

# The New Radio Legislation

By H. Gernsback

**W**E print, herewith, the full official text from the Washington Radio Telephone Conference, which took place in Washington during the week of Feb. 27th. As we mentioned in our last issue, there was no cause for anxiety by the amateurs. The government has always fully realized the value of the radio amateur and the experimenter; we also predicted our belief that nothing would be done that would curb our activities.

The draft, which we present, herewith, is, of course, only the recommendation of the Technical Committee, appointed by Mr. Hoover, but we feel safe in saying, that generally speaking, this draft will probably become law in one way or another with very few changes, if any.

We believe that the amateur has reason to feel very happy about the new changes which practically leave his status as it was before. It may also be seen that his wave length has been increased somewhat and he now has a larger wave band than he had before. We believe that the amateur will be satisfied with the outcome of the conference, particularly as the new wave length, that is 150 to 275 meters, will allow enough latitude for all experimentation.

It will also be noticed that the recommendation is that amateurs police themselves in the future, which is as it should be. The amateur has done so with more or less success in the past, and we believe that in the future he will do even better.

Speaking of the new recommendations in general, we believe that the entire Radio Fraternity, be they commercial, amateur, or otherwise, will have no reason for complaint, as all interests seem to have been taken care of, as well as it is humanly possible to do without encroaching upon any one's rights and at the same time leave the road open to the expansion and development of the new art.

We all realize that the radio telephone has brought a revolutionary change not only in radio itself but in our private lives as well. We believe we are not wrong in stating that the radio telephone will change our future habits as much as the telephone did when the public adopted it.

Regulation we all know was needed; as long as the regulations are fair to all concerned, radio will now surely come into its own, and it seems as if the radio millennium were soon to be at hand.

Our readers will be informed of all new developments pertaining to new legislation in future issues of this publication.

## SUMMARY OF PRELIMINARY REPORT OF THE TECHNICAL COMMITTEE OF THE RADIO TELEPHONE CONFERENCE

The Radio Telephone Conference was divided some days ago into committees, of which one of the most important is the Technical Committee under the chairmanship of Dr. Stratton.

This committee has now issued tentative recommendations as to methods and policies for radio telephone control. The committee puts its recommendations forward for consideration and constructive criticism by interested organizations with a view to reassembling again in two or three weeks to reconsider such criticism.

The recommendations are of great length and detail. They first point out the necessity for Government control of Radio telephones as the only solution to the present chaos of interference; that unless there is definite regulation of all telephone transmitting stations the whole system will be destroyed by interferences.

In order to accomplish this the committee recommends that the existing powers of the Department of Commerce should be extended to complete control of transmitting stations. It does not recommend any control of receiving stations. The committee recommends that wave lengths below 6,000 meters should in a general way be reserved for radio telephone service but that those wave lengths which have become fixed in service for telegraph service within this range, such as SOS signals, shall be retained. But it is the hope and expectation that the radio telephone may ultimately keep the whole range from zero to 6,000 meters.

The committee considers that the present development of the art warrants the separation of twenty different wave bands within this range, of which seventeen lie between zero and 2,000 meters. In the assignment of these wave bands the committee recommends that priority first be given to broadcasting service and that secondarily, broadcasting service itself should be divided into priorities in the following rotation, first Government broadcasting; second, educational and public broadcasting; third, private broadcasting, including entertainment, news, etc., and fourth, toll broadcasting.

Reservation of wave lengths between 150 and 275 is made for amateurs and some opportunity in experimental wave lengths would be assigned to them in addition. The committee recommends that amateurs shall police themselves as to division of their wave bands between different varieties of amateur work. The committee recommends in addition to the establishment of wave bands for different services in various priorities that it is also necessary to limit the amount of power used in transmitting stations, thus limiting each of them to some special zone in order to further limit interferences and enable a wider variety of wave lengths to be assigned to different localities. The committee also recommends that the time of day occupied by different transmitting stations for different services should be placed in control.

The conference strongly recommends the extension of authority of the Government into thorough control of transmitting stations and that the radio telephone may be considered a public utility.

The tentative recommendations follow:

## TENTATIVE REPORT OF DEPARTMENT OF COMMERCE CONFERENCE ON RADIO TELEPHONY

Resolved, That the Conference on Radio Telephony recommend that the radio laws be amended so as to give to the Secretary of Commerce adequate legal authority for the effective control of the establishment of all radio transmitting stations except amateur, experimental and Government stations and of the operation of non-governmental radio transmitting stations.

