirectional antennas.
2. Antenna efficiencies (in mv/m at one mile for one kilowatt).
Class I—225 mv/m
Class II and III—175 mv/m
Class IV—150 mv/m
3. Frequency, 1000 kc.
4. Soil conductivity, $s = 10-13$.
5. Soil dielectric constant, $e = 15$.
6. Groundwave transmission as shown on chart in Appendix IV.
7. Skywave transmission as shown on chart in Appendix V.
8. Protection to service areas as shown in Appendix II, Table I.
9. Ratio of desired to undesired signal:

Channel Separation	Ratio of Desired to Undesired
Same frequency	20:1
10 kc.	2:1
20 kc.	1:10
30 kc.	1:50

TABLE I
REQUIRED DAY SEPARATION IN MILES BETWEEN BROADCAST STATIONS ON THE SAME CHANNEL

Class and Power	Class IV		Classes II and III						Class I						
	100 W.	250 W.	0.25 Kw.	0.5 Kw.	1 Kw.	5 Kw.	10 Kw.	25 Kw.	50 Kw.	10 Kw.	25 Kw.	50 Kw.	100 Kw.	250 Kw.	500 Kw.
Class IV															
100 W.	143	165	172	192	213	265	285	310	335	390	417	437	462	486	513
250 W.	165	173	180	200	221	273	293	318	343	415	442	462	487	511	538
Classes II and III															
0.25 Kw.	172	180	183	203	224	276	296	321	346	418	446	465	490	514	541
0.5 Kw.	192	200	203	210	231	283	303	328	353	446	473	493	518	542	569
1 Kw.	213	221	224	231	239	291	311	336	361	467	494	514	539	563	590
5 Kw.	265	273	276	283	291	313	333	358	383	520	547	567	592	616	643
10 Kw.	285	293	296	303	311	333	345	370	395	540	567	587	612	636	663
25 Kw.	310	318	321	328	336	358	370	389	414	565	592	612	637	661	688
50 Kw.	335	343	346	353	361	383	395	414	430	587	614	634	659	683	710
Class I															
10 Kw.	390	415	418	446	467	520	540	565	587	556	585	605	620	655	682
25 Kw.	417	442	446	473	494	547	567	592	614	585	612	632	657	682	709
50 Kw.	437	462	465	493	514	567	587	612	634	605	632	652	677	702	729
100 Kw.	462	487	490	518	539	592	612	637	659	628	657	677	697	727	754
250 Kw.	486	511	514	542	563	616	636	661	683	655	682	702	727	751	778
500 Kw.	513	538	541	569	590	643	663	688	710	682	709	729	754	778	805

TABLE II

REQUIRED DISTANCE IN MILES FROM THE BOUNDARY OF A COUNTRY IN WHICH A CLASS I-A STATION IS LOCATED FOR DAYTIME OPERATION OF A CLASS II ON THE SAME CHANNEL

Power of Station	Class II							
	0.25 Kw.	0.5 Kw	1 Kw.	5 Kw.	10 Kw.	25 Kw.	50 Kw.	
Miles from Boundary	237	261	282	335	355	380	402	

(Continued on page 370)

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Appendices and Tables: Allocation Provisions of Havana Agreement

(Continued from page 368)

TABLE III
REQUIRED DAY AND NIGHT SEPARATION IN MILES BETWEEN BROADCAST STATIONS ON ADJACENT CHANNELS

Class & Power	Class IV						Classes II and III															
	0.1 Kw.		0.25 Kw.		0.5 Kw.		0.25 Kw.			0.5 Kw.			1 Kw.			5 Kw.			10 Kw.			
	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	
Class IV																						
0.1 Kw.	73	37	32	82	45	40	86	47	42	94	55	50	105	63	58	133	84	79	149	98	93	
0.25 Kw.	82	45	40	90	48	41	94	50	43	102	58	51	113	66	59	141	87	80	157	101	94	
Classes II & III																						
0.25 Kw.	86	47	42	94	50	43	96	51	48	104	59	51	115	67	59	143	88	80	159	102	94	
0.5 Kw.	94	55	50	102	58	51	104	59	51	112	62	52	123	70	60	151	91	81	167	105	95	
1 Kw.	105	63	58	113	66	59	115	67	59	123	70	60	131	73	62	159	94	83	175	108	97	
5 Kw.	133	84	79	141	87	80	143	88	80	151	91	81	159	94	88	180	104	87	196	118	101	
10 Kw.	149	98	93	157	101	94	159	102	94	167	105	95	175	108	97	196	118	101	210	123	104	
25 Kw.	172	115	110	180	118	111	182	119	111	190	122	112	198	125	114	219	135	118	233	140	121	
50 Kw.	190	131	126	198	134	127	200	135	127	208	138	128	216	141	130	237	151	134	251	156	137	
Class I																						
10 Kw.	162	107	102	170	110	103	172	111	103	180	114	104	188	117	106	209	127	118	223	132	113	
25 Kw.	183	126	121	191	129	122	193	130	122	201	133	123	209	136	125	230	146	128	244	151	132	
50 Kw.	203	144	139	211	147	140	218	148	140	221	151	141	229	154	143	250	164	147	264	169	150	
500 Kw.	277	211	206	285	214	207	287	215	207	295	218	208	303	221	210	324	231	214	338	236	217	

Class and Power	Class II						Class I					
	25 Kw.		50 Kw.		10 Kw.		25 Kw.		50 Kw.		500 Kw.	
	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.	10 Kc.	20 Kc.	30 Kc.
Class IV												
0.1 Kw.	172	115	110	190	131	126	162	107	102	183	126	121
0.25 Kw.	180	118	111	198	134	127	170	110	108	191	129	122
Classes II and III												
0.25 Kw.	182	119	111	200	135	127	172	111	108	193	130	122
0.5 Kw.	190	122	112	208	138	128	180	114	104	201	133	123
1 Kw.	198	125	114	216	141	130	188	117	106	209	136	125
5 Kw.	219	135	118	237	151	134	209	127	110	230	146	129
10 Kw.	233	140	121	251	156	137	223	132	113	244	151	132
25 Kw.	250	149	125	268	165	141	242	145	123	261	160	136
50 Kw.	268	165	141	284	172	145	260	161	139	279	163	144
Class I												
10 Kw.	242	145	123	260	161	139	232	137	115	253	156	134
25 Kw.	261	160	136	279	168	144	258	156	134	272	163	139
50 Kw.	281	178	154	297	185	158	273	174	152	292	181	157
500 Kw.	355	245	221	371	252	225	347	241	219	366	248	224

TABLE IV
Required Night Separation in Miles Between Broadcast Stations on the Same Channels

The following tables indicate the mileage protection each class must give all other classes.

Class I-A	Class I-A	Not required to protect Class II stations on same channel at night.		
Class I-B	Class I-B	Must protect other Class I-B stations as shown below.		
Class I-B	5 kw.	10 kw.	25 kw.	50 kw.
10 kw.	2665	3010	3280	3280
25 kw.	3010	3243	3500	3500
50 kw.	3280	3500	3660	3660

TABLE IV-C
CLASS III-Aa MUST PROTECT OTHER CLASSES AS SHOWN BELOW

Class III-A	1 Kw.	5 Kw.	.5 Kw.	1 Kw.
1 Kw.	739	1025	550	553
5 Kw.	1025	1039	347	851

aSee Appendix VII for protection Class III stations should give Class II stations on regional channels.

TABLE IV D
Class III B b Must protect other classes as shown below.

Class III B	1 kw.	5 kw.	.5 kw.	1 kw.
.5 kw.	735	1020	383	550
1. kw.	739	1025	550	553

TABLE IV-B
CLASS II—MUST PROTECT OTHER CLASSES AS SHOWN BELOW

Class II	Class II Stations					Class I-B Stations			Class I-A Stations Distance from Nearest Border of Country in Which Class I-A Station is Located		
	.25 Kw.	.5 Kw.	1 Kw.	5 Kw.	10 Kw.	25 Kw.	50 Kw.	10 Kw.	25 Kw.	50 Kw.	
.25 Kw.	451	602	732	1018	1186	1271	1529	1378	1610	1760	1038
.5 Kw.	602	606	736	1022	1140	1275	1533	1508	1735	1890	1180
1 Kw.	732	736	739	1025	1143	1280	1535	1658	1855	2080	1355
5 Kw.	1018	1022	1025	1039	1157	1292	1547	2165	2395	2550	1830
10 Kw.	1186	1140	1143	1157	1162	1288	1543	2450	2680	2830	2122
25 Kw.	1271	1275	1280	1292	1298	1810	1540	2880	2880	3260	2575
50 Kw.	1529	1533	1535	1547	1553	1560	1570	3090	3330	3480	2730

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TABLE IV E

Class IV—Must protect other classes as shown below.

Class IV	Class III A		Class III B		Class IV
	1 kw.	5 kw.	.5 kw.	1 kw.	
.1 kw.	300	300	Daytime separation determines	Daytime separation determines	
.25 kw.	395	407			

See Note a, Table IV-c

TABLE IV F

Distance Class II Stations must be from Class I A and I B Stations to obtain recommended protection to Class II Station (2.5 mv/m ground wave contour).

Class II (a)	10 kw.	Class I A and I B Stations		
		25 kw.	50 kw.	500 kw.
.25 kw.	1248	1462	1520	2767
.5 kw.	1252	1470	1523	2771
1. kw.	1256	1473	1528	2775
5. kw.	1270	1484	1541	2789
10. kw.	1275	1490	1546	2793
25. kw.	1285	1498	1743	2803
50. kw.	1293	1510	1750	2812

Note (a): Must use directional antenna to protect dominant station or stations with these separations.

TABLE IV G

Distance Class IV Stations must be from Class III-A and III-B Station to obtain recommended protection to Class IV Station (4.0 mv/m ground wave contour).

Class IV Power	Class III-A or III-B		
	.5	1.0	5.0
.10	377	547	847
.25	381	551	851

APPENDIX VII

Engineering Requirements for the Use of Regional Channels by Class II Station under the Provisions of Section C 5 c.
 A Class II station assigned to a regional channel in accordance with Section C 5 c shall use a directional antenna or other means to limit the interfering signal within the protected service area of any Class II station on the channel to the value set forth in Appendix II, Table I. The interfering signal in case of projected operation shall be determined from the characteristics of the antenna and appropriate curve in Appendix V. In case of actual operation the interfering signal shall be determined by the method described in Section B 4.
 Class III stations, operating on a channel to which a Class II station is assigned, should limit the interference to the Class II station in conformity with the provisions of Appendix II, Table I.

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Frequency Modulation: History and Progress

By PAUL A. deMARS

Technical Director, The Yankee Network

AS RADIO broadcasting enters its twentieth year, a new technical development has captured the interest of engineers and owners of broadcasting stations. This development is Major E. H. Armstrong's system of frequency modulation, now being tried out in the ultra-high frequencies by a number of stations. This new system is being held by its proponents as destined to revolutionize the radio broadcasting art.

It is the purpose of this review to relate something of the history of this development, the state of its development at the present time, and the economic and technological implications that may be estimated from actual observations and experimentation with this new system.

The Armstrong system of frequency modulation, (F-M for short) was presented as an accomplished fact to the Institute of Radio Engineers, Nov. 6, 1935. The outstanding characteristic of Armstrong's system is the virtual elimination of natural static and man-made electrical disturbances. In addition, the system has inherent characteristics which permit transmission of programs with virtually no distortion and fidelity limited only by the quality of loud speakers. This achievement is the result of a quarter century of study and experimentation, during which period Major Armstrong is credited with the invention of the regenerative or "feedback" circuit, the superheterodyne circuit and the superregenerative circuit. Armstrong's inventions have brought modern communications and broadcasting to the present high state of development and there are an increasing number of those in these fields who feel, as does the writer, that his system of frequency modulation will be an even greater contribution than his former achievements.

Armstrong Obtained Patents in 1933

Armstrong applied for patents on his system of frequency modulation in 1932 and secured patents covering his system in 1933. In December 1933, the complete invention was disclosed to the RCA. During 1934, and until the fall of 1935, Major Armstrong's apparatus was used in conjunction with the RCA's transmitter atop the Empire State Building in New York, and a series of laboratory and field demonstrations were run off. Transmitting with a power estimated at about 2 kw. in the 40 mc. region, which is best suited for frequency modulation development, reception was practically perfect 85 miles away, where recordings of reception of the new static-free test programs were made. But the RCA asked Armstrong to remove his equipment in the fall of 1935 to make way for television.

At this juncture, C. R. Runyon,

an old friend and veteran radio "ham", in the summer of 1935 began to build a frequency modulation transmitter of his own in Yonkers to operate at 110 megacycles in the amateur band. It was Runyon's station, W2AG, that provided transmission for the demonstration before the Institute of Radio Engineers on Nov. 6, 1935. Runyon's transmitter, with several changes in frequency in the region of 110 mc., has since been used to demonstrate F-M. Runyon, himself, has contributed a great deal to the engineering design of transmitting equipment for F-M in the ultra-high frequencies.

Art Apathetic, Armstrong Builds Own Station

But the radio art was apathetic to Armstrong's invention and his fighting blood warmed; he took steps to obtain an experimental station of his own to permit experimentation with high power. He was eventually authorized by the Federal Communications Commission to construct a station with power of 40 kw. to operate with frequency modulation in a 200 kc. band on a frequency of 41.6 mc.

In the meantime, television was clamoring for recognition and expressing its need of channels to permit experimentation and development. The FCC called a general hearing on June 15, 1936, to obtain information from the radio services that would guide it in allocating the ultra-high frequencies above 30,000 kc. Just a week previously the writer had been introduced to frequency modulation by Major Armstrong at a talk and demonstration given before the Baltimore-Washington section of the Institute of Radio Engineers. These introductions were timely, for since 1932 The Yankee Network Inc. had been conducting experimentation under the writer's supervision with amplitude modulation (A-M) in the ultra-high frequencies. A detailed and comprehensive survey of the results of operation with 500 watts power on 41 mc. had just been completed. The results indicated definitely that, using the conventional system of modulation, broadcasting in the ultra-high frequencies in the region of 40 mc. offered no advantages over operation in the regular broadcast band and it was concluded that the very short waves could only provide a restricted supplementary service to the regular band. The advantages demonstrated by Armstrong's F-M system changed the picture completely and marked the beginning of Yankee Network's interest in the new system.

Using the recordings made in 1934 and 1935 of transmission from the RCA transmitter on the Empire State Building in New York City to demonstrate his assertions, Major Armstrong urged the FCC to set aside 5 mc. for broadcast ex-

perimentation in the new allocations. The writer was the only other engineer who spoke for frequency modulation at this hearing, which lasted over two weeks.

As a final result of the hearing, the Federal Communications Commission issued General Order 19, which, in its final form today, gives F-M a 1 mc. band, 42.4 to 43.6 mc. (five channels), and an .8 megacycle band, 26.2 to 27.0 mc. (four channels), and a .86 mc. band, 117.070 to 118.030 mc. (four channels) for high frequency broadcast stations.

John Shepard 3d and Dr. Doolittle Interested

In the meantime, the F-M broadcasts from C. R. Runyon's station in Yonkers, and since the fall of 1938, from W2XMN, Armstrong's 40 kw. station on the Hudson River Palisades at Alpine, New Jersey, were bringing others into the situation. John Shepard 3d, president of the Yankee Network Inc., was a convert and applied to the FCC for authorization to erect a 50 kw. F-M station in Massachusetts in the spring of 1937. Delays in securing a suitable site for the Yankee Network station delayed construction for over a year, but in October 1938 work was begun on the construction of Yankee's station on Mt. Asnebumskit in the Town of Paxton, near Worcester, Mass. Installation of transmitting equipment was completed to a power output of 2 kw. by May 1939, and this station, with call letters W1XOJ, has been in regular operation since then, daily from 8 a.m. to midnight, with this power on a frequency of 43 mc.

Back in 1936, Dr. Franklin Doolittle, owner of WDRG, in Hartford, Conn., saw the possibilities of the new system for broadcasting service. Eventually his F-M station, with call letters W1XPW, located on Meriden Mountain, near Hartford, began testing in the spring of 1939 and since late summer has been in regular operation daily with a power of 1 kw. on a frequency of 43.4 mc.

During the period while Shepard and Doolittle were constructing their stations, the General Electric Co. set up one experimental station at Schenectady and another at Albany. These stations were designed to use both F-M and A-M emissions. A large series of tests were conducted to determine by actual operation, the relative advantages or disadvantages of F-M and A-M.

General Electric, Stromberg Bring Out Receivers

During the summer of 1938 the General Electric manufactured a limited number of F-M receivers, and during 1939 has offered F-M receivers in three models—a table model for F-M only, a console model for F-M only, and a console model for the regular band, two shortwave bands and F-M, priced

respectively at \$59.50, \$100 and \$200. The Stromberg-Carlson Co. is introducing receiver models that roughly parallel the GE line. About a half dozen other manufacturers are getting ready to introduce F-M and combination regular-band, shortwave and F-M receivers.

Since the summer of 1939, the FCC has received about 40 applications for F-M broadcasting stations, and as many more stations are known to intend filing applications for F-M stations in the near future. The broadcasting industry is at last waking up to the significance of the 1935 and 1936 disclosures regarding F-M broadcasting.

The FCC scheduled a general hearing for February 28, 1940 to discuss the relative merits of frequency modulation and amplitude modulation and consider recommendations in connection with allocation problems for broadcast service in the ultra-high frequencies. This action by the Commission puts a period at the end of this phase of this new development and marks the beginning of a new era in radio broadcasting service.

Much has been said in the past regarding high fidelity, and as far as the output of the listener's loudspeaker reflects accomplishment, little has been achieved. A high fidelity system of broadcasting requires a freedom from noise that permits the broadcasting of silence together with natural reproduction. The technical limitations of the regular broadcast band cannot meet these requirements day in and day out except to an insignificant portion of broadcast listeners. Furthermore, A-M in the ultra-high frequencies only partially removes the restrictions inherent in the present band.

Hesitancy Seen Due To Misconceptions

Since Armstrong's system of frequency modulation removes the restrictions that prevent a real high fidelity service by present broadcast methods, namely noise and distortion, the question may be fairly asked, "Why is there any hesitancy on the part of engineers and station owners to accept this new system and make it available to the public as quickly as possible?" The answer is probably due to misconceptions concerning and lack of information regarding the inherent characteristics of F-M broadcasting services in the ultra high frequency.

