

# **RADIO LAWS AND REGULATIONS**

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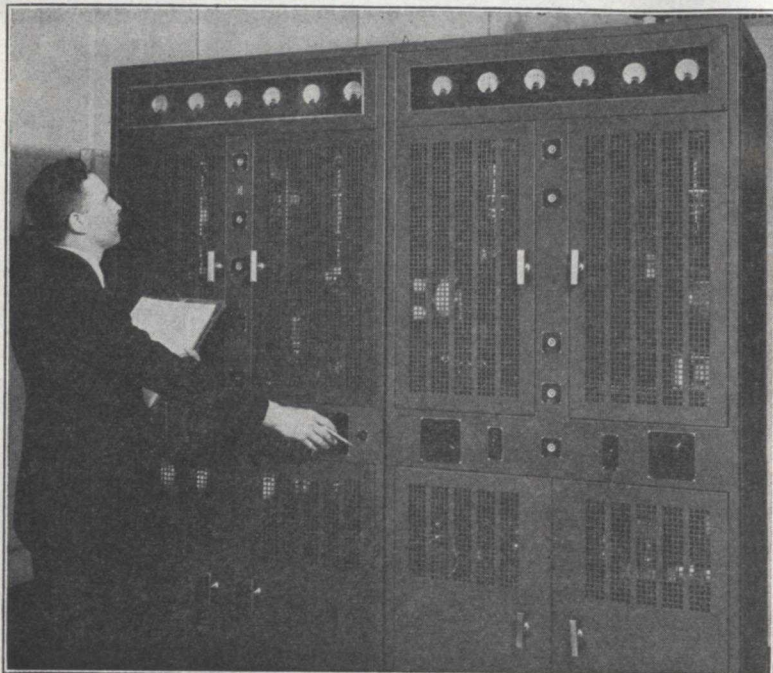
**NATIONAL RADIO INSTITUTE**

ESTABLISHED 1914

**WASHINGTON, D. C.**







Courtesy Western Electric Co.

Radio operator logging meter readings of a Western Electric broadcast transmitter.

"It becomes more and more true that those who break off education as a continuous process rapidly become uneducated. Not only does what they once knew become rusty and useless, but the growth of new knowledge passes them by and leaves them adrift in a world which they are not qualified to understand."

NEWTON D. BAKER,  
Former Secretary of War.

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**WASHINGTON, D. C.**

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THIS EXPERIMENTAL MANUAL IS A PART OF THE  
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**RADIOTRICIAN & TELETRICIAN**

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# Radio Laws and Regulations

## Introduction

VERY early in the life of Radio, the necessity for Governmental regulation of radio communication was realized. The fact that the first radio law was passed back in 1910 is evidence of this. Since then, many different radio laws have been passed and enforced by the United States. The first radio laws were designed to limit interference between stations, for it was obvious that a system of communication in which signals from two different stations interfered with each other to such an extent that both would be unintelligible, would be practically valueless. And as the importance of Radio in the safeguarding of lives had become known, the first laws made it imperative for ships carrying more than 50 men, passengers and crew included, to be radio-equipped. Later, laws were passed requiring that operators of radio equipment be licensed, for it was soon realized that radio equipment in the hands of inexperienced or incapable operators would be valueless as far as fulfilling its purpose—the safeguarding of human lives!

The development of Radio, the growth of radio broadcasting and radiotelegraphy, and the increased number of experimental stations necessitated frequent revisions of the radio laws. New Radio Acts have been passed on an average of every two or three years.\*

The Radio Act of 1910, called the Ship Act, had only four sections. It specified that every seagoing vessel carrying 50 or more men must be radio-equipped, that the radio equipment should be efficient and in good working order, that it should

be in charge of a person skilled in the use of radio apparatus, and that the apparatus have a transmitting range of at least 100 miles.

An amendment to this Act, approved two years later, specified the radio equipment on vessels carrying 50 or more men should be in charge of two persons so that there would be someone on duty at all times.

The Radio Act of 1912 provided for the licensing of every radio transmitter except those owned by the U. S. Army or Navy, and for the licensing of radio operators. It also specified that only licensed operators should operate radio transmitting equipment, except at government stations.

Between 1910 and 1927, the growth of Radio was nothing short of miraculous. From a communication system used on board ships, it developed into a world-wide industry. By the year 1927, hundreds of broadcasting stations were on the air, millions of receivers were in use and millions of families had become accustomed to radio entertainment. The industry had grown so rapidly it had practically outgrown the facilities provided by the Government for its control. And

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\* A copy of the International Telecommunications Treaty of 1934 can be obtained by sending twenty cents in coin to Superintendent of Documents, Government Printing Office, Washington, D. C. Copies of the rules and regulations enforced by the Federal Communications Commission can also be obtained from the Superintendent of Documents. These rules and regulations are divided into parts covering the various services. Each part has been printed and bound in separate pamphlet form. The part numbered 13, entitled "Rules Governing Commercial Radio Operators," should be obtained by every applicant interested in getting a commercial radio operator's license; send five cents in coin (stamps will not be accepted) to the Superintendent of Documents with your order for this part of the rules.



Radio was more or less an overgrown, undisciplined infant.

It was to bring order out of chaos that the Radio Act of 1927 was passed. For the same reason, later in 1927, an International Convention was held at Washington for the purpose of standardizing radio terms and adopting regulations which would be helpful to the radio industry and the general public.

### The Federal Communications Commission

The big thing accomplished by the Radio Act of 1927 was the establishment of the Federal Radio Commission with regulatory power over everything pertaining to Radio in the United States. In 1934, this Commission was replaced by the Federal Communications Commission, created 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 the 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.

The Communications Act of 1934, as it is now called, provides that there shall be seven Commissioners appointed by the President. The members of the Federal Communications Commission must be citizens of the United States; two commissioners cannot be appointed from the same radio zone; no member may be financially interested in the manufacture or sale of radio apparatus or in the operation of any radio station.

The provisions of the Communications Act of 1934 apply to all interstate and foreign communication by wire or radio and all interstate and foreign transmission

of energy by radio, which originates 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 does 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.

Under this act, the duties and authorities of the Federal Communications Commission are:

- (a) Classify radio stations;
- (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 times 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 (this means that the Commission *does not* have authority to issue an operator's license or permit to a citizen of another country);

(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 wilfully 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 wilfully or maliciously interfered with any other radio communications or signals; or

(F) Has obtained or attempted to ob-

tain, 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.

(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.

(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.

### Extracts from the Communications Act of 1934, as Amended

SEC. 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 construed 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.

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.*

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 communication relating thereto.

(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 communica-

tions 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.

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.*

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.

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.

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.

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.

SEC. 358. The radio installation, the operators, the regulation of their watches, the transmission and receipt of messages, and the radio service of the ship except as they may be regulated by law or international agreement, or by rules and regulations made in pursuance thereof, shall in the case of a ship of the United States be under the supreme control of the master.

SEC. 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 imprison-



ment for a term of not more than two years, or both.

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.

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 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 ob-

tained, 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.

### Extracts from the International Telecommunication Convention, Madrid, 1932

ARTICLE 24. (1) The contracting governments agree to take all the measures possible, compatible with the system of telecommunication used, with a view to insuring the secrecy of international correspondence.

ARTICLE 34. (1) Stations carrying on radio communications in the mobile service shall be bound, within the scope of their normal operation, to exchange radio communications with one another irrespective of the radio system they have adopted.

ARTICLE 35. (1) All stations, regardless of their purpose, must, so far as possible, be established and operated in such a manner as not to interfere with the radio services or communications of either the other contracting governments, or the private operating agencies recognized by these contracting governments and of other duly authorized operating agencies which carry on radio-communication service.

ARTICLE 36. Stations participating in the mobile service shall be obliged to accept, with absolute priority, distress calls and messages regardless of their origin, to reply in the same manner to such messages, and immediately to take such action in regard thereto as they may require.

ARTICLE 37. The contracting governments agree to take the steps required to prevent the transmission or the putting into circulation of false or deceptive distress signals or distress calls, and the use,

by a station, of call signals which have not been regularly assigned to it.

### Extracts from the General Radio Regulations (Cairo Revision, 1938)

ARTICLE 2. (44) The administrations agree to take the necessary measures to prohibit and prevent:

(45) (a) the unauthorized interception of radio communications not intended for the general use of the public;

(46) (b) the divulging of the contents or of the mere existence, the publication or any use whatever, without authorization, of the radio communication mentioned in No. 45.

ARTICLE 3. (47) 1. (1) No transmitting station may be established or operated by any person or by any enterprise whatever without a special license issued by the government of the country to which the station in question is subject.

ARTICLE 6. (69) 1. The waves emitted by a station must be kept on the authorized frequency as exactly as the state of the art permits, and their radiation must be as free as practically possible from all emissions not essential to the type of communication carried on.

(71) 2. (1) The state of the art in the various cases of operation concerns the exactitude of the frequency, the level of harmonics, and the width of the frequency band occupied.

ARTICLE 9. (203) 2. The frequency of emission of mobile stations shall be verified as often as possible by the inspection service to which they are subject.

ARTICLE 11. (276) 1. The radio service of a mobile station shall be placed under the supreme authority of the master or the person responsible for the ship, aircraft, or any other vehicle carrying the mobile station.

(278) 3. The master or responsible person, as well as any persons who may have knowledge of the text or simply the existence of radiotelegrams, or of any information acquired by means of the radio service, shall be bound by the obligation to observe and insure the secrecy of the correspondence.

ARTICLE 12. (279) 1. (1) The competent governments or administrations of

countries where a mobile station calls, may demand the production of the license. The operator of the mobile station or the person responsible for the station must submit to this verification. The license must be kept in such a way that it may be furnished without delay. However, the production of the license may be replaced by a permanent posting in the station, of a copy of the license certified by the authority which has granted it.

ARTICLE 17. (374) 2. (1) Before transmitting, any station must keep watch over a sufficient interval to assure itself that it will cause no harmful interference with the transmissions being made within its range; if such interference is likely, the station shall await the first stop in the transmission which it may disturb.

ARTICLE 22. (525) 1. (1) The transmission of unnecessary or unidentified signals or correspondence shall be forbidden to all stations.

(527) (2) Tests and experiments shall be permitted in mobile stations if they do not interfere with the service of other stations. As for stations other than mobile stations, each administration shall judge, before authorizing them, whether or not the proposed tests or experiments are likely to interfere with the service of other stations.

ARTICLE 24. (542) 1. No provision of these Regulations shall prevent a mobile station in distress from using any means available to it for drawing attention, signalling its position, and obtaining help.

(548) 3. (2) Aircraft. Any aircraft in distress must transmit the distress call on the watching-wave of the land or mobile stations capable of helping it; when the call is addressed to stations of the maritime service, the waves to be used are the distress-wave or watching-wave of these stations.

(549) 4. (1) In radiotelegraphy, the distress signal shall consist of the group ... — — — ..., transmitted as one signal, in which the dashes must be emphasized so as to be distinguished clearly from the dots.

(550) In radiotelephony, the distress signal shall consist of the spoken expression Mayday (corresponding to the



French pronunciation of the expression "m'aider").

(551) (2) These distress signals shall announce that the ship, aircraft, or any other vehicle which sends the distress signal is threatened by serious and imminent danger and requests immediate assistance.

(555) 5. (4) This call shall have absolute priority over other transmissions. All stations hearing it must immediately cease all transmission capable of interfering with the distress traffic, and must listen on the wave used for the distress call. This call must not be sent to any particular station and shall not require an acknowledgment of receipt.

(556) 6. (1) The distress call must be followed as soon as possible by the distress message. This message shall include the distress call followed by the name of the ship, aircraft, or the vehicle in distress, information regarding the position of the latter, the nature of the distress and the nature of the help requested, and any other further information which might facilitate this assistance.

(557) (2) When, in its distress message, an aircraft is unable to signal its position, it shall endeavor after the transmission of the incomplete message to send its call signal long enough so that the radio direction-finding stations may determine its position.

(558) 7. (1) As a general rule, a ship or aircraft at sea shall signal its position in latitude and longitude (Greenwich) using figures, for the degrees and minutes, accompanied by one of the words North or South and one of the words East or West. A period shall separate the degrees from the minutes. In some cases, the true bearings and the distance in nautical miles from some known geographical point may be given.

(560) (3) As a general rule, an aircraft flying over land shall signal its position by the name of the nearest locality, its approximate distance from this point, accompanied, according to the case, by one of the words North, South, East, or West, or, in some cases, words indicating intermediate directions.

(561) 8. The distress call and mes-

sage shall be sent only by order of the master or person responsible for the ship, aircraft, or other vehicle carrying the mobile station.

(569) 11. (1) Stations of the mobile service which receive a distress message from a mobile station which is unquestionably in their vicinity, must acknowledge receipt thereof at once. If the distress call has not been preceded by an auto-alarm signal, these stations may transmit this auto-alarm signal with the authorization of the authority responsible for the station (for mobile stations, see No. 276), taking care not to interfere with the transmission of the acknowledgment of the receipt of said message by other stations.

(570) (2) Stations of the mobile service which receive a distress message from a mobile station which unquestionably is not in their vicinity, must wait a short period of time before acknowledging receipt thereof, in order to make it possible for stations nearer to the mobile station in distress to answer and acknowledge receipt without interference.

(573) 14. The control of distress traffic shall devolve upon the mobile station in distress or upon the mobile station which has sent the distress call. These stations may delegate the control of the distress traffic to another station.

