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RADIO REGULATIONS

**ANNEXED TO THE
INTERNATIONAL TELECOMMUNICATION CONVENTION
(ATLANTIC CITY, 1947)**

ADDITIONAL RADIO REGULATIONS

ADDITIONAL PROTOCOL

**TO THE ACTS OF THE INTERNATIONAL RADIO
CONFERENCE OF ATLANTIC CITY, 1947, SIGNED BY
THE DELEGATES OF THE EUROPEAN REGION**

RECOMMENDATIONS AND RESOLUTIONS

**ADOPTED BY
THE INTERNATIONAL RADIO CONFERENCE
(ATLANTIC CITY, 1947)**

**GENEVA
GENERAL SECRETARIAT OF THE INTERNATIONAL
TELECOMMUNICATION UNION**

1949



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(Atlantic City, 1947)

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RADIO REGULATIONS

annexed to
International Telecommunication Convention
(Atlantic City, 1947)

CHAPTER I

ARTICLE 1

Definitions

Preamble

- 1 The following definitions have been formulated in view of the Regulations annexed to the Convention and of the operation of the respective services; these definitions are not necessarily applicable to other purposes.

Section I. General Terms

- 2 *Telecommunication*: Any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, visual or other electromagnetic systems.
- 3 *General Network of Telecommunication Channels*: The whole of the existing telecommunication channels open to public correspondence, with the exception of the telecommunication channels of the mobile service.
- 4 *Radiocommunication*: Any telecommunication by means of Hertzian waves.
- 5 *Hertzian Waves*: Electromagnetic waves of frequencies between 10 kc/s and 3 000 000 Mc/s.

6 *Radio*: A general term applied to the use of Hertzian
waves.

7 *Telegraphy*: A system of telecommunication for the
transmission of written matter by the use of a signal code.

8 *Telephony*: A system of telecommunication set up
for the transmission of speech or, in some cases, other sounds.

9 *Television*: A system of telecommunication for the
transmission of transient images of fixed or moving objects.

10 *Facsimile*: A system of telecommunication for the
transmission of fixed images with a view to their reception in
a permanent form.

11 *Radiolocation*: Determination of a position or of a
direction by means of the constant velocity or rectilinear prop-
agation properties of Hertzian waves.

12 *Radionavigation*: Radiolocation intended solely for
the determination of position or direction or for obstruction
warning, in navigation.

13 *Radar*: Radiolocation system where transmission
and reception are carried out at the same location, and which
utilizes the reflecting or retransmitting properties of objects
in order to determine their positions.

14 *Primary Radar*: Radar using reflection only.

15 *Secondary Radar*: Radar using automatic retrans-
mission on the same or on a different radio frequency.

16 *Radio Direction-Finding*: Radiolocation in which
only the direction of a station is determined by means of its
emissions.

17 *Telegram*: Written matter intended to be trans-
mitted by telegraphy; this term also includes radiotelegram
unless otherwise specified.

- 18 *Radiotelegram*: Telegram originating in or intended
for a mobile station, transmitted on all or part of its route
over the radiocommunication channels of a mobile service.

Section II. Services

- 19 *Fixed Service*: A service of radiocommunication be-
tween specified fixed points.

- 20 *Aeronautical Fixed Service*: A fixed service intended
for the transmission of information relating to air navigation,
preparation for and safety of flight.

Broadcasting Service:

- 21 a) A radiocommunication service of transmissions
to be received directly by the general public.
22 b) This service may include transmissions of sounds
or transmissions by television, facsimile or other
means.

- 23 *Mobile Service*: A service of radiocommunication
between mobile and land stations, or between mobile stations.

- 24 *Maritime Mobile Service*: A mobile service between
ship stations and coast stations, or between ship stations.

- 25 *Aeronautical Mobile Service*: A mobile service be-
tween aircraft stations and aeronautical stations, or between
aircraft stations.¹⁾

- 26 *Land Mobile Service*: A mobile service between base
stations and land mobile stations, or between land mobile
stations.

- 27 *Radiolocation Service*: A service involving the use
of radiolocation.

- 28 *Radionavigation Service*: A radiolocation service in-
volving the use of radionavigation.

- 29 *Maritime Radionavigation Service*: A radionaviga-
tion service intended for the benefit of ships.

- 30 *Aeronautical Radionavigation Service*: A radionavi-
gation service intended for the benefit of aircraft.

25.1 ¹⁾ As regards public correspondence, see 255.

- 31 *Amateur Service:* A service of self training, inter-
communication and technical investigations carried on by
amateurs, that is, by duly authorized persons interested in
radio technique solely with a personal aim and without pecuni-
ary interest.
- 32 *Meteorological Aids Service:* A service of emissions
of special radio signals intended solely for meteorological,
including hydrological, observations and exploration.
- 33 *Standard Frequency Service:* A radiocommunica-
tion service for the transmission of standard and specified
frequencies of known high accuracy, intended for general re-
ception.
- 34 *Special Service:* A service not otherwise defined in
this article carried on exclusively for specific needs of general
utility, and not open to public correspondence.

Section III. Stations

Station:

- 35 a) A separate transmitter or receiver or a combi-
nation of transmitters and receivers including
the accessory equipment required for carrying
on a definite radiocommunication service.
- 36 b) The station assumes the classification of the ser-
vice in which it operates permanently or tem-
porarily.
- 37 *Fixed Station:* A station in the fixed service.
- 38 *Aeronautical Fixed Station:* A station in the aero-
nautical fixed service.
- 39 *Broadcasting Station:* A station in the broadcasting
service.
- 40 *Land Station:* A station in the mobile service not
intended for operation while in motion.
- 41 *Coast Station:* A land station in the maritime mobile
service carrying on a service with ship stations.
- 42 *Aeronautical Station:* A land station in the aero-
nautical mobile service, carrying on a service with aircraft

stations. In certain instances an aeronautical station may be placed on board a ship.

43 *Base Station:* A land station in the land mobile service carrying on a service with land mobile stations.

44 *Mobile Station:* A station in a mobile service intended to be used while in motion or during halts at unspecified points.

45 *Ship Station:* A mobile station in the maritime mobile service located on board a vessel which is not permanently moored.

46 *Aircraft Station:* A mobile station installed on board any type of aircraft and continuously subject to human control.

47 *Land Mobile Station:* A mobile station in the land mobile service capable of surface movement within the geographical limits of a country or continent.

48 *Radiolocation Station:* A station in the radiolocation service.

49 *Radionavigation Station:* A station in the radionavigation service.

50 *Radionavigation Land Station:* A station in the radionavigation service not intended for operation while in motion.

51 *Radionavigation Mobile Station:* A station in the radionavigation service intended to be used while in motion or during halts at unspecified points.

52 *Radio Direction-Finding Station:* A radiolocation station intended to determine only the direction of other stations by means of transmissions from the latter.

53 *Radiobeacon Station:* A radionavigation station the emissions of which are intended to enable a mobile station to determine its bearing or its direction in relation to the radiobeacon station.

54 *Standard Frequency Station:* A station in the standard frequency service.

55 *Experimental Station:* A station utilizing Hertzian waves in experiments with a view to the development of science or technique. This definition does not include amateur stations.

56 *Amateur Station:* A station in the amateur service.

Section IV. Technical Characteristics

57 *Frequency Assigned to a Station:* The frequency coinciding with the centre of the frequency band in which the station is authorized to work. This frequency does not necessarily correspond to any frequency in an emission.

58 *Bandwidth Occupied by an Emission:* The band of frequencies comprising 99% of the total radiated power extended to include any discrete frequency on which the power is at least 0.25% of the total radiated power.

59 *Frequency Tolerance:* The frequency tolerance, expressed as a percentage or in cycles per second, is the maximum permissible deviation, with respect to the reference frequency¹⁾, of the corresponding characteristic frequency of an emission; the reference frequency may differ from the frequency assigned to a station by a fixed and specified amount.

59.1 ¹⁾ The concept of a reference frequency becomes necessary to include the many classes of emission now coming into use, including single sideband and multiple working. This is merely a frequency which is selected in any convenient way. The actual emission includes frequencies which are characteristic of the physical emission (for example, the carrier frequency itself, or a particular frequency in a sideband) as distinguished from the assigned frequency and the reference frequency, which may be regarded as mere numbers. It is intended that, consistent with the physical qualities of the apparatus, one of these characteristic frequencies shall always coincide with the reference frequency. This characteristic frequency may then be referred to as the one which corresponds to the reference frequency. It is the maximum permissible difference between these two frequencies, namely the reference frequency, which is a mere number, and the corresponding characteristic frequency, which represents a physical attribute of the emission, that is meant by frequency tolerance.

60 *Power of a Transmitter:*

- a) When not otherwise specified, one shall use only the definition of "peak power of a radio transmitter" as follows:

61 *Peak Power of a Radio Transmitter:* The mean power supplied to the antenna during one radio frequency cycle at the highest crest of the modulation envelope, taken under conditions of normal operation.

- 62 b) In cases where the first definition does not suffice, in view of the classification of the emission, to characterise fully its practical properties, the following definition of "mean power of a radio transmitter" may be employed in addition.

63 *Mean Power of a Radio Transmitter:* The power supplied to the antenna during normal operation, averaged over a time sufficiently long compared to the period corresponding to the lowest frequency encountered in actual modulation.¹⁾

- 64 c) When the words "peak power" or "mean power" are not used in the context, the figure for "peak power" is to be followed by the letter "p" and that for "mean power" by the letter "m".

65 *Gain of an Antenna:* The gain of an antenna²⁾ in a given direction is the ratio, expressed in decibels, of the square of the field intensity radiated in this direction by the given antenna to the square of the field intensity radiated in its median plane by a perfect half-wave antenna isolated in space, where the fields are measured at a distance sufficiently great. It is assumed that the real antenna and the perfect half wave antenna are supplied with equal power.

63.1¹⁾ In general a time of 1/10 second, during which the mean power is a maximum, will be selected.

65.1²⁾ When not specified otherwise, the figure expressing the gain of an antenna refers to the gain in the direction of the main beam.

66 *Coefficient of Directivity of an Antenna:* The coefficient of directivity of an antenna ¹⁾ in a given direction is the ratio, expressed in decibels, of the square of the field intensity radiated in this direction to the mean of the squares of the field intensity radiated in all directions in space, where the fields are measured at a distance sufficiently great.

Directivity Diagram of an Antenna:

- 67 a) The directivity diagram of an antenna is the graphical representation of the gain of this antenna in the different directions of space.
- 68 b) The horizontal directivity diagram of an antenna is the representation of the gain in the different directions of a horizontal plane or, if necessary, in the different directions of a plane slightly inclined to the horizontal.

69 *Harmful Interference:* Any radiation or any induction which endangers the functioning of a radionavigation service or of a safety service ²⁾ or obstructs or repeatedly interrupts a radio service operating in accordance with these Regulations.

Section V. Systems and Equipment

70 *Instrument Landing System:* A system of radionavigation, intended to facilitate aircraft in landing, which provides lateral and vertical guidance including indications of distance from the optimum point of landing.

71 *Racon:* A radionavigation system transmitting, automatically or in response to a predetermined received signal, a pulsed radio signal with specific characteristics.

66.1 ¹⁾ When not specified otherwise the figure expressing the coefficient of directivity refers to that in the direction of the main beam. When it is not necessary to take into account antenna and earth losses the coefficient of directivity as defined above is 2.15 decibels higher than the gain of the antenna as defined in 65.

69.1 ²⁾ Any radio service, the operation of which is directly related, whether permanently or temporarily, to the safety of human life and the safeguarding of property, shall be considered as a safety service.

- 72 *Coded Passive Reflector*: An object intended to reflect Hertzian waves and having variable reflecting properties according to a predetermined code, for the purpose of producing an indication on a radar receiver.
- 73 *Radiosonde*: An automatic radio transmitter in the meteorological aids service usually carried on an aircraft, free balloon, kite or parachute, which transmits meteorological data.

CHAPTER II

ARTICLE 2

Designation of Emissions

- 74 § 1. Emissions are designated according to their classification and the width of the frequency band occupied by them.

Section I. Classification

- 75 § 2. Emissions are classified and symbolized according to the following characteristics:

- (1) Type of modulation
- (2) Type of transmission
- (3) Supplementary characteristics.

- | 76 § 3. (1) Types of modulation: | <i>Symbol</i> |
|---|---------------|
| a) Amplitude | A |
| b) Frequency (or phase) | F |
| c) Pulse | P |
| 77 (2) Types of transmission: | |
| a) Absence of any modulation intended to carry information | 0 |
| b) Telegraphy without the use of modulating audio frequency | 1 |
| c) Telegraphy by the keying of a modulating audio frequency or audio frequencies or by the keying of the modulated emission (special case: an unkeyed modulated emission) | 2 |
| d) Telephony | 3 |
| e) Facsimile | 4 |
| f) Television | 5 |
| g) Composite transmissions and cases not covered by the above | 9 |

- 78 (3) Supplementary characteristics:
- a) Double sideband, full carrier (none)
 - b) Single sideband, reduced carrier a
 - c) Two independent sidebands, reduced carrier b
 - d) Other emissions, reduced carrier c
 - e) Pulse, amplitude modulated d
 - f) Pulse, width modulated e
 - g) Pulse, phase (or position) modulated f
- 79 § 4. *Note:* As an exception to the above principles, damped waves are designated by B
- 80 § 5. The classification of emissions is tabulated below:

Type of Modulation	Type of Transmission	Supplementary Characteristics	Symbol
Amplitude Modulated	Absence of any modulation	—	A0
	Telegraphy without the use of modulating audio frequency (on-off keying)	—	A1
	Telegraphy by the keying of a modulating audio frequency or audio frequencies or by the keying of the modulated emission (special case: an unkeyed modulated emission)	—	A2
	Telephony	Double sideband, full carrier	A3
		Single sideband, reduced carrier	A3a

Type of Modulation	Type of Transmission	Supplementary Characteristics	Symbol
		Two independent sidebands, reduced carrier	A3b
	Facsimile	—	A4
	Television	—	A5
	Composite transmissions and cases not covered by the above	—	A9
	Composite transmissions	Reduced carrier	A9c
Frequency (or phase) Modulated	Absence of any modulation	—	F0
	Telegraphy without the use of modulating audio frequency (frequency shift keying)	—	F1
	Telegraphy by the keying of a modulating audio frequency or audio frequencies, or by the keying of the modulated emission (special case: an unkeyed emission modulated by audio frequency)	—	F2
	Telephony	—	F3
	Facsimile	—	F4
	Television	—	F5
	Composite transmissions and cases not covered by the above	—	F9
Pulse Modulated	Absence of any modulation intended to carry information	—	P0

Type of Modulation	Type of Transmission	Supplementary Characteristics	Symbol
	Telegraphy without the use of modulating audio frequency	—	P1
	Telegraphy by the keying of a modulating audio frequency or audio frequencies, or by the keying of the modulated pulse (special case: an unkeyed modulated pulse)	Audio frequency or audio frequencies modulating the pulse in amplitude	P2d
		Audio frequency or audio frequencies modulating the width of the pulse	P2e
		Audio frequency or audio frequencies modulating the phase (or position) of the pulse	P2f
		Amplitude modulated	P3d
	Telephony	Width modulated	P3e
		Phase (or position) modulated	P3f
	Composite transmissions and cases not covered by the above	—	P9

Section II. Bandwidth

81 § 6. Wherever the full designation of an emission is necessary, the symbol for that class of emission, as given

above, is prefixed by a number indicating the width in kilocycles of the frequency band occupied by it (see 58).