Perhaps the following will tend to clarify this situation. Armstrong's system modulates the radiated power to produce changes in frequency instead of amplitude as in the conventional system. This imposes a characteristic on the radiated wave that is not duplicated by natural static or most man-made interferences. By causing the

(Continued on page 374)

High Frequency Broadcasting Stations in the United States

(Authorized by FCC as of January 15, 1940)
Frequency Groups listed in FCC Rules: Sec. 4.114

FREQUENCY MODULATION

Location	Call Letters	Licensee	Power in Watts	Frequency in Kc.
N. of Alpine, N. J.	W2XMN	Edwin H. Armstrong	40,000	42800 117430
New York City	W2XOR	Bamberger Broadcasting Service (WOR)	CP-1,000	43400
Schenectady, N. Y.	W2XDA	General Electric Co. (WGY)	50	43200
Albany, N. Y.	W2XOY	General Electric Co. (WGY)	150	43200
Superior, Wis.	W9XYH	Head of the Lakes Broadcasting Co. (WEBC)	CP-1,000	43000
New York City	W2XQR	John V. L. Hogan (WQXR)	1,000	43200
Washington, D. C.	W3XO	Jansky & Bailey	1,000	43200
Milwaukee, Wis.	W9XAO	The Journal Co. (WTMJ)	CP-1,000	42600
Bethesda, Md.	W3XMC	McNary & Chambers	CP-100	42600
New York City	W2XWG	National Broadcasting Co. (WEAF)	CP-1,000	42600
Yonkers, N. Y.	W2XAG	Carman R. Runyon, Jr.	5,000	117190
Hartford, Conn.	W1XPW	WDRG, Inc.	1,000	43400
Hartford, Conn.	W1XSO	Travelers Broadcasting Service Corp. (WTIC)	CP-1,000	43200
Rochester, N. Y.	W8XAD	WHEC, Inc.	CP-1,000	42600
Rochester, N. Y.	W8XVB	Stromberg-Carlson Co. (WHAM)	1,000	43200
Boston, Mass.	W1XK	Westinghouse E. & M. Co. (WBZ)	CP-1,000	42600
Springfield, Mass.	W1XSN	Westinghouse E. & M. Co. (WBZA)	1,000	42600
Columbus, O.	W8XVH	WBNS, Inc.	CP-250	43000
Worcester, Mass.	W1XTQ	Telegram Publishing Co.	CP-1,000	43400
Boston, Mass.	W1XOJ	Yankee Network	CP-50,000	43000
Chicago, Ill.	W9XEN	Zenith Radio Corp.	CP-1,000	42800

AMPLITUDE MODULATION

Location	Call Letters	Licensee	Power in Watts	Frequency in Kc.
Boston, Mass.	*W1XER	Yankee Network	500	42340
Boston, Mass.	W1XKA	Westinghouse E. & M. Co. (WBZ)	50	42220
Chattanooga, Tenn.	W4XBW	WDOD Broadcasting Corp.	100	26000
Cincinnati, O.	W8XNU	The Crosley Corp. (WLW)	1,000	25950
Cleveland, O.	W8XNT	United Broadcasting Co. (WHK)	50	42340
Dallas, Tex.	W5XD	A. H. Belo Corp. (WFAA)	100	25300
Denver, Col.	W9XLA	KLZ Broadcasting Co. (KLZ)	100	25400
Detroit, Mich.	W8XWJ	Evening News Ass'n. (WWJ)	500	42060
Hartford, Conn.	W1XEH	Travelers Broadcasting Service Corp. (WTIC)	150	42460
Kansas City, Mo.	W9XER	Midland Broadcasting Co. (KMBC)	500	42460
Kansas City, Mo.	W9XA	Commercial Radio Equipment Co.	1,000	26000
Kansas City, Mo.	W9XBA	WHB Broadcasting Co.	100	26100
Los Angeles, Cal.	W6XKG	Ben S. McGlashan (KGFJ)	1,000	25950
Los Angeles, Cal.	W6XRE	Ben S. McGlashan (KGFJ)	500	42300 116950 350000
Los Angeles, Cal.	W6XDA	Columbia Bestg. System (KNX)	100	42300
Memphis, Tenn.	W4XCA	Memphis Commercial Appeal Co. (WMC)	250	26150
Milwaukee, Wis.	W9XAZ	The Journal Co. (WTMJ)	CP-500	42260
Minneapolis, Minn.	W9XHW	Columbia Broadcasting System (WCCO)	50	42300
Nashville, Tenn.	W4XA	National Life & Accident Ins. Co. (WSM)	1,000	26150
New Bedford, Mass.	W1XEQ	E. Anthony & Sons (WNBH)	100	42300
New York City	W2XJI	Bamberger Broadcasting Service (WOR)	100	25300
New York City	W2XWF	Wm. G. H. Finch	1,000	42180
New York City	W2XDV	Columbia Broadcasting System (WABC)	50	42300
New York City	W2XGQ	Knickerbocker Broadcasting Co. (WMCA)	100	25500
New York City	W2XVP	Municipal Broadcasting System (WNYC)	CP-1,000	26100
Oklahoma City, Okla.	W5XAU	WKY Radiophone Co.	100	26125
Philadelphia, Pa.	W3XIR	WCAU Broadcasting Co.	100	42140
South Bend, Ind.	W9XH	South Bend Tribune (WSBT)	100	26050
Springfield, Mass.	W1XKB	Westinghouse E. & M. Co. (WBZA)	1,000	42380
St. Louis, Mo.	W9XOK	Star Times Publishing Co. (KXOK)	100	25300
St. Louis, Mo.	W9XPD	Pulitzer Publishing Co. (KSD)	100	25900
Superior, Wis.	W9XJL	Head of the Lakes Broadcasting Co. (WEBC)	250	26100

* Transmitter located at Sargents Purchase, N. H.

Frequency Modulation: History and Progress

(Continued from page 372)

modulation to produce wide frequency deviations from the unmodulated carrier frequency, startling reduction in interference from noise results, the reduction being of the order of 1,000-to-1 in power ratio.

The wide frequency swing used removes all inherent limitations as far as the radio link is concerned to rendering a real high fidelity broadcasting service. It has been demonstrated again and again that noise-free reception is obtained over wide areas from stations of even moderate power, and that all the frequencies within the range of human hearing are transmitted without distortion that can be detected by the human ear. The wide frequency swing used in the new system also permits the simultaneous transmission of other services such as facsimile or telegraph.

It has further been demonstrated that in spite of the quasi-optical nature of the very short waves, whose range are limited by the curvature of the earth, but not to the optical horizon as has been asserted by many authorities, that an F-M station of given power on the ultra-shortwaves renders a superior service in every respect to the regular broadcast band on the medium frequencies and that the primary service area of an F-M station will be much greater.

F-M vs. A-M Frequency Band Widths

Perhaps the greatest difficulty in accepting the merits of this new system in lieu of the present is because of the wide band of frequencies required to develop its full advantages. Comparing real high fidelity services, an F-M station uses a 200 kc. band, as compared with a 40 kc. band for A-M stations in the ultra-high frequencies. From the above it would appear as though five times as many A-M stations as F-M stations could be accommo-

dated in a given band. Paradoxical as it may seem, the reverse is actually the case. The reason is an inherent characteristic of the new system in respect to the mutual interference between stations operating on the same frequency.

In A-M the presence of an undesired signal produces interference in proportion to its intensity relative to the desired signal. Everyone connected with the broadcasting art is painfully aware of the limitation to coverage, due to interference between stations of relatively low power operating on the same frequency in the regular broadcast band, even though they be separated by as much as a thousand miles. A high fidelity service by present methods would require that the undesired signal be less than 1/100th of the desired signal and less than 1/1000th of the desired signal if the station frequencies deviate by an amount sufficient to produce audible beat notes. It is doubtful if stations operating at frequencies of the order of 40 mc. or higher could be controlled now or ever to such a degree as to prevent audible heterodyne beats between carriers. In an A-M system, therefore, stations could not be assigned for operation on the same frequency unless separated by great distances, and even then they would mutually limit each other's service area to about the same degree as in the present band.

With F-M the picture is radically different. Theory indicates, and actual tests confirm, that if the desired signal is twice the undesired signal, there is neither interference in the form of beat notes, nor impairment to quality of reception. This means that F-M stations may be duplicated on the same channel with due consideration of the service area of each station at any separation without either serious mutual limitation or interference to

the respective service of either station. In the present system the area where the ratio of the desired to undesired signal is not equal to that required for acceptable service is a no-man's land. In the new system, the area where the signals from stations on the same frequency differ by more than 2-to-1 in intensity is merely an area in which the listener can, provided the signals are of sufficient strength to each render satisfactory service in the absence of the other, select either station by using a simple, directive antenna with more than 2-to-1 discrimination. It has been amply demonstrated that this is easily practical.

Duplication of Stations Every 50-300 Miles

From an allocation standpoint, it is only necessary to provide sufficient channels to accommodate the number of stations required to serve the largest metropolitan areas. Stations may be duplicated on these channels every 50 to 300 miles, depending on the power, antenna efficiency and the need for broadcast service. Stations in the same area may operate under any conditions without interference, provided one channel intervenes between assignments, and stations may operate on adjacent channels if the transmitters are located near each other and the ratio of powers and antenna efficiency keep the signal intensities within a ratio of the order of 20-to-1. A 5 mc. band

would, therefore, permit 13 or more stations in each service area of the United States.

Based on the experimental data obtained from the operation of the General Electric's frequency modulation stations in Schenectady and Albany that were previously referred to, I. R. Wier, of GE in a paper presented last February before the Bridgeport section of the Institute of Radio Engineers, showed that even with low standards of noise and interference, more F-M stations than A-M stations can be used in a given band and the advantage in this respect increases in favor of F-M as the standards of broadcasting service are raised.

Granting the above, perhaps the broadcasting art wants to know if F-M has lived up to the claims of its proponents in actual practice. The writer can give first-hand information in this connection, as he has designed and supervised the construction of two F-M stations and made measurements and observations on their performance since May, 1939 and in addition has made measurements and observations of Major Armstrong's station since the spring of 1937.

On May 27, 1939, the Yankee Network's high frequency broadcast station, W1XOJ, went on the air for the first time. It has been in regular operation since then with a power of 2 kw. W1XOJ is located centrally with respect to the populated areas of Massachu-

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FCC Regulations Governing Broadcast Services Other Than Standard Broadcast

Relay Broadcast Stations
International Broadcast Stations

Television Broadcast Stations
Facsimile Broadcast Stations
Non-Commercial Educational Broadcast Stations

High Frequency Broadcast Stations
Developmental Broadcast Stations

(Rules and Regulations and Standards Applicable to Standard Broadcast Stations
Published by BROADCASTING in Separate Volume; see page 263)

IN GENERAL

Sec. 4.1 *Frequency tolerance.* The operating frequency of the broadcast stations as listed below shall be maintained within plus or minus the percentage of the assigned frequency as given in Table I.

Class of Station	Frequency Tolerance
Relay Broadcast Station (a) 1622 to 2830 kc	0.04%
(b) 30,000 to 40,000 kc and above	{ 10 watts or less 0.1% above 10 watts 0.05%
International Broadcast Station	0.005% ¹
Television Broadcast Station	0.01%
Facsimile Broadcast Station	0.05% or less as required
High Frequency Broadcast Station	0.01%
Non-Commercial Educational Broadcast Station	0.01%
Developmental Broadcast Station	0.05% or less as required

Sec. 4.2 *Frequency monitors.*

(a) The licensee of each broadcast station listed in Sec. 4.1, except relay broadcast stations, shall operate at the transmitter a frequency monitor independent of the frequency control of the transmitter.

(b) The frequency monitor shall be designed and constructed in accordance with good engineering practice and shall have an accuracy sufficient to determine that the operating frequency is within one-half (½) of the allowed tolerance.

(c) The licensee of each relay broadcast station shall provide the necessary means for determining that the frequency of the station is within the allowed tolerance.

(d) The frequency of all stations listed in Sec. 4.1 shall be checked at each time of beginning operation and as often thereafter as necessary to maintain the frequency within the allowed tolerance.

Sec. 4.3 *License period; renewal.*

(a) Licenses for the following classes of broadcast stations will be normally issued for a period of one year expiring as follows:

Class of Station	Date of Expiration
Relay Broadcast Station (a) 1622 to 2830 kc	October 1
(b) 30,000 to 40,000 kc and above	December 1
International Broadcast Station	November 1
Television Broadcast Station	February 1
Facsimile Broadcast Station	March 1
High Frequency Broadcast Station	April 1
Non-Commercial Educational Broadcast Station	May 1
Developmental Broadcast Station	May 1

(b) Each licensee shall submit the application for renewal of license at last 60 days prior to the expiration date (Sec. 1.360).

(c) A supplemental report shall be submitted with each application for renewal of license of a station licensed experimentally² in accordance with the regulations governing each class of station.

Sec. 4.4 *Requirements, limitations and restrictions.*

(a) No station licensed experimentally will be assigned for exclusive use of any frequency. In case interference would be caused by simultaneous operation of stations licensed experimentally, such licensees shall endeavor to arrange satisfactory time division. If such agreement cannot be reached, the Commission will determine and specify the time division.

(b) The Commission may from time to time require that a station licensed experimentally conduct such experiments that are deemed desirable and reasonable for the development of the service.

(c) The program of research and experimentation as offered by an applicant in compliance with the requirements for obtaining a license for an experimental station² shall be adhered to in the main, unless the licensee is authorized to do otherwise by the Commission.

(d) A licensee of an experimental station is not required to adhere to a regular schedule of operation but shall actively conduct a program of research and experimentation or transmission of programs, provided, however, licensees of developmental broadcast stations which are licensed to conduct special intermittent experiments, such as to develop and test commercial broadcast equipment, are required to operate only when there is a need therefor.

(e) A supplementary statement shall be filed with and made a part of each application for construction permit for any broadcast station on an experimental basis which specifies any frequency above 300,000 kilocycles or in the bands 162,000 to 168,000, 210,000 to 216,000 and 264,000 to 270,000 kilocycles except television, confirming the applicant's understanding:

1. That all operation upon the frequency is experimental only;
2. That the frequency may not be the best suited to the particular experimental work to be carried on, and
3. That the frequency may not be allocated for the service that may be developed experimentally.

¹Tolerance may be .01% on equipment installed prior to January 1, 1940, and until January 1, 1941, when all international stations shall maintain frequency within 0.005% of the assigned frequency.

²The phrases "station licensed experimentally" and "experimental station" are used interchangeably and refer to stations listed in Sec. 4.3 when so specified in the instrument of authorization.

Sec. 4.5 *Station records.*

(a) The licensee of each class of broadcast station listed in Sec. 4.1 shall maintain adequate records of the operation, including:

1. Hours of operation.
2. Program transmitted.
3. Frequency check.
4. Pertinent remarks concerning transmission.
5. In case of relay station, an entry giving point of program origination and receiver location shall be included.
6. Research and experimentation conducted in case of an experimental station.
7. And any additional information specified in the regulations governing each class of station or for completing the supplemental report as required.

(b) The above information shall be made available upon request by authorized Commission representatives.

Sec. 4.6 *Equipment changes.* The licensee of each class of broadcast station listed in Sec. 4.1 may make any changes in the equipment that are deemed desirable or necessary, provided:

1. That the operating frequency is not permitted to deviate more than the allowed tolerance;
2. That the emissions are not permitted outside the authorized band;
3. That the power output complies with the license and the regulations governing the same, and
4. That the transmitter as a whole or output power rating of the transmitter is not changed.

Sec. 4.7 *Emission authorized.* All classes of broadcast licenses authorize A3 emission only unless otherwise specified in the license. In case A1, A2, A4, A5, or special emission are necessary or helpful in carrying on any phases of experimentation, application setting out fully the needs shall be made to, and authority therefore received from, the Commission.

Sec. 4.8 *Additional orders, as needed.* In case all the general rules and regulations and the specific rules governing each class of broadcast station do not cover all phases of operation or experimentation with respect to external effects, the Commission may make supplemental or additional orders in each case as deemed necessary for operation in the public interest, convenience, and/or necessity.

Sec. 4.9 *Operation.* A licensed operator shall be on duty and in charge of the transmitter of each broadcast station listed in Sec. 4.1. In no case will remote control operation be authorized. A transmitter is not considered as being operated by remote control when the following conditions prevail:

(a) Continuous reading indicating instruments are before the operator as follows:

1. Frequency deviation meter.
2. Percentage modulation indicator.
3. Spurious emission check (receiver).
4. Last radio stage plate voltage.
5. Last radio stage total plate current.
6. Output or antenna current.

(b) The operator has off and on control of the power to the last radio stage.

(c) The operator can reach the transmitter proper in not more than five minutes to make any changes or adjustments necessary to maintain proper operation.

Sec. 4.10 *Rebroadcasts.*¹

(a) The licensee of an international or non-commercial educational broadcast station may, without further authority of the Commission, rebroadcast the program of a United States standard broadcast station, provided the Commission is notified of the call letters of each station rebroadcast and the licensee certified that express authority has been received from the licensee of the station originating the program.² (See Secs. 4.43 and 4.132 (c) concerning commercial announcements.)

(b) No licensee of an international or non-commercial educational broadcast station shall rebroadcast the program of any other class of United States radio station without written authority having first been obtained from the Commission.⁴

(c) No licensee of any other class of broadcast station listed in Sec. 4.1 (television, facsimile, high frequency or developmental) shall rebroadcast the program of any radio station without written authority first having been obtained from the Commission.⁴

(d) Authority will not be granted to rebroadcast in the United States the program of an international broadcast station located within the limits of the North American continent, except upon a satisfactory showing that no other facilities exist for transmitting the program to the area served by the station proposing the rebroadcast.

¹For definition of "rebroadcast" see Sec. 3.94 (a).

²The notice and certification of consent must be given within three (3) days of any single rebroadcast, but in case of the regular practice of rebroadcasting certain programs of a standard broadcast station several times during a license period, notice and certification of consent must be given for the ensuing license period with the application for renewal of license, or at the beginning of such rebroadcast practice if begun during a license period.