Resolved, That it is the sense of the Conference that radio communication is a public utility and as such should be regulated and controlled by the Federal Government in the public interest.

Resolved, That the types of radio apparatus most effective in reducing interference should be made freely available to the public without restriction.

### I. ALLOCATION OF WAVES

A. It is recommended that waves for radio telephony be allocated in bands according to the class of service as follows:

## RECOMMENDED WAVE ALLOCATION

	Wave Length, Meters	Frequency, Kilocycles per Second
(1) Transoceanic radio telephone experiments, non-exclusive..	6,000	50
(2) Fixed service radio telephony, non-exclusive.....	5,000	60
(3) Mobile service radio telephony non-exclusive.....	3,300	90.9
(4) Government broadcasting, non-exclusive.....	2,850	105.2
(5) Fixed station radio telephony, non-exclusive.....	2,650	113.2
(6) Aircraft radio telephony and telegraphy, exclusive...	2,500	120
(7) Government and public broadcasting.....	2,050	146
(8) Radio beacons, exclusive..	1,850	162
(9) Aircraft radio telephony and telegraphy, exclusive.....	1,650	181.8
(10) Radio compass, exclusive..	1,550	193.5
(11) Government and public broadcasting, 700 miles inland.....	1,500	200
(12) Mobile radio telephony, non-exclusive.....	1,500	200
(13) Mobile radio telegraphy, exclusive.....	1,500	200
(14) Aircraft radio telephony and telegraphy, exclusive.....	1,500	200
(15) Private and toll broadcasting, exclusive.....	1,500	200
(16) Restricted special amateur radio telegraphy, non-exclusive.....	1,500	200
(17) City and state public safety broadcasting, exclusive.....	1,500	200
(18) Technical and training schools (shared with amateur.....)	1,500	200
(19) Amateur (exclusive, 150 to 200 meters) (shared with technical and training schools, 200 to 275 meters)	150	2,000
(20) Reserved.....	below 150	above 2,000

Note 1. The terms used in the above schedule are defined as follows: "Broadcasting" signifies transmission to an unlimited number of receiving stations without charge at the receiving end. It includes:

(1) Government broadcasting signifying broadcasting by departments of the Federal Government;

(2) Public broadcasting signifying broadcasting from public institutions, including state governments, political subdivisions thereof, and universities and such others as may be licensed for the purpose of disseminating informational and educational service;

(3) Private broadcasting signifying broadcasting by the owner of a station, as a communication company, a store, a newspaper, or such other private or public organization or person as may be licensed for the purpose of disseminating news, entertainment and other service; and

(4) Toll broadcasting signifying broadcasting by a public service radio telephone company as a paid service.

(Other definitions to be added.)

Note 2. A station carrying on two or more of the broadcasting services specified in classes 2, 3 and 4 must be licensed for each class of service.

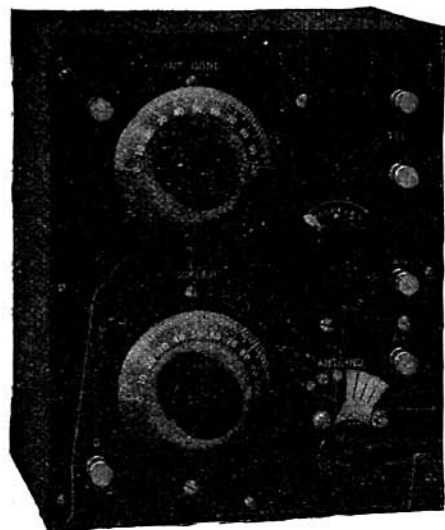
Note 3. Public broadcasting may temporarily be permitted to be done at the wave bands assigned to private and toll broadcasting, with a change to the assigned longer waves at a later date.

Note 4. Municipal and state radio telephone service for public safety should in small cities be conducted by interrupting the broadcast service of classes 2, 3 or 4 in case of emergency. In large cities this service will ordinarily have its own station and will use the wave band, 275 to 285 meters, assigned to such service.

Note 5. Private detective agencies desir-

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## Methods of Transmission Used in Broadcasting Stations

(Continued from page 946)

waves be of fairly high frequency and completely steady or undamped.

Many experiments using arc and radio-frequency spark transmitters were conducted in the early days of radio telephony, but only by the perfection of the thermionic valve or audion and its use in the production of continuous waves and in the amplification of the modulations of the voice has it been possible to bring the radio telephone to its present efficient stage.