(603) 22. (1) In radiotelegraphy, the urgent signal shall consist of the group XXX transmitted three times, with the letters of each group, as well as the consecutive groups, well separated; it shall be sent before the call.

(604) 22. (2) In radiotelephony, the urgent signal shall consist of three transmissions of the expression PAN (corresponding to the French pronunciation of the word "panne"); it shall be transmitted before the call.

(605) (3) The urgent signal shall indicate that the calling station has a very urgent message to transmit concerning the safety of a ship, an aircraft, or another vehicle, or concerning the safety of some person on board or sighted from on board.

(606) (4) In the aeronautical service, the urgent signal PAN shall be used in radiotelegraphy and in radiotelephony to

indicate that the aircraft transmitting it is in trouble and is forced to land, but that it is not in need of immediate help. This signal should, so far as possible, be followed by a message giving additional information.

(607) (5) The urgent signal shall have priority over all other communications, except distress communications, and all mobile or land stations hearing it must take care not to interfere with the transmission of the message which follows the urgent signal.

(608) (6) In case the urgent signal is used by a mobile station, this signal must, as a general rule, subject to the provisions of No. 606, be addressed to a definite station.

(612) 25. (1) The urgent signal may be transmitted only with the authorization of the master or of the person responsible for the ship, aircraft, or any other vehicle carrying the mobile station.

(613) (2) In the case of a land station, the urgent signal may be transmitted only with the approval of the responsible authority.

(615) 26. (1) In radiotelegraphy, the safety signal shall consist of the group TTT, transmitted three times, with the letters of each group, as well as the consecutive groups, well separated. This signal shall be followed by the word DE and three transmissions of the call signal of the station sending it. It announces that this station is about to transmit a message concerning the safety of navigation or giving important meteorological warnings.

(616) (2) In radiotelephony, the word Security (corresponding to the French pronunciation of the word "sécurité") repeated three times, shall be used as the safety signal.

(619) 28. (2) All stations hearing the safety signal must continue listening on the wave on which the safety signal has been sent until the message so announced has been completed; they must moreover keep silence on all waves likely to interfere with the message.

ARTICLE 26. *Order of Priority of Communications in the Mobile Service.*

(653) The order of priority of radio

communications in the mobile service shall be as follows:

1. Distress calls, distress messages, and distress traffic;

2. Communications preceded by an urgent signal;

3. Communications preceded by a safety signal;

4. Communications relative to radio direction-finding bearings;

5. Government radiotelegrams for which priority right has not been waived;

6. All other communications.

## Extracts from Rules and Regulations of the Federal Communications Commission

### CHAPTER 1—RULES OF PRACTICE AND PROCEDURE

SEC. 1.391 *Under Title III of the Act.* Any licensee receiving official notice of a violation of the terms of the Communications Act of 1934, of any legislative act, Executive Order, or treaty to which the United States is a party, or of the Rules and Regulations of the Federal Communications Commission, shall, within three days from such receipt, send a written answer direct to the Federal Communications Commission at Washington, D. C., and a copy thereof to the office of the Commission originating the official notice when the originating office is other than the office of the Commission in Washington, D. C. *Provided, however,* that if an answer cannot be sent nor an acknowledgment made within such three-day period by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date, with a satisfactory explanation of the delay. The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus, the answer shall state fully what steps, if any, are taken to prevent future violations, and if any new apparatus is to be installed, the date such apparatus was ordered, the



name of the manufacturer, and promised date of delivery. If the installation of such apparatus requires a construction permit, the file number of the application shall be given, or if a file number has not been assigned by the Commission, such identification as will permit of ready reference. If the notice of violation relates to some lack of attention or improper operation of the transmitter, the name and license number of the operator in charge shall be given.

SEC. 1.411 *Order of suspension.* 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 shall deem appropriate. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of suspension.

SEC. 1.412 *Proceedings.* Proceedings for the suspension of an operator's license shall in all cases be initiated by the entry of an order of suspension. Respondent will be given notice thereof together with notice of his right to be heard and to contest the proceeding. The effective date of the suspension will not be specified in the original order but will be fixed by subsequent motion of the Commission in accordance with the conditions specified above. Notice of the effective date of suspension will be given respondent, who shall send his operator license to the

office of the Commission in Washington, D. C., on or before the said effective date, or, if the effective date has passed at the time notice is received, the license shall be sent to the Commission forthwith.

#### PART 2—GENERAL RULES AND REGULATIONS

SEC. 2.48 *Station inspection.* The licensee of any radio station shall make the station available for inspection by representatives of the Commission at any reasonable hour and under the regulations governing the class of station concerned.

SEC. 2.52 *Operator license, posting of.* The original license of each station operator shall be posted at the place where he is on duty or kept in his possession in the manner specified in the regulations governing the class of station concerned.

SEC. 2.53 *Operators' place of duty. a.* Except as may be provided in the rules governing a particular class of station, one or more licensed operators of the grade specified by these rules and regulations shall be on duty at the place where the transmitting apparatus of each station is located and in actual charge thereof whenever it is being operated: *Provided, however,* that in the case of two or more stations, except amateur and broadcast, licensed in the name of the same person to use frequencies above 30,000 kilocycles only, a licensed radio operator of any class except amateur, radio-telephone third class, or holder of restricted operator permit who has the station within his effective control, may be on duty at any point within the communication range of such stations in lieu of the transmitter location or control point during the actual operation of the transmitting apparatus and shall supervise the emissions of all such stations so as to insure the proper operation in accordance with the station license.

SEC. 2.54 *Retention of radio station logs.* Logs of a radio station, when required elsewhere in these rules and regulations to be made or kept, shall be retained by the licensee for a period of one year unless otherwise provided by the rules governing the particular service or class of station concerned: *Provided, however,* that logs involving communica-

tions incident to a disaster or which include communications incident to or involved in an investigation by the Commission and concerning which the licensee has been notified, shall be retained by the licensee until specifically authorized in writing by the Commission to destroy them: *Provided, further,* that logs incident to or involved in any claim or complaint of which the licensee has notice shall be retained by the licensee until such claim or complaint has been fully satisfied or until the same has been barred by statute limiting the time for the filing of suits upon such claims.

SEC. 2.55. *Logs, by whom kept.* Each log shall be kept by the person or persons competent to do so, having actual knowledge of the facts required, who shall sign the log when starting duty and again when going off duty. The logs shall be made available upon request by an authorized representative of the Commission.

SEC. 2.57 *Correction of logs.* No log or portion thereof shall be erased, obliterated, or wilfully destroyed within the period of retention provided by the rules. Any necessary correction may be made only by the person originating the entry, who shall strike out the erroneous portion, initial the correction made and indicate the date of correction.

SEC. 2.58 *Rough logs.* Rough logs may be transcribed into condensed form, but in such case the original log or memoranda and all portions thereof shall be preserved and made a part of the complete log.

SEC. 2.59 *Distress messages.* Each station licensee shall give absolute priority to radio communications or signals relating to ships or aircraft 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 or aircraft 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.

SEC. 2.60 *Control of distress traffic.* The control of distress traffic shall devolve upon the mobile station in distress or upon the station which by application of the provisions of Sec. 2.61 has sent the distress call. These stations may delegate the control of the distress traffic to another station.

SEC. 2.61 *Retransmission of distress message.* Any station which becomes aware that a mobile station is in distress may transmit the distress message in the following cases:

a. When the station in distress is not itself in a position to transmit the message.

b. In the case of mobile stations, when the master or the person in charge of the ship, aircraft, or other vehicle carrying the station which intervenes believes that further help is necessary.

c. In the case of other stations, when directed to do so by the station in control of distress traffic or when it has reason to believe that a distress call which it has intercepted has not been received by any station in a position to render aid.

SEC. 2.62 *Resumption of operation after distress.* No station having been notified to cease operation shall resume operation on frequency or frequencies which may cause interference until notified by the station issuing the original notice that the station involved will not interfere with distress traffic as it is then being routed or until the receipt of a general notice that the need for handling distress traffic no longer exists.

SEC. 2.63 *Operation during emergency.* The licensee of any station, except amateurs, may, during a period of emergency in which the normal communication facilities are disrupted as a result of hurricane, flood, earthquake, or similar disaster, utilize such station for emergency communication service in communicating in a manner other than that specified in the station license, provided (1) that as soon as possible after the beginning of such emergency use notice be sent to the Commission in Washington, D. C., and to the Inspector in Charge of the district in which the station is located, stating the nature of the emergency and the use to



which the station is being put, and (2) that the emergency use of the station shall be discontinued as soon as substantially normal communication facilities are again available, and the Commission in Washington, D. C., and the Inspector in Charge be notified immediately when such special use of the station is terminated. The Commission may at any time order the discontinuance of such service.

**SEC. 2.75 Frequency measurement.** The licensee of each station shall provide means for the measurement of the station frequency. The measurement of the station frequency shall be made by a means independent of the frequency control of the transmitter, and shall be conducted in accord with the regulations governing the class of station concerned.

**SEC. 2.80 Operating power tolerance.** The operating power of all radio stations shall be maintained within the following tolerance of the assigned power:

1. When the maximum power only is specified, the operating power shall not be greater than necessary to carry on the service and in no event more than 5 per cent above the maximum power specified.

2. When an exact power is specified, the operating power shall not be more than 5 per cent above or less than 10 per cent below such power.

#### PART 13—RULES GOVERNING COMMERCIAL RADIO OPERATORS

**SEC. 13.61 Operators' authority.** The various classes of commercial operator licenses issued by the Commission authorize the holders thereof to operate radio stations, except amateur, as follows:

(e) *Restricted radiotelephone operator permit.* Any station while using type A-O, A-3, or A-4 emission: *Provided*, that,

(1) Such operator is prohibited from making adjustments that may result in improper transmitter operation.

(2) The equipment is so designed that none of the operations necessary to be performed during the course of normal rendition of service may cause off-frequency operation or result in any unauthorized radiation.

(3) Any needed adjustments of the transmitter that may affect the proper

operation of the station are regularly made by or in the presence of an operator holding a first- or second-class license, either telephone or telegraph, who shall be responsible for the proper operation of the equipment.

##### Exceptions:

(1) The permit is not valid for the operation of any of the various classes of broadcast stations other than a relay broadcast station.

(2) The permit is not valid for the operation of a coastal telephone station or a coastal harbor station other than in the Territory of Alaska.

(3) The permit is not valid for the operation of a ship station licensed to use type A-3 emission for communication with coastal telephone stations.

(f) *Restricted radiotelegraph operator permit.* Any station while using type B, A-O, A-1, A-2, A-3, or A-4 emission: *Provided*, that, in the case of equipment designed for and using type A-3 or A-4 emission,

(1) Such operator is prohibited from making adjustments that may result in improper transmitter operation.

(2) The equipment is so designed that none of the operations necessary to be performed during the course of normal rendition of service may cause off-frequency operation or result in any unauthorized radiation.

(3) Any needed adjustments of the transmitter which may affect proper operation of the station are regularly made by or in the presence of an operator holding a first- or second-class license, either telephone or telegraph, who shall be responsible for the proper operation of the equipment.

##### Exceptions:

(1) The permit is not valid for the operation of any of the various classes of broadcast stations other than a relay broadcast station.

(2) The permit is not valid for the operation of a ship station licensed to use type A-3 emission for communication with coastal telephone stations.

(3) The license is not valid for the operation of a radiotelegraph station on board a vessel required by treaty or sta-

tute to be equipped with a radio installation.

(4) The license is not valid for the operation of any ship telegraph, coastal telegraph, or marine-relay station open to public correspondence.

**SEC. 13.63 Operator's responsibility.** The licensed operator responsible for the maintenance of a transmitter may permit other persons to adjust a transmitter in his presence for the purpose of carrying out tests or making adjustments requiring specialized knowledge or skill, provided that he shall not be relieved thereby from responsibility for the proper operation of the equipment.

**SEC. 13.71 Issue of duplicate license.** An operator whose license or permit has been lost, mutilated, or destroyed, shall immediately notify the Commission. A sworn application for duplicate should be submitted to the office of issue embodying a statement attesting to the facts thereof. If a license has been lost, the applicant must state that reasonable search has been made for it, and further, that in the event it be found, either the original or the duplicate will be returned for cancellation. The applicant must also give a statement of the service that has been obtained under the lost license.

**SEC. 13.72 Exhibiting signed copy of application.** When a duplicate operator license or permit has been requested, or request for renewal upon service has been made, the operator shall exhibit in lieu thereof a signed copy of the application for duplicate, or renewal, which has been submitted by him.

**SEC. 13.75 Posting license or verified statement.** The holder of a radiotelegraph or radiotelephone first- or second-class license who is employed as a service and maintenance operator at stations operated by holders of Restricted Operator Permits shall post at such station his operator license or a verified statement from the Commission in lieu thereof.

#### F.C.C. Operators' Examinations

To keep in step with developments in the field of radio communications, the Federal Communications Commission has placed into effect a new system of giving

examinations to applicants for commercial operators' licenses. The new system was introduced primarily to insure that applicants are properly qualified for responsible positions as radio operators in the communications field. With increased power, higher efficiency, closer frequency tolerances and the introduction of a greater variety of equipment, radio operators must not only know the fundamentals of radio, but must also be familiar with the more advanced problems occurring in the operation and maintenance of transmitting and receiving equipment employed for communication purposes.