³The broadcasting of a program relayed by a relay broadcast station (Sec. 4.21) is not considered a rebroadcast.

⁴Informal application may be employed.

(d) A licensee of an international broadcast station may authorize the rebroadcast of its programs by any station outside the limits of the North American continent without permission from the Commission, provided that the station rebroadcasting the programs cannot be received consistently in the United States.

(f) An application for authority to rebroadcast the program of any radio station shall be accompanied by written consent or certification of consent of the licensee of the station originating the programs.

Sec. 4.11 Equipment and program tests.

(a) A licensee of a broadcast station listed in Sec. 4.1 shall conduct equipment tests in accordance with Sec. 2.42 and program tests in accordance with Sec. 2.43.

(b) In case the transmitter and associated equipment are on hand in complete form and an application for license was filed and granted with the application for construction permit, then the notification of equipment tests and program tests as required by paragraph (a) of this section need not be made.

RELAY BROADCAST STATIONS

Sec. 4.21 Defined.¹ The term "relay broadcast station" means a station licensed to transmit from points where wire facilities are not available, programs for broadcast by one or more broadcast stations or orders concerning such programs.

Sec. 4.22 Licensing and authorizations.

(a) A license for a relay broadcast station will be issued only to the licensee of a standard broadcast station², provided, however, in cases where it is impractical, impossible, or prohibited by laws or regulations for the licensee of a standard broadcast station to install, operate or maintain the necessary equipment under its legal control, the Commission may grant special temporary authority for each event to another person to operate as a relay broadcast station equipment already licensed for another service, or equipment which may be installed under Section 319 (b) of the Communications Act of 1934 without a construction permit and provided further:

(b) The Commission may license a special relay broadcast station to the licensee of another class of broadcast station provided a need therefor is shown and the relay station will be used only for relaying of programs for broadcast by such broadcast station.

(c) The license of a relay broadcast station authorizes the transmission of commercial or sustaining programs, or orders concerning such programs, to be broadcast by its standard broadcast station and other broadcast stations transmitting the same programs simultaneously or a chain program to the network with which the licensee is regularly affiliated. The license of a relay station does not authorize transmission of programs to be broadcast solely by other broadcast stations not aforementioned.

(d) In case a licensee has two or more standard broadcast stations located in different cities, it shall, in applying for a new relay station or for renewal of license of an existing relay station, designate the standard broadcast station or stations in conjunction with which the relay station is to be operated principally, and it shall not thereafter operate the relay station in conjunction with another of its standard broadcast stations located in a different city for more than a total of ten days in any thirty-day period.

(e) Each application for temporary authority to operate a relay broadcast station from a person other than a licensee of a standard broadcast station shall be accompanied by an application for authority to broadcast the program from the licensee of the standard broadcast station proposing the broadcast.

(f) An application for special temporary authority to operate another class of station as a relay broadcast station shall specify a group of frequencies allocated in Sec. 4.23; provided, however, in case of events of national interest and importance which cannot be transmitted successfully to the nearest available wire facilities on these frequencies, other frequencies under the jurisdiction of the Commission may be requested, if it is shown that the operation thereon will not cause interference to established stations.

(g) An application for special temporary authority to operate on frequencies not allocated by Sec. 4.23 or to operate another class of station as a relay broadcast station must be received by the Commission not less than ten days prior to the actual event to be broadcast, and shall contain complete information concerning the frequencies requested and the license of the station to be used. In case of emergencies, which shall be fully explained in the application, the Commission may waive the ten-day requirement specified herein.

Sec. 4.23 Frequency assignment and operation.

(a) The following groups of frequencies are allocated for assignment to relay broadcast stations:

Group A	Group B	Group C	Group D	Group E
1622 kc	1606 kc	1646 kc	30,820 kc	31,220 kc
2055	2022	2090	33,740	35,620
2150	2102	2190	35,820	37,020
2790	2758	2830	37,980	39,260
Group F	Group G	Group H	Group I	Group J
31,620 kc	33,380 kc	132,260 kc	133,030 kc	Any four frequencies above
33,200	35,020	134,080	134,850	300,000 kc excluding band
37,340	37,620	135,480	136,810	400,000 to
39,620	39,820	135,760	138,630	401,000 kc

(b) One of the above groups only, including all four frequencies will be assigned each station. The first application from any metropolitan area for the frequencies in Groups A, B or C shall specify Group A; the second Group B, and the third Group C, the fourth Group A again, etc. and likewise for frequencies in Groups D, E, F or G, first application Group D, second E, third F, etc. Outstanding assignments not following this order will not be changed unless need therefor develops. Additional applicants shall specify the next unassigned group in sequence or any other group if it appears interference will be avoided thereby.

(c) A station may be licensed for Group H when a need for frequencies of this order may be shown.

(d) Group I will be licensed to stations to operate with frequency modulation only when need for such operation and frequencies of this order may be shown.

¹ See Sec. 4.5 (6) for special log entry requirement.

² See "Number of Relay Broadcast Stations That Will be Licensed to Each Holder of Standard Broadcast Station License" as announced by the Commission.

(e) Any four specific frequencies under Group J will be assigned on experimental operation only and an applicant may apply for the four frequencies which appear most suitable for the experimental work to be conducted.

(f) The licensee of a station on Group J shall carry on research and experimentation for the advancement of the relay broadcast art and development of these ultra high frequencies for relay broadcast services. An application for authority to operate a station on frequencies in Group J shall include a statement concerning the research and experiments to be conducted. The research and experiments shall indicate reasonable promise of substantial contribution to the development of the program relay services.

(g) A license authorizes operation on only one of the four assigned frequencies at any one time. In case it is desired to transmit programs and spoken orders concerning such programs simultaneously, two licenses are required though each may specify the same group of frequencies.

Sec. 4.24 Frequency selection to avoid interference. In case two or more stations are licensed for the same group of frequencies in the same area and in case simultaneous operation is contemplated, the licensees shall endeavor to select frequencies to avoid interference. If a mutual agreement to this effect cannot be reached the Commission shall be notified and it will specify the frequencies on which each station is to be operated.

Sec. 4.25 Power limitations.

(a) A relay broadcast station assigned frequencies in Groups A, B, C and J will be licensed to operate with a power output not in excess of that necessary to transmit the program and orders satisfactorily to the receivers and shall not be operated with a power greater than licensed.

(b) A relay broadcast station assigned frequencies in Groups D, E, F and G will not be authorized to install equipment or licensed for an output power in excess of 100 watts; provided that before using any frequency in these groups with a power in excess of 25 watts, tests shall be made by the licensee to insure that no objectionable interference will result to the service of any government station, and provided, further, that if the use of any frequency may cause interference then the power shall be reduced to 25 watts or another frequency in the licensed group selected which will not cause objectionable interference.

(c) A relay broadcast station assigned frequencies in Groups H and I will be licensed to operate with a power output not in excess of that necessary to transmit the program and orders satisfactorily to the receivers and shall not be operated with a power greater than that licensed. In event interference may be caused to stations on adjacent channels, licensees shall endeavor to make arrangements to reduce power to a point where interference will not be objectionable. If a satisfactory arrangement cannot be agreed upon, the Commission will determine and specify the maximum power or conditions of operation of each such station.

Sec. 4.26 Supplemental report with renewal application. The licensee of a relay broadcast station assigned frequencies under Group J shall submit a supplemental report with and made a part of each application for renewal of license as follows:

1. Number of hours operated for experimental purposes.
2. Developments carried on in the relay broadcast service.
3. Propagation characteristics of the frequencies assigned with regard to relay broadcast service.
4. All developments or major changes in equipment.
5. Any other pertinent developments.

INTERNATIONAL BROADCAST STATIONS

Sec. 4.41 Defined. The term "international broadcast station" means a station licensed for the transmission of broadcast programs for international public reception. (Frequencies for these stations are allocated from bands assigned [between 6,000 and 26,600 kilocycles] for broadcasting by International Agreement).

Sec. 4.42 Licensing requirements; necessary showing. A license for an international broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That there is a need for the international broadcast service proposed to be rendered.
2. That the necessary program sources are available to the applicant to render an effective international service.
3. That the technical facilities are available on which the proposed service can be rendered without causing interference to established international stations having prior registration and occupancy in conformity with existing international conventions or regulations on the frequency requested.¹
4. That directive antennas and other technical facilities will be employed to deliver maximum signals to the country or countries for which the service is designed.
5. That the production of the program service and the technical operation of the proposed station will be conducted by qualified persons.
6. That the applicant is technically and financially qualified and possesses adequate technical facilities to carry forward the service proposed.
7. That the public interest, convenience and necessity will be served through the operation of the proposed station.

Sec. 4.43 Service; commercial or sponsored programs.

(a) A licensee of an international broadcast station shall render only an international broadcast service which will reflect the culture of this country and which will promote international goodwill, understanding and cooperation. Any program solely intended for, and directed to an audience in the continental United States does not meet the requirements for this service.²

(b) Such international broadcast service may include commercial or sponsored programs provided that,

1. Commercial program continuities give no more than the name of the sponsor of the program and the name and general character of the commodity, utility or service, or attraction advertised.
2. In case of advertising a commodity, the commodity is regularly sold or is being promoted for sale on the open market in the foreign country or countries to which the program is directed in accordance with paragraph (c) of this section.
3. In case of advertising an American utility or service to prospective

¹ See General Radio Regulations annexed to the International Telecommunications Convention, Madrid, 1932, Article 7. Prior to Sept. 1, 1939 and thereafter see Cairo General Radio Regulations, Article 7, annexed to the International Telecommunications Conferences, Cairo, Egypt, 1938. Also, see list of assignments to international channels prepared by the Bureau of International Telecommunications Union, Berne, Switzerland.

² Suspended indefinitely Sept. 27, 1939.

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FCC Regulations Governing Broadcast Services Other Than Standard Broadcast

(Continued from page 377)

tourists or visitors to the United States, the advertisement continuity is particularly directed to such persons in the foreign country or countries where they reside and to which the program is directed in accordance with subsection (c) of this section.

- In case of advertising an international attraction (such as a world fair, resort, spa, etc.) to prospective tourists or visitors to the United States, the oral continuity concerning such attraction is consistent with the purpose and intent of this section.
- In case of any other type of advertising, such advertising is directed to the foreign country or countries and to which the program is directed in accordance with paragraph (c) of this section and is consistent with the purpose and intent of this section.

(c) The areas or zones established to be served by international broadcast stations are the foreign countries of the world, and directive antennas shall be employed to direct the signals to specific countries. The antenna shall be so designed and operated that the signal (field intensity) toward the specific foreign country or countries served shall be at least 3.16 times the average effective signal from the station (power gain of 10).

(d) An international broadcast station may transmit the program of a standard broadcast station or network system provided the conditions in paragraph (b) of this section in regard to any commercial continuities are observed and when station identifications are made, only the call letter designation of the international station is given on its assigned frequency, and provided further that in the case of chain broadcasting, the program is not carried simultaneously by another international station (except another station owned by the same licensee operated on a frequency in a different group to obtain continuity of signal service), the signals from which are directed to the same foreign country or countries.

(e) Station identification, program announcements, and oral continuity shall be made with international significance (language particularly) which is designed for the foreign country or countries for which the service is primarily intended.

Sec. 4.44 Frequency assignment.

(a) The following groups of frequencies are allocated for assignment to international broadcast stations:

Group A	Group B	Group C	Group D
6020 kc	9510 kc	11,710 kc	15,110 kc
6040	9530	11,750	15,150
6060	9570	11,770	15,170
6080	9590	11,790	15,190
6100	9650 ^F	11,810	15,210
6140	9670 ^F	11,830	15,230
6170 ^S		11,850	
6190 ^S		11,870	
		11,890	

Group E	Group F	Group G	Group H
15,250 kc	17,760 kc	21,460 kc	25,600 kc
15,270	17,780	21,480	25,625
15,290	17,800	21,520	25,650
15,310	17,830 ^F	21,540	25,675
15,330		21,570 ^F	25,700
		21,590 ^F	25,725
		21,610 ^F	25,750
		21,630 ^F	25,775
		21,650 ^F	25,800
			25,825
			25,850

(b) A separate license and call letter designation will be issued for each frequency except that where frequencies in two or more groups are required to maintain a particular international broadcast service to certain foreign country or countries, one frequency from each of the groups required may be authorized by one license and one call letter designation. In such cases these frequencies shall be used consecutively during a day as required and they shall not be used simultaneously either on the same transmitter or different transmitters.

(c) Not more than one frequency in any one group in paragraph (a) of this section will be assigned to a station.

Sec. 4.45 Power requirement. No international broadcast station will be authorized to install equipment or licensed for operation with a power less than 50 kilowatts.³

Sec. 4.46 Supplemental report with renewal application. A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following:

- The number of hours operated on each frequency.
- A list of programs transmitted of special international interest.
- Outline of reports of reception and interference and conclusions with regard to propagation characteristics of the frequency assigned.

¹ See Section 3 (p) of the Communications Act of 1934 for the definition of "chain broadcasting".

² Any operation on this frequency prior to September 1, 1939, shall be in compliance with Article 7, Cairo General Radio Regulations as adopted at the International Telecommunications Conferences, Cairo, Egypt, 1938.

³ This provision shall become effective as applying to existing stations July 1, 1940.

Sec. 4.47 Frequency control. The transmitter of each international broadcast station shall be equipped with automatic frequency control apparatus so designed and constructed that it is capable of maintaining the operating frequency within plus or minus 0.005 per cent of the assigned frequency.¹

VISUAL BROADCAST SERVICE

[For recommended new rules and proposed RMA television transmission standards and allocation recommendations, see pages 342 and 343]

TELEVISION BROADCAST STATIONS

[See pages 342 and 343 for proposed rules]

FACSIMILE BROADCAST STATIONS

4.96 Supplemental report with renewal application

Sec. 4.61 Defined. The term "visual broadcast service" means a service rendered by stations broadcasting images for general public reception. There are two classes of stations recognized in the visual broadcast service, namely: television broadcast stations and facsimile broadcast stations.

Sec. 4.71 Defined. The term "television broadcast station" means a station licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public. The transmission of the synchronized sound (aural broadcast) is considered an essential phase of television broadcast and one license will authorize both visual and aural broadcast as herein set out.

Sec. 4.72 Licensing requirements; necessary showing. A license for a television broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

- That the applicant has a program of research and experimentation which indicates reasonable promise of substantial contribution to the development of the television broadcast art.
- That the program of research and experimentation will be conducted by qualified engineers.
- That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.
- That the public interest, convenience and/or necessity will be served through the operation of the proposed station.

Sec. 4.73 Charges prohibited; restrictions and announcements. (a) A license of a television broadcast station shall not make any charge, directly or indirectly, for the transmission of either aural or visual programs.

(b) In the case of experimental televising of the production of a commercial standard broadcast program, all commercial announcements not a part of the entertainment continuity shall be eliminated from the television broadcast except the mere statement of the name of the sponsor or product or the televising of the trademark, symbol, slogan or product of the sponsor; provided, however, that when the program transmission is incidental to the experiments being conducted and not featured, and subject to interruptions as the experiments may require, the commercial announcements may be broadcast aurally.

(c) No licensee of a standard broadcast station or network shall make any additional charge, directly or indirectly, for the simultaneous transmission of the aural or visual program by a television broadcast station, nor shall commercial accounts be solicited by the licensee of a standard broadcast station or network, or by others acting in their behalf upon the representation that the commercial program will also be transmitted by a television broadcast station.

(d) The synchronized sound (aural) program of a television broadcast station may be broadcast by a standard broadcast station, provided:

- That no announcements or references shall be made over the standard broadcast station regarding the operation of the television broadcast station, except the mere statement that the program being transmitted is the sound or aural program of a television broadcast station (identify by call letters).
- That the call letter designation when identifying the television broadcast station shall be given on its assigned frequency only.

Sec. 4.74 Frequency assignment. (a) The following groups of channels are allocated for assignment to television broadcast stations licensed experimentally:

Group A	Group B	Group C
44,000- 50,000 kc	156,000-162,000 kc	Any 6,000 kc. band above 300,000 kc. excluding band 400,000 to 401,000 kc.
50,000- 56,000	162,000-168,000 ²	
66,000- 72,000	180,000-186,000	
78,000- 84,000	186,000-192,000	
84,000- 90,000	204,000-210,000	
96,000-102,000	210,000-216,000 ²	
102,000-108,000	234,000-240,000	
	240,000-246,000	
	258,000-264,000	
	264,000-270,000 ²	
	282,000-288,000	
	288,000-294,000	

(b) Each television station will be assigned only one 6000-kilocycle fre-

¹ See Section 4.1 page 376. This provision shall become effective as applying to existing stations Jan. 1, 1941.

² See Secs. 4.4 (e) and 4.154 (a).

HIGH FREQUENCY BROADCAST STATIONS

Sec. 4.111 *Defined.* The term "high frequency broadcast station" means a station licensed on frequencies above 25,000 kilocycles for transmission of aural programs for general public reception.

Sec. 4.112 *Licensing requirements; necessary showing.* A license for a high frequency broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and experimentation which indicates reasonable promise of substantial contribution to the development of high frequency broadcasting.
2. That substantial data will be taken on the propagation characteristics of these frequencies; on the noise level in different parts of the city; on the field intensity necessary to render good broadcast service; on antenna design and characteristics with respect to propagation; and on other allied phases of broadcast coverage.
3. That the research and experimentation will be conducted by qualified engineers.
4. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.
5. That the public interest, convenience and necessity will be served through the operation of the proposed station.

Sec. 4.113 *Charges prohibited; restriction and announcements.* (a) A licensee of a high frequency broadcast station shall not make any charge, directly or indirectly, for the transmission of programs, but may transmit the programs of a standard broadcast station or network including commercial programs, if the call letter designation when identifying the high frequency broadcast station is given on its assigned frequencies only and the statement is made over the high frequency broadcast station that the program of a standard broadcast station or network (identify by call letters or name of network) is being broadcast. Immediately following any announcement of the call letter designation of a standard broadcast station, the program from which is being broadcast over a high frequency broadcast station, the call letter designation of the high frequency broadcast station shall be given. In case of the rebroadcast of the program of any broadcast station, Sec. 4.10 applies.