Various kinds of microphones for modulation purposes have been used. One type was the Fessenden condenser microphone, and consisted of a variable condenser, the movable plates of which were connected to the antenna and the stationary plates to the ground. The position of the movable plate was varied by the voice modulations and the antenna capacity varied accordingly. This had the effect of detuning the antenna in synchronism with the modulations of the voice.

The carbon-grain microphone, which is a very old method, is still used extensively and is, in fact, about as efficient as any. The vibrations of the microphone diaphragm produced by the voice, vary the resistance of the carbon-grains across which is connected the modulation circuit.

One of the most modern methods which is being used very extensively, is particularly adapted for orchestra music or singing voice, when the concentration effect of a horn would prove harmful to the tone of the music. This is known as the "Phonotron," and consists of a large paper diaphragm of special design which is attached to a small movable armature coil supported in the field of an electro-magnet. The vibrations produced in the diaphragm by the music or voice make the armature coil vibrate in the magnetic field at the same frequency. Current is, therefore, induced in the armature which is connected to the modulation circuit of the transmitter.

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ing to operate radio telephone broadcasting service should be required to co-operate with municipal or state service in the use of the wave band, 275 to 285 meters, assigned to the latter service.

Note 6. When transoceanic radio telephone experiments are to be conducted the Department of Commerce should endeavor to arrange with other countries for the use of the wave band, 5,000 to 6,000 meters assigned for this purpose.

Note 7. The wave band from 1,550 to 1,650 meters is for use of radio telephone communication over natural barriers, but is not exclusive of other services.

Note 8. The wave band from 700 to 750





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meters may be used for Government and public broadcasting in parts of the country farther than 700 miles from the sea coast.

Note 9. The restricted special amateur wave of 310 meters is for use by a limited number of inland stations and only where it is necessary to bridge large, sparsely populated areas or to overcome natural barriers.

Note 10. The wave band from 2,850 to 3,300 meters may be used for fixed service radio telephony only provided it does not interfere with service using continuous wave telegraphy.

Note 11. No definite allocation shall be made in the wave band from 1,050 to 1,500 meters until after a conference between the Government Departments concerned.

Note 12. Wave bands marked "non-exclusive" are available also for other types of transmission.

Note 13. Wave bands not included in this table and those bands marked non-exclusive are available for radiotelegraphy, subject to regulation.

B. It is recommended that the Secretary of Commerce assign a specific wave length to each radio telephone broadcasting station (except Government and amateur stations), this, of course, being within the band pertaining to the particular service of that station.

C. It is recommended that the wave band assigned to amateurs, 150 to 275 meters, be divided into bands according to the method of transmission, damped wave stations being assigned the band of lowest wave lengths, interrupted or modulated continuous wave radio telegraph stations the next band, radio telephone stations the next band, and finally unmodulated continuous wave radio telegraph stations the band of highest wave lengths. It is recommended that amateurs be permitted to carry on broadcasting within the wave length band assigned by the Secretary of Commerce to amateur radio telephony.

D. It is recommended that the present regulations governing experimental stations remain in effect.

E. It is recommended that the establishment at any later date of any commercial transmitting stations having more than 1 kw. input to the antenna may, at the discretion of the Secretary of Commerce, be prohibited within 25 land miles of a Government or commercial station or in regions where congestion of radio traffic shall warrant such prohibition.

### II. POWER LIMITATION, GEOGRAPHICAL DISTRIBUTION, AND HOURS OF OPERATION OF BROADCASTING STATIONS

A. It is recommended that the Secretary of Commerce assign to each radio telephone broadcasting station a permissible power based on the normal range of the station, such normal ranges for the different classes of service to have the following average values, larger or smaller values being discretionary where conditions warrant:  
Government broadcasting stations, 600 (land) miles.

Public broadcasting stations, 250 miles.

Private and toll broadcasting stations, 50 miles.

(Note. The Bureau of Standards of the Department of Commerce, should make a study of the relation between the normal reliable range of a station and the antenna power on the basis of the use of good available receiving apparatus. It is recognized that this relation may change with the development of the radio art.)

B. It is recommended that the same wave (or overlapping wave bands) not be assigned to stations within the following distances from one another, except that these distances may be lowered if the normal ranges of the stations are correspondingly lowered:

For government broadcasting stations, 1,500 miles.

For public broadcasting stations, 750 miles.

For private and toll broadcasting stations, 150 miles.

(Note. The Bureau of Standards should make a study of the width of wave band (expressed in cycles per second) required for satisfactory radio telephony. It is recognized that this width depends on the methods of transmission and reception employed.)