**Examination Elements.** The new examinations are divided into six elements, and written examinations will comprise questions from one or more of the following elements:

(1) *Basic Law.*—Provisions of law and regulation with which every operator should be familiar. The examination consists of ten questions: Three on the Communications Act of 1934, two on the International General Radio Regulations (Cairo revision), and five on the Rules and Regulations of the Federal Communications Commission. The questions are to be answered in essay form.

(2) *Basic Theory and Practice.*—Technical matters appropriate for every class of license except restricted radiotelephone operator permit.

(3) *Radiotelephone.*—Additional matters, both legal and technical, including radiotelephone theory and practice.

(4) *Advanced Radiotelephone.*—Theory and practice applicable to broadcast station operation.

(5) *Radiotelegraph.*—Additional matters, both legal and technical, including radiotelegraph theory and practice.

(6) *Advanced Radiotelegraph.*—Radio telegraph theory and practice of wider scope, particularly with respect to ship radio matters (direction finders, ship radiotelephone stations, spark transmitters, etc.).

**Grading.** Ten per cent will be allowed for each question answered correctly.

Each element, except Element 1, of the examination comprises 10 pages of 5 ques-



tions each, totaling 50 questions. Two per cent credit will be allowed for each correct solution. No credit will be allowed if a question is unanswered, or if more than one solution is indicated, or if a solution is only partially correct. In all computations a slide rule may be used, and normal slide-rule accuracy in the solutions will be accepted.

The questions comprising the Elements 2 to 6, inclusive, do not under any circumstances require or permit an essay or explanatory type of answer. In answering the type of question in which several choices are given, the applicant *must* choose *one* (and only *one*) of the answers shown. The numeral preceding the answer which is selected as correct must be inserted in the space which is provided, to the right of the question. Two examples of this type of question are given below:

San Francisco is located in:

1. Nebraska.
2. New York.
3. Oregon.
4. California.
5. Texas.

4

San Francisco is *not* located in

1. The Western Hemisphere.
2. The United States.
3. North America.
4. California.
5. Canada.

5

The other types of questions which may be found in the examination are to be answered by the solution of a simple mathematical problem, the drawing of a simple diagram, the completion of an incomplete diagram, or the correction of an incorrect diagram, as required. In the correction of an incorrect diagram, any connection which is to be eliminated shall be crossed out by means of a wavy line or by short diagonal cross lines.

The applicant must sign his name in the space which is provided on each sheet of the examination. Before beginning the examination, the applicant should read carefully the instructions printed on the element envelope.

*Examination Requirements.* Applicants

for original licenses will be required to pass examinations as follows:

- (a) Radiotelephone second-class operator license:
  - (1) Ability to transmit and receive spoken messages in English.
  - (2) Written examination elements one, two and three.
- (b) Radiotelephone first-class operator license:
  - (1) Ability to transmit and receive spoken messages in English.
  - (2) Written examination elements one, two, three and four.
- (c) Radiotelegraph second-class operator license:
  - (1) Ability to transmit and receive spoken messages in English.
  - (2) Transmitting and receiving code test of sixteen (16) code groups per minute.
  - (3) Written examination elements one, two, five and six.
- (d) Radiotelegraph first-class operator license:
  - (1) Ability to transmit and receive spoken messages in English.
  - (2) Transmitting and receiving code test of twenty-five (25) words per minute plain language and twenty (20) code groups per minute.
  - (3) Written examination elements one, two, five and six.
- (e) Restricted radiotelephone operator permit:
  - (1) Ability to transmit and receive spoken messages in English.
  - (2) Written examination element one.
- (f) Restricted radiotelegraph operator permit:
  - (1) Transmitting and receiving code text of sixteen (16) code groups per minute.
  - (2) Written examination elements one, two and five.

*Form of Writing.* Written examinations shall be in English and shall be written by the applicant in longhand in ink, except that diagrams may be in pencil. A ruler, a compass and an eraser, as well as several long, well-sharpened lead pencils, will be desirable for the drawing of diagrams and sketches. All writing paper to be used during examination will be furnished by

the inspector. Books and papers may not be taken into the examining room.

*Passing Mark.* A passing mark of 75% of a possible 100% will be required on each element of a written examination.

*New Class—Additional Requirements.*

The holder of a license who applies for another class of license will be required to pass only the added examination elements for the new class of license.

*Eligibility for Reexamination.* An applicant who fails an examination element will be ineligible for two months to take an examination for any class of license requiring that element. A month after date is the same day of the following month, or if there is no such day, the last day of such month. This principle applies for other periods. For example, in the case of the two-month period to which this note refers, an applicant examined December 1 may be reexamined February 1, and an applicant examined December 29, 30, or 31 may be reexamined the last day of February, while one examined February 28 may be reexamined April 28. Examination elements will be graded in the order listed, and an applicant may, without further application, be issued the class license for which he qualifies.

### Extracts from F.C.C. Rules and Regulations Applicable to Broadcast Stations

69. *Broadcast Service.* The band of frequencies extending from 540 to 1,550 kilocycles, both inclusive, is allocated for use by broadcast stations. This band of frequencies is referred to herein as the "broadcast band."

70. *Classes of Broadcast Stations.* For the purposes of allocation of frequencies, power, and time of operation, broadcast stations are classified as follows:

#### A. FREQUENCY AND POWER DESIGNATIONS

- |                         |              |
|-------------------------|--------------|
| a. Clear channel.       | c. Regional. |
| b. High power regional. | d. Local.    |

#### B. TIME DESIGNATION

- |                    |                     |
|--------------------|---------------------|
| a. Unlimited time. | d. Sharing time.    |
| b. Limited time.   | e. Part time.       |
| c. Daytime.        | f. Specified hours. |

### DEFINITIONS

71. The term "broadcast station" means a station used for the dissemination of radiotelephone emissions intended to be received by the public.

72. The term "clear channel station" means a station licensed to operate on a frequency designated as a clear channel.

73. The term "high power regional station" means a station licensed to operate simultaneously with one or more stations assigned to the same frequency designated for such use, and with an authorized power of not less than 5 kilowatts.

74. The term "regional station" means a station licensed to operate simultaneously with one or more stations assigned to the same frequency designated for such use, and with an authorized power of not less than 250 watts nor more than 1,000 watts at night, and not more than 2,500 watts during daytime.

75. The term "local station" means a station licensed to operate with other stations assigned to the same frequency designated for such use, and with an authorized power of 100 watts at night and not more than 250 watts during daytime.

76. The term "unlimited time station" means a station licensed to operate without a maximum limit as to time.

77. The term "limited time station" means a station licensed to operate, on a frequency designated as a clear channel, during daytime, and until local sunset, or until sunset at the dominant clear channel station, and in addition during night hours, if any, not used by the dominant clear channel station.

78. The term "daytime station" means a station licensed to operate during the hours between 6 a.m. and local sunset, or until sunset at the dominant station if farther west than the daytime station.

79. The term "sharing time station" means a station the operating hours of which are so restricted by the station license as to require a division of time with one or more other stations using the same frequency in the same geographical area.

80. The term "part-time station" means a station the operating hours of which are specified in the station license as a



fraction of the total hours of the broadcast day, and the use of the same frequency during the remainder of the time not assigned to any other station in the same geographical area.

81. The term "specified hours station" means a station the exact operating hours of which are specified in the license.

82. The term "Canadian exclusive frequency" means a frequency in the broadcast band which is reserved for exclusive use by stations located in the Dominion of Canada.

83. The term "Canadian shared frequency" means a frequency in the broadcast band used simultaneously by broadcast stations located in the Dominion of Canada and the United States, its Territories and possessions.

84. The term "daytime" means that period of time between 6 a.m. and local sunset.

85. The term "nighttime" means that period of time between local sunset and 12 midnight.

86. The term "sunset" means, for each particular location and during any particular month, the average time of sunset as specified in the license of a broadcast station.

87. The term "broadcast day" means that period of time between 6 a.m. and 12 midnight, local standard time.

88. The term "experimental period" means that period of time between 12 midnight and 6 a.m. This period may be used for experimental purposes by the licensee of any broadcast station, on its assigned frequency and with its authorized power, provided no interference is caused to other stations maintaining a regular operating schedule within such period, and provided further that no "daytime" station or "specified hours" station may broadcast any commercial or sponsored program during this period.

89. The term "main studio" means, as to any station, the studio from which the majority of its local programs originate, and/or from which a majority of its station announcements are made of programs originating at remote points.

90. The term "portable transmitter" means a transmitter so constructed that it

may be moved about conveniently from place to place, and is in fact so moved about from time to time, but not ordinarily used while in motion. In the broadcast band, such a transmitter is used for making field intensity measurements in locating a satisfactory site before erection of a permanent transmitter. A portable broadcast station will not be licensed for regular transmission of programs intended to be received by the public.

91. The term "auxiliary transmitter" means a transmitter maintained only for transmitting the regular program of a station in case of failure of the main transmitter.

92. The term "authorized power" or "licensed power" means the power assigned to a station by the Commission, and specified in the instrument of authorization.

93. The term "maximum rated carrier power" means the power determined by the design of a transmitter and the type and number of vacuum tubes used in the last radio stage. This power is to be distinguished from the operating power; in general, it is the maximum power at which the transmitter can be operated satisfactorily.

94. The term "operating power" means the power that is actually transmitted by the station. This power is determined by one of several methods hereinafter set out. (See paragraph 134.) The operating power shall be the same as the licensed power.

95. The term "plate input power" means the product of the direct plate voltage applied to the tubes in the last radio stage and the total direct current flowing to these tubes, measured without modulation.

96. The term "last radio stage" means the oscillator or radio-frequency power amplifier stage that supplies power to the antenna.

97. The term "antenna input power" or "antenna power" means the product of the total antenna resistance and the square of the antenna current at the operating frequency.

98. The term "modulation" means the

process whereby the frequency or amplitude of a radio wave is varied in accordance with a sound wave.

99. The term "modulator" means the last audio frequency amplifier stage which modulates a radio stage.

100. The term "modulated stage" means the radio-frequency amplifier stage to which the modulator is coupled and which is modulated.

101. The term "percentage modulation" means the ratio of half the difference between the maximum and minimum amplitudes of a modulated wave to the average amplitude, expressed in percentage.

102. The term "maximum percentage of modulation" means the greatest percentage of modulation that may be obtained by a transmitter without producing in its output more than 10 percent combined audio harmonics.

103. The term "combined audio harmonics" means the sum of the amplitudes of all the various harmonic components.

104. The term "high level modulation" means that the plate circuit of the last radio stage is modulated.

105. The term "low level modulation" means that a radio stage before the last one is modulated, and the last radio stage operates only as a linear power amplifier.

106. The term "grid bias modulation in the last radio stage" means that the grid bias of the last radio stage is varied by the audio-frequency power supplied by the modulator. If such modulation is employed in other than the last radio stage, it is low-level modulation.

107. The term "antenna resistance" means the total resistance of the transmitting antenna system at the operating frequency and at the point at which the antenna current is measured.

108. The term "antenna current" means the radio-frequency current in the antenna with no modulation.

129. No licensee shall change the number of vacuum tubes, change to vacuum tubes of a different power rating or class of operation in the last radio stage, or change system of modulation without the authority of the Commission.

130. Other changes which do not affect

the maximum power rating or operating power of the transmitter, or the operation or precision of the frequency-control equipment, may be made at any time without authority of the Commission, but in the next succeeding application for renewal of license such changes must be shown in full.

131. (c) No broadcast station licensee shall change the physical height of the transmitting antenna or supporting structures, or make any changes in the radiating system which will measurably alter the radiation patterns, except upon written application to and authority from the Commission.

(d) The antenna and/or supporting structure shall be painted and illuminated in accordance with the specifications supplied by the Commission in the Communications Act of 1934.

132. (a) The transmitter proper and associated transmitting equipment of each broadcast station shall be designed, constructed and operated in accordance with good engineering practice in all phases not otherwise specifically included in these regulations.

(b) The transmitter shall be wired and shielded in accordance with good engineering practice, and shall be provided with safety features in accordance with the specifications of Article 37 of the current National Electrical Code as approved by the American Standards Association.

(c) The station equipment shall be so operated, tuned, and adjusted that emissions are not radiated outside the authorized band which cause or are capable of causing interference to the communications of other stations. The spurious emissions, including radio frequency harmonics and audio frequency harmonics, shall be maintained at as low a level as required by good engineering practice. The program distortion, audio frequency range, carrier hum, noise level, and other essential phases of the operation which control the external effects shall at all times conform to the requirements of good engineering practice.

(d) Whenever, in this rule, the term "good engineering practice" is used, the specifications deemed necessary to meet



the requirements of good engineering practice will be published from time to time.

#### TECHNICAL OPERATION

134. The operating power of a broadcast station will be determined either by direct measurement or indirect measurement by means of the plate input power to the last radio stage.

a. Unless specifically authorized by the Commission to do otherwise, the licensee of a broadcast station shall compute its operating power by indirect method by means of the plate input power to the last radio stage.

b. Any licensee who has at any time been authorized by the Commission to compute operating power by any other method (e.g., by antenna input direct measurement, or radiated power measurements computed from field intensity measurements) shall, upon making any change in the antenna system or in the antenna current measuring instruments, or any other change which may change the characteristics of the antenna, revert to the use of the indirect measurement of antenna input until further order of the Commission.

135. The operating power shall be determined by indirect measurement from the plate input power of the last radio stage by multiplying the plate voltage  $E_p$  by the total plate current of the last radio stage  $I_p$  and by the proper factor  $F$  (Operating power =  $E_p \times I_p \times F$ ). For stations using high-level modulation, the value of factor  $F$  depends upon the maximum rated carrier power of the transmitter. When this power is 100 watts, the value of  $F$  is 0.50; for powers between 250 and 1,000 watts,  $F$  is .60; for powers between 2,500 and 50,000 watts,  $F$  is .65.