(b) No licensee of any standard broadcast station or network shall make any additional charge, directly or indirectly, for the simultaneous transmissions of programs by the high frequency broadcast station, nor shall commercial accounts be solicited by a licensee of a standard broadcast station or network, or by others acting in their behalf upon representation that the commercial program will also be transmitted by a high frequency broadcast station.

Sec. 4.114 *Frequency assignment.*

(a) The following groups of frequencies are allocated for assignment to high frequency broadcast stations:

Group A	Group B	Group C	Group D
25,300 kc	25,900 kc	26,300 kc	42,060 kc
25,325	25,925	26,500	42,100
25,350	25,950	26,700	42,140
25,375	25,975	26,900	42,180
25,400	26,000		42,220
25,425	26,025		42,260
25,450	26,050		42,300
25,475	26,075		42,340
25,500	26,100		42,380
25,525	26,125		42,420
25,550	26,150		42,460

Group E	Group F	Group G	Group H
42,600 kc	116,590 kc	117,190 kc	Any frequency above 300,000 kc.
42,800	116,710	117,430	excluding band
43,000	116,830	117,670	400,000 to
43,200	116,950	117,910	401,000 kc.
43,400	117,070		

(b) A station assigned a frequency in Group A, B, D or F is authorized to operate exclusively with amplitude modulation (maximum band width of emission 30 kc.). A station assigned a frequency in Group C, E or G is authorized to operate exclusively with frequency modulation (maximum band width of emission 200 kc.). A station assigned a frequency in Group H is authorized to operate with either amplitude or frequency modulation with the above band widths of emission as applicable.

(c) Stations serving the same area will not be assigned frequencies separated less than the following:

Group A or B	Group D	Group C, E, F, G or H
100 kc	160 kc	To be determined

(d) One frequency only in a Group will be assigned to a station. A station assigned a frequency in Group A, B or C will not be assigned another frequency. A station assigned a frequency in Group D may also be assigned a frequency in Group F, and in Group E, also in Group G. In case more than one frequency is assigned to a station, the license authorizes operation on only one of the frequencies at one time.

(e) A licensee of a station assigned a frequency in Group A or one of the last two frequencies in Group C shall make the necessary observations to determine that no interference is caused to international mobile service and international fixed service respectively; and that the operation is in accordance with international agreements on the assignments of stations to this band. If interference is caused to such services the licensee may be required to reduce the operating power of the station or cease operation until the Commission deems no further interference will result.

Sec. 4.115 *Power.*

(a) No high frequency broadcast station will be licensed for an output power rating greater than 1000 watts unless the applicant can show that greater power is needed to carry on a special program of research, provided, however, in no case will an operating power greater than 1000 watts be authorized to a station assigned a frequency in Group A or one of the last two frequencies in Group C.

(b) While conducting apparatus experiments and in case adequate signal for reliable service can be delivered with less power, the operating output may be reduced accordingly.

Sec. 4.116 *Frequency control.* Each high frequency broadcast station transmitter shall be equipped with automatic frequency control apparatus so de-

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band from groups in paragraph (a) of this rule. Both aural and visual carriers with side bands for modulation are authorized but no emission shall be transmitted outside the authorized frequency band.

(c) Frequency band in Group A shall be used by stations principally for developing television intended directly for public reception. Frequency bands in groups B and C may be licensed for the same purposes as those in Group A in addition for stations to serve auxiliary television purposes, such as television relay stations, developmental mobile service. However, no mobile or portable station will be licensed for the purpose of transmitting television programs to the public directly.

(d) A licensee will not be granted a second television station to operate on frequency band in Group A which would serve in whole or part the same service area as already served by a station licensed to it for a frequency band in Group A.

Sec. 4.75 *Power.* The operating power of a television broadcast station shall not be in excess of that necessary to carry forward the program of research. The operating power may be maintained at the maximum rating or less, as the conditions of operation may require.

Sec. 4.76 *Supplemental report with renewal application.* A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following:

1. Number of hours operated for transmission of television programs.
2. Comprehensive report of research and experimentation conducted.
3. Conclusions and program for further developments of the television broadcast service.
4. All developments and major changes in equipment.
5. Any other pertinent developments.

Sec. 4.91 *Defined.* The term "facsimile broadcast station" means a station licensed to transmit images of still objects for record reception by the general public.

Sec. 4.92 *Licensing requirements.* A license for a facsimile broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and experimentation which indicates reasonable promise of substantial contribution to the development of the facsimile broadcast service.
2. That sufficient facsimile recorders will be distributed to accomplish the experimental program proposed.
3. That the program of research and experimentation will be conducted by qualified engineers.
4. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.
5. That the public interest, convenience and/or necessity will be served through the operation of the proposed station.

Sec. 4.93 *Charges prohibited; restriction.* (a) A licensee of a facsimile broadcast station shall not make any charge, directly or indirectly, for the transmission of programs.

(b) No licensee of any standard broadcast station or network shall make an additional charge, directly or indirectly, for the transmission of some of the programs by a facsimile broadcast station, nor shall commercial accounts be solicited by any licensee of a standard broadcast station or network, or by others acting in their behalf, upon representation that images concerning that commercial program will be transmitted by a facsimile station.

Sec. 4.94 *Frequency assignment.* (a) The following groups of frequencies are allocated for assignment to facsimile broadcast stations which will be licensed experimentally only:

Group A	Group B	Group C	Group D
25,025 kc	43,540 kc	116,110 kc	Any frequency above 300,000 kc.
25,050	43,580	116,230	excluding band
25,075	43,620	116,350	400,000 to
25,100	43,660	116,470	401,000 kc.
25,125	43,700		
25,150	43,740		
25,175	43,780		
25,200	43,820		
25,225	43,860		
25,250	43,900		
	43,940		

(b) Other broadcast or experimental frequencies may be assigned for the operation of facsimile broadcast stations on an experimental basis provided a sufficient need therefor is shown and no interference will be caused to established radio stations.

(c) One frequency only will be assigned to a facsimile station from the groups in paragraph (a) of this section. More than one frequency may be assigned under provisions of paragraph (b) of this section if a need therefor is shown.

(d) Each applicant shall specify the maximum modulating frequencies proposed to be employed.

(e) The operating frequency of a facsimile broadcast station shall be maintained in accordance with the frequency tolerance given in Sec. 40.01 provided, however, where a lesser tolerance is necessary to prevent interference, the Commission will specify the tolerance.

(f) A facsimile broadcast station authorized to operate on frequencies regularly allocated to other stations or services shall be required to abide by the rules governing the stations regularly operating thereon, which are applicable to facsimile broadcast stations and are not in conflict with Secs. 4.1 to 4.11, inclusive, of these rules.

Sec. 4.95 *Power.* The operating power of a facsimile broadcast station shall not be in excess of that necessary to carry forward the program of research, provided, however, not more than 1000 watts will be authorized on a frequency in Group A. The operating power may be maintained at the maximum rating or less, as the conditions of operation may require.

Sec. 4.96 *Supplemental report with renewal application.* A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following:

1. Number of hours operated for transmission of facsimile programs.
2. Comprehensive report of research and experimentation conducted.
3. Conclusions and programs for further developments of the facsimile broadcast service.
4. All developments and major changes in equipment.
5. Any other pertinent developments.

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signed and constructed that it is capable of maintaining the operating frequency within plus or minus 0.01% of the assigned frequency.

Sec. 4.117 *Supplemental report with renewal application.* A supplemental report shall be filed with each and made a part of the application for renewal of license and shall include statements of the following, among others:

1. The number of hours operated.
2. Data taken in compliance with Sec. 4.112 (2).
3. Outline of reports of reception and interference and conclusions with regard to propagation characteristics of the frequency assigned.
4. Research and experiments being carried on to improve transmission and to develop broadcasting on the very high frequencies.
5. All developments or major changes in equipment.
6. Any other pertinent developments.
7. Comprehensive summary of all reports received. See Sec. 4.114 (c).

NON-COMMERCIAL EDUCATIONAL BROADCAST STATIONS

Sec. 4.131 *Defined.* The term "non-commercial educational broadcast station" means a station licensed to an organized non-profit educational agency for the advancement of its educational work and for the transmission of educational and entertainment programs to the general public.

Sec. 4.132 *Operation and service.* The operation of, and the service furnished by, non-commercial educational broadcast stations shall be governed by the following regulations:

(a) A non-commercial educational broadcast station will be licensed only to an organized non-profit educational agency and upon a showing that the station will be used for the advancement of the agency's educational program particularly with regard to use in an educational system consisting of several units.

(b) Each station may transmit programs directed to specific schools in the system for use in connection with the regular courses as well as routine and administrative material pertaining to the school system and may transmit educational and entertainment programs to the general public.

(c) Each station shall furnish a non-profit and non-commercial broadcast service. No sponsored or commercial program shall be transmitted nor shall commercial announcements of any character be made. A station shall not transmit the programs of other classes of broadcast stations unless all commercial announcements and commercial references in the continuity are eliminated.

Sec. 4.133 *Power.* The operating power of non-commercial educational broadcast stations shall be not less than 100 watts or greater than 1000 watts unless a definite need for greater power is shown.

Sec. 4.134 *Frequency control.* The transmitter of each non-commercial educational broadcast station shall be equipped with automatic frequency control apparatus so designed and constructed that it is capable of maintaining the operating frequency within plus or minus 0.01 percent of the assigned frequency.

Sec. 4.135 *Operating schedule.* Non-commercial educational broadcast stations are not required to operate on any definite schedule or minimum hours.

Sec. 4.136 *Equipment requirements.* The transmitting equipment, installation, and operation as well as the location of the transmitter shall be in conformity with the requirements of good engineering practice as released from time to time by the Commission.

Sec. 4.137 *Frequencies.*

(a) The following frequencies are allotted for assignment to non-commercial educational broadcast stations:

41,020 kc	41,220 kc	41,420 kc	41,620 kc	41,820 kc
41,060	41,260	41,460	41,660	41,860
41,100	41,300	41,500	41,700	41,900
41,140	41,340	41,540	41,740	41,940
41,180	41,380	41,580	41,780	41,980

(b) Stations serving the same area will not be assigned frequencies separated less than 160 kilocycles.

(c) Amplitude modulation shall be employed exclusively unless it can be shown that frequency modulation will better serve the purpose of the station in which case such modulation may be authorized provided sufficient frequencies can be grouped so as to obtain the required band width without causing interference to established stations or preventing the full expansion of the service.

(d) Only one frequency will be assigned to a station.

DEVELOPMENTAL BROADCAST STATIONS

Sec. 4.151 *Defined.* The term "developmental broadcast station" means a station licensed to carry on development and research for the advancement of broadcast services along lines other than those prescribed by other broadcast rules or a combination of closely related developments that can be better carried on under one license.

Sec. 4.152 *Licensing requirements; necessary showing.*

(a) Licenses for developmental broadcast stations will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and development which cannot be successfully carried on under any of the classes of broadcast stations already allocated, or is distinctive from those classes, or combination of closely related developments that involve different phases of broadcasting which can be pursued better under one license.
2. That the program of research has reasonable promise of substantial contribution to the development of broadcasting, or is along lines not already thoroughly investigated.
3. That the program of research and experimentation will be conducted by qualified persons.

4. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.

5. That the public interest, convenience and necessity will be served through the operation of the proposed station.

(b) A separate developmental broadcast station license will be issued for each major development proposed to be carried forward. When it is desired to carry on several independent developments, it will be necessary to make satisfactory showing and obtain a license for each.

Sec. 4.153 *Program service; charges prohibited; announcements.*

(a) A licensee of developmental broadcast stations shall broadcast programs only when they are necessary to the experiments being conducted. A regular program service shall be broadcast unless specifically authorized by the license.

(b) A license of a developmental broadcast station shall not make an charge, directly or indirectly, for the transmission of programs, but may transmit the programs of a standard broadcast station or network including commercial programs, if the call letter designation when identifying the developmental broadcast station is given on its assigned frequency only and the station is made over the developmental broadcast station that the program of broadcast station or network (identify by call letters or name of network) being broadcast in connection with the developmental work. In case of the rebroadcast of the program of any broadcast station, Sec. 4.10 applies.

Sec. 4.154 *Frequency assignment.*

(a) The following frequencies are allocated for assignment to developmental broadcast stations:

2,396	1,614	12,855	12,862.5	37,140
2,400	2,398	12,870		37,540
3,490	3,492.5	17,300	17,310	39,140
3,495		17,320		39,540
4,795	4,797.5	23,100		132,400
4,800		30,660		132,680
6,420	6,425	31,020		133,380
6,430		31,140		134,360
8,650	8,655	31,180		135,340
8,660		31,540		137,440
9,130	9,135	33,340		137,860
9,140		33,460		138,140
		33,620		138,840
		35,060		139,540
		35,460		139,960
		37,060		162,000 to 168,000
				210,000 to 216,000
				264,000 to 270,000
				300,000 to 400,000
				401,000 and above

* Also available for assignment to all other stations in the experimental service.

(b) A license will be issued for more than one of these frequencies upon a satisfactory showing that there is need thereof.

(c) The frequencies suited to the purpose and in which there appears to be the least or no interference to established stations shall be selected.

(d) In cases of important experimentation which cannot be conducted successfully on the frequencies allocated in subsection (a) of this Rule, the Commission may authorize developmental broadcast stations to operate on any frequency allocated for broadcast stations or any frequencies allocated for other services under the jurisdiction of the Commission upon satisfactory showing that such frequencies can be used without causing interference to established services.

Sec. 4.155 *Frequency tolerance.*

(a) The operating frequency of a developmental broadcast station shall be maintained in accordance with the frequency tolerance given in Sec. 4.1 provided, however, where lesser tolerance is necessary to prevent interference the Commission will specify the tolerance.

(b) The operating power of a developmental broadcast station shall not be in excess of that necessary to carry on the program of research. The operating power may be maintained at the maximum rating or less, as the condition of operation may require.

Sec. 4.156 *Supplemental report with renewal application.* A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following, among others:

1. The number of hours operated.
2. Comprehensive report on research and experiments conducted.
3. Conclusions and program for further development of the broadcast service.
4. All developments and major changes in equipment.
5. Any other pertinent developments.

Sec. 4.157 *Frequency restrictions.* A developmental broadcast station authorized to operate on frequencies regularly allocated to other stations or services, shall be required to abide by all rules governing the stations operating regularly thereon which are applicable to developmental broadcast stations and are not in conflict with Secs. 4.1 to 4.11, inclusive, and Secs. 4.151 to 4.156, inclusive, of these rules.

¹ This frequency will not be available for the experimental service after October 1, 1939.

REGULATIONS GOVERNING CANADIAN BROADCAST STATIONS

Made Under Canadian Broadcasting Act, 1936

(As Promulgated by Canadian Broadcasting Corporation, Effective Nov. 1, 1937, and Amended April 1 and July 7, 1939)

Authority. The attached regulations, numbered 1 to 23, were passed at a meeting of the Canadian Broadcasting Corporation held at Toronto, in the Province of Ontario, on the 8th day of September, 1937, and under the regulations of the Canadian Broadcasting Corporation, and were made under authority of subsection one of section twenty-two of The Canadian Broadcasting Act, chapter twenty-four of the Statutes of 1936, which reads as follows:—

"The Corporation may make regulations
(a) to control the establishment and operation of chains or networks of stations in Canada;
(b) to prescribe the periods to be reserved periodically by any private station for the broadcasting of programs of the Corporation;
(c) to control the character of any and all programs broadcast by Corporation or private stations;
(d) to determine the proportion of time which may be devoted to advertising in any programs broadcast by the stations of the Corporation or by private stations and to control the character of such advertising;
(e) to prescribe the proportion of time which may be devoted to political broadcasts by the stations of the Corporation and by private stations, and to assign such time on an equitable basis to all parties and rival candidates."

Definitions. 1. In these regulations, unless the context otherwise requires.
(a) The "Act" means The Canadian Broadcasting Act, chapter twenty-four of the Statutes of 1936;
(b) "Corporation" means the Canadian Broadcasting Corporation;
(c) "licence" means a licence issued to a broadcasting station under the Radiotelegraph Act; and "licensee" means the holder of such licence;
(d) "private station" means any broadcasting station licensed to a person other than the Corporation;
(e) "regulations" means these regulations;
(f) "representatives of the Corporation" means the General Manager of the Corporation, the Assistant General Manager of the Corporation or persons authorized in writing by the General Manager of the Corporation;
(g) "station" refers to stations owned or operated by the Corporation as well as by others and it may also refer to the owner or licensee of a station.

Scope of Regulations. 2. These regulations apply to all stations in Canada and to all matter broadcast by such stations.

Program Log. 3. (1) Each station shall maintain a program log in a form acceptable to the Corporation and shall cause entries to be made therein as follows:—

(a) date, call letters, location, frequency;
(b) the time at which each station identification announcement is made;
(c) the title and brief description of each program broadcast, with the time of the beginning and ending so as to give a continuous record of each day's broadcast. If a mechanical reproduction is used, that fact shall be noted, together with a statement whether or not announcement thereof was made. In the case of a talk or speech, the name of the speaker and the auspices under which the talk or speech was given shall be entered. If the speech is made by a political candidate or on behalf of a political candidate or political party, the political affiliation of the candidate or party shall also be entered;
(d) the duration of each spot or other similar announcement and the broadcast hour during which it was transmitted;
(e) the name of the sponsor of any program or announcement for which the station is paid.

(2) Key letters or abbreviations may be used if the explanation of each is plainly given in the log. The logs shall be produced for the inspection of the representatives of the Corporation upon the request of such representatives.

(3) Each station shall keep on file a copy of
(a) the continuity used for any program;
(b) all program or other announcements containing advertising matter;
(c) the manuscript of addresses or talks.

(4) In the case of chain broadcasts these records shall be kept by the originating station.

(5) Such records shall be retained by the station for a period of one year and shall be open for inspection by representatives of the Corporation upon request of such representatives.

Time. 4. The time mentioned in all program logs and contracts used in connection with broadcasting shall be local standard time (or local daylight-saving time if that is in force) unless otherwise specified or agreed.

Program Schedules. 5. Each station shall, each week, file with the Corporation in a form acceptable to the Corporation an advance copy of its program schedule for the following week, showing the exact hours and how they are to be occupied each day.