- 82 § 7. Bandwidths of 10 kilocycles or less shall be expressed to a maximum of two significant figures after the decimal.
- 83 § 8. For the necessary bandwidths of various classes of emissions, see appendix 5.
- 84 § 9. The following are examples of the designation of emissions.

Description	Designation
1. Telegraphy 25 words per minute, International Morse Code, carrier modulated by keying only	0.1 A1
2. Telegraphy, 525 c/s tone, 25 words per minute, International Morse Code, carrier and tone keyed or tone only keyed	1.15 A2
3. Amplitude modulated telephony, 3 000 c/s maximum modulation, double sideband, full carrier	6 A3
4. Amplitude modulated telephony, 3 000 c/s maximum modulation, single sideband, reduced carrier	3 A3a
5. Amplitude modulated telephony, 3 000 c/s maximum modulation, two independent sidebands, reduced carrier	6 A3b
6. Vestigial sideband television (one sideband partially suppressed), full carrier (including a frequency modulated sound channel)	6 000 A5,F3
7. Frequency modulated telephony, 3 000 c/s modulation frequency, 20 000 c/s deviation	46 F3
8. Frequency modulated telephony, 15 000 c/s modulation frequency, 75 000 c/s deviation	180 F3
9. One-microsecond pulses, unmodulated, assuming a value of 5 for K (see appendix 5)	10 000 P0

Section III. Nomenclature of Frequencies

85 § 10. Frequencies shall be expressed in kilocycles per second (kc/s) at and below 30 000 kilocycles per second and in megacycles per second (Mc/s) above this frequency.

Frequency Sub-Division	Frequency Range	Metric Sub-Division
VLF (Very Low Frequency)	Below 30 kc/s	Myriametric Waves
LF (Low Frequency)	30 to 300 kc/s	Kilometric Waves
MF (Medium Frequency)	300 to 3 000 kc/s	Hectometric Waves
HF (High Frequency)	3 000 to 30 000 kc/s	Decametric Waves
VHF (Very High Frequency)	30 000 kc/s to 300 Mc/s	Metric Waves
UHF (Ultra High Frequency)	300 to 3 000 Mc/s	Decimetric Waves
SHF (Super High Frequency)	3 000 to 30 000 Mc/s	Centimetric Waves
EHF (Extremely High Frequency)	30 000 to 300 000 Mc/s	Millimetric Waves

CHAPTER III

Frequencies

ARTICLE 3

General Rules for the Assignment and Use of Frequencies

- 86 § 1. The countries, members of the Union, adhering to these Regulations, agree that in assigning frequencies to stations which, by their very nature, are capable of causing harmful interference to the services rendered by the stations of another country, they will make such assignments in accordance with the table of frequency allocations and other provisions of this chapter.
- 87 § 2. The frequencies so assigned shall be selected in such a manner as to avoid causing harmful interference with services carried on by stations using frequencies assigned to them in conformity with the provisions of this chapter and which are entitled to international protection from harmful interference as provided in article 11.
- 88 § 3. A country, member of the Union, shall not assign to a station any frequency in derogation of either the table of frequency allocations given in this chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations.
- 89 § 4. The stations of a service shall use frequencies so separated from the limits of a band allocated to that service as not to cause harmful interference to the services to which the frequency bands immediately adjoining are allocated.
- 90 § 5. Where a band of frequencies is allocated to different services in adjacent Regions or sub-Regions, the basic prin-

ciple is the equality of right to operate. Accordingly, the stations of each service in one Region or sub-Region must operate so as not to cause harmful interference with services in the other Regions or sub-Regions.

ARTICLE 4

Special Arrangements

- 91 § 1. Two or more countries, members of the Union, may, in accordance with article 40 of the Convention, conclude special arrangements regarding the sub-allocation of bands of frequencies to the appropriate services of the participating countries.
- 92 § 2. Two or more countries, members of the Union, may, in accordance with article 40 of the Convention, conclude special arrangements, as a result of a Conference to which all those members of the Union affected have been invited, regarding the assignment of frequencies to those of their stations which participate in one or more specific services within the frequency bands allocated to these services by article 5, either below 5 060 kc/s or above 27 500 kc/s, but not between those limits.
- 93 § 3. The countries, members of the Union, may, in accordance with article 40 of the Convention, conclude, on a world-wide basis and as a result of a Conference to which all members of the Union have been invited, special arrangements concerning the assignment of frequencies to those of their stations participating in a specific service, on condition that such assignments are within the frequency bands allocated exclusively to that service in article 5.
- 94 § 4. Special arrangements concluded in accordance with the provisions of 91, 92 and 93 shall not be in conflict with any of the provisions of these Regulations.

- 95 § 5. The Secretary General of the Union shall be informed prior to the commencement of any Conference to be convened to conclude such an arrangement and shall be informed of the terms of the arrangement when concluded.
- 96 § 6. In accordance with the provisions of article 10 the International Frequency Registration Board may be invited to send representatives to participate in an advisory capacity in the preparation of these arrangements, it being recognized that in the majority of cases such participation is desirable.

ARTICLE 5

Table of Frequency Allocations 10 kc/s to 10 500 Mc/s

- 97 § 1. In the table of frequency allocations which follows, the services to which each band is allocated are listed in alphabetical order. The order of listing does not, therefore, indicate relative priority.
- 98 § 2. a) A footnote reference which appears in the lower left-hand margin of any section of a column showing allocations, either "World-Wide" or "Regional", applies to the services listed in that section of the column.
- 99 b) Any footnote reference placed immediately after a particular service listing applies only to that service.
- 100 § 3. The three Regions¹⁾ (see appendix 16) into which the world has been subdivided for the allocation of frequencies are:
- 101 *Region 1:*
- Region 1 includes the area limited on the East by line A [lines A, B and C are defined below] and on the West by line B, excluding any of the territory of Iran which lies be-
- 100.1 ¹⁾ It should be noted that where the adjective "regional" is used in other chapters of these Regulations it does not necessarily relate to the three Regions here defined for purposes of frequency allocation.

tween these limits. It also includes that part of the territory of Turkey and the Union of Soviet Socialist Republics lying outside of these limits, the territory of the Mongolian Peoples' Republic, and the area to the North of the U.S.S.R. which lies between lines A and C.

102 *Region 2:*

Region 2 includes the area limited on the East by line B and on the West by line C.

103 *Region 3:*

Region 3 includes the area limited on the East by line C and on the West by line A, except the territories of the Mongolian Peoples' Republic, Turkey, the territory of the U.S.S.R. and the area to the North of the U.S.S.R. It also includes that part of the territory of Iran lying outside of those limits.

The lines A, B, and C are defined as follows:

104 *Line A:*

Line A extends from the North Pole along meridian 40° East of Greenwich to parallel 40° North; thence by great circle arc to the intersection of meridian 60° East and the Tropic of Cancer; thence along the meridian 60° East to the South Pole.

105 *Line B:*

Line B extends from the North Pole along meridian 10° West of Greenwich to its intersection with parallel 72° North; thence by great circle arc to the intersection of meridian 50° West and parallel 40° North; thence by great circle arc to the intersection of meridian 20° West and parallel 10° South; thence along meridian 20° West to the South Pole.

106 *Line: C*

Line C extends from the North Pole by great circle arc to the intersection of parallel 65° 30' North with the international boundary in Bering Strait; thence by great circle arc to the intersection of meridian 165° East of Greenwich and parallel 50° North; thence by great circle arc to the intersection of meridian 170° West and parallel 10° North; thence along parallel 10° North to its intersection with meridian 120° West; thence along meridian 120° West to the South Pole.

- 107 § 4. The "European Area" is bounded on the West by the Western boundary of Region 1, on the East by the meridian 40° East of Greenwich and on the South by the parallel 30° North so as to include the western part of the U.S.S.R. and the territories bordering the Mediterranean, with the exception of the parts of Arabia and Saudi-Arabia included in this sector.
- 108 § 5. The allocation of frequency bands to the several services is shown in the following table:

109 Table of Frequency Allocations—10 kc/s to 10 500 Mc/s

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
10-14 (4)	Radio-navigation			
14-70 (56)	a) Fixed b) Maritime mobile ¹⁾			
70-90 (20)		a) Fixed b) Maritime mobile ¹⁾ c) Radio-navigation ²⁾	a) Fixed b) Maritime mobile ¹⁾	a) Fixed b) Maritime mobile ¹⁾ ²⁾
90-110 (20)	a) Fixed b) Maritime mobile ¹⁾ c) Radio-navigation ²⁾			

110 ¹⁾ Limited to coastal telegraph stations using unmodulated emissions (A1 only).

111 ²⁾ In Region 1, Australia and New Zealand, the frequency bands 70-72 kc/s and 84-86 kc/s are reserved for the exclusive use of continuous wave systems of radionavigation.

112 ²⁾ The development of long distance radionavigation systems is authorized in this band which will become exclusively allocated wholly or in part for the use of any one such system as soon as it is internationally adopted. Other considerations being equal, preference should be given to the system requiring the minimum bandwidth for world-wide service and causing the least harmful interference to other services.

If a pulse radionavigation system is employed, the pulse emissions nevertheless must be confined within the band, and must not cause harmful interference outside the band to stations operating in accordance with the Regulations.

During the experimental period prior to the international adoption of any long-distance radionavigation system in this band, the rights of existing stations operating in this band will continue to be recognized.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
110-130 (20)		a) Fixed b) Maritime mobile c) Radio-navigation d)	a) Fixed b) Maritime mobile	a) Fixed b) Maritime mobile d)
130-150 (20) e)		Maritime mobile e)	a) Fixed ⁷⁾ b) Maritime mobile	a) Fixed ⁷⁾ b) Maritime mobile
150-160 (10)		a) Broadcasting b) Maritime mobile ⁹⁾ s)	a) Fixed b) Maritime mobile	a) Fixed b) Maritime mobile

113 ^o In Region 1, Australia and New Zealand, the frequency bands 112-115 kc/s and 126-129 kc/s are reserved for the exclusive use of continuous wave systems of radionavigation.

114 ^o The frequency 143 kc/s is the calling frequency for stations in the maritime mobile service using the band 110-160 kc/s. The conditions for its use are prescribed in article 33.

115 ^o Limited to ship stations (telegraphy exclusively).

116 ^o The fixed service is authorized, provided no harmful interference is caused to ship telegraphy in the North Atlantic and the Mediterranean areas.

117 ^o By special arrangement.

118 ^o The maritime mobile service must not cause harmful interference to the reception of broadcasting stations within the boundaries of the national territories in which the broadcasting stations are situated.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
160-285 (125)		160-255 (95) Broad- casting ¹⁰⁾	160-200 (40) Fixed ¹²⁾	160-200 (40) Fixed
		255-285 (30) a) Aero- nautical radio- navigation b) Broad- casting c) Maritime mobile ¹¹⁾ ¹⁰⁾ ¹¹⁾	200-285 (85) a) Aero- nautical mobile b) Aero- nautical radio- navigation ¹²⁾	200-285 (85) a) Aero- nautical mobile b) Aero- nautical radio- navigation ¹²⁾

119 ¹⁰⁾ In the Union of South Africa, the territory under mandate of Southwest Africa, Northern Rhodesia and Southern Rhodesia, the band 160-200 kc/s is allocated for the fixed service and the band 200-285 kc/s is allocated for the aeronautical radionavigation and aeronautical mobile services.

120 ¹¹⁾ The necessary special arrangements which will be made by an Administrative Conference for the European Area of Region 1 will take into account the following considerations:

121 a) In the western part of the European Area, the band 255-285 kc/s will be used for the aeronautical radionavigation service. Additionally the United Kingdom will share portions of the band with the maritime mobile service.

122 b) In the U.S.S.R., the band 255-285 kc/s will be shared between the broadcasting and maritime mobile services.

123 c) The Norwegian broadcasting stations at present working in the band 255-285 kc/s may continue to do so if authorized by the above mentioned Conference.

124 ¹²⁾ Priority is given to the aeronautical fixed service in northern areas which are subject to auroral disturbances.

125 ¹²⁾ Priority is given to the aeronautical radionavigation service in Region 2, China, India, and Pakistan.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
285-325 (40)		285-315 (30) Maritime radio- navigation (radio- beacons)	285-325 (40) Maritime radio- navigation (radio- beacons)	285-325 (40) a) Aero- nautical radio- navigation b) Maritime radio- navigation (radio- beacons)
		315-325 (10) Aero- nautical radio- navigation		
		14)	15)	16)

126 ¹⁴⁾ In the U.S.S.R., the band 315-325 kc/s is used for the maritime radionavigation service, while the remainder of Region 1 uses this band for the aeronautical radionavigation service. The maritime radionavigation service will be operated so as not to interfere with the aeronautical radionavigation service in the North Sea area.

The aeronautical radionavigation service will be operated so as not to interfere with the maritime radionavigation service in the Black Sea and White Sea areas.

The maritime radionavigation and aeronautical radionavigation services will be operated in accordance with a frequency assignment plan agreed by the various interested administrations to avoid interference in the Baltic Sea area.

127 ¹⁵⁾ In Region 2, the aeronautical radionavigation service is permitted in the band 285-325 kc/s provided that no harmful interference is caused to the maritime radionavigation service.