For stations of all powers using low-level modulation, with maximum percentage of modulation from 85 to 100, the value of  $F$  is 0.33.

For stations of all powers using grid bias modulation in the last radio stage, with maximum percentage of modulation from 85 to 100, the value of  $F$  is 0.22.

136. In computing operating power by indirect measurement, the above factors shall apply in all cases, and no distinction will be recognized due to the operating

power being less than the maximum rated carrier power.

137. The antenna input power determined by direct measurement is the square of the antenna current times the antenna resistance at the point where the current is measured and at the operating frequency. Direct measurement of the antenna input power will be accepted as the operating power of the station, provided the data on the antenna resistance measurements are submitted under oath, giving detailed description of the method used and the data taken. The antenna current shall be measured by an ammeter of accepted accuracy. These data must be submitted to and approved by the Commission before any licensee will be authorized to operate by this method of power determination. The antenna ammeter shall not be changed to one of different type, maximum reading or accuracy without the authority of the Commission. If any change is made in the antenna system or any change made which may affect the antenna system, the method of determining operating power shall be changed immediately to the indirect method.

138. The operating power of a broadcast station determined by the radiated power computed from field intensity measurements may be accepted in lieu of antenna input power, provided a sufficient number of measurements are taken to insure accuracy and an analysis of the antenna system is submitted indicating the relative distribution of the radiation (i.e., ground and sky wave radiation.) The data on the antenna resistance, complete description of the antenna system with dimensions and method of taking field intensity measurements and of relating these measurements to the operating power shall be submitted to and approved by the Commission before any licensee will be authorized to operate by this method of power determination. If any change is made in the antenna system or any change made which may affect the antenna system, the method of determining operation power shall be changed immediately to the indirect method.

139. (a) A licensee of a broadcast station will not be authorized to operate a

transmitter unless it is capable of delivering satisfactorily the authorized power with a modulation of at least 85 per cent. When the transmitter is operated with 85 per cent modulation, not over 10 per cent combined audio frequency harmonics shall be generated by the transmitter.

(b) All broadcast stations shall, on and after November 1, 1936, have in operation a modulation monitor approved by the Commission.

(c) The operating percentage of modulation of all stations shall be maintained as high as possible consistent with good quality of transmission and good broadcast practice and in no case less than 85 per cent on peaks of frequent recurrence during any selection which normally is transmitted at the highest level of the program under consideration.

(d) The Commission will, from time to time, publish the specifications, requirements for approval, and a list of approved modulation monitors.

140. A licensee of a broadcast station will not be authorized to operate a transmitter with an operating power greater than the maximum rated carrier power of the transmitter.

141. A licensee of a broadcast station claiming a greater percentage of modulation than the fundamental design indicates can be procured, shall submit full data showing the antenna input power by direct measurement, and complete information, either oscillograms or other acceptable data, to show that a modulation of 85 per cent or more, with not over 10 per cent combined audio harmonics, can be obtained with the transmitter operated at the maximum authorized power.

142. The licensee of a broadcast station shall maintain the operating power of the station in exact accord with its licensed power at all times, except that in an emergency when, due to causes beyond the control of the licensee, it becomes impossible to operate with the full licensed power, the station may be operated at reduced power for a period of not to exceed 10 days, provided that the Commission and the inspector in charge shall be notified in writing immediately after the emergency develops.

143. Each broadcast station shall be equipped with suitable indicating instruments of accepted accuracy to measure the antenna current, direct plate circuit voltage, and the direct plate circuit current of the last radio stage. These indicating instruments shall not be changed or replaced, without authority of the Commission, except by instruments of the same type, maximum scale reading, and accuracy.

144. Each broadcast station shall be so operated that the frequency is maintained between the limits of 20 cycles per second above to 20 cycles per second below the assigned frequency.

145. The licensee of a broadcast station shall make provision for the checking of the frequency of the emitted wave by means independent of the frequency control of the transmitter and capable of the accuracy specified in paragraph 144.

146. The Commission will authorize the installation of new transmitting equipment in a broadcast station, or changes in the frequency control of an existing transmitter, only if such equipment is so designed that there is reasonable assurance that the transmitter is capable of maintaining automatically the assigned frequency within the limits of 20 cycles per second above to 20 cycles per second below the assigned frequency.

147. New automatic frequency control equipment, and changes in existing automatic frequency control equipment that may affect the precision of frequency control or the operation of the transmitter, shall be installed only upon authorization from the Commission.

148. Upon showing that a need exists for the use of an auxiliary transmitter\* in addition to the regular transmitter of a broadcast station, a license may be issued therefore provided that:

a. An auxiliary transmitter shall be installed only at the same location as the main transmitter, except that upon satisfactory showing of technical necessity, the Commission may authorize another location.

b. A licensed operator shall be in con-

\* All regulations applying to broadcast transmitting equipment shall apply also to an auxiliary transmitter.



trol whenever an auxiliary transmitter is placed in operation.

c. The auxiliary transmitter shall be maintained so that it may be put into immediate operation at any time upon failure of the main transmitter, or upon request by a duly authorized Government representative.

d. The auxiliary transmitter shall be tested at least once each week to determine that it is in proper operating condition, and that it is adjusted to the proper frequency. A record shall be kept of the time and result of test. Tests shall be conducted only between 1 a.m. and 12 noon.

e. The auxiliary transmitter shall be equipped with satisfactory control equipment which will enable the maintenance of the frequency emitted by the station within the limits prescribed by these regulations.

f. An auxiliary transmitter which is licensed at a geographical location different from that of the main transmitter shall be equipped with a frequency control which will automatically hold the frequency within the limits prescribed by these regulations without any manual adjustment during operation or when it is being put into operation.

149. If a licensee of a broadcast station has duplicate transmitting equipment and arranges for alternate operation, one such duplicate shall be considered as an auxiliary transmitter subject to the above conditions: *Provided, however*, that duplicate equipment for alternate operation may be licensed when the Commission is satisfied that desirable experimental work is being carried on, in which case the licensee shall be subject to the regulations governing experimental stations.

150. Within two days after each use of the auxiliary transmitter, except for testing, the Commission and the inspector in charge shall be notified in writing of the date, time, and power at which the auxiliary transmitter is operated, and the reasons for each use.

#### TIME OF OPERATION

151. Except Sundays, the licensee of each broadcast station shall maintain a

minimum regular operating schedule of two thirds of the hours that it is authorized to operate during each broadcast day, except that in an emergency when, due to causes beyond the control of the licensee, it becomes impossible to continue operating, the station may cease operation for a period of not to exceed 10 days, provided that the Commission and the inspector in charge shall be notified in writing immediately after the emergency develops.

152. If the minimum operating schedule herein required is not adhered to, the licensee may, after hearing, be required to share time with other stations, or be limited to operation during daytime or during specified hours.

153. A licensee of an unlimited time station may operate the station on any schedule of hours during the broadcast day and the experimental period, provided the minimum regular schedule is maintained during the broadcast day.

154. If the license of a sharing time station specifies the hours of operation, the schedule so specified shall be adhered to until otherwise ordered by the Commission.

155. If the licenses of sharing time stations do not specify hours of operation, the licensees shall endeavor to reach an agreement for a definite schedule of periods of time to be used by each. Such agreement shall be in writing, and each licensee shall file the same in triplicate original with each application to the Commission for renewal of license. If and when such written agreements are properly filed in conformity with this order, the file mark of the Commission will be affixed thereto, one copy will be retained by the Commission, one copy forwarded to the inspector in charge, and one copy returned to the licensee to be posted with the station license and considered as a part thereof. If the license specifies a proportionate time division, the agreement shall maintain this proportion. If no proportionate time division is specified in the license, the licensees shall agree upon a division of time. Such division of time shall not include simultaneous operation of the stations unless speci-

cally authorized by the terms of the license.

156. Departure from the regular operating schedule set forth in a time-sharing agreement will be permitted only in cases where an agreement to that effect is reduced to writing, is signed by the licensees of the stations affected thereby, and filed in triplicate by each licensee with the Commission prior to the time of the proposed change. If time is of the essence, the actual departure in operating schedule may precede the actual filing of written agreement, provided appropriate notice is sent to the Commission and the inspector in charge.

157. If the licensees of sharing time stations are unable to agree on a division of time, the Commission shall be so notified by statement to that effect filed with application for renewal of license. Upon receipt of such statement, the Commission will designate the application for a hearing and, pending such hearing, the operating schedule previously adhered to shall remain in full force and effect.

158. If the licensee of a broadcast station is required to cease operation of the station at the time of sunset at some point within the United States, the license will specify the hour of the day during each month of the license period when operation of such station shall cease.

159. The licensee of a limited time station that is authorized to resume operation at the time the unlimited time station on the same frequency ceases operation, shall, with each application for renewal of license, file in triplicate a copy of his regular operating schedule, signed and approved by the licensee of the unlimited time station. Upon receipt of such operating schedule, properly executed, the Commission will affix its file mark, retain one copy, forward one copy to the inspector in charge, and return one copy to the licensee of the limited time station, who shall post it with the station license, and it shall be considered as a part thereof. Departure from said operating schedule will be permitted only in accordance with the procedure set forth in paragraph 156.

160. If the licensees of the limited time

and unlimited time stations are unable to agree upon a definite time for resumption of operation by the limited time station, the Commission shall be so notified by the licensee of the limited time station. After receipt of such statement the Commission will designate for hearing the applications of both stations for renewal of license, and pending the hearing the schedule previously adhered to shall remain in full force and effect.

161. Any broadcast station, other than a day or limited time station, that is licensed for operation part time on a channel on which the entire available broadcast time (i.e., the broadcast day) has not been designated for use in the same geographical area, may operate only during the hours specified in the license.

162. In all cases where a station licensee is required to prepare and file an operating schedule, any deviation or departure from such schedule, except as herein authorized, shall be considered as a violation of a material term of the license.

163. In all cases where specific hours of operation are fixed in the license, any deviation or departure therefrom, except as authorized by the Commission, shall be considered as a violation of the material terms of the license.

164. Upon completion of construction of a broadcast station in exact accord with the terms of the construction permit, and prior to the filing of application for license, the permittee is authorized to test the equipment between the hours of 1 a.m. and 6 a.m., local standard time, for a period not to exceed 10 days: *Provided*, that the Commission and the inspector in charge are notified two days in advance of the beginning of such equipment tests: *And provided further*, that the Commission may cancel or change the period and/or date of the beginning of such authority as may appear to be in the public interest, convenience, and necessity.

165. When construction is completed in exact accord with the terms of the construction permit, and after an application for station license has been filed with the Commission, showing the transmitter to be in satisfactory operating condition, the permittee is authorized to conduct pro-



gram tests in exact accord with the equipment, power, frequency, and hours of operation specified in the construction permit, for a period not to exceed 30 days: *Provided*, that the Commission and the inspector in charge of the proper district are notified two days in advance of the beginning of such program tests: *And provided further*, that the Commission may cancel or change the period and/or date of the beginning of such authority as may appear to be in the public interest, convenience and necessity.

166. If local time is changed from standard time to daylight-saving time at the location of all stations sharing time on the same frequency, the hours of operation of all such stations on that frequency shall be understood to refer to daylight-saving time, and not standard time, as long as daylight-saving time is observed. This provision shall govern when the time is changed by provision of law or general observance of daylight-saving time by the various communities, and when the time of operation of such stations is specified in the license or is mutually agreed upon by the licensees: *Provided, however*, that when the license specifies average time of sunset, local standard time shall be used.

167. Where the local time is not changed from standard time to daylight-saving time at the location of all stations sharing time on the same frequency, the hours of operation on this frequency shall be understood to have reference to standard time, and not daylight-saving time, unless said licensees mutually agreed upon a new schedule which shall be effective only while daylight-saving time is observed at the location of some of these stations.

168. The time of operation of any broadcast station which does not share time with other stations on the same frequency shall be understood to have reference to local standard time unless modification of such license with respect to hours of operation is made by the Commission.

169. The station license shall be posted in a conspicuous place in the room in which the transmitter is located, and the

license of the station operator shall be posted in a conspicuous place in a room occupied by the operator while on duty.

170. The licensee of each station shall keep a licensed operator or operators, of the grade specified by the secretary of the Commission, on duty during all periods of actual operation of the transmitter at the place where the transmitting equipment is located.

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

### LOG RECORDS

172. The licensee of each broadcast station shall maintain program and operating logs and shall require entries to be made as follows:

A. *The Program Log.* a. An entry of the time each station and call announcement is made, with an indication of the type of announcement.

b. An entry briefly describing each program broadcast, such as "music," "drama," "speech," etc., with the time of the beginning and ending. If a mechanical reproduction is used, that fact shall be noted, together with an indication whether announcement thereof was made. If a speech is made by a political candidate, the name and political affiliations of such speaker shall be entered.

B. *The Operating Log.* a. An entry of the time the station begins to supply power to the antenna, and the time it stops.

b. An entry of the time the program begins and ends.

c. An entry of each interruption to the carrier wave, its cause and duration.

d. An entry of the following each 30 minutes:

- (1) Operating constants of last radio stage (total plate current and plate voltage).
- (2) Antenna current.
- (3) Frequency check.
- (4) Temperature of crystal control chamber.