Station Identification. 6. Each station shall announce its call letters not less than once nor more than four times an hour, during hours of operation.

Programs in General. *7. No one shall broadcast
(a) anything contrary to law;
(b) the actual proceeding at any trial in a Canadian Court;
(c) abusive comment on any race, religion or creed;
(d) obscene, indecent or profane language;
(e) malicious, scandalous, or defamatory matter;
(f) advertising matter containing false or deceptive statements;
(g) false or misleading news;
(h) upon the subject of birth control;

* NOTE TO SECTION 7. It is not the intention of the Corporation to restrict freedom of speech nor the fair presentation of controversial material. On the contrary, the policy of the Corporation is to encourage the fair presentation of controversial questions. At the same time, it should be realized that the message of broadcasting is received at the bedside in the relatively unguarded atmosphere of the home, reaching old and young alike. Certain subjects, while meriting discussion elsewhere in the public interest are not necessarily suitable for this intimate medium.

(i) upon the subject of venereal disease, or other subjects relating to public health which the Corporation may from time to time designate, unless such subjects be presented in a manner and at a time approved by the General Manager as appropriate to the medium of broadcasting;

(j) (i) programs presenting a person who claims supernatural or psychic powers, or a fortune-teller, character analyst, crystal-gazer or the like, or programs which lead or may lead the listening public to believe that the person presented claims to possess or possesses supernatural or psychic powers or is or claims to be a fortune-teller, character analyst, crystal-gazer or the like.

(ii) programs in which a person answers or solves or purports to answer or solve questions or problems submitted by listeners or members of the public unless such programs prior to being broadcast shall have been approved in writing by a representative of the Corporation.

Political broadcasts. 8. (1) Political broadcasts are governed by subsections (3), (4) and (5) of section 22 of The Canadian Broadcasting Act, 1936, which read as follows:—

"(3) Dramatized political broadcasts are prohibited.

"(4) The names of the sponsor or sponsors and the political party, if any, upon whose behalf any political speech or address is broadcast shall be announced immediately preceding and immediately after such broadcasts.

"(5) Political broadcasts on any Dominion, Provincial or Municipal election day and on the two days immediately preceding any such election day are prohibited."

(2) Each station shall allocate time for political broadcasts as fairly as possible between the different parties or candidates desiring to purchase or obtain time for such broadcasts.

Advertising Content. 9. (1) The advertising content of any program shall not exceed in time ten per cent of any program period.

(2) Notwithstanding the provisions of subsection (1) any station shall upon instruction in writing from the Corporation reduce the total daily advertising content of its programs if the said total daily advertising content in the opinion of the Corporation occupies an undue proportion of the daily broadcast time.

(3) Upon notice in writing from the Corporation any station shall change the quality or nature of its advertising broadcasts.

10. Notwithstanding the provisions of these regulations the Corporation may, upon satisfactory evidence being submitted to it of a contract or contracts for the use of mechanical reproductions outstanding on November 1, 1937, which contain more than the advertising content prescribed in section 9 (1) or which relate to the subjects mentioned in section 7 (j) permit the continued use of the said mechanical reproductions until, but not beyond December 31, 1937.

Advertising programs in general. 11. (1) In any program no one shall advertise

(a) any act or thing prohibited by law;
(b) the prices of goods or services, except the prices of publications auxiliary to the information services of the Corporation;
(c) any insurance corporation not registered to do business in Canada;
(d) bonds, shares, or other securities or mining or oil properties or royalties or other interests in mining or oil properties other than the securities of the Dominion or Provincial governments or municipalities or other public authorities, provided nothing herein shall prevent anyone from sponsoring a program giving quotations of market prices without comment;
(e) spirituous liquors;
Subsection (f) of Clause 11 was repealed and the following new regulation substituted effective April 1, 1939:

(f) wine and beer except that programmes sponsored by breweries or wine companies will be temporarily allowed in the Province of Quebec subject to the following conditions:

(i) The only announcements of sponsorship allowed shall be two in number—one at the beginning of each programme and one at the end.

(ii) The form of such announcements shall be:
"This programme is presented with the compliments of the ABC Brewery".

"This programme has been presented with the compliments of the ABC Brewery."

or some suitable and necessary variation of these forms.

(iii) No other announcement shall be made or devices used in any such programme to advertise the product of the sponsor.

(iv) All continuities and programmes shall be approved by the General Manager before they are broadcast.

Spot Announcements. 12. (1) "Spot" announcements shall not exceed two minutes for each broadcasting hour, subject always to the provisions of subsection (2) of this regulation.

(2) No "spot" announcement shall be broadcast on week-days between 7:30 p. m. and 11 p. m. nor on Sundays at any time, provided that where exceptional conditions prevail owing to the geographical situation stations may be given permission by the Corporation to broadcast "spot" announcements on week-days during the hours prohibited in this section.

(3) Subsections (1) and (2) of this regulation shall not apply to time signals or weather reports, provided that no advertising other than the name of the sponsor is mentioned.

Foods and Drugs; Proprietary or Patent Medicines. 13. (1) No continuity advertising an article marketed under the Proprietary or Patent Medicine Act or the Food and Drug Act may be broadcast until it has been approved by the Department of Pensions and National Health.

Continuities submitted for approval shall be forwarded, in duplicate, to the Canadian Broadcasting Corp., 341 Church St., Toronto, at least two weeks in advance of intended use. The formula for any article bearing a distinctive or trade name distinguishing it from any other product, and marketed under the Food and Drugs Act, shall be submitted with each pertinent continuity.

(2) No electrical transcription advertising an article marketed under the Proprietary or Patent Medicine Act or the Food and Drugs Act shall be broadcast by any station unless certified by an affidavit that the advertising continuity has been approved by the Department of Pensions and National Health.

(3) No announcer may broadcast any statement concerning any article marketed under the Food and Drugs Act or the Proprietary or Patent Medicine Act that is not contained in the continuity approved by the Department of Pensions and National Health.

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REGULATIONS GOVERNING CANADIAN BROADCAST STATIONS

(Continued from page 381)

(4) Testimonials referring to an article marketed under the Food and Drugs Act or the Proprietary or Patent Medicine Act shall be regarded as constituting a part of the advertising continuity.

(5) No continuity recommending any treatment for any ailment shall be broadcast until it has been approved by the Department of Pensions and National Health.

(6) Inspectors of Food and Drugs, Department of Pensions and National Health, are authorized to act as representatives of the Corporation for the purpose of enforcing this regulation.

News Broadcasts. 14. Stations shall not transmit any news or information of any kind published in any newspaper or obtained, collected, collated, or coordinated by any newspaper or association of newspapers or any news agency or service, except the following:—

(a) Such news bulletins as are released regularly from the various bureaus of The Canadian Press for the express use of broadcasting stations in Canada;

(b) Local news under arrangements to be made by each station individually with its local newspaper or newspapers, or such news as it may collect through its own employees;

(c) News from sources other than those provided for in subsections (a) and (b) herein, shall not be broadcast unless the express permission in writing of the Corporation through its General Manager is secured in advance.

Material to be submitted. 15. Representatives of the Corporation may require the production of material to be broadcast before any broadcast is arranged to take place.

Corporation Programs. 16. Time reserved for the broadcasting of Corporation programs shall be used only for such programs unless approval to the contrary has been received in writing from the Corporation in each specific case.

Priority for Programs. 17. Stations shall upon request of the Corporation give right of way to such Corporation or other programs as the Corporation shall designate. In such event neither the station nor the Corporation shall incur any liability for compensation or damages.

Re-broadcasting of programs. 18. No station shall "pick up" and re-broadcast any program unless permission in writing has first been obtained from the Corporation.

Mechanical Reproductions. 19. (1) No station shall use a mechanical reproduction (except when its use is merely incidental as for an identification or background) between the hours of 7:30 p. m. and 11:00 p. m. except with the previous consent of the Corporation in writing.

(2) A mechanical reproduction shall be announced as such immediately before and after the program concerned, except when its use is merely incidental as for an identification or background. The exact form of announcement is not prescribed, but the language shall be clear and in terms commonly used and understood. The following are examples of statements sufficient for the purpose:—

(a) "This is a recorded program."

(b) "This is a program of electrical transcription."

(3) No program of mechanical reproductions shall contain any reference to the name of any person, firm or corporation connected with the manufacture, sale, hire or ownership of the said mechanical reproductions used in the said program.

Effective July 7, 1939, Regulation No. 19, is amended by adding the following new subsection (4):

19. (4) No one shall, by means of a mechanical reproduction or otherwise, broadcast any program which achieves indirectly by an evasion what a regulation or ruling of the Corporation prohibits from being broadcast directly and which shall have the effect of allowing the broadcasting of any program or speech, the simultaneous broadcasting of which over a network or hook-up is contrary to the regulations or rulings of the Corporation.

Chain Broadcasting. 20. Unless permission in writing is first obtained from the Corporation

(a) no station shall continue to be a part or shall form a part of a chain or network originating outside of Canada;

(b) no chain or network of two or more stations shall continue to be operated within Canada or shall be set up or operated within Canada;

(c) no station shall continue to be or become an outlet for any station, chain or network existing or originating outside of Canada;

(d) no station shall continue to be or become an associate station of or with any station, chain or network existing or originating outside of Canada.

Station Contracts. 21. Every station shall file with the Corporation a copy of the forms of contract used by it and a statement of its charges. Every such contract shall expressly make the enjoyment of the privilege to broadcast conditional upon the observance of these regulations. The licensee of each station shall see that a copy of these regulations is available at the station and that the station employees and persons broadcasting are familiar with them.

Violation of Regulations. 22. The Corporation may send a written or telegraph notice to the licensee of any station informing him of any alleged violation of these regulations and he shall have a delay of six days within which to answer in writing, giving in full his reply to the notice. The Corporation may make such investigation of the facts as it shall consider appropriate and for this purpose its representatives may examine the records and question the employees of any station.

Repeal. 23. These regulations shall have full force and effect as of the 1st day of November, 1937, and on and after that date all regulations inconsistent therewith shall be deemed to have been repealed.

NOTE: The penalty for violation of these regulations is provided for under section 22 (6) of the Act which reads:

"(6) In case of any violation or non-observance by a private station of the regulations made by the Corporation under this section, the Corporation may order that the license of such private station be suspended for a period not exceeding three months and any such order shall be forwarded to the Minister who shall forthwith communicate the same to the licensee of the station and shall take such steps as may be necessary to carry out the terms of such order."

All by Ourselves We Nearly Elected a Mayor

IN THE 1940 mayoralty elections in Toronto there were two candidates. One was supported by all the newspapers. The other's only means of publicity was our radio station. Here is an extract from a letter from the Tandy Advertising Agency Limited:

"It is also in order for us to congratulate you on the good work done by your station. Running for the office of Mayor, Major Duncan was opposing a candidate who was solidly supported by all Toronto daily papers. Major Duncan used small newspaper advertisements to call attention to his broadcasts on your station. Despite the combined editorial opposition of the papers together with the fact that his opponent was already the Mayor running for re-election, he ran neck and neck for mayoralty honours and was only defeated by a small majority.

"Major Duncan was indeed a 'radio candidate' and as he used *only* CKCL we wish to congratulate your station on the splendid work it did for him."

When one radio station can bring a candidate into a neck and neck mayoralty contest and have him lose by only about 3500 votes in a total poll of 120,000, that station has plenty of audience. You had best consider this audience when considering the Toronto market.

CKCL

TORONTO, CANADA

Henry S. Gooderham, President

Rules & Regulations and Standards

Applicable to Standard Broadcast Stations

Including

Rules of Practice and Procedure

General Rules and Regulations
Governing all classes of radio stations

Rules Governing Standard Broadcast Stations

Standards of Good Engineering Practice
Concerning Standard Broadcast Stations, 550-1600 Kc.

As Promulgated by the

FEDERAL COMMUNICATIONS COMMISSION

In Effect August 1, 1939

Published by

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Washington, D. C.

60c per copy
Two or more copies, 50c each ● 72 pages

The Communications Act of 1934

(Provisions Relating to Broadcasting and Allied Services, With Sections Dealing Exclusively With Public Utility Common Carriers Omitted)

Passed by 73rd Congress; Approved June 19, 1934; With Amendments

TITLE I—GENERAL PROVISIONS

PURPOSES OF ACT; CREATION OF FEDERAL COMMUNICATIONS COMMISSION

SECTION 1. For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is hereby created a commission to be known as the "Federal Communications Commission," which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this Act.¹

APPLICATION OF ACT

SEC. 2. (a) The provisions of this Act shall apply to all interstate and foreign communication by wire or radio and all interstate and foreign transmission of energy by radio, which originate and/or is received within the United States, and to all persons engaged within the United States in such communication or such transmission of energy by radio, and to the licensing and regulating of all radio stations as hereinafter provided; but it shall not apply to persons engaged in wire or radio communication or transmission in the Philippine Islands or the Canal Zone, or to wire or radio communication or transmission wholly within the Philippine Islands or the Canal Zone.

(b) Subject to the provisions of section 301, nothing in this Act shall be construed to apply or to give the Commission jurisdiction with respect to (1) charges, classifications, practices, services, facilities, or regulations for or in connection with intrastate communication service of any carrier, or (2) any carrier engaged in interstate or foreign communication solely through physical connection with the facilities of another carrier not directly or indirectly controlling or controlled by, or under direct or indirect common control with, such carrier; except that sections 201 to 205 of this Act, both inclusive, shall, except as otherwise provided therein, apply to carriers described in clause (2).

DEFINITIONS

SEC. 3. For the purposes of this Act, unless the context otherwise requires—

(a) "Wire communication" or "communication by wire" means the transmission of writing, signs, signals, pictures, and sounds of all kinds by aid of wire, cable, or other like connection between the points of origin and reception of such transmission, including all instrumentalities, facilities, apparatus, and services (among other things, the receipt, forwarding, and delivery of communications) incidental to such transmission.

(b) "Radio communication" or "communication by radio" means the transmission by radio of writing, signs, signals, pictures, and sounds of all kinds, including all instrumentalities, facilities, apparatus, and services (among other things, the receipt, forwarding, and delivery of communications) incidental to such transmission.

(c) "Licensee" means the holder of a radio station license granted or continued in force under authority of this Act.

(d) "Transmission of energy by radio" or "radio transmission of energy" includes both such transmission and all instrumentalities, facilities, and services incidental to such transmission.

(e) "Interstate communication" or "interstate transmission" means communication or transmission (1) from any State, Territory, or possession of the United States (other than the Philippine Islands and the Canal Zone), or the District of Columbia, to any other State, Territory, or possession of the United States (other than the Philippine Islands and the Canal Zone), or the District of Columbia, (2) from or to the United States to or from the Philippine Islands or the Canal Zone, insofar as such communication or transmission takes place within the United States, or (3) between points within the United States but through a foreign country; but shall not include wire communication between points within the same State, Territory, or possession of the United States, or the District of Columbia, through any place outside thereof, if such communication is regulated by a State commission.

(f) "Foreign communication" or "foreign transmission" means communication or transmission from or to any place in the United States to or from a foreign country, or between a station in the United States and a mobile station located outside the United States.

(g) "United States" means the several States and Territories, the District of Columbia, and the possessions of the United States, but does not include the Philippine Islands or the Canal Zone.

(h) "Common carrier" or "carrier" means any person engaged as a common carrier for hire, in interstate or foreign communication by wire or radio or in interstate or foreign radio transmission of energy, except where reference is made to common carriers not subject to this Act; but a person engaged in radio broadcasting shall not, insofar as such person is so engaged, be deemed a common carrier.

(i) "Person" includes an individual, partnership, association, joint-stock company, trust, or corporation.

(j) "Corporation" includes any corporation, joint-stock company, or association.

(k) "Radio station" or "station" means a station equipped to engage in radio communication or radio transmission of energy.

(l) "Mobile station" means a radio-communication station capable of being moved and which ordinarily does move.

(m) "Land station" means a station, other than a mobile station, used for radio communication with mobile stations.

(n) "Mobile service" means the radio-communication service carried on between mobile stations and land stations, and by mobile stations communicating among themselves.

(o) "Broadcasting" means the dissemination of radio communications intended to be received by the public, directly or by the intermediary of relay stations.

(p) "Chain broadcasting" means simultaneous broadcasting of an identical program by two or more connected stations.

(q) "Amateur station" means a radio station operated by a duly authorized person interested in radio technique solely with a personal aim and without pecuniary interest.

(r) "Telephone exchange service" means service within a telephone exchange, or within a connected system of telephone exchanges within the same exchange area operated to furnish to subscribers intercommunicating service of the character ordinarily furnished by a single exchange, and which is covered by the exchange service charge.

(s) "Telephone toll service" means telephone service between stations in different exchange areas for which there is made a separate charge not included in contracts with subscribers for exchange service.

(t) "State commission" means the commission, board, or official (by whatever name designated) which under the laws of any State has regulatory jurisdiction with respect to intrastate operations of carriers.

(u) "Connecting carrier" means a carrier described in clause (2) of section 2 (b).

(v) "State" includes the District of Columbia and the Territories and possessions.

PROVISIONS RELATING TO THE COMMISSION

SEC. 4. (a) The Federal Communications Commission (in this Act referred to as the "Commission") shall be composed of seven commissioners appointed by the President, by and with the advice and consent of the Senate, one of whom the President shall designate as chairman.

(b) Each member of the Commission shall be a citizen of the United States. No member of the Commission or person in its employ shall be financially interested in the manufacture or sale of radio apparatus or of apparatus for wire or radio communication; in communication by wire or radio or in radio transmission of energy; in any company furnishing services or such apparatus to any company engaged in communication by wire or radio or to any company manufacturing or selling apparatus used for communication by wire or radio; or in any company owning stocks, bonds, or other securities of any such company; nor be in the employ of or hold any official relation to any person subject to any of the provisions of this Act, nor own stocks, bonds, or other securities of any corporation subject to any of the provisions of this Act. Such commissioners shall not engage in any other business, vocation, or employment. Not more than four commissioners shall be members of the same political party.

(c) The commissioners first appointed under this Act shall continue in office for the terms of one, two, three, four, five, six, and seven years, respectively, from the date of the taking effect of this Act, the term of each to be designated by the President, but their successors shall be appointed for terms of seven years; except that any person chosen to fill a vacancy shall be appointed only for the unexpired term of the commissioner whom he succeeds. No vacancy in the Commission shall impair the right of the remaining commissioners to exercise all the powers of the Commission.