128 ¹⁶⁾ In Region 3, the maritime radionavigation service has priority.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
325-405 (80)	a) Aero- nautical mobile b) Aero- nautical radio- navigation 17) 18) 19) 20)			

129 ¹⁰⁾ The aeronautical radionavigation service has priority except in New Zealand.

130 ¹⁰⁾ In Regions 1 and 3, the frequency 333 kc/s is the general calling frequency for aircraft stations operating in the band 325-405 kc/s.

131 ¹⁰⁾ This band is allocated exclusively to the aeronautical mobile and aeronautical radionavigation services. Nevertheless, in the European Area, subject to authorisation by the regional agreement concluded by the next European Regional Broadcasting Conference and the conditions specified in that agreement, the administrations concerned may place in the bands 325-365 kc/s and 395-405 kc/s those of the following broadcasting stations which will not cause harmful interference to the aeronautical mobile and aeronautical radionavigation services.

The broadcasting stations now in operation in the whole of the band 325-405 kc/s are:

Banska Bystrica
Bergen

Finnmark
Lulea

132 ¹⁰⁾ The fixed stations in Scandinavia now operating in the band 385-395 kc/s may continue to do so by special arrangement.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
405-415 (10)		a) Aero-nautical radio-navigation b) Maritime radio-navigation (radio direction-finding) c) Mobile except aero-nautical mobile	a) Aero-nautical mobile b) Aero-nautical radio-navigation c) Maritime radio-navigation (radio direction-finding)	a) Aero-nautical mobile b) Aero-nautical radio-navigation c) Maritime radio-navigation (radio direction-finding)
21)		22)	23)	

133 ²¹⁾ The frequency 410 kc/s is designated for the maritime radionavigation service (radio direction-finding). Other services shall not cause harmful interference to radio direction-finding.

134 ²²⁾ The use of the band 405-415 kc/s by the radionavigation services is limited to radio direction-finding except as indicated in a) and b) below:

135 a) In the Baltic and North Sea areas this band may also be used for the maritime radionavigation service for radiobeacon stations of mean power not exceeding 10 watts and subject to not causing harmful interference to radio direction-finding.

136 b) In the U.S.S.R. this band may also be used for the aeronautical radionavigation service on the basis of not causing harmful interference to the service provided by the existing radio direction-finding stations and the radiobeacon stations referred to in subparagraph a) above.

137 ²³⁾ In Region 2, in addition to the provisions of Note ²¹⁾, the aeronautical radionavigation service has priority over the aeronautical mobile service.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
415-490 (75)	Maritime mobile ²⁴⁾ ²⁵⁾			
490-510 (20) ²⁶⁾	Mobile (distress and calling)			
510-525 (15)		Maritime Mobile ²⁴⁾ ²⁵⁾	Mobile	Mobile ²⁷⁾
525-535 (10)		Broad- casting ²⁸⁾	Mobile	Mobile
535-1605 (1070)	Broad- casting ²⁹⁾			

138 ²⁰⁾ The band 415-490 kc/s is allocated exclusively for the maritime mobile service on a world-wide basis and the band 510-525 kc/s is allocated exclusively for that service in Region 1. Nevertheless, in the European Area, subject to authorisation by the regional agreement concluded by the next European Regional Broadcasting Conference and to the conditions specified in that agreement, the administrations concerned may place in the bands 415-485 kc/s and 515-525 kc/s such of the following broadcasting stations as will not cause harmful interference to the maritime mobile service:

Geneva
Hamar
Innsbruck

Oestersund
Oulu

139 ²⁰⁾ Limited to telegraphy.

140 ²²⁾ The frequency 500 kc/s is the international distress and calling frequency. The conditions for its use are prescribed in article 33.

141 ²²⁾ In Region 3, the maritime mobile service has priority in the band 510-525 kc/s.

142 ²³⁾ In the Union of South Africa, the territory under mandate of South-west Africa, Northern Rhodesia and Southern Rhodesia, the band 525-535 kc/s is used for the mobile service.

143 ²³⁾ In the territory of the U.S.S.R., the band 1 560-1 605 kc/s is shared with the fixed service. In the European Area, the fixed service in the U.S.S.R. and the broadcasting service in the neighbouring countries operate subject to the condition of avoiding harmful interference on a reciprocal basis.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
1 605-2 000 (395)		1 605-2 000 (395) a) Fixed b) Mobile except aero-nautical mobile 30) 31) 32)	1 605-1 800 (195) a) Aero-nautical radio navigation b) Fixed c) Mobile	1 605-1 800 (195) a) Fixed b) Mobile
			1 800-2 000 (200) a) Amateur b) Fixed c) Mobile except aero-nautical mobile d) Radio-navigation 33)	1 800-2 000 (200) a) Amateur b) Fixed c) Mobile except aero-nautical mobile d) Radio-navigation 33)
2 000-2 065 (65)		2 000-2 045 (45) a) Fixed b) Mobile except aero-nautical mobile 30)	2 000-2 065 (65) a) Fixed b) Mobile	2 000-2 065 (65) a) Fixed b) Mobile
		2 045-2 065 (20) Meteoro-logical aids		

144 ³⁰⁾ Special arrangements will determine the conditions of operation of stations of the fixed and mobile services in order to protect these services from

mutual harmful interference, having special regard to the difficulties of operation of the maritime mobile service.

145 ³⁰ In the band 1 715–2 000 kc/s Austria, Ireland, the Netherlands, Northern Rhodesia, Southern Rhodesia, Switzerland, the Union of South Africa and the United Kingdom may assign up to 200 kc/s for the amateur service provided that the mean power of any amateur station does not exceed 10 watts and that no harmful interference is caused to the authorised services of other countries.

146 ³⁰ The operation of the existing Northeast Atlantic Standard Loran Chain (Iceland-Faroes-Hebrides) is authorised temporarily in the band 1 900–2 000 kc/s until 1st July 1949 provided that in the meantime all practicable measures are taken to minimise harmful interference from Loran transmissions to other services operating in the same or adjacent frequency bands and, in particular, to narrow the emitted bandwidth. If, however, nine months before the said date, at least three of the interested countries* declare to the Secretary General of the Union that they are of the opinion that aids to radionavigation which are suitable for the Northeast Atlantic area and designed for operation in frequency bands allocated for the radionavigation service under these Regulations, are not available, or cannot be made available by the 1st July 1949 a special Administrative Conference of the interested countries* shall be summoned within two months to review the matter.

147 ³⁰ In any particular area the Loran system of radionavigation operates either on 1 850 or 1 950 kc/s, the band occupied being 1 800–1 900 kc/s or 1 900–2 000 kc/s.

Any of the authorised services may employ whichever of these two bands is not required for Loran on condition that they do not cause harmful interference to Loran.

146 1 *The countries interested in this question are: Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, the Netherlands, Norway, Poland, Portugal, Sweden, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and the Union of Soviet Socialist Republics.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
2 065-2 300 (235) 34)		2 065-2 300 (235) a) Fixed b) Mobile ex- cept aero- nautical mobile(R) ³⁶⁾ 36)	2 065-2 105 (40) Maritime mobile 35)	2 065-2 105 (40) Maritime mobile
			2 105-2 300 (195) a) Fixed b) Mobile 37)	2 105-2 300 (195) a) Fixed b) Mobile
2 300-2 850 (550) (cont'd)		2 300-2 498 (198) a) Broad- casting ³⁶⁾ b) Fixed c) Mobile ex- cept aero- nautical mobile(R) ³⁶⁾ 36)	2 300-2 495 (195) a) Broad- casting ³⁶⁾ b) Fixed c) Mobile 37)	2 300-2 495 (195) a) Broad- casting ³⁶⁾ b) Fixed c) Mobile

148 ³⁴⁾ The frequency 2 182 kc/s is the distress and calling frequency for the maritime mobile service (telephony). The interested administrations will ensure, by special arrangement where necessary, that an adequate guard-band is provided. The conditions for the use of this frequency are prescribed in article 34.

149 ³⁵⁾ For the explanation of the terms "Aeronautical mobile (R)" and "Aeronautical mobile (OR)" see 256 and 257.

150 ³⁶⁾ For the conditions of use of this band by the broadcasting service see 243, 244 and 250-254.

151 ³⁷⁾ In Region 2, provision will be made for coastal telegraphy in the maritime mobile service by special arrangement.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
2 300-2 850 (cont'd)		2 300-2 498 (cont'd)	2 495-2 505 (10) Standard frequency	2 495-2 505 (10) Standard frequency
		2 498-2 502 (4) Standard frequency ²⁵⁾		
		2 502-2 625 (123) a) Fixed b) Mobile ex- cept aero- nautical mobile (R) ²⁶⁾		
		2 625-2 650 (25) a) Maritime mobile b) Maritime radio- navigation ²⁷⁾	2 505-2 850 (345) a) Fixed b) Mobile	2 505-2 850 (345) a) Fixed b) Mobile
		2 650-2 850 (200) a) Fixed b) Mobile ex- cept aero- nautical mobile (R) ²⁸⁾		

152 ²⁵⁾ The standard frequency is 2 500 kc/s.

153 ²⁶⁾ Special arrangements will determine the conditions of operation of stations of the fixed and mobile services in order to protect these services from mutual harmful interference having special regard to the difficulties of operation of the maritime mobile service and also to the needs of the fixed service in certain areas.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
2 850-3 025 (175)	Aero- nautical mobile (R) ²⁵⁾			
3 025-3 155 (130)	Aero- nautical mobile (OR) ²⁵⁾			
3 155-3 200 (45)	a) Fixed b) Mobile except aero- nautical mo- bile (R) ²⁵⁾			
3 200-3 230 (30)	a) Broadcast- ing ²⁵⁾ b) Fixed c) Mobile except aero- nautical mo- bile (R) ²⁵⁾			
3 230-3 400 (170)	a) Broadcast- ing ²⁵⁾ b) Fixed c) Mobile except aero- nautical mobile			
3 400-3 500 (100)	Aero- nautical mobile (R) ²⁵⁾			

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
3 500-4 000 (500)		3 500-3 800 (300) a) Amateur b) Fixed c) Mobile except aero- nautical mobile	3 500-4 000 (500) a) Amateur b) Fixed c) Mobile except aero- nautical mo- bile (R) ³⁵⁾	3 500-3 900 (400) a) Amateur b) Fixed c) Mobile
		3 800-3 900 (100) a) Aero- nautical mo- bile (OR) ³⁵⁾ b) Fixed c) Land mobile		
		3 900-3 950 (50) Aero- nautical mobile (OR) 36)		3 900-3 950 (50) a) Aero- nautical mobile b) Broad- casting
		3 950-4 000 (50) a) Broad- casting b) Fixed		3 950-4 000 (50) a) Broad- casting b) Fixed

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
4 000—4 063 (63)	Fixed			
4 063—4 438 (375)	Maritime mobile ⁴⁰⁾ (41)			
4 438—4 650 (212)		Fixed	a) Fixed b) Mobile except aeronautical mobile(R) ⁴²⁾	a) Fixed b) Mobile except aeronautical mobile
4 650—4 700 (50)	Aero-nautical mobile (R) ⁴³⁾			
4 700—4 750 (50)	Aero-nautical mobile (OR) ⁴⁴⁾			

154 ⁴⁰⁾ In the U.S.S.R., in the bands 4 063—4 133 kc/s and 4 408—4 438 kc/s, fixed stations of limited power may operate provided that, in order to minimise the possibility of causing harmful interference to the maritime mobile service, they are situated at least 600 km from the coast. A limited power station is one whose power and antenna characteristics are so adjusted that the field strength established at any point in any direction does not exceed that obtainable with a non-directive antenna and a peak power of 1 kilowatt.

155 ⁴¹⁾ In addition to the provisions of 154, the band 4 063—4 438 kc/s may be used, exceptionally and on the essential condition that harmful interference is not caused to the maritime mobile service, by fixed stations of mean power not exceeding 50 watts communicating only within the national boundaries of the countries concerned. At the time of notification of these cases the attention of the International Frequency Registration Board is drawn to the above condition.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
4 750-4 850 (100)		a) Aero- nautical mobile (OR) ³⁶⁾ b) Broadcast- ing ³⁶⁾ c) Fixed d) Land mobile	a) Broadcast- ing ³⁶⁾ b) Fixed	a) Broadcast- ing ³⁶⁾ b) Fixed
4 850-4 995 (145)	a) Broadcast- ing ³⁶⁾ b) Fixed c) Land mobile			
4 995-5 005 (10) ⁴²⁾	Standard frequency			
5 005-5 060 (55)	a) Broadcast- ing ³⁶⁾ b) Fixed			
5 060-5 250 (190)	Fixed			

156 ⁴²⁾ The standard frequency is 5 000 kc/s.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
5 250-5 480 (230)		5 250-5 430 (180) a) Fixed b) Land mobile	5 250-5 450 (200) a) Fixed b) Land mobile	5 250-5 430 (180) a) Fixed b) Land mobile
		5 430-5 480 (50) a) Aero- nautical mobile (OR) ³⁵⁾ b) Fixed c) Land mobile	5 450-5 480 (30) Aero- nautical mobile (R)	5 430-5 480 (50) a) Aero- nautical mobile (OR) ³⁵⁾ b) Fixed c) Land mobile
5 480-5 680 (200)	Aero- nautical mobile (R) ³⁵⁾			
5 680-5 730 (50)	Aero- nautical mobile (OR) ³⁵⁾			
5 730-5 950 (220)	Fixed			
5 950-6 200 (250)	Broad- casting			

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
6 200-6 525 (325)	⁴³⁾ Maritime mobile			
6 525-6 685 (160)	³⁵⁾ Aero- nautical mobile (R)			
6 685-6 765 (80)	³⁵⁾ Aero- nautical mobile (OR)			
6 765-7 000 (235)	Fixed			
7 000-7 100 (100)	Amateur			
7 100-7 300 (200)		7 100-7 150 (50) a) Amateur b) Broad- ⁴⁴⁾ casting	7 100-7 300 (200) Amateur	7 100-7 150 (50) a) Amateur b) Broad- ⁴⁵⁾ casting
		7 150-7 300 (150) Broad- casting		7 150-7 300 (150) Broad- ⁴⁵⁾ casting

157 ⁴³⁾ The band 6 200-6 525 kc/s may be used, exceptionally and on the essential condition that harmful interference is not caused to the maritime mobile service, by fixed stations of mean power not exceeding 50 watts communicating only within the national boundaries of the countries concerned. At the time of notification of these cases the attention of the International Frequency Registration Board is drawn to the above condition.