173. Each log shall be kept by the per-

son or persons competent to do so, having actual knowledge of the facts required, and who shall sign the log when starting duty and again when going off duty. The logs shall be made available upon request by authorized Government representatives.

174. The exact form of logs is not prescribed, but they shall be kept in an orderly manner, and in such detail that the information required is readily available. Key letters or abbreviations may be used if the explanation of each is given plainly in the log.

175. Each licensee of a broadcast station shall announce the call letters and location as frequently as practicable during the hours of operation, and in any event before or after each program being broadcast. In no event shall more than 30 minutes elapse between such announcements, and in so far as practicable these announcements shall be made on the hour and half hour. These requirements are waived when such announcements would interrupt a single consecutive speech, play, symphony concert or operatic production of longer duration than 30 minutes; in such cases, the announcement of the call letters and location shall be made as soon as possible.

176. Each broadcast program consisting of a mechanical reproduction, or a series of mechanical reproductions, shall be announced in the manner and to the extent set out below:

1. A mechanical reproduction, or a series thereof, of longer duration than fifteen minutes, shall be identified by appropriate announcement at the beginning of the program, at each fifteen minute interval, and at the conclusion of the program; provided, however, that the identifying announcement at each fifteen minute interval is waived in case of a mechanical reproduction consisting of a single, continuous, uninterrupted speech, play, symphony concert or operatic production of longer duration than fifteen minutes.
2. A mechanical reproduction, or a series thereof, of a longer duration than five minutes and not in excess of fifteen minutes, shall be identified by an appropriate announcement at the beginning and end of the program.
3. A single mechanical reproduction of a duration not in excess of five minutes,

shall be identified by appropriate announcement immediately preceding the use thereof.

4. In case a mechanical reproduction is used for background music, sound effects, station identification, program identification (theme music of short duration), or identification of the sponsorship of the program proper, no announcement of the mechanical reproduction is required.
5. The exact form of the identifying announcement is not prescribed but the language shall be clear and in terms commonly used and understood by the listening public. The use of the applicable identifying words such as "a record", "a recording", "a recorded program", "a mechanical reproduction", "a transcription", "an electrical transcription", will be considered sufficient to meet the requirements hereof. The identifying words shall accurately describe the type of mechanical reproduction used, i. e. where a transcription is used it shall be announced as a "transcription" or an "electrical transcription", and where a phonograph record is used it shall be announced as a "record" or a "recording."

177. The term "rebroadcast" means reception by radio of the program\* of a radio station, and the simultaneous or subsequent retransmission of such program by a broadcast station.\*\*

180. No station licensee shall resume operations until the need for distress traffic no longer exists, or it is determined that the station will not interfere with distress traffic as it is then being routed, and the operation of the station shall again be discontinued if the routing of distress traffic is so changed that the station will interfere. The status of distress traffic may be ascertained by communication with Government and commercial stations. The Commission may hereafter require the licensees of certain stations to keep an effective watch on the distress frequency, 600 kilocycles (410 kilocycles in the Great Lakes area.)

### Classification of Emissions

A. Emissions shall be classified according to the purpose for which they are

\* As used herein, "program" means any complete program or part thereof, or any signals if other than A-3 emission.

\*\* In case a program is transmitted from its point of origin to a broadcast station entirely by telephone facilities in which a section of such transmission is by radio, the broadcasting of this program is not considered a rebroadcast.



used, assuming their modulation or their possible keying to be only in amplitude, as follows:

#### 1. Continuous waves.

**Type A-0.** Waves the successive oscillations of which are identical under fixed conditions.<sup>1</sup>

**Type A-1.** Telegraphy on pure continuous waves. A continuous wave which is keyed according to a telegraph code.

**Type A-2.** Modulated telegraphy. A carrier wave modulated at one or more audible frequencies, or their combination with the carrier wave being keyed according to a telegraph code.

**Type A-3.** Telephony. Waves resulting from the modulation of a carrier wave by frequencies corresponding to the voice, to music or to other sounds.

**Type A-4.** Facsimile. Waves resulting from the modulation of a carrier wave by frequencies produced at the time of the scanning of a fixed image, with a view to its reproduction in a permanent form.

**Type A-5.** Television. Waves resulting from the modulation of a carrier wave by frequencies produced at the time of the scanning of fixed or moving objects.<sup>2</sup>

#### 2. Damped waves:

**Type B.** Waves composed of successive series of oscillations the amplitude of which, after attaining a maximum, decreases gradually, the wave trains being keyed according to a telegraph code.

B. Authorization for other types of emission may be issued and will be termed "special" in the instrument of authorization. When special emissions are authorized they will be described and limited as to band width by the instrument of authorization.

C. Communication band width. The frequency bands authorized to be occupied by the above types of emission are as shown in the table in the next column.

D. The band width described herein is the maximum permissible for the type of emission indicated. In no case shall the band width emitted exceed the frequency separation band width as shown in the table of frequency allocations.

E. The term "Radiotelegraph" as hereinabove used shall be construed to include types A1, A2 and A4 emission.

F. The term "Radiotelephone" as here-

<sup>1</sup> These waves shall be used only in special cases, such as standard frequency emissions.

<sup>2</sup> "Objects" is used here in the optical sense of the word.

inabove used shall be construed to include type A3 emission only.

Type of transmission	Total width of the band in cycles. For transmission with two sidebands.
A-0 Continuous waves no signaling	
A-1 Telegraphy, pure, continuous wave Morse code Baudot code Stop-start printer	Numerically equal to the telegraph speed in bands for the fundamental frequency, 3 times this width for the 3rd harmonic, etc. (For a code of 8 time elements (dots or blanks) per letter and 48 time elements per word, the speed in bands shall be equal to 0.8 times the speed in words per minute.)
Scanning-type printer	300-1000, for speeds of 50 words per minute, according to the conditions of operation, and the number of lines scanned (for example, 7 or 12). Harmonics are not considered in the above values.
A-2 Telegraphy modulated to musical frequency	Figures appearing under A1, plus twice the highest modulation frequency.
A-3 Commercial telephony Broadcasting	About 6,000 to 8,000. <sup>3</sup>  15,000 to 20,000.
A-4 Facsimile	Approximately the ratio between the number of picture components <sup>4</sup> to be transmitted and the number of seconds necessary for the transmission.
A-5 Television	Approximately the product of the number of picture components <sup>4</sup> multiplied by the number of pictures transmitted per second.

## Rules and Regulations Governing Aviation Services

### DEFINITIONS

9.1 *Aviation service.* The term "aviation service" means a radiocommunication or special service carried on by aircraft stations, airport control stations, aeronautical stations, aeronautical fixed stations, instrument landing stations, and flying-school stations.

9.2 *Public aviation service* means a radiocommunication service open to public correspondence (paid or toll messages) to provide public communications

<sup>3</sup> It is recognized that the band-width be wider for multiple-channel radiotelephony and secret radiotelephony.

<sup>4</sup> Two picture components, one black and one white, constitute a cycle; thus, the modulation frequency equals one-half the number of components transmitted per second.

to, from, and between aircraft in flight.

9.3 *Aircraft station* means a radio station on board any aircraft (either heavier-than-air or lighter-than-air) other than public service aircraft station.

9.4 *Scheduled aircraft* means an aircraft regularly flying a fixed route.

9.5 *Nonscheduled aircraft* means other than scheduled aircraft.

9.6 *Aeronautical station* means a station used primarily for radiocommunication with aircraft stations, but which may also carry on a limited fixed service with other aeronautical stations in connection with the handling of communications relating to the safety of life and property in the air.

9.7 *Aeronautical fixed station* means a station used in the fixed service for the handling of point-to-point communications relating solely to actual aviation needs.

9.8 *Chain of stations* in the aviation service is a series of coordinated stations operating on frequencies allocated to aviation services in accordance with an approved plan.

9.9 *Airport control station* means a station provided for furnishing communications limited to actual aviation needs between an airport control tower and aircraft stations in the immediate vicinity of the airport.<sup>1</sup>

9.10 *Flying school station* means a station used for communications pertaining to instruction to students or pilots while in flight.

9.11 *Instrument landing station* is a special service station for facilitating the landing of aircraft.<sup>2</sup>

9.12 *Radio marker station* means a station marking a definite location on the ground as an aid to air navigation.<sup>3</sup>

9.13 *Public service aircraft station* means a station licensed on board an aircraft for the purpose of carrying on public aviation service.

<sup>1</sup> Approximately within 30 miles distance or 10 minutes flight of the airport.

<sup>2</sup> May include one or more of the following: Glide path transmitter, localizer transmitter, combination glide path and localizer transmitter, approach marker transmitters.

<sup>3</sup> May be any one of several types such as fan marker, inner marker, outer marker, or z marker. When a marker station is installed as part of an instrument landing system, it will not be separately licensed.

9.14 *Public service aeronautical station* means a land station licensed for communicating with public service aircraft stations for the purpose of carrying on a public aviation service.

### TESTS

9.31 *Equipment and service tests authorized for aeronautical and aeronautical fixed stations.* Equipment and service tests as authorized in sections 2.42 and 2.43 may be conducted provided that the necessary precautions are taken to avoid interference.

9.32 *Routine tests.* The licenses of all classes of stations in the aviation service are authorized to make such routine tests as may be required for the proper maintenance of the station, provided that precautions are taken to avoid interference with any station. Tests on 3105 and 6210 kilocycles using a regular antenna system can be made only at such times when no interference will be caused and, if in range of an airport control station or Civil Aeronautics Authority station, only after permission is secured from such stations before commencing the tests.

### LOGS

9.41 *Information required in station logs.* All stations in the aviation service except aircraft stations must keep an adequate log showing (1) hours of operation, (2) frequencies used, (3) stations with which communication was held, and (4) signature of operator(s) on duty.

9.42 *Station logs public aviation service.* In addition to all the requirements in section 9.41 above, all stations (both public service aircraft station and public service aeronautical station) in the public aviation service must keep a file of all record communications handled and a list of radiotelephone contacts established.

### INSPECTIONS

9.51 *Availability for inspections.* All classes of stations in the aviation service shall be made available for inspection upon request of an authorized representative of the Federal Government.

9.52 *Responsibility of licensee.* It is the responsibility of the licensees of air-



craft radio stations to submit their stations for inspection by a representative of the Commission at least once during the license period.

## COMMUNICATIONS

9.61 *Methods of identification.* The aircraft name, company number, trip number, official registry number or other identification approved by the Commission may be used in lieu of the call letters; provided that adequate records are maintained to permit ready identification of individual aircraft. Also the name of the city or airport in which other classes of stations are located may be used in lieu of the call letters of the station when using telephony. In the case of stations using telegraphic emissions, the call letters designated in the license shall be used at the end of each sequence of communication to one or more stations.

9.62. *Permissible communications.* All stations in the aviation service, except those stations licensed for public aviation service, shall transmit only communications relating to and necessary for aircraft operation and the protection of life and property in the air.

9.63 *Priority of aviation communications.* (a) The regular routine communications of stations in the aviation service are essential to the safe operation of aircraft and shall have priority over the public aviation service stations.

(b) The radio operator in charge of the aircraft station shall suspend operations of aviation public service stations when such operations will delay or interfere with messages pertaining to safety of life and property or when ordered to do so by the captain of the aircraft.

(c) The operation of public aviation service stations shall in no way interfere with the radiocommunications of the aviation service.

(d) In cases where the aviation public service aircraft station license is issued to cover auxiliary equipment of the regular aircraft station, public communications shall be restricted to the extent necessary for the safe operation of aircraft as determined by the person in charge of the aircraft.

## FREQUENCIES

### 9.71 Air control frequencies (kc.).

(a)	130,400			
(b)	* 129,200	129,800	131,000	131,600
(c)	* 129,000	130,000	130,800	131,400
	129,400	130,200	131,200	131,800
	129,600	130,600		

(d) 278 kc. This frequency is available for assignment in lieu of a high frequency, except that its use must be supplemented by a service on one of the high frequencies; provided, however, that upon application therefor the Commission may exempt any station from the high frequency service requirement when it appears that in the preservation of life and property in the air such service is not required at that station.

9.72 *Miscellaneous calling and working frequencies.* 333 kc. General calling frequency for aircraft stations operating outside the North American continent on transoceanic flights.

375 kc. International direction-finding frequency for use outside the continental United States.

457 kc. Working frequency exclusively for aircraft on sea flights desiring an intermediate frequency.

500 kc. International calling and distress frequency for ships and aircraft over the seas.

1638 kc. Air navigation frequency, available for aeronautical stations, scheduled and non-scheduled aircraft.

3105 kc.<sup>7</sup> National aircraft calling and working frequency for use by non-scheduled aircraft. The use of this frequency is restricted to communications pertaining solely to aircraft operation and the protection of life and property.

3117.5 kc.<sup>7</sup> National aircraft calling and working frequency for aircraft which normally fly regularly scheduled routes. The use of this frequency is restricted to communications pertaining solely to aircraft operation and the protection of life and property.

<sup>6</sup> These frequencies to be used, in the order named, in the event that the geographical location of airport stations is such as to render the use of the frequency 130,400 kc. impracticable.

<sup>7</sup> These frequencies will be assigned, when necessary, on the basis of an individual study of the circumstances surrounding each case.

6210 kc.<sup>7</sup> International aircraft calling and working frequency for use by both scheduled and non-scheduled aircraft. The use of this frequency is restricted to communications pertaining solely to aircraft operation and the protection of life and property.