(d) Each commissioner shall receive an annual salary of \$10,000, payable in monthly installments.

(e) The principal office of the Commission shall be in the District of Columbia, where its general sessions shall be held; but whenever the convenience of the public or of the parties may be promoted or delay or expense prevented thereby, the Commission may hold special sessions in any part of the United States.

(f) Without regard to the civil-service laws or the Classification Act of 1923, as amended, (1) the Commission may appoint and prescribe the duties and fix the salaries of a secretary, a director for each division, a chief engineer and not more than three assistants, a chief accountant and not more than three assistants, a general counsel and not more than three assistants, and temporary counsel designated by the Commission for the performance of special services, and (2) each commissioner may appoint and prescribe the duties of a secretary at an annual salary not to exceed \$4,000. The general counsel and the chief engineer and the chief accountant shall each receive an annual salary of not to exceed \$9,000; the secretary shall receive an annual salary of not to exceed \$7,500; the director of each division shall receive an annual salary of not to exceed \$7,500; and no assistant shall receive an annual salary in excess of \$7,500. The Commission shall have authority, subject to the

¹ The provision relating to safety of life and property were added by "An Act to amend the Communications Act of 1934, approved June 19, 1934, for the purpose of promoting safety of life and property at sea through the use of wire and radio communications, to make more effective the International Convention for the Safety of Life at Sea, 1924, and for other purposes." Public—No. 87—75th Congress, 1st Session, approved May 20, 1937.

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provisions of the civil-service laws and the Classification Act of 1923, as amended, to appoint such other officers, engineers, accountants,² inspectors, attorneys, examiners, and other employees as are necessary in the execution of its functions.

(g) The Commission may make such expenditures (including expenditures for rent and personal services at the seat of government and elsewhere, for office supplies, law books, periodicals, and books of reference, and for printing and binding) as may be necessary for the execution of the functions vested in the Commission and as from time to time may be appropriated for by Congress. All expenditures of the Commission, including all necessary expenses for transportation incurred by the commissioners or by their employes, under their orders, in making any investigation or upon any official business in any other places than in the city of Washington, shall be allowed and paid on the presentation of itemized vouchers therefor approved by the chairman of the Commission or by such other member or officer thereof as may be designated by the Commission for that purpose.

(h) Four members of the Commission shall constitute a quorum thereof. The Commission shall have an official seal which shall be judicially noticed.

(i) The Commission may perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this Act, as may be necessary in the execution of its functions.

(j) The Commission may conduct its proceedings in such manner as will best conduce to the proper dispatch of business and to the ends of justice. No commissioner shall participate in any hearing or proceeding in which he has a pecuniary interest. Any party may appear before the Commission and be heard in person or by attorney. Every vote and official act of the Commission shall be entered of record, and its proceedings shall be public upon the request of any party interested. The Commission is authorized to withhold publication of records or proceedings containing secret information affecting the national defense.

(k) The Commission shall make an annual report to Congress, copies of which shall be distributed as are other reports transmitted to Congress. Such report shall contain such information and data collected by the Commission as may be considered of value in the determination of questions connected with the regulation of interstate and foreign wire and radio communication and radio transmission of energy, together with such recommendations as to additional legislation relating thereto as the Commission may deem necessary. *Provided*, That the Commission shall make a special report not later than February 1, 1935, recommending such amendments to this Act as it deems desirable in the public interest: *Provided further*, That each year, at the beginning of the session of the Congress, the Commission shall report to the Congress whether or not any new wire or radio communication legislation is required better to insure safety of life and property. If any such new legislation is considered necessary the Commission shall make specific recommendations thereof to the Congress.³

(l) All reports of investigations made by the Commission shall be entered of record, and a copy thereof shall be furnished to the party who may have complained, and to any common carrier or licensee that may have been complained of.

(m) The Commission shall provide for the publication of its reports and decisions in such form and manner as may be best adapted for public information and use, and such authorized publications shall be competent evidence of the reports and decisions of the Commission therein contained in all courts of the United States and of the several States without any further proof or authentication thereof.

(n) Rates of compensation of persons appointed under this section shall be subject to the reduction applicable to officers and employes of the Federal Government generally.

(o) For the purpose of obtaining maximum effectiveness from the use of radio and wire communications in connection with safety of life and property, the Commission shall investigate and study all phases of the problem and the best methods of obtaining the cooperation and coordination of these systems.

DIVISIONS OF THE COMMISSION

SEC. 5. (a) The Commission is hereby authorized by its order to divide the members thereof into not more than three divisions, each to consist of not less than three members. Any commissioner may be assigned to and may serve upon such division or divisions as the Commission may direct, and each division shall choose its own chairman. In case of a vacancy in any division, or of absence or inability to serve thereon of any commissioner thereto assigned, the chairman of the Commission or any commissioner designated by him for that purpose may temporarily serve on said division until the Commission shall otherwise order.

(b) The Commission may by order direct that any of its work, business, or functions arising under this Act, or under any other Act of Congress, or in respect of any matter which has been or may be referred to the Commission by Congress or by either branch thereof, be assigned or referred to any of said divisions for action thereon, and may by order at any time amend, modify, supplement, or rescind any such direction. All such orders shall take effect forthwith and remain in effect until otherwise ordered by the Commission.

(c) In conformity with and subject to the order or orders of the Commission in the premises, each division so constituted shall have power and authority by a majority thereof to hear and determine, order, certify, report, or otherwise act as to any of said work, business, or functions so assigned or referred to

it for action by the Commission, and in respect thereof the division shall have all the jurisdiction and powers now or then conferred by law upon the Commission, and be subject to the same duties and obligations. Any order, decision, or report made or other action taken by any of said divisions in respect of any matters so assigned or referred to it shall have the same force and effect, and may be made, evidenced, and enforced in the same manner as if made, or taken by the Commission, subject to rehearing by the Commission as provided in section 405 of this Act for rehearing cases decided by the Commission. The secretary and seal of the Commission shall be the secretary and seal of each division thereof.

(d) Nothing in this section contained, or done pursuant thereto, shall be deemed to divest the Commission of any of its powers.

(e) The Commission is hereby authorized by its order to assign or refer any portion of its work, business, or functions arising under this or any other Act of Congress or referred to it by Congress, or either branch thereof, to an individual commissioner, or to a board composed of an employe or employes of the Commission, to be designated by such order, for action thereon, and by its order at any time to amend, modify, supplement, or rescind any such assignment or reference: *Provided, however*, That this authority shall not extend to investigations instituted upon the Commission's own motion or, without the consent of the parties thereto, to contested proceedings involving the taking of testimony at public hearings, or to investigations specifically required by this Act. All such orders shall take effect forthwith and remain in effect until otherwise ordered by the Commission. In case of the absence or inability for any other reason to act of any such individual commissioner or employe designated to serve upon any such board, the chairman of the Commission may designate another commissioner or employe, as the case may be, to serve temporarily until the Commission shall otherwise order. In conformity with and subject to the order or orders of the Commission in the premises, any such individual commissioner, or board acting by a majority thereof, shall have power and authority to hear and determine, order, certify, report, or otherwise act as to any of said work, business, or functions so assigned or referred to him or it for action by the Commission and in respect thereof shall have all the jurisdiction and powers now or then conferred by law upon the Commission and be subject to the same duties and obligations. Any order, decision, or report made or other action taken by any such individual commissioner or board in respect of any matters so assigned or referred shall have the same force and effect, and may be made, evidenced, and enforced in the same manner as if made or taken by the Commission. Any party affected by any order, decision, or report of any such individual commissioner or board may file a petition for rehearing by the Commission or a division thereof and every such petition shall be passed upon by the Commission or a division thereof. Any action by a division upon such a petition shall itself be subject to rehearing by the Commission, as provided in section 405 of this Act and in subsection (c). The Commission may make and amend rules for the conduct of proceedings before such individual commissioner or board and for the rehearing of such action before a division of the Commission or the Commission. The secretary and seal of the Commission shall be the secretary and seal of such individual commissioner or board.

* * * * *

TITLE III—PROVISIONS RELATING TO RADIO PART I—GENERAL PROVISIONS

LICENSE FOR RADIO COMMUNICATION OR TRANSMISSION OF ENERGY

SECTION 301. It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be considered to create any right, beyond the terms, conditions, and periods of the license. No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States or in the District of Columbia to another place in the same Territory, possession, or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or possession of the United States; or (c) from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel or aircraft of the United States; or (f) upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

ZONES⁵

GENERAL POWERS OF COMMISSION

SEC. 303. Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall—

(a) Classify radio stations;

⁵ Sec. 302 was repealed by "AN ACT relating to the allocation of radio facilities." Public—No. 652—74th Congress, approved, June 5, 1936. The text of Sec. 302 was as follows:

² The provisions relating to accountants were added by "An Act to amend paragraph (f) of Sec. 4 of the Communications Act of 1934." Public, No. 423, 74th Congress, approved, Jan. 22, 1936.

³ The second proviso was added by Public—No. 97—75th Congress, 1st Session, approved May 20, 1937.

⁴ Subsection (o) of section 4 was added by "An Act to amend the Communications Act of 1934." Public—No. 97—75th Congress, approved May 20, 1937.

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(b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;

(c) Assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

(d) Determine the location of classes of stations or individual stations;

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the frequencies, authorized power, or in the time of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this Act will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest;

(h) Have authority to establish areas or zones to be served by any station;

(i) Have authority to make special regulations applicable to radio stations engaged in chain broadcasting;

(j) Have authority to make general rules and regulations requiring stations to keep such records of programs, transmissions of energy, communications, or signals as it may deem desirable;

(k) Have authority to exclude from the requirements of any regulations in whole or in part any radio station upon railroad rolling stock, or to modify such regulations in its discretion;

(l) Have authority to prescribe the qualifications of station operators, to classify them according to the duties to be performed, to fix the forms of such licenses, and to issue them to such citizens of the United States as the Commission finds qualified;

(m) (1) Have authority to suspend the license of any operator upon proof sufficient to satisfy the Commission that the licensee—

(A) has violated any provision of any Act, treaty, or convention binding on the United States, which the Commission is authorized to administer, or any regulation made by the Commission under any such Act, treaty, or convention; or

(B) has failed to carry out a lawful order of the master or person lawfully in charge of the ship or aircraft on which he is employed; or

(C) has willfully damaged or permitted radio apparatus or installations to be damaged; or

(D) has transmitted superfluous radio communications or signals or communications containing profane or obscene words, language, or meaning, or has knowingly transmitted—

(1) false or deceptive signals or communications, or

(2) a call signal or letter which has not been assigned by proper authority to the station he is operating; or

(E) has willfully or maliciously interfered with any other radio communications or signals; or

(F) has obtained or attempted to obtain, or has assisted another to obtain or attempt to obtain, an operator's license by fraudulent means.

(2) No order of suspension of any operator's license shall take effect until fifteen days' notice in writing thereof, stating the cause for the proposed suspension, has been given to the operator licensee who may make written application to the Commission at any time within said fifteen days for a hearing upon such order. The notice to the operator licensee shall not be effective until actually received by him, and from that time he shall have fifteen days in which to mail the said application. In the event that physical conditions prevent mailing of the application at the expiration of the fifteen-day period, the application shall then be mailed as soon as possible thereafter, accompanied by a satisfactory explanation of the delay. Upon receipt by the Commission of such application for hearing, said order of suspension shall be held in abeyance until the conclusion of the hearing which shall be conducted under such rules as the Commission may prescribe. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of suspension.⁶

(n) Have authority to inspect all radio installations associated with stations required to be licensed by any Act or which are subject to the provisions of any Act, treaty, or convention binding on the United States, to ascertain whether in construction, installation, and operation they conform to the requirements of the rules and regulations of the Commission, the provisions of any Act, the terms of any treaty or convention binding on the United States, and the conditions of the license or other instrument of authorization under which they are constructed, installed, or operated.⁶

Sec. 302. (a) For the purposes of this title the United States is divided into five zones, as follows: The first zone shall embrace the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, and the District of Columbia; the second zone shall embrace the States of Pennsylvania, Virginia, West Virginia, Ohio, Michigan, and Kentucky; the third zone shall embrace the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma; the fourth zone shall embrace the States of Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas, and Missouri; and the fifth zone shall embrace the States of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

(b) The Virgin Islands, Puerto Rico, Alaska, Guam, American Samoa, and the Territory of Hawaii are expressly excluded from the zones herein established.

(o) Have authority to designate call letters of all stations;

(p) Have authority to cause to be published such call letters and such

other announcements and data as in the judgment of the Commission may be required for the efficient operation of radio stations subject to the jurisdiction of the United States and for the proper enforcement of this Act;

(q) Have authority to require the painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute, a menace to air navigation.

(r) Make such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this Act, or any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is or may hereafter become a party.⁷

WAIVER BY LICENSEE

SEC. 304. No station license shall be granted by the Commission until the applicant therefor shall have signed a waiver of any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

GOVERNMENT-OWNED STATIONS

SEC. 305. (a) Radio stations belonging to and operated by the United States shall not be subject to the provisions of sections 301 and 303 of this Act. All such Government stations shall use such frequencies as shall be assigned to each or to each class by the President. All such stations, except stations on board naval and other Government vessels while at sea or beyond the limits of the continental United States, when transmitting any radio communication or signal other than a communication or signal relating to Government business, shall conform to such rules and regulations designated to prevent interference with other radio stations and the rights of others as the Commission may prescribe.

(b) Radio stations on board vessels of the United States Shipping Board Bureau or the United States Shipping Board Merchant Fleet Corporation or the Inland and Coastwise Waterways Service shall be subject to the provisions of this title.

(c) All stations owned and operated by the United States, except mobile stations of the Army of the United States, and all other stations on land and sea, shall have special call letters designated by the Commission.

FOREIGN SHIPS

SEC. 306. Section 301 of this Act shall not apply to any person sending radio communications or signals on a foreign ship while the same is within the jurisdiction of the United States, but such communications or signals shall be transmitted only in accordance with such regulations designed to prevent interference as may be promulgated under the authority of this Act.

ALLOCATION OF FACILITIES; TERMS OF LICENSES

SEC. 307. (a) The Commission, if public convenience, interest, or necessity will be served thereby, subject to the limitations of this Act, shall grant to any applicant therefor a station license provided for by this Act.

(b) In considering applications for licenses, and modifications and renewals thereof, when and insofar as there is demand for the same the Commission shall make such distribution of licenses, frequencies, hours of operation, and of power among the several States and communities as to provide a fair, efficient, and equitable distribution of radio service to each of the same.⁷

(c) The Commission shall study the proposal that Congress by statute allocate fixed percentages of radio broadcasting facilities to particular types or kinds of non-profit radio programs or to persons identified with particular types or kinds of non-profit activities, and shall report to Congress, not later than February 1, 1935, its recommendations together with the reasons for the same.

(d) No license granted for the operation of a broadcasting station shall be for a longer term than three years and no license so granted for any other class of station shall be for a longer term than five years, and any license granted may be revoked as hereinafter provided. Upon the expiration of any license, upon application therefor, a renewal of such license may be granted from time to time for a term of not to exceed three years in the case of broadcasting licenses and not to exceed five years in the case of other licenses, but action of the Commission with reference to the granting of such application for the renewal of a license shall be limited to and governed by the same considerations and practice which affect the granting of original applications.

(e) No renewal of an existing station license shall be granted more than thirty days prior to the expiration of the original license.

APPLICATIONS FOR LICENSES; CONDITIONS IN LICENSE FOR FOREIGN COMMUNICATION

SEC. 308. (a) The Commission may grant licenses, renewal of licenses, and modification of licenses only upon written application therefor received by it: *Provided, however,* That in cases of emergency found by the Commission, licenses, renewals of licenses, and modifications of licenses, for stations on vessels or aircraft of the United States, may be issued under such conditions as the Commission may impose, without such formal application. Such licenses, however, shall in no case be for a longer term than three months: *Provided further,* That the Commission may issue by cable, telegraph, or radio a permit for the operation of a station on a vessel of the United States at sea, effective in lieu of a license until said vessel shall return to a port of the continental United States.

⁶Subsections (m) and (n) of section 303 were amended and subsection (r) of section 303 was added by Public—No. 97—75th Congress, 1st Session, approved May 20, 1937.

⁷Subsection (b) of section 307 was amended by Public—No. 652—74th Congress, approved June 5, 1936.

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(Provisions Relating to Broadcasting and Allied Services, With Sections Dealing Exclusively With Public Utility Common Carriers Omitted)

Passed by 73rd Congress; Approved June 19, 1934; With Amendments

REVOCATION OF LICENSES

(b) All such applications shall set forth such facts as the Commission by regulation may prescribe as to the citizenship, character and financial, technical, and other qualifications of the applicant to operate the station; the ownership and location of the proposed station and of the stations, if any, with which it is proposed to communicate; the frequencies and the power desired to be used; the hours of the day or other periods of time during which it is proposed to operate the station; the purposes for which the station is to be used; and such other information as it may require. The Commission, at any time after the filing of such original application and during the term of any such license, may require from an applicant or licensee further written statements of fact to enable it to determine whether such original application should be granted or denied or such license revoked. Such application and/or such statement of fact shall be signed by the applicant and/or licensee under oath or affirmation.

(c) The Commission in granting any license for a station intended or used for commercial communication between the United States or any Territory or possession, continental or insular, subject to the jurisdiction of the United States, and any foreign country, may impose any terms, conditions, or restrictions authorized to be imposed with respect to submarine-cable licenses by section 2 of an Act entitled "An Act relating to the landing and the operation of submarine cables in the United States," approved May 24, 1921.

HEARINGS ON APPLICATIONS FOR LICENSES; FORM OF LICENSES; CONDITIONS ATTACHED TO LICENSES

Sec. 309. (a) If upon examination of any application for a station license or for the renewal or modification of a station license the Commission shall determine that public interest, convenience, or necessity would be served by the granting thereof, it shall authorize the issuance, renewal, or modification thereof in accordance with said finding. In the event the Commission upon examination of any such application does not reach such decision with respect thereto, it shall notify the applicant thereof, shall fix and give notice of a time and place for hearing thereon, and shall afford such applicant an opportunity to be heard under such rules and regulations as it may prescribe.