158 ⁴⁴⁾ In Region 1, the use of the band 7 100-7 150 kc/s by the amateur service is authorised provided that no harmful interference is caused to the broadcasting service. However, in the Union of South Africa and the territory under mandate of Southwest Africa, the band 7 100-7 150 kc/s will be used exclusively for the amateur service.

159 ⁴⁵⁾ In Australia and the Netherlands East Indies, the band 7 100-7 150 kc/s, and in China and New Zealand, the band 7 100-7 300 kc/s, may be allocated for the amateur service. The administrations of the countries mentioned in this note shall take all practicable steps to avoid causing any harmful interference to the broadcasting service and will ensure that amateur stations do not use a peak power exceeding 100 watts. If, however, harmful interference to the broadcasting service is experienced these administrations will consider reducing the use of these bands by the amateur service.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
7 300-8 195 (895)	Fixed			
8 195-8 815 (620)	⁴⁶⁾ Maritime mobile			
8 815-8 965 (150)	³⁶⁾ Aero- nautical mobile (R)			
8 965-9 040 (75)	³⁶⁾ Aero- nautical mobile (OR)			
9 040-9 500 (460)	Fixed			
9 500-9 775 (275)	Broad- casting			
9 775-9 995 (220)	Fixed			
9 995-10 005 (10) ⁴⁷⁾	Standard frequency			

160 ⁴⁶⁾ Between 8 615 and 8 815 kc/s, the U.S.S.R. will meet their special requirements for the fixed service with due regard to technical provisions (power, location, antenna, etc.) with a view to minimising the possibility of harmful interference with the maritime mobile service. Coast stations in the maritime mobile service will also have due regard to technical provisions (power, location, antenna, etc.) with a view to minimising the possibility of harmful interference with the fixed service in the U.S.S.R. The International Frequency Registration Board will be consulted regarding these arrangements.

161 ⁴⁷⁾ The standard frequency is 10 000 kc/s.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
10 005-10 100 (95)	Aero- nautical mobile (R) ³⁵⁾			
10 100-11 175 (1 075)	Fixed			
11 175-11 275 (100)	Aeronau- tical mo- bile (OR) ³⁵⁾			
11 275-11 400 (125)	Aeronau- tical mo- bile (R) ³⁵⁾			
11 400-11 700 (300)	Fixed ⁴⁸⁾			
11 700-11 975 (275)	Broad- casting			
11 975-12 330 (355)	Fixed			
12 330-13 200 (870)	Maritime mobile ⁴⁹⁾			

162 ⁴⁸⁾ In the U.S.S.R., the band 11 400-11 450 kc/s is used for the aeronautical mobile (OR) service on a shared basis.

163 ⁴⁹⁾ Between 12 925 and 13 200 kc/s the U.S.S.R. will meet their special requirements for the fixed service with due regard to technical provisions (power, location, antenna, etc.) with a view to minimising the possibility of harmful interference with the maritime mobile service. Coast stations in the maritime mobile service will also have due regard to technical provisions (power, location, antenna, etc.), with a view to minimising the possibility of harmful interference with the fixed service in the U.S.S.R. The International Frequency Registration Board will be consulted regarding these arrangements.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
13 200-13 260 (60)	Aeronau- tical mo- bile (OR) ⁵⁰⁾			
13 260-13 360 (100)	Aeronau- tical mo- bile (R) ⁵⁰⁾			
13 360-14 000 (640) ⁵⁰⁾	Fixed			
14 000-14 350 (350)	Amateur ⁵¹⁾			
14 350-14 990 (640)	Fixed			
14 990-15 010 (20) ⁵²⁾	Standard frequency			

164 ⁵⁰⁾ The frequency 13 560 kc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of $\pm 0.05\%$ of this frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

165 ⁵¹⁾ In the U.S.S.R., the band 14 250-14 350 kc/s is also allocated for the fixed service.

166 ⁵²⁾ The standard frequency is 15 000 kc/s.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
15 010-15 100 (90)	Aeronau- tical mo- bile (OR) ³⁵⁾			
15 100-15 450 (350)	Broad- casting			
15 450-16 460 (1 010)	Fixed			
16 460-17 360 (900)	Maritime mobile ³⁵⁾			
17 360-17 700 (340)	Fixed			
17 700-17 900 (200)	Broad- casting			
17 900-17 970 (70)	Aeronau- tical mo- bile (R) ³⁵⁾			
17 970-18 030 (60)	Aeronau- tical mo- bile (OR) ³⁵⁾			

167 ³⁵⁾ Between 17 160 and 17 360 kc/s, the U.S.S.R. will meet their special requirements for the fixed service with due regard to technical provisions (power, location, antenna, etc.) with a view to minimising the possibility of harmful interference with the maritime mobile service. Coast stations in the maritime mobile service will also have due regard to technical provisions (power, location, antenna, etc.) with a view to minimising the possibility of harmful interference with the fixed service in the U.S.S.R. The International Frequency Registration Board will be consulted regarding these arrangements.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
18 030-19 990 (1 960)	Fixed			
19 990-20 010 (20) 64)	Standard frequency			
20 010-21 000 (990)	Fixed			
21 000-21 450 (450)	Amateur			
21 450-21 750 (300)	Broad- casting			
21 750-21 850 (100)	Fixed			
21 850-22 000 (150)	a) Aeronau- tical fixed b) Aeronau- tical mo- bile(R) ⁶⁵⁾			

168 ⁶⁴⁾ The standard frequency is 20 000 kc/s.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
22 000-22 720 (720)	Maritime mobile			
22 720-23 200 (480)	Fixed			
23 200-23 350 (150)	a) Aeronau- tical fixed b) Aeronau- tical mo- bile(OR) ¹⁶⁹			
23 350-24 990 (1 640)	a) Fixed b) Land mobile ¹⁷⁰			
24 990-25 010 (20) ¹⁷⁰	Standard frequency			

169 ¹⁶⁹ Inter-ship telegraphy in the maritime mobile service is permitted in the band 23 350-24 000 kc/s.

170 ¹⁷⁰ The standard frequency is 25 000 kc/s.

Frequency Band and (Bandwidth) kc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
25 010-25 600 (590)	a) Fixed b) Mobile except aero- nautical mobile			
25 600-26 100 (500)	Broad- casting			
26 100-27 500 (1 400)	a) Fixed b) Mobile except aero- nautical mobile			
67)	68)			
27 500-28 000 (500)		Meteoro- logical aids	a) Fixed b) Mobile	a) Fixed b) Mobile
28 000-29 700 (1 700)	Amateur			

171 ⁶⁷⁾ The frequency 27 120 kc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of $\pm 0.6\%$ of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

172 ⁶⁸⁾ In Region 2, Australia, New Zealand, the Union of South Africa and the territory under mandate of Southwest Africa, the amateur service will operate within the band 26 960-27 230 kc/s.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
29.7-88 (58.3)		29.7-31.7 (2) Aero- nautical radio- navigation 59) 61)	29.7-44 (14.3) a) Fixed b) Mobile	29.7-31.7 (2) a) Fixed b) Mobile
		31.7-41 (9.3) a) Fixed b) Mobile 62)		31.7-44 (12.3) a) Aero- nautical radio- navigation b) Fixed c) Mobile
		41-68 (27) Broad- casting 64) 65)	44-50 (6) a) Broad- casting b) Fixed c) Mobile	44-50 (6) a) Broad- casting b) Fixed c) Mobile
			50-54 (4) Amateur	50-54 (4) Amateur
			54-72 (18) a) Broad- casting b) Fixed c) Mobile (cont'd)	54-68 (14) a) Broad- casting b) Fixed c) Mobile
(cont'd)				

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
29-7-88 (cont'd)		68-70 (2) Aero- nautical radio-	54-72 (cont'd)	68-70 (2) Aero- nautical radio-
(cont'd)		⁶⁶⁾ navigation	(cont'd)	⁶⁷⁾ navigation

173 ⁶⁰⁾ In the U.S.S.R., the band 29.7-30 Mc/s is allocated additionally for the aeronautical mobile service.

174 ⁶⁰⁾ In Australia, the band 29.7-31.7 Mc/s is allocated for the aeronautical radionavigation service.

175 ⁶⁰⁾ In the U.S.S.R., the band 30-31.7 Mc/s is allocated for the radionavigation service.

176 ⁶²⁾ The frequency 40.68 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of $\pm 0.05\%$ of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

177 ⁶³⁾ In Region 1, the aeronautical radionavigation service may be accommodated in the band 31.7-41 Mc/s. The operation of standard beam approach equipment, as described in 258, is to be protected by special arrangement.

178 ⁶⁴⁾ In the Union of South Africa, the territory under mandate of South-west Africa, Northern Rhodesia and Southern Rhodesia, the band 41-44 Mc/s is allocated for the aeronautical radionavigation, fixed and mobile services; the bands 44-50 Mc/s and 54-68 Mc/s are allocated for the fixed and mobile services in addition to the broadcasting service, the band 50-54 Mc/s being used exclusively for the amateur service.

179 ⁶⁵⁾ In the United Kingdom, the band 66.5-68 Mc/s may be used for the fixed and land mobile services under local arrangement with France in order to avoid mutual harmful interference.

180 ⁶⁶⁾ In the U.S.S.R., the band 68-72 Mc/s is allocated for the broadcasting service. The aeronautical radionavigation service in other countries and the broadcasting service in the U.S.S.R. are subject to local arrangement in order to avoid mutual harmful interference.

181 ⁶⁷⁾ In China, the bands 68-72 Mc/s and 76-88 Mc/s are allocated for the broadcasting, fixed and mobile services.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
29.7-88 (cont'd)		70-72.8 (2.8) a) Fixed b) Mobile except aero- nautical mobile	54-72 (cont'd)	70-78 (8) a) Fixed b) Mobile
		72.8-75.2 (2.4) Aero- nautical radio- navigation	72-76 (4) a) Fixed b) Mobile	
		75-2-78 (2.8) a) Fixed b) Mobile except aero- nautical mobile	76-88 (12) a) Broad- casting b) Fixed c) Mobile	
		78-80 (2) Aero- nautical radio- navigation	(cont'd)	78-80 (2) Aero- nautical radio- navigation

182 ⁶⁵⁾ In France and the U.S.S.R., the band 72-72.8 Mc/s is allocated for the amateur service.

183 ⁶⁶⁾ In India, the bands 70-72.8 Mc/s and 76-85 Mc/s are allocated exclusively for the broadcasting service.

184 ⁶⁷⁾ The frequency 75 Mc/s is designated for aeronautical marker beacons. In Region 1, the guardband is ± 0.2 Mc/s; in Regions 2 and 3, ± 0.4 Mc/s.

185 ⁶⁸⁾ In the U.S.S.R., the band 76-108 Mc/s is allocated for the broadcasting service.

186 ⁶⁹⁾ The broadcasting service in the U.S.S.R. and the radionavigation service in neighbouring countries are subject to local arrangement as regards avoiding mutual harmful interference.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-wide	Regional		
		Region 1	Region 2	Region 3
29.7-88 (cont'd)		80-83 (3) a) Fixed b) Land mobile 71)	76-88 (cont'd)	80-87 (7) a) Fixed b) Mobile
		83-85 (2) Aero- nautical radio- navigation 71) 72)		
		85-87.5 (2.5) a) Fixed b) Mobile 71) except aero- 72) nautical 73) mobile		74)
		87.5-88 (0.5) Broad- casting 72) 73)		87-88 (1) Broad- casting 74)

187 ⁷¹⁾ In the United Kingdom, the band 85-90 Mc/s is allocated for the maritime radionavigation service on a shared basis.

188 ⁷¹⁾ In Australia and New Zealand, the band 85-90 Mc/s is allocated for the maritime radionavigation service.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
88-100 (12)	72) Broad- 73) casting 74) 75) 76) 77) 78)			
100-108 (8)		Mobile except aero- nautical mobile (R) 35) 71) 79)	Broad- casting	Broad- casting 75) 80)
108-118 (10)	Aero- nautical radio- navigation			
118-132 (14) 81)	Aero- nautical mobile (R) 35)			

189 ⁷⁰⁾ In China, the band 88-108 Mc/s is allocated for the broadcasting and fixed services.

190 ⁷⁰⁾ In France, India and the United Kingdom, the meteorological aids service may be operated in the band 94.5-95 Mc/s.

191 ⁷⁰⁾ In the United Kingdom, the fixed and land mobile services may be operated in the band 95-100 Mc/s.

192 ⁷⁰⁾ In India, the band 95-97.5 Mc/s is allocated for the fixed and mobile services.

193 ⁷⁰⁾ In the Union of South Africa, the territory under mandate of South-west Africa, Northern Rhodesia and Southern Rhodesia, the band 100-108 Mc/s is allocated for the broadcasting service and the bands 132-144 Mc/s and 146-174 Mc/s for the fixed and mobile services.

194 ⁸⁰⁾ In Australia, the band 100-108 Mc/s is allocated for the aeronautical mobile (OR) service until required for the broadcasting service and in New Zealand it is allocated for the broadcasting and mobile services.

195 ⁸¹⁾ The frequency 121.5 Mc/s is the aeronautical emergency frequency in this band.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
132-144 (12)		Aero- nautical mobile (OR) <small>35) 79)</small>	a) Fixed b) Mobile	a) Fixed b) Mobile <small>82)</small>
144-146 (2)	Amateur			
146-235 (89)		146-156 (10) Aero- nautical mobile (OR) <small>35) 79) 83)</small>	146-148 (2) Amateur	146-148 (2) Amateur
<small>84)</small>		156-174 (18) a) Fixed b) Mobile except aero- nautical mobile <small>79) 86)</small> (cont'd)	148-174 (26) a) Fixed b) Mobile	148-170 (22) a) Fixed b) Mobile
		(cont'd)	(cont'd)	<small>82)</small>

196 ²²⁾ In Australia and New Zealand, the bands 132–144 Mc/s and 148–156 Mc/s are allocated exclusively for the aeronautical mobile (OR) service.

197 ^{ss} In Region 1, the meteorological aids service may be operated in the band 151-154 Mc/s.