140100 kc. National calling and working frequency available to aircraft for general communication purposes. The use of this frequency is restricted to communications pertaining solely to aircraft operation and the protection of life and property.

9.73 *Frequencies available for assignment to chain systems.*<sup>9</sup> The frequencies allocated to the several chains are as follows:

(a) *Northern transcontinental chain and feeders (red).* Available for aircraft and aeronautical stations:

3147.5	3372.5	5572.5	<sup>10</sup> 8240
3162.5	3467.5	5582.5	12330
3172.5	5122.5	5592.5	140800
3182.5	5162.5	5662.5	140940
3322.5	5172.5	5697.5	<sup>12</sup> 141080
		<sup>10</sup> 5825	<sup>12</sup> 141220

Available for aeronautical fixed stations:

<sup>10</sup> 12330

(b) *Midtranscontinental chain and feeders (blue).* Available for aeronautical and aircraft stations:

2906	<sup>12</sup> 4110	4967.5	<sup>10</sup> 10125
<sup>12</sup> 3062.5	4937.5	<sup>10</sup> 5692.5	141360
3072.5	4947.5	<sup>10</sup> 6510	141500
3088	4952.5	<sup>10</sup> 6520	<sup>12</sup> 141640
			<sup>12</sup> 141780

<sup>7</sup> 6210 kc. is established as an aircraft calling and working frequency on a world-wide basis by the General Radio Regulations (Cairo Revision 1938); 3105 kc. is allocated for similar purposes in the Western Hemisphere only by the Inter-American Arrangement Concerning Radiocommunications (Havana, December 1937); 3117.5 kc. is allocated for use for similar purposes by scheduled aircraft in the United States. Stations of the Civil Aeronautics Administration and airport control stations stand continuous watch on 3105 kc. Watch on 3117.5 and 6210 kc. is established only on specific request. The frequency 3105 kc. may be used by scheduled aircraft under outstanding licenses until the expiration of the license period. The frequency 3120 kc. may be used by non-scheduled aircraft under outstanding licenses until the expiration of the license period.

<sup>9</sup> Chain systems will be established as indicated upon a map to be maintained by the Commission, and this map will show the general routes and location of stations (except aircraft) in the aviation service authorized by the Commission.

<sup>10</sup> These frequencies are assigned upon the express condition that no interference will be caused to any service or any station which in the discretion of the Commission may have priority on the frequency or frequencies with which interference results.

<sup>12</sup> Available on a secondary basis.

<sup>13</sup> Subject to the condition that no interference is

Available for aeronautical fixed stations:

2732	<sup>10</sup> 6510	<sup>10</sup> 8015	<sup>10</sup> 10855
4110	<sup>10</sup> 6520	<sup>10</sup> 10125	

(c) *Southern transcontinental chain and feeders (brown).* Available for aeronautical and aircraft stations:

2946	3432.5	5612.5	<sup>10</sup> 6550
<sup>10</sup> 3137.5	4832.5	5622.5	<sup>10</sup> 7700
<sup>10</sup> 3222.5	<sup>15</sup> 5365	5632.5	<sup>10</sup> 10080
3232.5	<sup>15</sup> 5390	5652.5	141920
3242.5	<sup>15</sup> 5480	5672.5	142060
3257.5	5602.5	<sup>10</sup> 5887.5	<sup>12</sup> 142200
			<sup>12</sup> 142340

Available for aeronautical fixed stations:

2612	<sup>14</sup> 4730	<sup>14</sup> 5425	<sup>10</sup> 7700
<sup>12</sup> 2998	<sup>10</sup> 5255	<sup>10</sup> 6550	<sup>10</sup> 10080
<sup>12</sup> 3050	<sup>15</sup> 5365	<sup>10</sup> 6820	<sup>10</sup> 10190
<sup>10</sup> 3290			<sup>10</sup> 18360
4690			

(d) *Eastern continental chain and feeders (green).* Available for aeronautical and aircraft stations:

<sup>12</sup> 2608	2986	<sup>10</sup> 5707.5	<sup>12</sup> 11960
<sup>10</sup> 2898	4122.5	<sup>10</sup> 6795	140240
2922	<sup>10</sup> 4335	<sup>10</sup> 6805	140380
2946	4742.5	<sup>10</sup> 8565	<sup>12</sup> 140520
	5652.2		<sup>12</sup> 140660

Available for aeronautical fixed stations:

2608	<sup>14</sup> 4735	5310	<sup>10</sup> 8130
2748	<sup>14</sup> 4740	6795	<sup>10</sup> 10855
<sup>10</sup> 3290	<sup>14</sup> 4745	<sup>10</sup> 6805	<sup>10</sup> 11960
4115			
4335			

(e) *Northwestern continental chain and feeders (purple).* Available for aeronautical and aircraft stations:

2994	4917.5	<sup>10</sup> 5887.5	142900
3005	<sup>10</sup> 5275	<sup>10</sup> 6490	143040
3127.5	<sup>10</sup> 5377.5		<sup>12</sup> 143180

caused to Government stations, A3 emission may be used if the communication band width of emission does not exceed 3000 cycles.

<sup>14</sup> Subject to the condition that no interference is caused to aeronautical and aircraft stations.

<sup>15</sup> Maximum power 50 watts for use east of New York only, subject to the condition that no interference will be caused to Agriculture Stations in the fixed service or to any station which in the judgment of the Commission has priority on this frequency.

<sup>16</sup> Primarily for that portion of the Brown Chain between New York, New York and Montreal, Canada, but also may be used elsewhere subject to condition of no interference to this primary use.

<sup>17</sup> Primarily for that portion of the Brown Chain between New York, New York and Toronto, Canada, but also may be used elsewhere subject to condition of no interference to this primary use.

<sup>20</sup> Available for aeronautical and aircraft stations subject to 0.01% tolerance and 2500 cycles modulation.



Available for aeronautical fixed stations:

2644	<sup>10</sup> 5220	<sup>10</sup> 6490	<sup>10</sup> 10965
	<sup>10</sup> 5275	8700	

(f) *Midcontinental chain and feeders (yellow)*. Available for aerontutical and aircraft stations:

3447.5	<sup>10</sup> <sup>20</sup> 4650	<sup>20</sup> 5215	142480
3457.5	5032.5	5682.5	142620
3485	5042.5	<sup>10</sup> <sup>20</sup> 8070	<sup>12</sup> 142760

Available for aeronautical fixed stations:

<sup>10</sup> 2636	4650	<sup>10</sup> 8070	<sup>10</sup> 11910
<sup>10</sup> 2640	5215	<sup>10</sup> 9200	

(g) *Intercontinental chain and feeders (orange)*. Frequencies available for traffic control over the international routes as follows:

2870 kc. for traffic control over Inter-American Route (1) and Transpacific Route (2).

2912 kc. for traffic control over Europe-North America Route (3) and Arctic Route (4).

I. Available for aeronautical and aircraft stations on the routes designated:

1. *Inter-American Route*. Available for aeronautical and aircraft stations:

3082.5	6583	<sup>24</sup> 8225	17257
5405	6590	<sup>24</sup> 8233	71274
5692.5	6597	11381	23301
<sup>23</sup> 6557	<sup>24</sup> 8217	11394	23324

Available for aeronautical fixed stations:

2648	5375	<sup>22</sup> 9310	10955
2980	5945	<sup>10</sup> 10535	16240
			<sup>10</sup> 16290

2. *Transpacific Route*. Available for aeronautical and aircraft stations:

2976	6570	8577	17319
5165	6577	11356	17336
<sup>23</sup> 6557	8561	11369	23346
6563	8569	12824	23369

Available for aeronautical fixed stations:

2964	5925	<sup>10</sup> 8720	<sup>10</sup> 16280
4060	<sup>10</sup> 8120	12180	<sup>12</sup> 23025

<sup>22</sup> For use on routes lying south of the United States only.

<sup>23</sup> Additional frequency to be used only in case of interference or when traffic conditions do not permit the use of the other frequencies assigned to this route. Not to be used in continental United States.

<sup>24</sup> Priority is recognized of the service existing outside the American continents.

3. *Europe-North America Route*. Available for aeronautical and aircraft stations:

2912	6570	8554	<sup>23</sup> 17288
<sup>10</sup> 3285	6577	11306	17350
<sup>23</sup> 6543	8538	11319	<sup>23</sup> 17367
6563	8546	12776	23211
		<sup>23</sup> 12788	23234

Available for aeronautical fixed stations:

2980	5920	11470	16250
4055	8120	12165	16440
5375	8720	12180	

4. *Europe-Arctic Route*. Available for aeronautical and aircraft stations:

<sup>20</sup> 1674	<sup>23</sup> 6530	<sup>23</sup> 6550	11344
3285	6537	6557	17288
<sup>23</sup> 6523	6543	8485	23256
		11331	23279

Available for aeronautical fixed stations:

<sup>20</sup> 1722	<sup>23</sup> 2648	8720	10955
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II. Available for aeronautical and aircraft stations on routes 1, 2, 3 and 4 listed above:

<sup>20</sup> 143460	<sup>20</sup> 143600	<sup>20</sup> 143740
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9.74 *Lighter-than-air-craft frequencies*.

The following additional frequencies may be assigned to lighter-than-air craft and to aeronautical stations serving lighter-than-air craft:

2930	6615	11910
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9.75 *Radio marker station frequency*.

75000

9.76 *Instrument landing frequencies*.  
Glide path and localizer.

93500	94300	109900
93900	109500	112300

9.77 *Flying school frequencies*:

33420	33660	37860	<sup>20</sup> 39060
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<sup>20</sup> Priority is recognized of the existing services of the American continents as well as of the territories and possessions of the states of these continents.

<sup>20</sup> Not to be used south of Ketchikan, Alaska, or in the continental United States.

<sup>23</sup> Assignment limited to communications only over that portion of polar route terminating at Seattle, Washington, on condition of no interference to police communications.

<sup>20</sup> Also available for use on any other chain where the frequencies regularly assigned cannot be used due to interference.

<sup>20</sup> The frequency 39060 kc. is primarily for use in communication with motorless flight activities and is available for instruction of student trainees in motor propelled craft only on an adequate showing that the other three frequencies listed in this section are assigned in the vicinity of the proposed station and are insufficient for the needs.

9.78 *Public aviation service frequencies*. The frequencies 143320 kilocycles and 143460 kilocycles are available experimentally for the development of a domestic public aviation radiotelephone service. The frequencies available to ship telegraph and ship telephone stations are also available to public service aircraft stations on inter-continental or trans-oceanic air routes for the handling of public correspondence in the same manner and to the same extent that they are available to ships of the United States and under restrictions hereinafter provided.

9.81 *Frequency tolerance*. The frequency tolerance of stations in the aviation service shall be as specified in the accompanying table.

9.81 FREQUENCY TOLERANCE TABLE		Per cent tolerance	
Class of station	Frequency band	Equipment before Jan. 1, 1940	Authorized after Jan. 1, 1940
Aeronautical.....		0.04	0.02
Aeronautical, fixed.....		.03	.01
	Below 6 megacycles..	.02	.01
	Above 6 megacycles..	.04	.02
Aircraft using frequencies assigned aeronautical stations.....		.05	.05
Aircraft frequencies available to ships.....		.04	.02
Aircraft using other frequencies.....		.10	.02
Airport control stations.....	278 kilocycles.....		.02
Airport control stations using other frequencies.....			.02
All stations in aviation service using frequencies above 30 megacycles.....			.02

9.91 *Aircraft stations*. Communications by an aircraft station shall be limited to the necessities of safe aircraft navigation and normally contacts with airport control stations shall not be attempted unless the aircraft is within the control area of the airport.<sup>21</sup>

## AERONAUTICAL AND AERONAUTICAL FIXED STATIONS

9.101 *Service aeronautical station*. Aeronautical stations shall provide non-public service without discrimination to all scheduled aircraft the owners of which make cooperative arrangements for the operation and maintenance of the aeronautical stations which are to furnish such service and for shared liability in the operation of stations. In addition,

<sup>21</sup> Approximately within 30 miles distance or 10 minutes' flight of the airport.

this class of station shall provide reasonable and fair service to non-scheduled aircraft in accordance with the provisions of these rules.

9.102 *Service aeronautical fixed stations*. Aeronautical fixed stations are authorized primarily for the handling of communications in connection with and relating solely to the actual aviation needs of the licensees, and then only where frequencies are allocated to a chain and cooperative participants upon the basis of equality.

9.103 *Power*. Aeronautical or aeronautical fixed stations will not be licensed to use more than 1 kilowatt on the frequencies above 1500 kilocycles unless on proper showing the Commission shall authorize a greater power, in which event

the operating frequency must be maintained within 0.02 percent of the assigned frequency and suitable filters must be embodied in the equipment to limit the frequency band of emission to 5 kilocycles.

## AIRPORT CONTROL STATIONS

9.111 *Receiving watch on 3105 kilocycles*.<sup>22</sup> The licensee of an airport control station shall without discrimination provide nonpublic service for any and all aircraft. Such licensee shall maintain a continuous listening watch on the aircraft calling and working frequency 3105 kilocycles, and also be prepared to render a

<sup>22</sup> Effective June 10, 1939, the United States Army Air Corps will use 4495 kilocycles for air to ground communication in lieu of 3105 kilocycles. Any airport station located on an airport used extensively by military aircraft should provide equipment for and stand watch on that frequency (4495 kilocycles) in addition to and during the same hours as is required for the watch on 3105 kilocycles.



non-public communication service, during all hours of the day and night: *Provided, however*, that upon application therefor the Commission may exempt any station from the requirements of this provision when it appears that in the preservation of life and property in the air the maintenance of a continuous watch by such station is not required.