(b) Such station licenses as the Commission may grant shall be in such general form as it may prescribe, but each license shall contain, in addition to other provisions, a statement of the following conditions to which such license shall be subject:

(1) The station license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized therein.

(2) Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of this Act.

(3) Every license issued under this Act shall be subject in terms to the right of use or control conferred by section 606 hereof.

LIMITATION ON HOLDING AND TRANSFER OF LICENSES

Sec. 310. (a) The station license required hereby shall not be granted to or held by—

(1) Any alien or the representative of any alien;

(2) Any foreign government or the representative thereof;

(3) Any corporation organized under the laws of any foreign government;

(4) Any corporation of which any officer or director is an alien or of which more than one-fifth of the capital stock is owned of record or voted by which or their representatives or by a foreign government or representative thereof, or by any corporation organized under the laws of a foreign country;

(5) Any corporation directly or indirectly controlled by any other corporation of which any officer or more than one-fourth of the directors are aliens, or of which more than one-fourth of the capital stock is owned of record or voted, after June 1, 1935, by aliens, their representatives, or by a foreign government or representative thereof, or by any corporation organized under the laws of a foreign country, if the Commission finds that the public interest will be served by the refusal or the revocation of such license.

Nothing in this subsection shall prevent the licensing of radio apparatus on board any vessel, aircraft, or other mobile station of the United States when the installation and use of such apparatus is required by Act of Congress or any treaty to which the United States is a party.

(b) The station license required hereby, the frequencies authorized to be used by the licensee, and the rights therein granted shall not be transferred, assigned, or in any manner either voluntarily or involuntarily disposed of, or indirectly by transfer of control of any corporation holding such license, to any person, unless the Commission shall, after securing full information, decide that said transfer is in the public interest, and shall give its consent in writing.

REFUSAL OF LICENSES AND PERMITS IN CERTAIN CASES

Sec. 311. The Commission is hereby directed to refuse a station license and/or the permit hereinafter required for the construction of a station to any person (or to any person directly or indirectly controlled by such person) whose license has been revoked by a court under section 313, and is hereby authorized to refuse such station license and/or permit to any other person (or to any person directly or indirectly controlled by such person) which has been finally adjudged guilty by a Federal court of unlawfully monopolizing or attempting unlawfully to monopolize, radio communication, directly or indirectly, through the control of the manufacture or sale of radio apparatus, through exclusive traffic arrangements, or by any other means, or to have been using unfair methods of competition. The granting of a license shall not stop the United States or any person aggrieved from proceeding against such person for violating the law against unfair methods of competition or for a violation of the law against unlawful restraints and monopolies and/or combinations, contracts, or agreements in restraint of trade, or from instituting proceedings for the dissolution of such corporation.

SEC. 312. (a) Any station license may be revoked for false statements either in the application or in the statement of fact which may be required by section 308 hereof, or because of conditions revealed by such statements of fact as may be required from time to time which would warrant the Commission in refusing to grant a license on an original application, or for failure to operate substantially as set forth in the license, or for violation of or failure to observe any of the restrictions and conditions of this Act or of any regulation of the Commission authorized by this Act or by a treaty ratified by the United States: *Provided, however,* That no such order of revocation shall take effect until fifteen days' notice in writing thereof, stating the cause for the proposed revocation, has been given to the licensee. Such licensee may make written application to the Commission at any time within said fifteen days for a hearing upon such order, and upon the filing of such written application said order of revocation shall stand suspended until the conclusion of the hearing conducted under such rules as the Commission may prescribe. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of revocation.

(b) Any station license hereafter granted under the provisions of this Act or the construction permit required hereby and hereafter issued, may be modified by the Commission either for a limited time or for the duration of the term thereof, if in the judgment of the Commission such action will promote the public interest, convenience, and necessity, or the provisions of this Act or of any treaty ratified by the United States will be more fully complied with: *Provided, however,* That no such order of modification shall become final until the holder of such outstanding license or permit shall have been notified in writing of the proposed action and the grounds or reasons therefor and shall have been given reasonable opportunity to show cause why such an order of modification should not issue.

APPLICATION OF ANTITRUST LAWS

Sec. 313. All laws of the United States relating to unlawful restraints and monopolies and to combinations, contracts, or agreements in restraint of trade are hereby declared to be applicable to the manufacture and sale of and to trade in radio apparatus and devices entering into or affecting interstate or foreign commerce and to interstate or foreign radio communications. Whenever in any suit, action, or proceeding, civil or criminal, brought under the provisions of any said laws or in any proceedings brought to enforce or to review findings and orders of the Federal Trade Commission or other governmental agency in respect of any matters as to which said Commission or other governmental agency is by law authorized to act, any licensee shall be found guilty of the violation of the provisions of such laws or any of them, the court, in addition to the penalties imposed by said laws, may adjudge, order, and/or decree that the license of such licensee shall, as of the date the decree or judgment becomes finally effective or as of such date as the said decree shall fix, be revoked and that all rights under such license shall thereupon cease: *Provided, however,* That such licensee shall have the same right of appeal or review as is provided by law in respect of other decrees and judgments of said court.

PRESERVATION OF COMPETITION IN COMMERCE

Sec. 314. After the effective date of this Act no person engaged directly, or indirectly through any person directly or indirectly controlling or controlled by, or under direct or indirect common control with, such person, or through an agent, or otherwise, in the business of transmitting and/or receiving for hire energy, communications, or signals by radio in accordance with the terms of the license issued under this Act, shall by purchase, lease, construction, or otherwise, directly or indirectly, acquire, own, control, or operate any cable or wire telegraph or telephone line or system between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other capital share or any interest in the physical property and/or other assets of any such cable, wire, telegraph, or telephone line or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or shall acquire, own, control, or operate any cable or wire telegraph or telephone line or system between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, by purchase, lease, construction, or otherwise, directly or indirectly acquire, own, control, or operate any station or the apparatus therein, or any system for transmitting and/or receiving radio communications or signals between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or shall acquire, own, control, or operate any part of the stock or other capital share or any interest in the physical property and/or other assets of any such radio station, apparatus, or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or unlawfully to create monopoly in any line of commerce.

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Passed by 73rd Congress; Approved June 19, 1934; With Amendments

FACILITIES FOR CANDIDATES FOR PUBLIC OFFICE

SEC. 315. If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station, and the Commission shall make rules and regulations to carry this provision into effect: *Provided*, That such licensee shall have no power of censorship over the material broadcast under the provisions of this section. No obligation is hereby imposed upon any licensee to allow the use of its station by any such candidate.

LOTTERIES AND OTHER SIMILAR SCHEMES

SEC. 316. No person shall broadcast by means of any radio station for which a license is required by any law of the United States, and no person operating any such station shall knowingly permit the broadcasting of, any advertisement of or information concerning any lottery, gift enterprise, or similar scheme, offering prizes dependent in whole or in part upon lot or chance, or any list of the prizes drawn or awarded by means of any such lottery, gift enterprise, or scheme, whether said list contains any part or all of such prizes. Any person violating any provision of this section shall, upon conviction thereof be fined not more than \$1,000 or imprisoned not more than one year, or both for each and every day during which such offense occurs.

ANNOUNCEMENT THAT MATTER IS PAID FOR

SEC. 317. All matter broadcast by any radio station for which service, money, or any other valuable consideration is directly or indirectly paid, or promised to or charged or accepted by, the station so broadcasting, from any person shall, at the time the same is so broadcast, be announced as paid for or furnished, as the case may be, by such person.

OPERATION OF TRANSMITTING APPARATUS

SEC. 318. The actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder, and no person shall operate any such apparatus in such station except under and in accordance with an operator's license issued to him by the Commission: *Provided*, however, That the Commission if it shall find that the public interest, convenience, or necessity will be served thereby may waive or modify the foregoing provisions of this section for the operation of any station except (1) stations for which licensed operators are required by international agreement, (2) stations for which licensed operators are required for safety purposes, (3) stations engaged in broadcasting, and (4) stations operated as common carriers on frequencies below thirty thousand kilocycles: *Provided further*, That the Commission shall have power to make special regulations governing the granting of licenses for the use of automatic radio devices and for the operation of such devices.⁵

CONSTRUCTION PERMITS

SEC. 319. (a) No license shall be issued under the authority of this Act for the operation of any station the construction of which is begun or is continued after this Act takes effect, unless a permit for its construction has been granted by the Commission upon written application therefor. The Commission may grant such permit if public convenience, interest, or necessity will be served by the construction of the station. This application shall set forth such facts as the Commission by regulation may prescribe as to the citizenship, character, and the financial, technical, and other ability of the applicant to construct and operate the station, the ownership and location of the proposed station and of the station or stations with which it is proposed to communicate, the frequencies desired to be used, the hours of the day or other periods of time during which it is proposed to operate the station, the purpose for which the station is to be used, the type of transmitting apparatus to be used, the power to be used, the date upon which the station is expected to be completed and in operation, and such other information as the Commission may require. Such application shall be signed by the applicant under oath or affirmation.

(b) Such permit for construction shall show specifically the earliest and latest dates between which the actual operation of such station is expected to begin, and shall provide that said permit will be automatically forfeited if the station is not ready for operation within the time specified or within such further time as the Commission may allow, unless prevented by causes not under the control of the grantee. The rights under any such permit shall not be assigned or otherwise transferred to any person without the approval of the Commission. A permit for construction shall not be required for Government stations, amateur stations, or stations upon mobile vessels, railroad rolling stock, or aircraft. Upon the completion of any station for the construction or continued construction of which a permit has been granted, and upon it being made to appear to the Commission that all the terms, conditions, and obligations set forth in the application and permit have been fully met, and that no cause or circumstance arising or first coming to the knowledge of the Commission since the granting of the permit would, in the judgment of the Commission, make the operation of such station against the public interest, the Commission shall issue a license to the lawful holder of said permit for the operation of said station. Said license shall conform generally to the terms of said permit.

⁵ The provisions in section 318 were added by "An Act to amend section 318 of the Communications Act of 1934." Public—No. 26—75th Congress, 1st Session, approved March 29, 1937.

DESIGNATION OF STATIONS LIABLE TO INTERFERE WITH DISTRESS SIGNALS

SEC. 320. The Commission is authorized to designate from time to time radio stations the communications or signals of which, in its opinion, are liable to interfere with the transmission or reception of distress signals of ships. Such stations are required to keep a licensed radio operator listening in on the frequencies designated for signals of distress and radio communications relating thereto during the entire period the transmitter of such station is in operation.

DISTRESS SIGNALS AND COMMUNICATIONS

SEC. 321*. (a) The transmitting set in a radio station on shipboard may be adjusted in such a manner as to produce a maximum of radiation, irrespective of the amount of interference which may thus be caused, when such station is sending radio communications or signals of distress and radio communications relating thereto.⁶

(b) All radio stations, including Government stations and stations on board foreign vessels when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress; shall cease all sending on frequencies which will interfere with hearing a radio communication or signal of distress, and, except when engaged in answering or aiding the ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused with the radio communications or signals relating thereto, and shall assist the vessel in distress, so far as possible, by complying with its instructions.

INTERCOMMUNICATION IN MOBILE SERVICE

SEC. 322*. Every land station open to general public service between the coast and vessels or aircraft at sea shall, within the scope of its normal operations, be bound to exchange radio communications or signals with any ship or aircraft station at sea; and each station on shipboard or aircraft at sea shall, within the scope of its normal operations, be bound to exchange radio communications or signals with any other station on shipboard or aircraft at sea or with any land station open to general public service between the coast and vessels or aircraft at sea: *Provided*, That such exchange of radio communication shall be without distinction as to radio systems or instruments adopted by each station.⁷

INTERFERENCE BETWEEN GOVERNMENT AND COMMERCIAL STATIONS

SEC. 323. (a) At all places where Government and private or commercial radio stations on land operate in such close proximity that interference with the work of Government stations cannot be avoided when they are operating simultaneously, such private or commercial stations as do interfere with the transmission or reception of radio communications or signals by the Government stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time.

(b) The Government stations for which the above-mentioned division of time is established shall transmit radio communications or signals only during the first fifteen minutes of each hour, local standard time, except in case of signals or radio communications relating to vessels in distress and vessel requests for information as to course, location, or compass direction.

USE OF MINIMUM POWER

SEC. 324. In all circumstances, except in case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired.

FALSE DISTRESS SIGNALS; REBROADCASTING; STUDIOS OF FOREIGN STATIONS

SEC. 325. (a) No person within the jurisdiction of the United States shall knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent signal of distress, or communication relating thereto, nor shall any broadcasting station rebroadcast the program or any part thereof of another broadcasting station without the express authority of the originating station.

(b) No person shall be permitted to locate, use, or maintain a radio broadcast studio or other place or apparatus from which or whereby sound waves are converted into electrical energy, or mechanical or physical reproduction of sound waves produced, and caused to be transmitted or delivered to a radio station in a foreign country for the purpose of being broadcast from any radio station there having a power output of sufficient intensity and/or being so located geographically that its emissions may be received consistently in the United States, without first obtaining a permit from the Commission upon proper application therefor.

(c) Such application shall contain such information as the Commission may by regulation prescribe, and the granting or refusal thereof shall be subject to the requirements of section 309 hereof with respect to applications for station licenses or renewal or modification thereof, and the license or permission so granted shall be revocable for false statements in the application so required or when the Commission, after hearings, shall find its continuation no longer in the public interest.

⁶ Sections 321, 322 and 329 were amended by Public—No. 97—75th Congress, 1st Session, approved May 20, 1937.

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Passed by 73rd Congress; Approved June 19, 1934; With Amendments

CENSORSHIP; INDECENT LANGUAGE

SEC. 326. Nothing in this Act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication. No person within the jurisdiction of the United States shall utter any obscene, indecent, or profane language by means of radio communication.

USE OF NAVAL STATIONS FOR COMMERCIAL MESSAGES

SEC. 327. The Secretary of the Navy is hereby authorized, unless restrained by international agreement, under the terms and conditions and at rates prescribed by him, which rates shall be just and reasonable, and which, upon complaint, shall be subject to review and revision by the Commission, to use all radio stations and apparatus, wherever located, owned by the United States and under the control of the Navy Department, (a) for the reception and transmission of press messages offered by any newspaper published in the United States, its Territories or possessions, or published by citizens of the United States in foreign countries, or by any press association of the United States, and (b) for the reception and transmission of private commercial messages between ships, between ship and shore, between localities in Alaska and between Alaska and the continental United States: *Provided*, That the rates fixed for the reception and transmission of all such messages, other than press messages between the Pacific coast of the United States, Hawaii, Alaska, Guam, American Samoa, the Philippine Islands, and the Orient, and between the United States and the Virgin Islands, shall not be less than the rates charged by privately owned and operated stations for like messages and service: *Provided further*, That the right to use such stations for any of the purposes named in this section shall terminate and cease as between any countries or localities or between any locality and privately operated ships whenever privately owned and operated stations are capable of meeting the normal communication requirements between such countries or localities or between any locality and privately operated ships, and the Commission shall have notified the Secretary of the Navy thereof.

SPECIAL PROVISION AS TO PHILIPPINE ISLANDS AND CANAL ZONE

SEC. 328. This title shall not apply to the Philippine Islands or to the Canal Zone. In international radio matters the Philippine Islands and the Canal Zone shall be represented by the Secretary of State.

ADMINISTRATION OF RADIO LAWS IN TERRITORIES AND POSSESSIONS

SEC. 329.^a The Commission is authorized to designate any officer or employee of any other department of the Government on duty in any Territory or possession of the United States to render therein such service in connection with the administration of this Act as the Commission may prescribe and also to designate any officer or employee of any other department of the Government to render such services at any place within the United States in connection with the administration of title III of this Act as may be necessary: *Provided*, That such designation shall be approved by the head of the department in which such person is employed.⁷

TITLE IV—PROCEDURAL AND ADMINISTRATIVE PROVISIONS

JURISDICTION TO ENFORCE ACT AND ORDERS OF COMMISSION

SECTION 401. (a) The district courts of the United States shall have jurisdiction, upon application of the Attorney General of the United States at the request of the Commission, alleging a failure to comply with or a violation of any of the provisions of this Act by any person, to issue a writ or writs of mandamus commanding such person to comply with the provisions of this Act.

(b) If any person fails or neglects to obey any order of the Commission other than for the payment of money, while the same is in effect, the Commission or any party injured thereby, or the United States, by its Attorney General, may apply to the appropriate district court of the United States for the enforcement of such order. If after hearing, that court determines that the order was regularly made and duly served, and that the person is in disobedience of the same, the court shall enforce obedience to such order by a writ of injunction or other proper process, mandatory or otherwise, to restrain such person or the officers, agents, or representatives of such person, from further disobedience of such order, or to enjoin upon it or them obedience to the same.

(c) Upon the request of the Commission it shall be the duty of any district attorney of the United States to whom the Commission may apply to institute in the proper court and to prosecute under the direction of the Attorney General of the United States all necessary proceedings for the enforcement of the provisions of this Act and for the punishment of all violations thereof, and the costs and expenses of such prosecutions shall be paid out of the appropriations for the expenses of the courts of the United States.

(d) The provisions of the Expediting Act, approved February 11, 1903, as amended, and of section 238 (1) of the Judicial Code, as amended, shall be held to apply to any suit in equity arising under Title II of this Act, wherein the United States is complainant.

PROCEEDINGS TO ENFORCE OR SET ASIDE THE COMMISSION'S ORDERS—APPEAL IN CERTAIN CASES

SEC. 402. (a) The provisions of the Act of October 22, 1913 (38 Stat. 219), relating to the enforcing or setting aside of the orders of the Interstate Commerce Commission, are hereby made applicable to suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission under this Act (except any order of the Commission granting or refusing an application for a construction permit for a radio station, or for a radio station license, or for renewal of an existing radio station license, or for modification of an existing radio station license, or suspending a radio operator's license¹⁰), and such suits are hereby authorized to be brought as provided in that Act.

(b) An appeal may be taken, in the manner hereinafter provided, from decisions of the Commission to the Court of Appeals of the District of Columbia in any of the following cases:

(1) By any applicant for a construction permit for a radio station, or for a radio station license, or for renewal of an existing radio station license, or for modification of an existing radio station license, whose application is refused by the Commission.