198 ⁸⁴⁾ The frequency 156·80 Mc/s is designated for world-wide use for safety, calling, and intership and harbour control communications in the maritime mobile service (simplex telephony). Any other use of this frequency should be avoided in areas where such other use is liable to cause harmful interference to the maritime mobile service. The interested administrations will ensure, by special arrangements where necessary, that an adequate guard-band is provided. In Region 2, its use for this purpose will be restricted to the frequency modulated type of transmission (F3) and it is strongly recommended that the same type of transmission be adopted for this purpose in Regions 1 and 3.

199 ⁸⁵⁾ In France, the band 162-174 Mc/s is allocated for the broadcasting service.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
146-235 (cont'd)		156-174 (cont'd)	148-174 (cont'd)	170-200 (30) a) Broad- casting b) Fixed c) Mobile
		174-216 (42) Broad- casting ⁸⁷⁾ ⁸⁸⁾ ⁸⁹⁾	174-216 (42) a) Broad- casting b) Fixed c) Mobile	⁸⁶⁾ 200-235 (35) Aero- nautical radio- navigation
		216-235 (19) Aero- nautical radio- navigation ⁸⁹⁾ ⁹⁰⁾ ⁹¹⁾ (cont'd)	216-220 (4) a) Fixed b) Mobile	⁹²⁾ (cont'd)
(cont'd)				

200 ⁸⁶⁾ In Australia, the band 170-178 Mc/s is allocated for the aeronautical radionavigation service.

201 ⁸⁷⁾ In the United Kingdom, the band 174-200 Mc/s is also allocated for the fixed service, and the band 200-216 Mc/s is allocated for the aeronautical radionavigation service.

202 ⁸⁸⁾ In the Union of South Africa, the territory under mandate of Southwest Africa, Northern Rhodesia and Southern Rhodesia, the band 174-216 Mc/s is also allocated for the fixed and land mobile services.

203 ⁸⁹⁾ In the United Kingdom, distance measuring equipment will be operated in the band 200-235 Mc/s until such time as world standardisation at 1 000 Mc/s has been accomplished.

204 ⁹⁰⁾ In the U.S.S.R., the band 216-260 Mc/s is allocated for the radionavigation service.

205 ⁹¹⁾ In the Union of South Africa, the territory under mandate of Southwest Africa, Northern Rhodesia and Southern Rhodesia, the band 220-225 Mc/s is allocated for the amateur service.

206 ⁹²⁾ In China, the band 200-216 Mc/s is allocated for the broadcasting, fixed and mobile services, and the bands 216-220 Mc/s and 225-235 Mc/s for the fixed and mobile services, the band 220-225 Mc/s being allocated for the amateur service.



Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
146-235 (cont'd)		216-235 (cont'd)	220-235 (5) ⁹³⁾ Amateur 225-235 (10) a) Fixed b) Mobile ⁹³⁾	200-235 (cont'd)
235-328.6 (93.6)	a) Fixed b) Mobile			
328.6-335.4 (6.8)	Aero- nautical radio- navigation			
335.4-420 (84.6)	a) Fixed b) Mobile ⁹⁴⁾ ⁹⁵⁾			

207 ⁹³⁾ In Region 2, distance measuring equipment in the aeronautical radio-navigation service may be operated in the band 220-231 Mc/s until the 1st January 1952 in accordance with appropriate bilateral or multilateral arrangements.

208 ⁹⁴⁾ The meteorological aids service (radio-sonde) may be operated in the band 400-420 Mc/s.

209 ⁹⁵⁾ In the U.S.S.R., the band 412-460 Mc/s is allocated for the radionavigation service.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
420-450 (30)	a) Aero- nautical radio- navigation b) Amateur ⁹⁶⁾ ⁹⁷⁾			
450-460 (10)		a) Aero- nautical radio- navigation b) Amateur ⁹⁶⁾	a) Aero- nautical radio- navigation b) Fixed ⁹⁶⁾ c) Mobile ⁹⁷⁾	a) Aero- nautical radio- navigation b) Amateur ⁹⁶⁾
460-470 (10)	a) Fixed b) Mobile			
470-585 (115)	Broad- casting			

210 ⁹⁶⁾ In the band 420-460 Mc/s the aeronautical radionavigation service has priority. The other services are admitted to this band only on condition that harmful interference is not caused to the aeronautical radionavigation service.

211 ⁹⁷⁾ In Region 2, the allocation for the aeronautical radionavigation service in the band 420-460 Mc/s is temporary and is exclusively for altimeters.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
585-610 (25)		Radio-navigation ⁹⁹⁾	Broad-casting	Radio-navigation
610-940 (330) ⁹⁸⁾	Broad-casting ⁹⁹⁾ ¹⁰⁰⁾			
940-960 (20)		Broad-casting	Fixed	Broad-casting
960-1 215 (255)	Aero-nautical radio-navigation			
1 215-1 300 (85)	Amateur ¹⁰¹⁾			

212 ⁹⁸⁾ In Region 2, the frequency 915 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 25 Mc/s of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

213 ⁹⁹⁾ In France and Italy, the band 585-685 Mc/s is allocated for the fixed and broadcasting services.

214 ¹⁰⁰⁾ In Region 2, the fixed service may operate in the band 890-940 Mc/s.

215 ¹⁰¹⁾ In the U.S.S.R., the band 1 215-1 300 Mc/s is allocated for the fixed service, primarily for relaying television.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
1 300-1 700 (400)	102)	1 300-1 600 (300) a) Fixed b) Mobile 103) 104)	1 300-1 660 (360) Aero- nautical radio- navigation 104)	1 300-1 700 (400) a) Aero- nautical radio- navigation b) Fixed c) Mobile
		1 600-1 700 (100) Aero- nautical radio- navigation	1 660-1 700 (40) Meteoro- logical aids (radio sonde)	
1 700-2 300 (600)	a) Fixed b) Mobile 105)			
2 300-2 450 106) (150)	Amateur			

216 ¹⁰²⁾ In Region 2, the band 1 300-1 660 Mc/s is intended for an integrated system of electronic aids to air navigation and traffic control. Administrations of the other Regions should envisage the possibility of the future application of such a system on a world-wide basis.

217 ¹⁰³⁾ In the U.S.S.R., the band 1 300-1 600 Mc/s is allocated for the aeronautical radionavigation service.

218 ¹⁰⁴⁾ In Region 2 and the United Kingdom, the use of the band 1 300-1 365 Mc/s is restricted to surveillance radar.

219 ¹⁰⁵⁾ In Regions 1 and 3, the meteorological aids service may be operated in the band 1 700-1 750 Mc/s.

220 ¹⁰⁶⁾ In Region 2, Australia, New Zealand, Northern Rhodesia, Southern Rhodesia, the Union of South Africa, the territory under mandate of Southwest Africa, and the United Kingdom, the frequency 2 450 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 50 Mc/s of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
2 450-2 700 (250) ¹⁰⁶⁾	a) Fixed b) Mobile ¹⁰⁷⁾			
2 700-2 900 (200)	Aero- nautical radio- navigation ¹⁰⁸⁾			
2 900-3 300 (400)	Radio- navigation ¹⁰⁹⁾ ¹¹⁰⁾			
3 300-3 900 (600)		3 300-3 900 (600) a) Fixed b) Mobile c) Radio- navigation	3 300-3 500 (200) Amateur 3 500-3 900 (400) a) Fixed b) Mobile	3 300-3 900 (600) a) Amateur b) Fixed c) Mobile d) Radio- navigation

221 ¹⁰⁷⁾ In the U.S.S.R., the band 2 450-2 700 Mc/s is allocated for the aeronautical mobile and the aeronautical radionavigation services.

222 ¹⁰⁸⁾ The meteorological aids service may be operated in the band 2 700-2 900 Mc/s.

223 ¹⁰⁹⁾ The band 3 246-3 266 Mc/s is designated for racons.

224 ¹¹⁰⁾ In the band 2 900-3 300 Mc/s shipborne radar in merchant ships is confined within the band 3 000-3 246 Mc/s.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
3 900—4 200 (300)	a) Fixed b) Mobile			
4 200—4 400 (200)	Aero- nautical radio- navigation 111)			
4 400—5 000 (600)	a) Fixed b) Mobile			
5 000—5 250 (250)	Aero- nautical radio- navigation			
5 250—5 650 (400)	Radio- navigation 112) 113)			
5 650—5 850 (200) 114)	Amateur			

225 ¹¹¹⁾ In China, the band 4 200—4 400 Mc/s may be used for the fixed service provided that harmful interference is not caused to the aeronautical radionavigation service.

226 ¹¹²⁾ The band 5 440—5 460 Mc/s is designated for racons.

227 ¹¹³⁾ In the band 5 250—5 650 Mc/s shipborne radar in merchant ships is confined within the band 5 460—5 650 Mc/s.

228 ¹¹⁴⁾ In Region 2, Australia, New Zealand, Northern Rhodesia, Southern Rhodesia, the Union of South Africa, the territory under mandate of Southwest Africa, and the United Kingdom, the frequency 5 850 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 75 Mc/s of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

Frequency Band and (Bandwidth) Mc/s	Allocation to Services			
	World-Wide	Regional		
		Region 1	Region 2	Region 3
5 850-5 925 (75) ¹¹⁴⁾		a) Fixed b) Mobile	Amateur	a) Fixed b) Mobile
5 925-8 500 (2 575)	a) Fixed b) Mobile ¹¹⁵⁾			
8 500-9 800 (1 300)	Radio- ¹¹⁶⁾ navigation ¹¹⁷⁾			
9 800-10 000 (200)	a) Fixed b) Radio- navigation			
10 000-10 500 (500)	Amateur			
Above 10 500	Not allocated			

229 ¹¹⁵⁾ In the U.S.S.R., the band 6 900–7 050 Mc/s may be used for the meteorological aids service.

230 ¹¹⁶⁾ The band 9 300–9 320 Mc/s is designated for racons.

231 ¹¹⁷⁾ In the band 8 500–9 800 Mc/s shipborne radar in merchant ships is confined within the band 9 320–9 500 Mc/s.

ARTICLE 6

Special Rules Relating to Use of Classes of Emissions

- 232 § 1. The use of class B emissions is forbidden in all stations. However, it is permitted for emergency (reserve) installations in ships and for lifeboats, liferaft and survival craft equipments under the conditions fixed by article 33 (see 712).
- 233 § 2. Only classes A1 or F1 emissions are authorized for stations of the fixed and maritime mobile services working on frequencies in the band 110-160 kc/s. As an exception to this rule, class A2 emissions may be employed within the band 110-125 kc/s exclusively for the transmission of time signals.

ARTICLE 7

Special Rules for the Assignment and Use of Frequencies

- 234 § 1. (1) The countries, members of the Union, recognize that among frequencies which have long distance propagation characteristics, those between 5 000 and 30 000 kc/s are particularly useful for long distance communications, and agree to make every possible effort to reserve this band for such communications. Whenever frequencies in this band are used for short or medium distance communications, the minimum power necessary shall be employed.
- 235 (2) In order to reduce the requirements for frequencies in this band, and thus to prevent harmful interference to long distance radiocommunications, the administrations are encouraged to use every other means of communication wherever practicable.

236 § 2. When special circumstances make it indispensable to do so, an administration may, as an exception to the normal methods of working authorized by these Regulations, have recourse to the special methods of working enumerated below, on the sole condition that the characteristics of the stations still conform to those inserted in the Master International Frequency Register:

- a) a fixed station may, as a secondary service, transmit to mobile stations on its normal frequencies;
- b) a land station may communicate, on a secondary basis, with fixed stations or other land stations of the same category.

237 § 3. Any administration may assign a frequency in a band allocated to the fixed service to a station authorized to transmit by the unilateral method from one specified fixed point to a number of other specified fixed points, provided that such transmissions are not intended to be received directly by the general public.

238 § 4. Any mobile station the emission of which complies with the frequency tolerances required of coast stations may transmit on the same frequency as the coast station with which it communicates on condition that the coast station requests such transmission and that no harmful interference results to other stations.

239 § 5. In certain cases, for which provision is made in articles 33 and 34, aircraft stations are authorized to use frequencies in the maritime mobile bands between 4 000 and 23 000 kc/s for the purpose of entering into communication with stations of the maritime mobile service.

ARTICLE 8

Protection of Distress Frequencies

240 § 1. In the band 475 - 535 kc/s, no class of emission capable of rendering inoperative distress, alarm, safety or

urgency signals transmitted on 500 kc/s is allowed.

- 241 § 2. In Regions 1 and 3, in the band 325 – 345 kc/s, no class of emission capable of rendering inoperative distress, safety or urgency signals transmitted on 333 kc/s is allowed.

ARTICLE 9

Special Rules Relating to Particular Services

Section I. Broadcasting Service

- 242 § 1. *General.*

243 (1) In principle, the power of broadcasting stations which employ frequencies below 5 060 kc/s must not exceed (except in the band 3 900 – 4 000 kc/s) a value which permits of maintaining economically an effective national service of good quality within the limits of the country concerned.

244 (2) The use by the broadcasting service of the bands listed below is restricted to the Tropical Zone as defined in 252:

2 300 – 2 498 kc/s (Region 1)
2 300 – 2 495 kc/s (Regions 2 and 3)
3 200 – 3 400 kc/s (All Regions)
4 750 – 4 995 kc/s (All Regions)
5 005 – 5 060 kc/s (All Regions)

- 245 § 2. *Broadcasting in the European Area.*¹⁾

246 (1) So far as broadcasting in the European Area is concerned, the following restrictions are accepted in the application of the principle stated in 88. These may be annulled or modified by arrangement among the countries of the European Area.

247 (2) In the absence of previous arrangements among the

245.1 ¹⁾ See 107 for the definition of the European Area.

countries of the European Area, the option mentioned in 88 may not be exercised, within the limits of the European Area, for the purpose of effecting a broadcasting service outside the bands allocated to that service by these Regulations on frequencies below 1 605 kc/s.

248 (3) In principle, the previous arrangements referred to in the preceding paragraph are concluded at Broadcasting Conferences of the countries of the European Area. However, if a country desires to establish such a service or to obtain a modification of the conditions fixed by a previous arrangement relating to such a service (frequency, power, geographical position of the stations, etc.) in the interval between two such conferences, it shall so inform the countries of the European Area at least three months in advance through the medium of the Secretary General of the Union. Any country which has not answered within a period of six weeks after receipt of the communication in question shall be considered as having given its consent.

249 (4) In the case of a broadcasting station in the European Area working outside the authorized bands of frequencies, it is understood that such previous arrangement will also be necessary on every occasion when a change which might affect the conditions of international interference is to be made in the characteristics which have been previously inserted in the Master International Frequency Register.