9.112 *Airport facilities.* Only one airport control station will be licensed to operate at an airport.

9.113 *Service to be rendered.* Communications of an airport control station shall be limited to the necessities of safe operation of aircraft using the airport facilities or operating within the airport control area<sup>24</sup> and in all cases such stations shall be in a position to render, and shall render, all airport control services.

9.114 *Communications* must not be attempted with aircraft beyond the control area of the airport.<sup>24</sup>

9.115 *Interference.* The operation of airport control stations in adjacent airport areas shall be on a non-interference basis only. In case of disagreement between adjacent areas, the Commission may specify the arrangements necessary to eliminate interference.

9.116 *Power.* (a) Airport control stations using 278 kilocycles will not be licensed to use more than 15 watts power for type A-3 emission.

(b) Localizer transmitters authorized to use the frequency 278 kilocycles may use power in excess of 15 watts provided that the power is limited so as not to produce a field strength of more than 1500 microvolts per meter at one mile from the transmitter location, in the direction of the maximum field.

(c) The power of airport control stations operating on other frequencies shall be limited to 100 watts.

## FLYING SCHOOL STATIONS

9.121 *Eligibility for station license.* Radiocommunication facilities for flying schools may be assigned only to bona fide flying schools and soaring societies.

9.122 *Limitations of instructional facilities.* Assignments will be limited to

one station to an airport location for one or more flying schools.

9.123 *Coordinated use of instructional facilities.* Where more than one flying school operates from an airport location, coordinated use of a single instructional frequency shall be arranged, placed in the form of a signed agreement, and filed with the Commission.

9.124 *Use of flying school frequency.* All aircraft engaged in instructional flying in the vicinity of an airport shall transmit only on the flying school frequency assigned to that airport location.

9.125 *Supervision by airport control operator.* At any airport at which an airport control station or control tower is in operation, the airport control operator must be given a remote microphone connection to the transmitter operating on the flying school frequency for the transmission of orders or instructions of an emergency nature to students in flight within the control area<sup>24</sup> of the airport.

9.126 *Power.* The power output of flying school stations shall not be more than 50 watts nor less than 15 watts for land stations and not more than 20 watts for aircraft stations.

## INSTRUMENT LANDING STATIONS

9.141 *Basis of grant of facilities.* Instrument landing service<sup>26</sup> will not be authorized unless (1) the applicant meets all requirements specified by the Civil Aeronautics Authority and the Federal Communications Commission for the type of installation proposed, (2) the applicant executes a specific agreement to relinquish to the Civil Aeronautics Authority the use of any Government frequencies involved on demand and (3) the applicant executes a specific agreement to release the facilities and remove his equipment if and when such release or removal may be required by the Government.

<sup>26</sup> Instrument landing stations may include one or more of the following: glide path transmitter, localizer transmitter, combination glide path and localizer transmitter and approach marker transmitters. The frequencies available are assigned by Executive Order to the Civil Aeronautics Authority and may be made available for non-Government agencies only under specific conditions set forth in this section.

## Rules Governing Emergency Radio Services

### DEFINITIONS<sup>1</sup>

10.1 *Emergency service.* The term "emergency service" means a radiocommunication service carried on for emergency purposes.

10.2 *Municipal police station.* The term "municipal police station" means a station used by a municipal or county police department for emergency radiotelephone service with mobile police units.

10.3 *State police station.* The term "State police station" means a station used by a State police department for emergency radiotelephone service with mobile police units.

10.4 *Interzone police station.*<sup>2</sup> The term "interzone police station" means a station used by a police department for radiotelegraph communication (a) with similarly licensed stations in adjacent zones or with the nearest interzone police station, in case there is no similarly licensed station in the adjacent zone, (b) with stations within the zone, and (c) with mobile police units equipped for radiotelegraph reception.

10.5 *Zone police station.* The term "zone police station" means a station used by police departments for radiotelegraph communication (a) with stations within the zone, (b) with mobile police units equipped for radiotelegraph reception, and (c) with stations in adjacent zones, provided, in each case, express permission of the interzone stations in control of communications is obtained in accordance with the operating procedure prescribed by the Commission.

10.6 *Marine fire station.* The term "marine fire station" means a land station or a ship station used for intercommunication between municipal fire departments and fireboats.

10.7 *Special emergency station.* The term "special emergency station" means a station used for communications in

<sup>1</sup> For additional definitions see Part 2—General Rules and Regulations.

<sup>2</sup> Interzone police stations desiring to communicate with police agencies in adjacent foreign countries are referred to the provisions of Section 10 of the Inter-American Arrangement Concerning Radiocommunications.

emergencies in lieu of normal means of communication.

10.8 *Forestry station.* The term "forestry station" means a station used for communications necessary for the prevention and suppression of forest fires.

### ELIGIBILITY FOR LICENSE

10.21 *Police stations.* Authorization for the various classes of police stations will be issued only to instrumentalities of government.

10.22 *Marine fire stations.* Authorizations for marine fire stations will be issued only to municipalities.

10.23 *Special emergency stations.* Authorizations for special emergency stations will be issued only to (a) organizations established for relief purposes in emergencies and which have a disaster communication plan; (b) to persons having establishments in remote locations which cannot be reached by other means of communication; (c) to public utilities.

10.24 *Forestry stations.* Authorizations for forestry stations will be issued to municipal, State, or private organizations which are legally responsible for the protection of forest areas.

### FREQUENCIES

10.41 *State and municipal police stations.* The following frequencies are allocated for use by State and municipal police stations:

1610 kc.*	1682 kc.	2366 kc.*	2442 kc.
1626 kc.*	1690 kc.*	2382 kc.	2450 kc.
1634 kc.*	1698 kc.*	2390 kc.*	2458 kc.
1642 kc.*	1706 kc.*	2406 kc.	2466 kc.
1658 kc.	1712 kc.	2414 kc.	2474 kc.
1666 kc.	2326 kc.*	2422 kc.	2482 kc.
1674 kc.	2350 kc.*	2430 kc.	2490 kc.

10.42 *State and municipal additional unlimited power.* (a) The following additional frequencies are allocated for use by fixed and portable municipal and State police stations without limitation as to power:

GROUP A			
30700 kc.	33100 kc.	37500 kc.	
31100 kc.	33940 kc.	39100 kc.	
31900 kc.	35500 kc.	39900 kc.	

(b) The following additional frequencies are allocated for use by fixed and

\* Subject to the condition that no interference is caused to Canadian stations.



portable municipal State police stations operating with power not in excess of 250 watts:

#### GROUP B

31500 kc.	35900 kc.	37900 kc.
33500 kc.	37100 kc.	39500 kc.

(c) Notwithstanding the provisions of (a) and (b) of this section, municipalities and States may be authorized to operate mobile and portable-mobile stations on the frequency, or frequencies, assigned to their fixed station(s). An instrumentality of government operating mobile units only may be authorized to use a frequency from group A or group B of this section assigned an adjacent instrumentality of government, provided a copy of the agreement entered into between the two for the exchange of service is filed with the Commission.

(d) Municipalities and States desiring more than one fixed frequency shall, in making application, show a proper need therefor.

(e) Municipalities desiring frequencies for use by portable stations of 1 watt power or less, portable-mobile stations, or mobile stations different from those which may be allocated under section 10.42 (a) and (b), may be authorized to use the following frequencies:

#### GROUP C

30580 kc.	33780 kc.	37220 kc.
30980 kc.	35100 kc.	37780 kc.
31780 kc.	35220 kc.	39380 kc.

(f) States desiring frequencies for use by portable-mobile or mobile stations different from those which may be allocated under section 10.42 (a) and (b), may be authorized to use the following frequencies. These frequencies are also available to states for portable stations of 1 watt power or less:

#### GROUP D

35780 kc.	37380 kc.	39180 kc.	39780 kc.
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(g) The number of frequencies which may be assigned to any one municipality or State for either fixed, portable, or mobile stations will be governed pursuant to announced policies of the Commission.

10.44 *Zone and interzone.* The following frequencies are allocated for zone and interzone police stations:

(a) For interzone communication (available to interzone stations and zone police stations designated as alternate interzone stations):

2808 kc. working *	5135 kc. day only working
2812 kc. working	5140 kc. day only* working
2804 kc. calling *	5195 kc. day only* calling

(b) For zone communication (available to interzone and zone police stations):

2040 kc. working *	2044 kc. working *
2036 kc. calling *	

Calling frequencies herein allocated may be used for the transmission of operating signals and a single short radiotelegram provided no interference is caused to call signals.

10.45 *Marine fire stations.* The following frequencies are allocated for use by marine fire stations:

1630 kc.	35580 kc.	37740 kc.
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10.46 *Special emergency stations.* The following frequencies are allocated to special emergency stations:

(a) For portable stations with a maximum power<sup>7</sup> of 1 watt, portable-mobile stations, and mobile stations:

31740 kc.	33820 kc.	37180 kc.
33060 kc.	35140 kc.	37820 kc.
		39340 kc.

(b) For fixed, land, and portable stations without limitation as to power:<sup>7</sup>

31460 kc.	39660 kc.	39860 kc.
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(c) For fixed, land, and portable stations with a maximum power<sup>7</sup> of 1000 watts:

2726 kc. (A3 emission)
3190 kc. (A1 emission)

(d) For fixed, land, and portable stations of public utilities, using A3 emission, with a maximum power<sup>7</sup> of 50 watts:

2292 kc. *	4637.5 kc. day only *
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\* These frequencies are available on a secondary basis for zone communication (a) during periods when the frequencies regularly assigned for zone communication are unavailable due to the operation of experimental visual broadcast stations and (b) by zone stations separated from other zone stations by a distance greater than the communication range of the frequencies regularly assigned for zone communication. The term "day" as used herein means that period of time between 2 hours after local sunrise and 2 hours before local sunset.

\* May be used subject to the condition that no interference is caused to the service of experimental visual broadcast stations.

\* See Sections 2.17 to 2.21, 2.79, and 2.80 of Part 2—General Rules and Regulations.

\* May be used subject to the condition that no interference is caused to other services and that the frequency is maintained within a tolerance of 0.02 percent.

(e) Notwithstanding the provisions of (b), (c), and (d) of this section, authorizations may be issued covering the operation of mobile and portable-mobile stations on the frequency, or frequencies, assigned to licensees of fixed or land stations.

10.47 *Forestry stations.* The following frequencies are allocated to forestry stations:

(a)

30940 kc.	35740 kc.	39740 kc.
31340 kc.	35940 kc.	39940 kc.
31580 kc.	37460 kc.	31940 kc.
		39420 kc.

(b)

2212 kc. *	2236 kc. *	2244 kc. *
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#### FREQUENCY TOLERANCE<sup>9</sup>

10.61 *Percentage of tolerance.* The frequency tolerance of stations in the emergency service shall be as follows:

	Equipment authorized before Oct. 1, 1938	Equipment authorized after Oct. 1, 1938
	Percent	Percent
Fixed stations on frequencies below 6000 kc. ....	0.03	0.01
Land stations on frequencies below 6000 kc. ....	.04	.02
Portable and mobile stations on frequencies below 6000 kc. ....	.04	.02
Fixed and land stations on frequencies above 30000 kc. ....	.05	.02
Portable and mobile stations on frequencies above 30000 kc. ....	.05	.03
Portable and mobile stations of 1 watt power or less on frequencies above 30000 kc. ....	.1	.1

#### LICENSES

10.82 *Posting fixed station licenses.* The station licenses of stations in this service, operated at fixed locations, shall be conspicuously posted at the place where the control operator is located.

10.83 *Posting portable or mobile station licenses.* The licenses of portable and mobile stations, if separately issued, shall be readily available for inspection

\* Subject to the condition that no interference is caused to Canadian stations.

\* For additional information on frequency tolerance, see Appendix A of Part 2—General Rules and Regulations or Appendix 1 of the General Radio Regulations (Cairo Revision, 1938) annexed to the International Telecommunication Convention of Madrid, 1932.

by authorized Government representatives. Either the original authorization or a photocopy of that document shall be available at the portable or mobile station involved.

10.84<sup>11</sup> *Operator license.* The original license of each station operator shall be conspicuously posted at the place he is on duty, or, in the case of portable or mobile units, be kept in his personal possession.

#### LOGS<sup>12</sup>

10.101 *Contents.* Each licensee shall maintain adequate records of the operation of the station including (a) hours of operation; (b) nature and time of each transmission; (c) frequency measurements; (d) name of operator on duty at the transmitter. In the cases of groups of stations, either fixed or fixed and mobile, operating as a single coordinated communication system controlled from a single point, a single log may be maintained at a central location, provided that such log records the required information with respect to all stations in the network.

#### MUNICIPAL POLICE STATIONS

10.121 *Power.*<sup>13</sup> The maximum power to be assigned for the use of frequencies below 30000 kc. by municipal police stations will be based on the latest official population figures of the Department of Commerce for the area to be served in accordance with the following table:

Population:	Power watts
Under 100,000 .....	50
100,000 to 200,000 .....	100
200,000 to 300,000 .....	150
300,000 to 400,000 .....	200
400,000 to 500,000 .....	250
500,000 to 600,000 .....	300
600,000 to 700,000 .....	400
Over 700,000 .....	500

<sup>11</sup> Information pertaining to operators may be found in Article 10 of the General Radio Regulations (Cairo Revision, 1938) annexed to the International Telecommunication Convention of Madrid, 1932, Part 13—Rules Governing Commercial Radio Operators and Sections 2.52 and 2.53 of Part 2—General Rules and Regulations.