(2) By any other person aggrieved or whose interests are adversely affected by any decision of the Commission granting or refusing any such application.

(3) By any radio operator whose license has been suspended by the Commission.¹⁰

(c) Such appeal shall be taken by filing with said court within twenty days after the decision complained of is effective, notice in writing of said appeal and a statement of the reasons therefor, together with proof of service of a true copy of said notice and statement upon the Commission. Unless a later date is specified by the Commission as part of its decision, the decision complained of shall be considered to be effective as of the date on which public announcement of the decision is made at the office of the Commission in the city of Washington. The Commission shall thereupon immediately, and in any event not later than five days from the date of such service upon it mail or otherwise deliver a copy of said notice of appeal to each person shown by the records of the Commission to be interested in such appeal and to have a right to intervene therein under the provisions of this section, and shall at all times thereafter permit any such person to inspect and make copies of the appellant's statement of reasons for said appeal at the office of the Commission in the city of Washington. Within thirty days after the filing of said appeal the Commission shall file with the court the originals or certified copies of all papers and evidence presented to it upon the application or order¹¹ involved, and also a like copy of its decision thereon, and shall within thirty days thereafter file a full statement in writing of the facts and grounds for its decision as found and given by it, and a list of all interested persons to whom it has mailed or otherwise delivered a copy of said notice of appeal.

(d) Within thirty days after the filing of said appeal any interested person may intervene and participate in the proceedings had upon said appeal by filing with the court a notice of intention to intervene and a verified statement showing the nature of the interest of such party, together with proof of service of true copies of said notice and statement, both upon appellant and upon the Commission. Any person who would be aggrieved or whose interests would be adversely affected by a reversal or modification of the decision of the Commission complained of shall be considered an interested party.

(e) At the earliest convenient time the court shall hear and determine the appeal upon the record before it, and shall have power, upon such record, to enter a judgment affirming or reversing the decision of the Commission, and in event the court shall render a decision and enter an order reversing the decision of the Commission, it shall remand the case of the Commission to carry out the judgment of the court: *Provided, however*, That the review by the court shall be limited to questions of law and that findings of fact by the Commission, if supported by substantial evidence, shall be conclusive unless it shall clearly appear that the findings of the Commission are arbitrary or capricious. The court judgment shall be final, subject, however, to review by the Supreme Court of the United States upon writ of certiorari on petition therefor under section 240 of the Judicial Code, as amended, by appellant, by the Commission, or by any interested party intervening in the appeal.

(f) The court may, in its discretion, enter judgment for costs in favor of or against an appellant, and/or other interested parties intervening in said appeal, but not against the Commission, depending upon the nature of the issues involved upon said appeal and the outcome thereof.

INQUIRY BY COMMISSION ON ITS OWN MOTION

SEC. 403. The Commission shall have full authority and power at any time to institute an inquiry, on its own motion, in any case and as to any matter or thing concerning which complaint is authorized to be made, to or before the Commission by any provision of this Act, or concerning which any question may arise under any of the provisions of this Act, or relating to the enforcement of any of the provisions of this Act. The Commission shall have the same powers and authority to proceed with any inquiry instituted on its own motion as though it had been appealed to by complaint or petition under any of the provisions of this Act, including the power to make and enforce any order or orders in the case, or relating to the matter or thing concerning which the inquiry is had, excepting orders for the payment of money.

¹⁰ The provisions in sections 402 (a) and (b) (3) relating to suspension of a radio operator's license, were added by Public—No. 97—75th Congress, 1st Session, approved May 20, 1937.

¹¹ The words "or order" were added by Public—No. 97—75th Congress, 1st Session, approved May 20, 1937.

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Passed by 73rd Congress; Approved June 19, 1934; With Amendments

REPORTS OF INVESTIGATIONS

SEC. 404. Whenever an investigation shall be made by the Commission it shall be its duty to make a report in writing in respect thereto, which shall state the conclusions of the Commission, together with its decision, order, or requirement in the premises; and in case damages are awarded such report shall include the findings of fact on which the award is made.

REHEARING BEFORE COMMISSION

SEC. 405. After a decision, order, or requirement has been made by the Commission in any proceeding, any party thereto may at any time make application for rehearing of the same, or any matter determined therein, and it shall be lawful for the Commission in its discretion to grant such a rehearing if sufficient reason therefor be made to appear: *Provided, however,* That in the case of a decision, order, or requirement made under Title III, the time within which application for rehearing may be made shall be limited to twenty days after the effective date thereof, and such application may be made by any party or any person aggrieved or whose interests are adversely affected thereby. Applications for rehearing shall be governed by such general rules as the Commission may establish. No such application shall excuse any person from complying with or obeying any decision, order, or requirement of the Commission, or operate in any manner to stay or postpone the enforcement thereof, without the special order of the Commission. In case a rehearing is granted, the proceedings thereupon shall conform as nearly as may be to the proceedings in an original hearing, except as the Commission may otherwise direct; and if, in its judgment, after such rehearing and the consideration of all facts, including those arising since the former hearing, it shall appear that the original decision, order, or requirement is in any respect unjust or unwarranted, the Commission may reverse, change, or modify the same accordingly. Any decision, order, or requirement made after such rehearing, reversing, changing, or modifying the original determination, shall be subject to the same provisions as an original order.

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GENERAL PROVISIONS RELATING TO PROCEEDINGS—WITNESSES AND DEPOSITIONS

SEC. 409. (a) Any member or examiner of the Commission, or the director of any division, when duly designated by the Commission for such purpose, may hold hearings, sign and issue subpoenas, administer oaths, examine witnesses, and receive evidence at any place in the United States designated by the Commission; except that in the administration of Title III an examiner may not be authorized to exercise such powers with respect to a matter involving (1) a change of policy by the Commission, (2) the revocation of a station license, (3) new devices or developments in radio, or (4) a new kind of use of frequencies. In all cases heard by an examiner the Commission shall hear oral arguments on request of either party.

(b) For the purposes of this Act the Commission shall have the power to require by subpoena the attendance and testimony of witnesses and the production of all books, papers, schedules of charges, contracts, agreements, and documents relating to any matter under investigation. Witnesses summoned before the Commission shall be paid the same fees and mileage that are paid witnesses in the court of the United States.

(c) Such attendance of witnesses, and the production of such documentary evidence, may be required from any place in the United States, at any designated place of hearing. And in case of disobedience to a subpoena the Commission, or any party to a proceeding before the Commission, may invoke the aid of any court of the United States in requiring the attendance and testimony of witnesses and the production of books, papers, and documents under the provisions of this section.

(d) Any of the district courts of the United States within the jurisdiction of which such inquiry is carried on may, in case of contumacy or refusal to obey a subpoena issued to any common carrier or licensee or other person, issue an order requiring such common carrier, licensee, or other person to appear before the Commission (and produce books and papers if so ordered) and give evidence touching the matter in question; and any failure to obey such order of the court may be punished by such court as a contempt thereof.

(e) The testimony of any witness may be taken, at the instance of a party, in any proceeding or investigation pending before the Commission, by deposition, at any time after a cause or proceeding is at issue on petition and answer. The Commission may also order testimony to be taken by deposition in any proceeding or investigation pending before it, at any stage of such proceeding or investigation. Such depositions may be taken before any judge of any court of the United States, or any United States commissioner, or any clerk of a district court, or any chancellor, justice, or judge of a supreme or superior court, mayor, or chief magistrate of a city, judge of a county court, or court of common pleas of any of the United States, or any notary public, not being of counsel or attorney to either of the parties, nor interested in the event of the proceeding or investigation. Reasonable notice must first be given in writing by the party or his attorney proposing to take such deposition to the opposite party or his attorney of record, as either may be nearest, which notice shall state the name of the witness and the time and place of the taking of his deposition. Any person may be compelled to appear and depose, and to produce documentary evidence, in the same manner as witnesses may be compelled to appear and testify and produce documentary evidence before the Commission, as hereinbefore provided.

(f) Every person deposing as herein provided shall be cautioned and

sworn (or affirm, if he so request) to testify the whole truth, and shall be carefully examined. His testimony shall be reduced to writing by the magistrate taking the deposition, or under his direction, and shall, after it has been reduced to writing, be subscribed by the deponent.

(g) If a witness whose testimony may be desired to be taken by deposition be in a foreign country, the deposition may be taken before an officer or person designated by the Commission, or agreed upon by the parties by stipulation in writing to be filed with the Commission. All depositions must be promptly filed with the Commission.

(h) Witnesses whose depositions are taken as authorized in this Act, and the magistrate or other officer taking the same, shall severally be entitled to the same fees as are paid for like services in the courts of the United States.

(i) No person shall be excused from attending and testifying or from producing books, papers, schedules of charges, contracts, agreements, and documents before the Commission, or in obedience to the subpoena of the Commission, whether such subpoena be signed or issued by one or more commissioners, or in any cause or proceeding, criminal or otherwise, based upon or growing out of any alleged violation of this Act, or of any amendments thereto, on the ground or for the reason that the testimony or evidence, documentary or otherwise, required of him may tend to incriminate him or subject him to a penalty or forfeiture; but no individual shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter, or thing concerning which he is compelled, after having claimed his privilege against self-incrimination, to testify or produce evidence, documentary or otherwise, except that any individual so testifying shall not be exempt from prosecution and punishment for perjury committed in so testifying.

(j) Any person who shall neglect or refuse to attend and testify, or to answer any lawful inquiry, or to produce books, papers, schedules of charges, contracts, agreements, and documents, if in his power to do so, in obedience to the subpoena or lawful requirement of the Commission, shall be guilty of a misdemeanor and upon conviction thereof by a court of competent jurisdiction shall be punished by a fine of not less than \$100 nor more than \$5,000, or by imprisonment for not more than one year, or by both such fine and imprisonment.

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TITLE V—PENAL PROVISIONS—FORFEITURES

GENERAL PENALTY

SECTION 501. Any person who willfully and knowingly does or causes or suffers to be done any act, matter, or thing, in this Act prohibited or declared to be unlawful, or who willfully and knowingly omits or fails to do any act, matter, or thing in this Act required to be done, or willfully and knowingly causes or suffers such omission or failure, shall, upon conviction thereof, be punished for such offense, for which no penalty (other than a forfeiture) is provided herein, by a fine of not more than \$10,000 or by imprisonment for a term of not more than two years, or both.

VIOLATIONS OF RULES, REGULATIONS, AND SO FORTH

SEC. 502. Any person who willfully and knowingly violates any rule, regulation, restriction or condition made or imposed by the Commission under authority of this Act, or any rule, regulation, restriction, or condition made or imposed by any international radio or wire communications treaty or convention, or regulations annexed thereto, to which the United States is or may hereafter become a party, shall, in addition to any other penalties provided by law, be punished, upon conviction thereof, by a fine of not more than \$500 for each and every day during which such offense occurs.

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VENUE OF OFFENSES

SEC. 505. 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. Whenever the offense is begun in one jurisdiction and completed in another it may be dealt with, inquired of, tried, determined, and punished in either jurisdiction in the same manner as if the offense had been actually and wholly committed therein.

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TITLE VI—MISCELLANEOUS PROVISIONS

UNAUTHORIZED PUBLICATION OF COMMUNICATIONS

SEC. 605. No person receiving or assisting in receiving, or transmitting, or assisting in transmitting, any interstate or foreign communication by wire or radio shall divulge or publish the existence, contents, substance, purport, effect, or meaning thereof, except through authorized channels of transmission or reception, to any person other than the addressee, his agent, or attorney, or to a person employed or authorized to forward such communication to its destination, or to proper accounting or distributing officers of the various communicating centers over which the communication may be passed, or to the master of a ship under whom he is serving, or in response to a subpoena issued by a court of competent jurisdiction, or on demand of other lawful authority; and no person not being authorized by the sender shall intercept any communication and divulge or publish the existence, contents, substance, purport, effect, or meaning of such intercepted communication to any person; and no person not being entitled thereto shall receive or assist in receiving any interstate or foreign communication by wire or radio and use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto; and no person having received such intercepted

The Communications Act of 1934

(Provisions Relating to Broadcasting and Allied Services, With Sections Dealing Exclusively With Public Utility Common Carriers Omitted)

Passed by 73rd Congress; Approved June 19, 1934; With Amendments

communication or having become acquainted with the contents, substance, purport, effect, or meaning of the same or any part thereof, knowing that such information was so obtained, shall divulge or publish the existence, contents, substance, purport, effect, or meaning of the same or any part thereof, or use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto: *Provided*, That this section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication broadcast, or transmitted by amateurs or others for the use of the general public, or relating to ships in distress.

WAR EMERGENCY—POWERS OF PRESIDENT

SEC. 606. (a) During the continuance of a war in which the United States is engaged, the President is authorized, if he finds it necessary for the national defense and security, to direct that such communications as in his judgment may be essential to the national defense and security shall have preference or priority with any carrier subject to this Act. He may give these directions at and for such times as he may determine, and may modify, change, suspend, or annul them and for any such purpose he is hereby authorized to issue orders directly, or through such person or persons as he designates for the purpose, or through the Commission. Any carrier complying with any such order or direction for preference or priority herein authorized shall be exempt from any and all provisions in existing law imposing civil or criminal penalties, obligations, or liabilities upon carriers by reason of giving preference or priority in compliance with such order or direction.

(b) It shall be unlawful for any person during any war in which the United States is engaged to knowingly or willfully, by physical force or intimidation by threats of physical force, obstruct or retard or aid in obstructing or retarding interstate or foreign communication by radio or wire. The President is hereby authorized, whenever in his judgment the public interest requires, to employ the armed forces of the United States to prevent any such obstruction or retardation of communication: *Provided*, That nothing in this section shall be construed to repeal, modify, or affect either section 6 or section 20 of an Act entitled "An Act to supplement existing laws against unlawful

restraints and monopolies, and for other purposes," approved October 15, 1914.

(c) Upon proclamation by the President that there exists war or a threat of war or a state of public peril or disaster or other national emergency, or in order to preserve the neutrality of the United States, the President may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations within the jurisdiction of the United States as prescribed by the Commission, and may cause the closing of any station for radio communication and the removal therefrom of its apparatus and equipment, or he may authorize the use or control of any such station and/or its apparatus and equipment by any department of the Government under such regulations as he may prescribe, upon just compensation to the owners.

(d) The President shall ascertain the just compensation for such use or control and certify the amount ascertained to Congress for appropriation and payment to the person entitled thereto. If the amount so certified is unsatisfactory to the person entitled thereto, such person shall be paid only 75 per centum of the amount and shall be entitled to sue the United States to recover such further sum as added to such payment of 75 per centum will make such amount as will be just compensation for the use and control. Such suit shall be brought in the manner provided by paragraph 20 of section 24, or by section 145, of the Judicial Code, as amended.

EFFECTIVE DATE OF ACT

SEC. 607. This Act shall take effect upon the organization of the Commission, except that this section and sections 1 and 4 shall take effect July 1, 1934. The Commission shall be deemed to be organized upon such date as four members of the Commission have taken office.

SEPARABILITY CLAUSE

SEC. 608. If any provision of this Act or the application thereof to any person or circumstance is held invalid, the remainder of the Act and the application of such provision to other persons or circumstances shall not be affected thereby.

Unions And Labor Groups Dealing in Radio Fields

Name of Organization	Affiliation	Address Telephone No.	Executive	Name of Organization	Affiliation	Address Telephone No.	Executive
American Federation of Labor	AFL	901 Mass. Ave. NW. Washington, D. C. National 3870	William Green, Pres.	Radio Writers' Guild of the Authors League of America	....	6 E. 39th St. New York City Murray Hill 5-6930	Kenneth Webb, Pres.
Congress for Industrial Organization	CIO	1106 Connecticut Ave. Washington, D. C. District 3582	John L. Lewis, Pres.	American Advertising Guild	CIO	112 E. 19th St. New York City Algonquin 4-9119	John Bronfein, Pres.
American Communications Association (Formerly American Radio Telegraphists Association)	CIO	10 Bridge St. New York City Bowling Green 9-3007	Mervyn Rathbone, Pres.	American Newspaper Guild	CIO	14 Pearl St. New York City Whitehall 3-1272	Kenneth Crawford, Pres. Milton Kaufman, Ex. V.P. Victor Pasche, Secy.-Treas.
International Brotherhood of Electrical Workers	AFL	1200 15th St. NW. Washington, D. C. District 3766	Daniel W. Tracy, Pres.	Associated Actors & Artistes of America	AFL	545 Fifth Ave. New York City Vanderbilt 6-6340	Frank Gillmore, Pres.
American Federation of Musicians	AFL	1450 Broadway New York City Pennsylvania 6-2545	Joseph N. Weber, Pres.	<i>Organizations affiliated with Associated Actors & Artistes of America</i>			
American Guild of Radio Announcers and Producers	....	545 Fifth Ave. New York City Vanderbilt 6-6340	Roy S. Langham, Pres. Roger Bower, Sec.	Actors Equity Ass'n	AFL	45 W. 47th St. New York City Bryant 9-3550	Arthur Byron, Pres. Bert Lytell, First V.P. and Acting Pres. Paul Dullzell, Ex. Secy.-Treas.
International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators	AFL	630 Fifth Ave. New York City Circle 5-4370	George E. Browne, Pres.	American Federation of Radio Artists	AFL	2 W. 45th St. New York City Vanderbilt 6-1810	Mrs. Emily Holt, Ex. Secy.
Association of Technical Employees of NBC	....	201 N. Wells St. Chicago Randolph 8884	E. C. Horstman, Pres.	American Guild of Musical Artists Inc.	AFL	576 Fifth Ave. New York City Longacre 3-6223	Ernest Charles
Associated Broadcast Technicians (AFL)	IBEW (AFL)	1200 15th St., N.W. Washington, D.C. District 3766	Daniel W. Tracy, Pres.	American Guild of Variety Artists	AFL	2 W. 45th St. New York City Vanderbilt 6-0216	Dorothy Bryant, Ex. Secy.
				Screen Actors Guild	....	7046 Hollywood Blvd. Hollywood, Cal. Crestview 1-2166 545 Fifth Ave. New York City Vanderbilt 6-6340	Kenneth Thomson, Ex. Secy.