C. It is recommended that the Secretary of Commerce cause an immediate study to be made

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of the best geographical distribution of broadcasting stations with the view of attaining the best service with a minimum of interference. A chart has been prepared showing an ideal distribution of broadcasting stations under various assumed conditions as to number of available wave bands and ratio of distance between stations having the same wave length to normal range of the stations.

D. It is recommended that in cases where congestion of radio telephone broadcasting traffic exists, or threatens to exist, the Secretary of Commerce assign suitable hour of operation to existing or proposed private and toll broadcasting stations.

### III. CONSIDERATIONS TO BE FOLLOWED IN GRANTING LICENSES

A. It is recommended that in the case of conflict between radio communication services first consideration be given to the public not reached, or not so readily reached, by other communication services.

B. Subject to public interest and to the reasonable requirements of each type of service the order of priority of the services shall be Government, Public, Private, Toll.

C. It is recommended that the degree of public interest attaching to a private or toll broadcasting service be considered in determining its priority in the granting of licenses, in the assignment of waves, and in the assignment of permissible power, within the general regulations for these classes of service.

D. It is recommended that toll broadcasting service be permitted to develop naturally under close observation, with the understanding that its character, quality and value to the public will be considered in determining its privileges under future regulations.

E. It is recommended that direct advertising in radio broadcasting service be not permitted and that indirect advertising be limited to a statement of the call letters of the station and of the name of the concern responsible for the matter broadcasted—subject to such regulations as the Secretary of Commerce may impose.

F. It is recommended that when all available wave bands in any geographical region are already assigned, no further licenses for broadcasting be granted in that region until cause arises for the revocation of existing licenses.

G. It is recommended that private or toll broadcasting stations transmitting time signals shall transmit only official time signals and with authorization from and under conditions approved by the Secretary of Commerce.

H. It is recommended that the transmission of signals of such character or wave length as to deliberately interfere with the reception of official time signals constitutes grounds for the revocation of the transmitting license.

I. It is recommended that license requirements for the operator of a radio telephone transmitting station include a knowledge of the International Morse Code, sufficient to receive at a rate of not less than 10 words per minute.

### IV. TECHNICAL METHODS FOR THE REDUCTION OF INTERFERENCE

A. It is recommended that the Secretary of Commerce at his discretion prohibit at any time the use of existing radio transmitting apparatus and methods which result in unnecessary interference, provided that such action should not be taken unless more satisfactory apparatus and methods are commercially available at reasonable prices and until an adequate time interval is allowed for the substitution of the more satisfactory apparatus.

B. It is recommended that the Secretary of Commerce at his discretion prohibit at any time the use of existing radio receiving apparatus which cause the radiation of energy, provided that such action should not be taken unless more satisfactory apparatus and methods are commercially available at reasonable prices and until an adequate time interval is allowed for the substitution of the more satisfactory apparatus.

C. It is recommended that the Bureau of Standards make a study of the technical methods for the reduction of interference, with a view to publishing their findings, giving special attention to the following:

(1) The reduction of the rate of building up (increment) of oscillations in radiating systems. (This rapid building up of oscillations occurs in damped wave and interrupted continuous-wave transmitters, and may, of course, be eliminated by the substitution of other types of transmitter. It may, however, be reduced in these types by proper circuit arrangements.)

(2) The reduction of harmonics in continuous wave transmitters and of irregularities of oscillation ("mush" in arc transmitters and "swinging" of the frequency in all types of continuous wave transmitters not employing a master oscillator).

(3) The comparison of the variable amplitude method with the variable frequency method of continuous wave telegraphy.

(4) The preferable methods of telephone modulation to avoid changes in the frequency of oscillation.

(Continued on page 993)

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(6) The use of highly selective receiving apparatus, including a list of approved forms.

(7) The use of receiving coil aerials instead of antennae, with special reference to high selectivity.

(8) The reduction of interference with radio communication of other electrical processes, such as the operation of X-ray apparatus and electrical precipitation.

(9) The study and standardization of wave meters.

#### V. RECOMMENDATIONS OF THE COMMITTEE ON NOMENCLATURE

1. In place of the word "Wireless" and names derived from it, use the prefix "Radio"; Radio Telegraphy, Radio Telephony.

2. Instead of "Statics" or "X's", use "Atmospheric Disturbances" or "Atmospherics".

3. Disturbances produced by other stations to be designated as "Interference".

4. For the generic title of the vacuum tube, of any number of electrodes, and in any of its recognized modes of operation, use "Electron Tube".