250 § 3. *Broadcasting in the Tropical Zone.*

251 (1) In these Regulations, the expression "broadcasting in the Tropical Zone" indicates a type of broadcasting, for internal national use in countries in the zone defined in 252, where it may be shown that because of difficulty of high atmospheric noise level and propagation it is not possible to furnish economically a more satisfactory service through the use of low, medium or very high frequencies.

252 (2) The Tropical Zone (see appendix 16) is defined as:
a) the whole of that area in Region 2 contained between the Tropics of Cancer and Capricorn;

- b) the whole of that area in Regions 1 and 3 contained between the parallels 30° North and 35° South, with the addition of the area contained between the meridians 40° East and 80° East of Greenwich and the parallels 30° North and 40° North;
- c) the zone may be extended, in Region 2, to parallel 33° North, subject to appropriate special arrangements between the countries concerned in that Region.

253 (3) Within the Tropical Zone, the broadcasting service has priority over the other services with which it shares those bands listed in 244.

254 (4) The broadcasting service operating inside the Tropical Zone, and other services operating outside the Zone, are subject to the provisions of 90.

Section II. Aeronautical Mobile Service

255 § 4. Administrations shall not permit public correspondence in the frequency bands allocated exclusively to the aeronautical mobile service, unless allowed by special aeronautical regulations adopted by an aeronautical administrative conference to which all interested members of the Union have been invited. Such regulations must recognize the absolute priority of safety and control messages.

256 § 5. Frequencies in any band allocated to the aeronautical mobile (R) service are reserved for communications between any aircraft and those aeronautical stations primarily concerned with the safety and regularity of flight along national or international civil air routes.

257 § 6. Frequencies in any band allocated to the aeronautical mobile (OR) service are reserved for communications between any aircraft and aeronautical stations other than those primarily concerned with flight along national or international civil air routes.

Section III. Aeronautical Radionavigation Service

- 258 § 7. (1) Standard beam approach equipment, to be accom-
modated in the band 31.7 – 41 Mc/s in Region 1, consists of a
localizer and markers used to assist aircraft in making land-
ing approach.
- 259 (2) The band 328.6 – 335.4 Mc/s is for the use of the
Instrument Landing System (glide path).
- 260 (3) The band 4 200 – 4 400 Mc/s is for the use of radio
altimeters.
- 261 (4) The band 5 000 – 5 250 Mc/s is for the use of instru-
ment landing systems.

Section IV. Maritime Mobile Service

- 262 § 8. Ship stations authorized to work in the band 415 –
535 kc/s must, as far as possible, transmit on the frequencies
indicated in article 33 (see 730).
- 263 § 9. (1) The frequency bands allocated to the maritime mo-
bile service between 4 000 and 23 000 kc/s (see article 5),
are sub-divided into the following categories:
- 264 *a) Ship stations, telephony*
- 4 063 – 4 133 kc/s
 8 195 – 8 265 kc/s
 12 330 – 12 400 kc/s
 16 460 – 16 530 kc/s
 22 000 – 22 070 kc/s
- 265 *b) Coast stations, telephony*
- 4 368 – 4 438 kc/s
 8 745 – 8 815 kc/s
 13 130 – 13 200 kc/s
 17 290 – 17 360 kc/s
 22 650 – 22 720 kc/s
- 266 *c) Ship stations, telegraphy*
- 4 133 – 4 238 kc/s
 6 200 – 6 357 kc/s
 8 265 – 8 476 kc/s

12 400 - 12 714 kc/s

16 530 - 16 952 kc/s

22 070 - 22 400 kc/s

267 *d) Coast stations, telegraphy*

4 238 - 4 368 kc/s

6 357 - 6 525 kc/s

8 476 - 8 745 kc/s

12 714 - 13 130 kc/s

16 952 - 17 290 kc/s

22 400 - 22 650 kc/s

268 (2) Within the bands listed in 266, the following bands are reserved exclusively for calling:

4 177 - 4 187 kc/s

6 265.5 - 6 280.5 kc/s

8 354 - 8 374 kc/s

12 531 - 12 561 kc/s

16 708 - 16 748 kc/s

22 220 - 22 270 kc/s

269 (3) In Region 2, the frequency band 2 088.5 - 2 093.5 kc/s is reserved exclusively for calling (telegraphy only).

270 § 10. In order to minimize interference in the frequency bands allocated for radiotelephony in the maritime mobile service between 4 000 and 23 000 kc/s administrations agree to apply the following rules:

271 *a) radiotelephone emissions of ship stations, and of aircraft stations when communicating with stations of the maritime mobile service, shall comply with the frequency tolerance requirements prescribed for coast stations in appendix 3;*

272 *b) the recommendations for radiotelephony operation given in article 34, including duplex channelling, should be applied wherever possible.*

273 § 11. Radiotelegraph ship and coast stations may share
the appropriate bands allocated for radiotelephony, on a tem-
porary basis and under the following conditions:

- 274 a) wherever possible ship stations will observe the
frequency tolerance requirements specified for
coast stations in appendix 3;
- 275 b) all possible steps will be taken to minimize the
possibility of causing harmful interference to
radiotelephony, special arrangements being
made where necessary;
- 276 c) every effort will be made to discontinue, by the
date of the next ordinary Administrative Radio
Conference, the operation of radiotelegraph sta-
tions in the bands allocated for radiotelephony.

277 § 12. The frequency 8 364 kc/s is designated for the use
of survival craft equipped to transmit on frequencies be-
tween 4 000 and 23 000 kc/s and wishing to establish, with
stations of the maritime mobile service, communications re-
lating to search and rescue.

Section V. Fixed Service

278 § 13. *Selection of Frequencies for the International Ex-
change of Police Information.*

279 (1) The frequencies needed for the international ex-
change of information necessary to assist in the apprehen-
sion of criminals will be selected, if necessary, by special
arrangement among the interested administrations in the
bands of frequencies allocated to the fixed service.

280 (2) It is recognized that, in order to realize the maxi-
mum economy of frequencies, the International Frequency
Registration Board should be consulted by the administra-
tions concerned whenever such arrangements are under dis-
cussion on a regional or world-wide basis.

281 § 14. *Selection of Frequencies for the International Exchange of Synoptic Meteorological Information.*

282 (1) The frequencies needed for the international exchange of synoptic meteorological information will be selected, if necessary, by special arrangement among the interested administrations in the bands of frequencies allocated to the fixed service.

283 (2) It is recognized that, in order to realize the maximum economy of frequencies, the International Frequency Registration Board should be consulted by the administrations concerned whenever such arrangements are under discussion on a regional or world-wide basis.

CHAPTER IV

Notification and Registration of Frequencies International Frequency Registration Board

ARTICLE 10

General Provisions

284 § 1. The essential duties of the International Frequency
Registration Board shall be:

- 285 a) to effect an orderly recording of frequency assignments made by the respective countries so as to establish, in accordance with the procedure provided for in these Regulations, the date, purpose and technical characteristics of each of these assignments, with a view to ensuring formal international recognition thereof;
- 286 b) to render advice to the members of the International Telecommunication Union with a view to the operation of the maximum practicable number of radio channels in those portions of the spectrum where international interference may occur.

287 § 2. The functions of the Board shall include:

- 288 a) the recording of radio frequency assignments made in accordance with 285 for inclusion in the Master International Frequency Register;
- 289 b) the compilation in collaboration with, and for publication in suitable form and at appropriate intervals by, the Secretary General of the Union of frequency lists and other material relating to the assignment and use of frequencies;

- 290 *c)* the collection of such results of monitoring observations as administrations and organizations may be able to supply and the making of arrangements, through the Secretary General of the Union, for their publication in suitable form;
- 291 *d)* the periodic review of entries in the Frequency Register with a view to eliminating, in agreement with the country which made the assignment, inactive entries;
- 292 *e)* the investigation, at the request of one or more of the interested countries, of harmful interference and the formulation of recommendations with respect thereto;
- 293 *f)* the prosecution of studies of frequency utilization, and the recommendation to administrations, where appropriate, of adjustments in the use of frequencies in order to allow the establishment of new circuits;
- 294 *g)* the formulation and reference to C.C.I.R. of all general technical questions arising from the Board's examination of frequency assignments; and
- 295 *h)* the participation in an advisory capacity, upon invitation by the organization or countries concerned in the formulation of service or regional agreements.

296 § 3. (1) The International Frequency Registration Board shall be composed of a body of eleven independent members, all nationals of different countries members of the Union.

297 (2) The members of the Board shall be thoroughly qualified by technical training in the field of radio and shall possess practical experience in the assignment of frequencies.

298 (3) The members of the Board shall perform all their functions on a world-wide basis and in the interest of the most effective use of the radio spectrum. In particular, they

shall reach their decisions on frequency assignments (see 285) solely on an engineering basis.

299 However, for the more effective understanding of the problems coming before the Board under provision 286, each member shall be familiar with geographic, economic and demographic conditions within a particular area of the world.

300 (4) The members of the Board shall serve, not as representatives of their respective countries, or of a region, but as custodians of an international public trust.

301 (5) No member of the Board shall request or receive instructions relating to the exercise of his duties from any government or a member thereof or from any public or private organization or person. Furthermore, each member of the Union must respect the international character of the Board and of the functions of its members and shall refrain from any attempt to influence any of them in the performance of their functions.

302 No member of the Board nor any of its staff may take any part or have any financial interest whatsoever in any branch of telecommunication.¹⁾

303 § 4. (1) Members of the Board shall be elected by each ordinary Administrative Radio Conference according to the procedure established by that Conference.

304 (2) Members of the Board elected by said Conference shall take up their duties on the date determined by that Conference. They shall remain in office until the members elected by the following Conference have taken up their duties.

302.1 ¹⁾ The term "financial interest" is not to be construed as applying to the continuation of retirement benefits accruing in respect of previous employment or services.

- 305 (3) Each Conference shall determine the number of the members of the Board and the method of their election with a view to ensuring a balanced selection of the members from the various parts of the world.
- 306 (4) Members of the Board shall be eligible for re-election.
- 307 (5) Should a member of the Board relinquish his duties before the end of his normal term of office, he shall be replaced as soon as possible by a new member from the country to which the former member belonged. If this country is unable to provide a replacement member, the Administrative Council shall appoint a new member from a country belonging to the same region.
- 308 § 5. The Board shall have the assistance of a small specialized secretarial staff, who shall work under the direction of the Chairman in organizing and carrying out the work of the Board. The technical members of this staff shall be selected by the Board; but the staff shall be attached to the General Secretariat of the Union for general administrative purposes.

ARTICLE 11

Procedure in Connection with the International Frequency Registration Board

Section I. Preamble

- 309 § 1. (1) All of the frequency assignments to fixed, land, broadcasting, radionavigation land and standard frequency stations to be used for international communication or capable of causing harmful interference with any service of another country shall be notified to the Board and shall be recorded in the Master International Frequency Register in either of two columns.

310 (2) Any frequency assignment which is in full conformity with all provisions of the Radio Regulations shall be recorded in the REGISTRATION COLUMN.

311 Such a frequency assignment shall have the right to international protection from harmful interference.

312 (3) Any frequency assignment which, in any measure, contravenes the provisions of the Radio Regulations, but on the use of which the notifying country insists, shall be recorded in the NOTIFICATION COLUMN.

313 Such a record shall be made in order that the members of the International Telecommunication Union may take into account the fact that the frequency in question is in use; and an entry in the NOTIFICATION COLUMN shall not give the right of international protection to that frequency assignment except as provided for in 329.

Section II. Notification of Frequency Assignments

314 § 2. (1) In order to obtain international recognition of a frequency assignment, each country, upon the assignment by it of a frequency to a fixed, land, broadcasting, radionavigation land, or standard frequency station within its jurisdiction or control, or upon changing an existing frequency assignment or any of the particulars (specifically set forth in 318), shall notify the Board by any means of suitable record communication.

315 (2) Similar notice shall be given of the assignment of a frequency to be used for reception by a land station in the operation of a particular service with mobile stations.

316 (3) Specific frequencies prescribed by the present Regulations for common use by stations of a given service (for example, 500 kc/s) shall not be notified to the Board.

317 § 3. Notification under the provisions of § 2 of this article must be made to the Board before the frequency is brought into use and in time to enable administrations to make such representations as seem necessary to them to ensure the proper working of their services. However, where an urgent requirement must be met and it is clear that the use of a frequency assignment will not create international interference, the assignment need not be notified in advance.

318 § 4. (1) Each notice shall include at least the following information:

Name of the notifying country;

Frequency;

Class of station;

Location of station;

Class of emission and bandwidth;

Power;

Hours of operation;

Points of intended reception where applicable
(otherwise area to which communications are directed);

Date of use; and

If such assignment is made pursuant to a service or regional agreement, the identity of such agreement.

It is recommended that the notifying country also include the additional data called for in appendix 1 and may include other information.

319 (2) Preliminary telegraphic notices may be transmitted to the Board in brief form including at least the frequency, location and class of station, advising that a complete notice is being transmitted.

320 (3) The date of first receipt by the Board of such notice in either complete or preliminary form shall establish the order of its consideration; provided, however, that the date of receipt of a preliminary notice shall be applicable only

where the complete notice is received by the Board within 30 days thereafter.¹⁾

Section III. Procedure for the Examination of Notices

321 § 5. Upon the receipt of a complete notice, the Board shall record it; the date of the receipt of each notice shall be acknowledged immediately to the notifying country.

322 § 6. (1) At intervals of one week, the Board shall circulate by air mail in the form of a circular addressed to all countries, members of the Union, certified copies of all notices received by it.

323 (2) Any country which wishes to present objections or comments with regard to this notice, shall notify the Board by telegram of the main basis of its objection or comment within two weeks of the date of the receipt of the circular in which the details of the notice are published.

324 (3) Any country which has not communicated with the Board within this two-week period will be deemed to have no objection or comment.

325 (4) Within a further period of two weeks a letter shall be sent to the Board amplifying the objections or comments already telegraphed.