<sup>12</sup> Additional provisions relating to logs may be found in Sections 2.54 to 2.58 of Part 2—General Rules and Regulations.

<sup>13</sup> Additional provisions relating to power may be found in Sections 2.17 to 2.21, 2.79, and 2.80 of Part 2—General Rules and Regulations.



10.124 *Modulation limits.* The transmitters of municipal police stations shall be modulated not less than 85 percent nor more than 100 percent on peaks.

10.125 *Cooperative use of frequencies.* The frequencies allocated to municipal police stations are assigned for use within specified geographical boundaries and all licensees within those boundaries shall cooperate in the use of the assigned frequency.

10.126 *Service which may be rendered.* Municipal police stations, although licensed primarily for communication with mobile police units, may transmit emergency messages to other mobile units such as fire department vehicles, private ambulances and repair units of public utilities, in those cases which require cooperation or coordination with police activities. In addition, such stations may communicate among themselves provided (1) that no interference is caused to the mobile service, and (2) that communication is limited to places between which, by reason of their close proximity, the use of police radiotelegraph stations is impracticable. Municipal police stations shall not engage in point-to-point radio communication beyond the good service range of the transmitting station or transmit or handle communications requiring radiotelephone relay. Point-to-point communication between stations in the same local telephone exchange area is likewise prohibited unless the messages to be transmitted are of immediate importance to mobile units.

#### STATE POLICE STATIONS

10.151 *Power.*<sup>7</sup> The maximum power to be assigned for the use of State police stations shall be 5,000 watts during the period from sunrise to sunset and 1,000 watts from sunset to sunrise.

10.152 *Modulation limits.* The transmitters of State police stations shall be modulated not less than 85 percent nor more than 100 percent on peaks.

10.153 *Service which may be rendered.* State police stations, although licensed

primarily for communication with mobile police units, may transmit emergency messages to other mobile units such as fire department vehicles, private ambulances and repair units of public utilities, in those cases which require cooperation or coordination with police activities. In addition, such stations may communicate among themselves provided (1) that no interference is caused to the mobile service, and (2) that communication is limited to places between which, by reason of their close proximity, the use of police radiotelegraph stations is impracticable. State police stations shall not engage in point-to-point radio communication beyond the good service range of the transmitting station or transmit or handle communications requiring radiotelephone relay. Point-to-point communication between stations in the same local telephone exchange area is likewise prohibited unless the messages to be transmitted are of immediate importance to mobile units.

#### INTERZONE POLICE STATIONS

10.171 *One station per zone.* Authorizations for interzone police stations will not be issued for more than one station within a zone.

10.174 *Power.*<sup>7</sup> The maximum power to be assigned for the use of interzone police stations shall be 500 watts.

10.175 *Service which may be rendered.* Interzone police stations shall be operated only for the transmission of dispatches of an emergency nature relating to police business between police agencies, using the operating procedure prescribed by the Commission.

10.176 *Operator regulations.* The records and method of operation of interzone police stations shall be maintained and conducted in accordance with the operating procedure prescribed by the Commission.

#### ZONE POLICE STATIONS

10.193 *Power.*<sup>7</sup> The maximum power to be assigned for the use of zone police stations shall be 500 watts.

10.194 *Service which may be rendered.* Zone police stations shall be operated only

for the transmission of dispatches of an emergency nature relating to police business between police agencies, using the operating procedure prescribed by the Commission.

10.195 *Operator regulations.* The records and method of operation of zone police stations shall be maintained and conducted in accordance with the operating procedure prescribed by the Commission.

10.196 *Alternate zone control stations.* Zone police stations may be designated to act as alternate zone control stations for the interzone stations designated for the zone concerned; in which event, such zone police stations shall be eligible to be assigned all of the frequencies available for interzone police stations.

#### MARINE FIRE STATIONS

10.211 *Power.*<sup>7</sup> The maximum power to be assigned for the use of marine fire stations will be 500 watts.

10.212 *Service which may be rendered.* Marine fire stations are licensed primarily for intercommunication between fire headquarters and fireboats. However, they may transmit emergency messages to police boats or other marine units in cases which require cooperation or coordination with police or fire department activities.

#### SPECIAL EMERGENCY STATIONS

10.231 *Scope of Service.* Special emergency stations may be used only during an emergency jeopardizing life, property, public safety, or for essential public service, or when such an emergency is imminent, for communications relating thereto and for other essential communications. They may be used (a) for transmission from one point to another between which normal communication facilities are not usable, or are temporarily inadequate, or (b) for transmission to or from mobile units.

10.232\* *Selective calling system.* Notwithstanding the provisions of section 10.46 (c) and (d), types A1 or A2 emis-

sion may be used on 2726, 2292, and 4637.5 kc. for the sole purpose of establishing a selective calling system.

10.233 *Tests.* Special emergency stations may also conduct routine tests not exceeding 2 minutes in each half hour, or where more extended tests are required, they may not exceed a total of 4 hours per week.

#### FORESTRY STATIONS

10.251 *Scope of service.* Forestry stations, although licensed primarily for communication with mobile forest fire fighting units, may transmit emergency messages to other mobile units such as fire department vehicles, private ambulances, and mobile police units in those cases which require cooperation or coordination with forestry service activities. In addition, such stations may communicate among themselves, provided: (1) No interference is caused to mobile service, and (2) only those communications are transmitted which are necessary for the operation of forestry service.

10.252 *Power*<sup>7</sup>—*Modulation.* The maximum power to be assigned for the use of forestry stations shall be 50 watts. The transmitters of forestry stations shall be modulated not less than 85 percent, nor more than 100 percent on peaks.

#### Operation of "Transceivers"

Recent developments in ultra high frequency radio equipment have brought about the construction and sale by radio dealers of so-called "transceivers," and other types of low-powered transmitters. Many of these units are being operated as unlicensed radio stations and often in amateur bands, the nature of the transmission usually being of the type carried on by licensed amateurs. Such operation is a direct violation of the rules and regulations of the Federal Communications Commission, which definitely states that all persons who are engaged in the operation of apparatus which is used for the transmission of energy, communication or signals by radio, regardless of location, frequency or power used, are required to

<sup>7</sup> See Sections 2.17 to 2.21, 2.79, and 2.80 of Part 2—General Rules and Regulations.

<sup>7</sup> See Sections 2.17 to 2.21, 2.79, and 2.80 of Part 2—General Rules and Regulations.  
\* As amended Dec. 5, 1938.



## U. S. Radio Districts

Territory Included in Each Numbered District	Address: Radio Inspector in Charge
No. 1 The States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.	Customhouse, 7th Floor, Boston, Mass.
No. 2 The counties of Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, and Warren of the State of New Jersey; and the counties of Albany, Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Schenectady, Suffolk, Sullivan, Ulster, and Westchester of the State of New York.	1024-26-30 Federal Bldg., 641 Washington Street, New York, N. Y.
No. 3 The county of Newcastle of the State of Delaware; the counties of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean, and Salem of the State of New Jersey; the counties of Adams, Berks, Bucks, Carbon, Chester, Cumberland, Dauphin, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Perry, Philadelphia, Schuylkill, and York of the State of Pennsylvania.	Room 1200, New U. S. Customhouse, 2nd & Chestnut Streets, Philadelphia, Pa.
No. 4 The counties of Kent and Sussex of the State of Delaware; the District of Columbia; the State of Maryland; the counties of Arlington, Clark, Fairfax, Fauquier, Frederick, Loudoun, Page, Prince William, Rappahannock, Shenandoah, and Warren of the State of Virginia.	Fort McHenry, Baltimore Md.
No. 5 The State of North Carolina except that part lying in District 6, and the State of Virginia except that part lying in District 4.	Room 402, New P. O. Bldg. Norfolk, Va.
No. 6 The State of Alabama; the State of Georgia; the counties of Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga and Yancey of the State of North Carolina; the State of South Carolina; the State of Tennessee.	411 Federal Annex, Atlanta, Ga. (Sub-office: 208 P. O. Bldg., Savannah, Ga.)
No. 7 The State of Florida (Sub-office at 201 Stovalls Professional Bldg., Tampa, Fla.)	P. O. Box 150, Miami, Fla.
No. 8 The State of Arkansas; the State of Louisiana; the State of Mississippi; the city of Texarkana of the State of Texas.	326 Customhouse, New Orleans, La.
No. 9 The counties of Aransas, Brazoria, Brooks, Calhoun, Cameron, Chambers, Fort Bend, Galveston, Goliad, Harris, Hidalgo, Jackson, Jefferson, Jim Wells, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Victoria, Wharton, and Willacy of the State of Texas.	Room 404, Federal Bldg. Galveston, Texas.
No. 10 The State of New Mexico; the State of Oklahoma; the State of Texas except that part lying in District 9 and the City of Texarkana.	302 U. S. Terminal Annex Building, Dallas, Texas.
No. 11 The State of Arizona; the counties of Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura of the State of California; and the county of Clarke of the State of Nevada.	1105 Rives-Strong Bldg., Los Angeles, Calif. (Sub-office: Room 503, New California Bldg., San Diego, Calif.)
No. 12 The State of California except that part lying in District 11; the State of Nevada except that part lying in County Clarke; Guam; Midway; Wake; American Samoa.	328 Customhouse, San Francisco, Calif.
No. 13 The State of Idaho except that part lying in District 14; the State of Oregon.	207 New U. S. Courthouse, Portland, Oregon.
No. 14 The Territory of Alaska; the counties of Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, and Shoshone of the State of Idaho; the counties of Beaverhead, Broadwater, Cascade, Deerlodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Pondera, Powell, Ravalli, Sanders, Silver Bow, Teton, and Toole of the State of Montana; the State of Washington.	808 Federal Office Bldg., Seattle, Wash. (Sub-office: P. O. Box 2719, 313 Federal Bldg., Juneau, Alaska.)
No. 15 The State of Colorado; the State of Montana except that part lying in District 14; the State of Utah; the State of Wyoming.	504 Customhouse, Denver, Colo.
No. 16 The State of Minnesota; the counties of Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, and Schoolcraft of the State of Michigan; the State of North Dakota; the State of South Dakota; the State of Wisconsin except that part lying in District 18.	927 Main P. O. Bldg., St. Paul, Minn.
No. 17 The State of Iowa except that part lying in District 18; the State of Kansas; the State of Missouri; the State of Nebraska.	609 Pickwick Bldg., 903 McGee Street, Kansas City, Mo.
No. 18 The State of Illinois; the State of Indiana; the counties of Allamakee, Buchanan, Cedar, Clayton, Clinton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Johnson, Jones, Lee, Linn, Louisa, Muscatine, Scott, Washington, and Winneshiek of the State of Iowa; the counties of Columbia, Crawford, Dane, Dodge, Grant, Green, Iowa, Jefferson, Kenosha, Lafayette, Milwaukee, Ozaukee, Racine, Richland, Rock, Sauk, Walworth, Washington, and Waukesha of the State of Wisconsin.	246 U. S. Courthouse Bldg. Chicago, Ill.
No. 19 The State of Kentucky; the State of Michigan except that part lying in District 16; the State of Ohio; the State of West Virginia.	1025 New Federal Bldg., Detroit, Mich. (Sub-office: 541 Old P. O. Bldg., Cleveland, Ohio.)
No. 20 The State of New York except that part lying in District 2; the State of Pennsylvania except that part lying in District 3.	514 Federal Building, Buffalo, N. Y.
No. 21 The Territory of Hawaii.	Aloha Tower, Honolulu, T. H.
No. 22 The Territory of Puerto Rico; the Virgin Islands.	P. O. Box 1353, 303 Ochoa Bldg., San Juan, P. R.

obtain from the Commission a permit and a license to authorize the construction and operation of such equipment.

Questions have arisen in the past as to whether or not the Federal Communications Commission may exercise jurisdiction over radio stations of low power, transmissions of which are intended to be received wholly within a given state. This question has been definitely settled. The court, without exception, has held that the radio signal is interstate in character and that the provisions of the Com-

munications Act for 1934 apply to all stations which produce radio emissions intended for reception. Therefore, the Commission has jurisdiction over the operation of such stations. Penalties are provided for the operation of unlicensed radio stations, as indicated in Sections 501 and 502 of the Communications Act of 1934. All persons who desire to construct and operate a radio station of any type are required to obtain authority to do so from the Federal Communication-Commission.



## 10 BUSINESS COMMANDMENTS

Here are some "business commandments" which I read in Forbes Magazine. They appeal to me as being very sound, and I'd like to pass them on to you.

1. Don't wait for the other fellow to come to you; go to him.

2. In competition with others, always give them the credit of being a little smarter than you are.

3. If you have no money and little credit, capitalize on your personality. Sometimes it pays to have nerve.

4. Never admit to anybody—and least of all to yourself—that you are licked.

5. Keep your business troubles to yourself. Nobody likes a calamity howler.

6. Don't be afraid of dreaming too big dreams. It won't hurt you to figure owning a railroad, even if you have to compromise on a flivver.

7. Make friends; but remember that the best friends wear out if you use them too frequently.

8. Be square even to the point of finickiness and you will have mighty little occasion to complain of a crooked world.

9. Take advice but do your own deciding.

10. Don't toady. The world respects a man who can stand on his own legs and look the world in the eye.

J. E. SMITH