For the specific title of the ordinary three-electrode tube, use "Triode".

For the title of a triode employed in one of its regular modes, use "Rectifier triode", "Amplifier triode", "Generator triode".

5. In describing coupling of high frequency circuits, use "Resistance Coupling", "Inductive Coupling" (by self-inductance or mutual inductance), "Capacity Coupling".

6. For the generic title for a system of conductors for radiating or absorbing radio waves, use "Aerial".

For an open circuit aerial use "Antenna".

For a closed circuit aerial use "Coil".

7. For a receiving arrangement in which beats are produced by a separate local oscillator, use "Heterodyne".

For a receiving arrangement in which the same electron tube is used for generating oscillations and detecting, use "Self Netro".

8. Classification of waves emitted by radio transmitters.

Type A—Continuous Waves.

Waves that in the permanent state are periodic and such that their successive amplitudes of oscillations are identical.

Type A1—Manipulated Continuous Waves.

Continuous waves of which the amplitude or frequency vary under the action of hand telegraphic manipulation.

Type A2—Continuous Waves with audible frequency modulation.

Continuous waves of which the amplitude or the frequency vary according to a periodic law of audible frequency. This is commonly referred to as ICW method of transmission.

Type A3—Continuous waves with speech modulation.

Continuous waves of which the amplitude or the frequency vary in accordance with speech vibrations (radio telephony).

#### Type B—Damped Waves

Waves composed of successive trains in which the amplitude of the oscillations after having reached a maximum decreases gradually. This refers to waves from spark transmitters or other types of transmitters having a characteristic decrement similar to spark transmitters.

Note 1. If in continuous wave transmitters the rectified plate voltage is not substantially constant direct voltage the station should be classed under Type A2.

Note 2. In ICW transmitting stations if the variation in the wave length or frequency of the transmitted wave is effected in a gradual way (sinusoidally) the station should be classed under Type A2. If the variation in frequency or amplitude is abrupt (chopper method) it should be classed in Type B.

In order to differentiate between the amateur and the experimenter the following definitions are suggested for consideration:

The amateur is one who operates a radio station transmitting, receiving, or both, in a professional way, merely for personal interest or in connection with an organization of like interest.

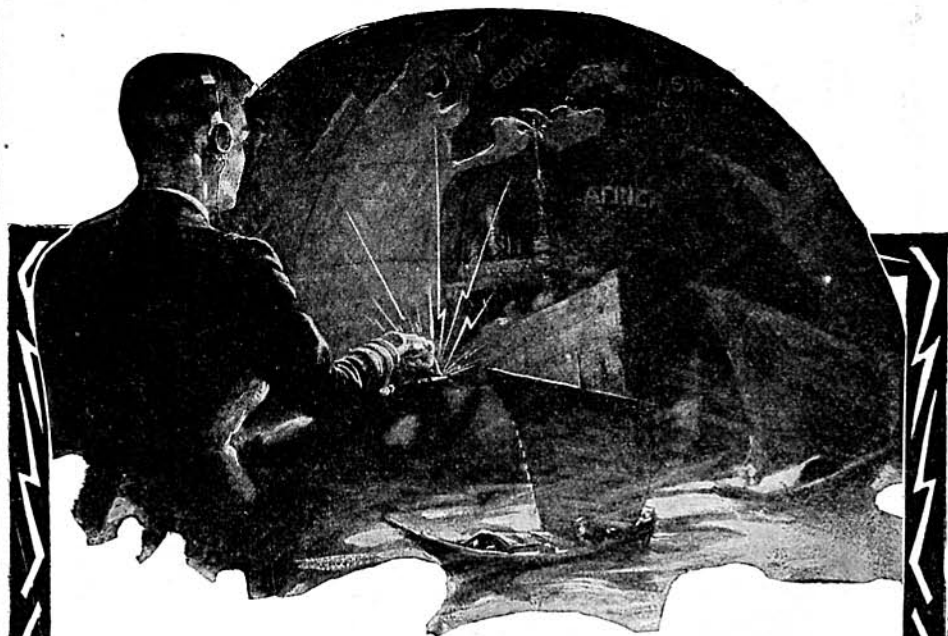
An experimenter is one who operates a transmitting or receiving station, or both, for exclusively technical or scientific investigations.

Note. Further recommendations on nomenclature to be added later.

## Resistance in High Frequency Work

(Continued from page 932)

radio, there is another factor to be considered besides that of skin effect above explained. This factor is the stray or distributed capacity of the coil. It is well



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