326 § 7. (1) The Board shall examine each notice with respect to:

327 a) its conformity with the table and the rules for allocation of frequencies;

328 b) its conformity with the other provisions of the Convention and the Radio Regulations (with the exception of those relating to the probability of harmful interference);

329 c) the probability of harmful interference either to any service rendered by a station for which a fre-

320.1 ¹⁾ In the event of undue delay in the delivery of a notice by post or telegraph, that event, if and when verified, shall not in any way prejudice the priority of consideration of the registration for the country which submitted the notice.

quency assignment has already been recorded in the Master International Frequency Register with a date in the REGISTRATION COLUMN or to a service operating in accordance with the provisions of 327 and 328, on a frequency recorded with a date in the NOTIFICATION COLUMN, but which has not, in fact, caused harmful interference.

330 (2) Where appropriate, the Board shall also examine the notice as regards its conformity with a regional or a service agreement.

331 § 8. In examining notices of assignment of frequencies to stations the Board shall bear in mind that in many instances, several stations may share the use of a single frequency.

332 § 9. When a service or a regional agreement has been concluded, the Board shall be informed of the details of this agreement. The procedure to be followed in connection with frequency assignments made pursuant to such service or regional agreement shall be as specified in § 7 of this article except that the Board shall not consider the question of interference among the parties to such an agreement.

Section IV. Recording of Frequency Assignments

333 § 10. (1) Depending upon the findings of the Board subsequent to the examination prescribed in § 7, further action shall be as follows:

334 (2) *Finding favourable with respect to 327, 328 and 329.*

The assignment shall be recorded in the Master International Frequency Register, the date of receipt of the first notice by the Board being shown in the REGISTRATION COLUMN.

335 (3) *Findings unfavourable with respect to 328.*

The notice shall be returned immediately by air mail to the notifying country with the reasons of the Board for this finding.

336 (4) *Finding favourable with respect to 327 and 328 but unfavourable with respect to 329.*

The notice shall be returned immediately by air mail to the notifying country, with the reasons of the Board for this finding and with such suggestions as the Board may be able to offer with a view to the satisfactory solution of the problem.

337 If the notifying country resubmits the notice with modification which results after re-examination in a favourable finding by the Board, the assignment shall be recorded in the Register as provided under 334, the date of receipt by the Board of the modified notice being shown in the REGISTRATION COLUMN.

338 Should the notifying country, however, insist upon reconsideration of the original notice unchanged, and should the Board's finding remain unchanged, the assignment shall be recorded in the Master International Frequency Register, the date of receipt of the first notice by the Board being shown in the NOTIFICATION COLUMN.

339 (5) *Finding favourable with respect to 328 and 329 but unfavourable with respect to 327.*

The frequency assignment shall be recorded in the Master International Frequency Register, the date of receipt of the first notice by the Board being shown in the NOTIFICATION COLUMN. However, if harmful interference to the reception of any station operating in accordance with the frequency allocation table is caused by the use of this frequency assignment, the station using this frequency assignment must immediately suspend operations upon receipt of advice of this harmful interference.

Section V. Review of Findings

340 § 11. (1) The reconsideration of a finding by the Board may be requested:

- by the notifying country, or
- by any other country interested in the question, but in the latter case only on the grounds of harmful interference either anticipated or actual.

341 (2) Prior to reconsideration, the Board shall circulate by air mail such requests to all countries members of the Union. The latter shall telegraph their objections or comments within two weeks of receipt of the circular and shall, within a further two-week period, dispatch a letter to the Board amplifying their telegram.

342 (3) The Board, in the light of all the data thus received shall render such further findings as the circumstances warrant.

343 § 12. (1) If, in accordance with provisions 336 and 338 an entry has been made in the Master International Frequency Register with the date in the NOTIFICATION COLUMN, the Board, upon request of the notifying country, and after the station has been in operation for a reasonable period, shall review the matter, first having given the interested countries an opportunity to present their views.

344 (2) If the Board's finding is then favourable, the date shall be transferred from the NOTIFICATION COLUMN to the REGISTRATION COLUMN without change. If the finding with respect to probable harmful interference is still unfavourable, the date shall be left in the NOTIFICATION COLUMN.

345 (3) If, on the contrary, the Board makes a finding that harmful interference actually exists, it shall be "prima facie" evidence that the operation is in violation of these Regulations. If, however, after not more than six years of operation, the Board has not made a finding of the existence of harmful

interference, the date shall be transferred to the REGISTRATION COLUMN without change.

- 346 § 13. Should a change be made in the basic data as specified in 318, recorded against a frequency assignment, the latter shall be subject to new registration, the record specifying the new data and the date of their receipt by the Board. However, should the Board arrive at the conclusion that the use of the frequency assignment based on the new data will not cause harmful interference with the service of a station for which a frequency assignment has been recorded, the amended assignment shall retain the original date of registration.

Section VI. Cancellation of Frequency Recordings

- 347 § 14. (1) As a general rule, the Board, after consulting the notifying country, shall cancel the recording of any frequency assignment if it finds that regular operation has not begun within two years following the date of its receipt of the first notice, unless it finds that the circumstances warrant the retention of the notice, in which case the entry may be retained for not more than one further period of one year.
- 348 (2) Exceptionally, however, and only in the case of a frequency assigned to a working service for use during years of high or low sunspot activity if the frequency has not been brought into use when three years have elapsed from the date of receipt of the first notice, and the Board finds, after consultation with the notifying country, that the circumstances warrant the retention of the notice, the entry may be retained for not more than one further period of three years.
- 349 (3) Frequencies assigned to a working service for use during years of high or low sunspot activity may be notified to the Board for any other service for use on an interim basis and without prejudice to the earlier frequency assignment.

350 § 15. In case of permanent discontinuance of the use of any listed frequency, the notifying country shall inform the Board within three months of such discontinuance, whereupon the entry shall be removed from the Register.

351 § 16. If the Board finds that a recorded frequency assignment has been out of use for three years it shall, in agreement with the notifying country, cancel the entry in the Register except in the case of a frequency intended for re-use by a working service during years of high or low sunspot activity, in which case the entry may be retained for one further period of three years.

Section VII. Studies and Recommendations

352 § 17. If it is requested by any country member of the Union and if the circumstances appear to warrant, the Board shall make a study and issue a report on the following problems of frequency utilization:

353 a) in cases arising under 336 as to a possible alternative frequency assignment to avoid probable interference; and

354 b) in cases where a need arises for additional channels within a specific portion of the frequency spectrum.

355 § 18. If one or more of the interested countries so request, the Board shall investigate any contravention or non-observance of these Regulations or any harmful interference and shall issue through the Secretary General of the Union a report containing its findings and recommendations for the solution of the problem.

356 § 19. If the Board finds that a change in the frequency of one or more stations will:

357 a) accommodate a new station;

358 b) facilitate the solution of an interference problem; or

- 359 *c)* otherwise facilitate the more effective use of a particular portion of the radio spectrum, and if such change is acceptable to the country or countries directly concerned, the change in frequency shall be recorded in the Master International Frequency Register without change in the original date or dates.

Section VIII. Availability of Records

- 360 § 20. The Board shall make available to the interested countries, for their information, and to the Secretary General of the Union for prompt publication, all reports of its findings and reasons therefor.
- 361 § 21. In case a country member of the Union avails itself of the provisions of article 25 of the Convention, the Board shall, upon request, make its records available for such proceedings as are prescribed in the Convention for the settlement of international disagreements.

ARTICLE 12

Internal Regulations of the International Frequency Registration Board

- 362 § 1. The Board shall meet as frequently as necessary to deal expeditiously with its work and, normally, at least once a week.
- 363 § 2. (1) At their first meeting the members of the Board shall elect from among their number a Chairman and a Vice-Chairman, each to hold office for a term of one year or until their successors are duly elected. Thereafter, the Vice-Chairman shall succeed annually to the Chairmanship and a new Vice-Chairman shall be elected.
- 364 (2) In the unavoidable absence of the Chairman and Vice-Chairman, the Board shall elect a temporary Chairman for the occasion from among its members.

365 § 3. (1) Each member of the Board, including the Chairman,
shall have one vote. Voting by proxy or by correspondence is
not allowed. Moreover, no member is entitled to vote on any
given question if he has not been present at that part of a
meeting at which that question was discussed.

366 (2) The minutes shall indicate whether a finding was
unanimous or by a majority. In the latter case, the vote of
each member present may be recorded on request of a mem-
ber, but shall not be made public.

367 (3) Problems of a purely non-technical nature shall be
decided by the Board on the basis of a two-thirds vote of the
members present. In the consideration of problems having
technical characteristics, the Board shall endeavour to reach
its decisions by unanimous agreement. If, after reconsidera-
tion of such a problem over a period not exceeding 14 days,
the Board fails to reach a unanimous decision, it shall imme-
diately thereafter decide the problem on the basis of a two-
thirds majority vote of the members present.

368 (4) A quorum of the Board shall be one-half of the
number of members of the Board. If, however, the verdict of
such a quorum on a question coming before it is not unani-
mous, the question shall be referred for decision at a later
meeting at which at least two-thirds of the total number of
members of the Board are present. If these calculations
result in a fraction, the fraction shall be rounded up to a
whole number.

369 § 4. Notices shall be considered by the Board within one
week of the expiration of the period for receipt of objection or
comments provided in article 11 and cannot be post-
poned unless the Board lacks sufficient data to render a deci-
sion in connection therewith. However, the Board shall not
act upon any notice which has a technical bearing on an earlier

notice still under consideration by the Board, until such time as it has reached a finding with respect to such earlier notice.

370 § 5. The Board shall keep a complete record of all official actions and minutes of all meetings; for which purpose the necessary personnel and facilities shall be provided by the General Secretary of the Union. A copy of all records and minutes of the Board shall be filed with the General Secretary of the Union and shall be available for public inspection. All records of the Board shall be kept in the official languages of the Union.

371 § 6. Each country shall have the right to send, at its own expense, a technical representative to appear before the Board in support of, or in opposition to, any notice or other matter under consideration in which his country has a direct interest.

CHAPTER V

Interference. Measures against Interference

ARTICLE 13

Interference and Tests

Section I. General Interference

- 372 § 1. Unnecessary transmissions and transmission of superfluous signals and correspondence are forbidden to all stations.
- 373 § 2. All stations shall radiate only as much power as is necessary to ensure a satisfactory service.
- 374 § 3. In order to avoid interference:
- locations of transmitting stations must be selected with particular care;
 - radiation in unnecessary directions shall be minimized, where the nature of the service permits, by taking the maximum practicable advantage of the properties of directional antennas.
- 375 § 4. Taking into account practical and technical considerations as well as the service to be performed, the class of emissions making use of the narrowest frequency band should be employed.
- 376 § 5. If, while complying with the provisions of article 17, a transmitter causes harmful interference through the intensity of its harmonics or other non-essential emissions, special measures must be taken to eliminate such interference.

Section II. Industrial Interference

- 377 § 6. Administrations shall take all practicable and necessary steps to ensure that the operation of electrical apparatus

or installations of any kind does not cause harmful interference to a radio service operating in accordance with the provisions of the present Regulations.

Section III. Special Cases of Interference

378/379 § 7. Except in cases of distress, communications between ship stations or between ship and aircraft stations must not interfere with the work of coast stations. When this work is thus interfered with, the ship or aircraft station which causes it must stop transmitting or change frequency upon the first request of the coast station concerned.

Section IV. Tests

380 § 8. (1) Before authorizing tests and experiments in any station each administration, in order to avoid harmful interference, shall prescribe the taking of all possible precautions such as the choice of frequency and of time and the reduction or, if possible, the suppression of radiation. Any harmful interference resulting from tests and experiments shall be eliminated as soon as possible.

381 (2) Signals for testing and adjustment must be chosen in such a manner that no confusion will arise with a signal, abbreviation, etc., having a special meaning defined by these Regulations or by the International Code of Signals.

382 (3) For testing in mobile stations see 679 and 680.

Section V. Identification of emissions

383 § 9. The transmission of signals without identification is forbidden to all stations.

384 § 10. In order that the identification of stations may be as rapid as possible, stations provided with a call sign in accordance with article 19 must, unless the Regulations provide otherwise, transmit this call sign during the course of their transmission as frequently as is practicable and reasonable.

- 385 § 11. Any station carrying out emissions for tests, adjustments or experiments, must, wherever possible, transmit at slow speed its call sign or, if necessary, its name, at frequent intervals during the course of these emissions.

ARTICLE 14

Procedure in a Case of Interference

- 386 § 1. If a case of interference so justifies, the administration of the country having jurisdiction over the transmitting station interfered with or, in certain cases, the centralising office for monitoring, shall seek the co-operation of other administrations, centralising offices, or other organizations in making observations and measurements necessary for the identification of the source and the establishment of the responsibility for the interference.
- 387 § 2. - Having determined the source and characteristics of the interference, the administration or centralising office referred to in 386 shall inform the administration of the country having jurisdiction over the interfering station or, where appropriate, the centralising office of that country, giving all useful information in order that that administration or its centralising office may take such steps as may be necessary to eliminate the interference.
- 388 § 3. The administration of the country having jurisdiction over the receiving station experiencing the interference, or the centralising office of that country, may also approach the administration of the country having jurisdiction over the interfering station or its centralising office, respectively.
- 389 § 4. If the interference persists in spite of the preceding actions, the administration having jurisdiction over the transmitting station interfered with, as well as the administration having jurisdiction over the receiving station experiencing interference, may address to the administration having jurisdiction over the interfering transmitting station a report of irregularity or infraction in the form indicated in appendix 2.

- 390 § 5. If there is a specialized international organization for a particular service, complaints and reports of irregularities and of infractions relating to interference caused by the stations in this service may be addressed to such organization at the same time as to the administration or centralising office concerned.
- 391 § 6. If the preceding actions do not produce satisfactory results, the administration concerned shall forward the file of the case to the International Frequency Registration Board for information, and, if it so desires, it may request the Board to act in accordance with provisions 355.

ARTICLE 15

Reports of Infringements

- 392 § 1. Infringements of the Convention or Radio Regulations are reported to their administration by the control organization, stations, or inspectors detecting them. For this purpose they use forms similar to the specimen given in appendix 2.
- 393 § 2. In the case of a station committing serious infringements, representations relating to them must be made to the administration of the country to which the station belongs, by the administrations which detect them.
- 394 § 3. If an administration has information of an infringement of the Convention or Radio Regulations, committed in a station which it has authorized, it ascertains the facts, fixes the responsibility, and takes the necessary action.

CHAPTER VI

Technical Provisions Concerning Equipment and Emissions

ARTICLE 16

Choice of Apparatus

- 395 § 1. The choice of apparatus and devices to be used in a station shall be unrestricted, provided that the performance thereof and the emissions therefrom satisfy the provisions of these Regulations.
- 396 § 2. However, within limits consistent with practical considerations, the choice of transmitting, receiving and measuring apparatus must be guided by the latest technical progress, particularly as indicated in the recommendations of the C.C.I.R.

ARTICLE 17

Quality of Emissions

- 397 § 1. The stations must conform to the Frequency Tolerances as specified in appendix 3.
- 398 § 2. The bandwidths of emissions, level of radio frequency harmonics, and non-essential emissions must be kept at the lowest value which the state of technique and the nature of the service permit. Appendices 4 and 5 must be considered as a guide in this respect, until more recent recommendations of the C.C.I.R. are published.
- 399 § 3. To ensure compliance with these Regulations the administrations will take necessary steps for frequent checks

to be made of the emissions of the stations under their jurisdiction, the technique of measurements being in accordance with the most recent recommendations of the C.C.I.R.

- 400 § 4. The administrations shall cooperate in the detection and elimination of interference, employing the facilities described in article 18 and following the procedures detailed in article 14.

ARTICLE 18

International Monitoring

- 401 § 1. The provisions of 399 may be implemented by means of monitoring stations. Such stations may be operated by an administration or by a public or private enterprise recognized by its administration or by a common monitoring service established by two or more countries or by some international organization.
- 402 § 2. Administrations agree to cooperate in the establishment of an international frequency monitoring system and, to the extent practicable, in the establishment of other monitoring based on recommendations of the C.C.I.R. The stations referred to in 401 may participate in this system.
- 403 § 3. (1) Meanwhile, administrations will, as far as they consider practicable, carry out such monitoring as may be required by the International Frequency Registration Board (I.F.R.B.) or by other administrations of countries members of the Union, or by other organizations operating within the framework of the Union. The results of such monitoring shall be forwarded to the I.F.R.B. as well as to the administration or organization directly concerned, in order that the results may be noted by the I.F.R.B.
- 404 (2) As far as may be deemed practicable by the administration concerned, all of the monitoring stations of one

country or one international organization participating in this international monitoring work shall report and transmit results of measurements through one centralizing office. Where such an office exists, it shall receive directly all requests for monitoring originating in the I.F.R.B., or in similar offices of other countries or international organizations concerned; it shall similarly forward the results to the organization which has requested the monitoring, as well as to the I.F.R.B.

405 § 4. However, these provisions shall not affect private monitoring arrangements made for special purposes by administrations, international organizations, or public or private enterprises.

406 § 5. (1) After the C.C.I.R. has made a recommendation as to the technical standards for performance to be observed by various classes of monitoring stations and after the expiration of any time limits associated with that recommendation for the application of the new technical standards, the I.F.R.B. may recognize these provisionally as optimum practicable technical standards.

407 (2) Administrations or international organizations shall be responsible for determining whether their monitoring stations meet these technical standards. They shall notify to the Secretary General of the Union the names and locations of the stations which may participate and the postal and telegraphic addresses to which requests for monitoring information should be sent. The notification shall include a statement of the standards of measurements maintained by these stations.

408 (3) The Secretary General shall publish periodically a list of the stations referred to in 407, and other information so notified, including a statement of the current standards recognized by the I.F.R.B.

409 (4) Where the results supplied by any monitoring station appear to the I.F.R.B. to be questionable or insufficient for its purposes, the I.F.R.B. shall, through the Secretary

General of the Union, advise the administration or international organization concerned, giving the appropriate details.

- 410 § 6. The I.F.R.B. shall maintain a record of the results supplied by the monitoring stations participating. For each series of measurements, it shall state the estimated accuracy and the procedures of measurement followed by the monitoring station.
- 411 § 7. The I.F.R.B. shall prepare periodically, with the assistance of, and for publication by, the Secretary General of the Union, summaries of the useful monitoring data received by the Board, including a list of the stations contributing the data.

CHAPTER VII

Identification of stations

ARTICLE 19

Call Signs

Section I. Allocation and Notification

- 412 § 1. (1) All stations open to the international service of public correspondence, all amateur stations, and other stations which are capable of causing harmful interference beyond the boundaries of the country to which they belong, must have call signs from the international series assigned to each country in the table given in 419.
- 413 (2) However, it is not compulsory to assign call signs from the international series to stations which are easily identified by other means and whose signals of identification or characteristics of emission are published in international documents.
- 414 § 2. (1) When a fixed station uses more than one frequency in the international service, each frequency shall be identified by a separate call sign used solely for this frequency.
- 415 (2) When a broadcasting station uses more than one frequency in the international service, each frequency shall be identified by a separate call sign used solely for this frequency or by some other appropriate means, such as announcing the name of the place and frequency used.
- 416 (3) When a land station uses more than one frequency, such frequencies may, if desired, be identified by separate call signs.

417 § 3. (1) Each country shall choose the call signs of its stations from the international series allocated to it and shall, in accordance with article 20, notify to the Secretary General of the Union the call signs which it has assigned. These notifications do not include call signs assigned to amateur and experimental stations.

418 (2) The Secretary General of the Union shall ensure that the same call sign is not allotted more than once and that call signs which might be confused with distress signals, or with other signals of the same nature, are not allotted.

Section II. Allocation of International Series

419 § 4. The first character or the first two characters of the call signs given in the following table show the nationality of the stations.

Table of Allocation of Call Signs

Country	Call Signs	Country	Call Signs
United States of America (Not allocated)	AAA-ALZ	Republic of the Philippines	DUA-DZZ
Pakistan	AMA-AOZ	Spain	EAA-EHZ
India	APA-ASZ	Ireland	EIA-EJZ
Commonwealth of Australia	ATA-AWZ	Union of Soviet Socialist Republics	EKA-EKZ
Argentina Republic	AXA-AXZ	Republic of Liberia	ELA-ELZ
China	AYA-AZZ	Union of Soviet Socialist Republics	EMA-EOZ
Chile	BAA-BZZ	Iran	EPA-EQZ
Canada	CAA-CEZ	Union of Soviet Socialist Republics	ERA-ERZ
Cuba	CFA-CKZ	Estonia	ESA-ESZ
Morocco	CLA-CMZ	Ethiopia	ETA-ETZ
Cuba	CNA-CNZ	Union of Soviet Socialist Republics	EUA-EZZ
Bolivia	COA-COZ	France and Colonies and Protectorates	FAA-FZZ
Portuguese Colonies	CPA-CPZ	Great Britain	GAA-GZZ
Portugal	CQA-CRZ	Hungary	HAA-HAZ
Uruguay	CSA-CUZ	Switzerland	HBA-HBZ
Canada	CVA-CXZ		
Germany	CYA-CZZ		
Belgian Congo	DAA-DMZ		
Bielorussian Soviet Socialist Republic	DNA-DQZ		
	DRA-DTZ		

Country	Call Signs	Country	Call Signs
Ecuador	HCA-HDZ	Netherlands Indies . .	PKA-POZ
Switzerland	HEA-HEZ	Brazil	PPA-PYZ
Poland	HFA-HFZ	Surinam	PZA-PZZ
Hungary	HGA-HGZ	(Service abbreviations).	QAA-QZZ
Republic of Haiti . . .	HHA-HHZ	Union of Soviet	
Dominican Republic . .	HIA-HIZ	Socialist Republics . .	RAA-RZZ
Republic of Colombia . .	HJA-HKZ	Sweden	SAA-SMZ
Korea	HLA-HMZ	Poland	SNA-SRZ
Iraq	HNA-HNZ	Egypt	SSA-SUZ
Republic of Panama . . .	HOA-HPZ	Greece	SVA-SZZ
Republic of Honduras . .	HQA-HRZ	Turkey	TAA-TCZ
Siam	HSA-HSZ	Guatemala	TDA-TDZ
Nicaragua	HTA-HTZ	Costa Rica	TEA-TEZ
Republic of El Salvador .	HUA-HUZ	Iceland	TFA-TFZ
Vatican City State . . .	HVA-HVZ	Guatemala	TGA-TGZ
France and Colonies and		France and Colonies and	
Protectorates	HWA-HYZ	Protectorates	THA-THZ
Kingdom of Saudi		Costa Rica	TIA-TIZ
Arabia	HZA-HZZ	France and Colonies and	
Italy and Colonies . . .	IAA-IZZ	Protectorates	TJA-TZZ
Japan	JAA-JSZ	Union of Soviet	
Mongolian		Socialist Republics . .	UAA-UQZ
People's Republic . . .	JTA-JVZ	Ukrainian Soviet	
Norway	JWA-JXZ	Socialist Republic . . .	URA-UTZ
(Not allocated)	JYA-JZZ	Union of Soviet	
United States of America	KAA-KZZ	Socialist Republics . .	UUA-UZZ
Norway	LAA-LNZ	Canada	VAA-VGZ
Argentina Republic . . .	LOA-LWZ	Commonwealth of	
Luxemburg	LXA-LXZ	Australia	VHA-VNZ
Lithuania	LYA-LYZ	Newfoundland	VOA-VOZ
Bulgaria	LZA-LZZ	British Colonies and	
Great Britain	MAA-MZZ	Protectorates	VPA-VSZ
United States of America	NAA-NZZ	India	VTa-VWZ
Peru	OAA-OCZ	Canada	VXA-VYZ
Republic of Lebanon . .	ODA-ODZ	Commonwealth of	
Austria	OEA-OEZ	Australia	VZA-VZZ
Finland	OFA-OJZ	United States of America	WAA-WZZ
Czechoslovakia	OKA-OMZ	Mexico	XAA-XIZ
Belgium and Colonies . .	ONA-OTZ	Canada	XJA-XOZ
Denmark	CUA-OZZ	Denmark	XPA-XPZ
Netherlands	PAA-PIZ	Chile	XQA-XRZ
Curacao	PJA-PJZ	China	XSA-XSZ
		France and Colonies and	
		Protectorates	XTA-XWZ

Country	Call Signs	Country	Call Signs
Portuguese Colonies . . .	XXA-XXZ	Principality of Monaco .	3AA-3AZ
Burma	XYA-XZZ	Canada	3BA-3FZ
Afghanistan	YAA-YAZ	Chile	3GA-3GZ
Netherlands Indies . . .	YBA-YHZ	China	3HA-3UZ
Iraq	YIA-YIZ	France and Colonies and	
New Hebrides	YJA-YJZ	Protectorates	3VA-3VZ
Syria	YKA-YKZ	(Not allocated)	3WA-3XZ
Latvia	YLA-YLZ	Norway	3YA-3YZ
Turkey	YMA-YMZ	Poland	3ZA-3ZZ
Nicaragua	YNA-YNZ	Mexico	4AA-4CZ
Rumania	YOA-YRZ	Republic of the	
Republic of El Salvador	YSA-YSZ	Philippines	4DA-4IZ
Yugoslavia	YTA-YUZ	Union of Soviet	
Venezuela	YVA-YYZ	Socialist Republics . . .	4JA-4LZ
Yugoslavia	YZA-YZZ	Venezuela	4MA-4MZ
Albania	ZAA-ZAZ	Yugoslavia	4NA-4OZ
British Colonies and		British Colonies and	
Protectorates	ZBA-ZJZ	Protectorates	4PA-4SZ
New Zealand	ZKA-ZMZ	Peru	4TA-4TZ
British Colonies and		United Nations	4UA-4UZ
Protectorates	ZNA-ZOZ	Republic of Haiti	4VA-4VZ
Paraguay	ZPA-ZPZ	Yemen	4WA-4WZ
British Colonies and		(Not allocated)	4XA-4ZZ
Protectorates	ZQA-ZQZ	(Not allocated)	5AA-5ZZ
Union of South Africa . .	ZRA-ZUZ	(Not allocated)	6AA-6ZZ
Brazil	ZVA-ZZZ	(Not allocated)	7AA-7ZZ
Great Britain	2AA-2ZZ	(Not allocated)	8AA-8ZZ
		(Not allocated)	9AA-9ZZ

Section III. Formation of Call Signs

420 § 5. Call signs in the international series are formed as stated below. It is understood, however, that in accordance with the table in 419, the first letter in certain series is replaced by a digit:

421 a) Three letters, or three letters followed by not more than three digits (other than the digits 0 and 1 in cases where they immediately follow a letter), in the case of land and fixed stations.

- 422 *b)* However, it is recommended that, as far as possible:
- the call signs of coast and aeronautical stations shall consist of three letters or three letters followed by a single digit other than 0 or 1;
 - the call signs of fixed stations shall consist of three letters followed by two digits (other than the digits 0 and 1 in cases where they immediately follow a letter).
- 423 *c)* Four letters in the case of ship stations (for ship stations using radiotelephony see 429).
- 424 *d)* Five letters in the case of aircraft stations (for aircraft stations using radiotelephony see 431).
- 425 *e)* The call sign of the parent ship or aircraft followed by two digits (other than 0 or 1), in the case of lifeboats, liferafts and other survival craft.
- 426 *f)* Four letters followed by a single digit (other than 0 or 1) in the case of mobile stations other than ship and aircraft stations (for stations of this category using radiotelephony see 433).
- 427 *g)* One or two letters and a single digit (other than 0 or 1) followed by a group of not more than three letters in the case of amateur and experimental stations. The prohibition of the use of the digits 0 and 1, however, does not apply to amateur stations.
- 428 § 6. (1) Coast stations employing radiotelephony may use as a call sign:
- a call sign established in conformity with 421 and 422;

- the geographical name of the place as it appears in the List of Coast and Ship Stations, followed preferably by the word RADIO or by any other appropriate indication.

429 (2) Ship stations using radiotelephony may use as a call sign:

- a call sign established in conformity with 423;
- a call sign consisting of two or three letters followed by four digits (other than the digit 0 or 1 where they immediately follow a letter);
- the name of the ship as it appears in the international documents, preceded, if necessary, by the name of the owner.

430 (3) Aeronautical stations using radiotelephony may use as a call sign:

- a call sign established in conformity with 421 and 422;
- the name of the airport or geographical name of the place as it appears in the List of Aeronautical and Aircraft Stations, followed by the word TOWER or any other appropriate word.

431 (4) Aircraft stations using radiotelephony may use as a call sign:

- a call sign established in conformity with 424;
- a combination of characters corresponding to the official registration mark assigned to the aircraft.

432 (5) Land stations other than coast and aeronautical stations, which use radiotelephony may use as a call sign:

- a call sign established in conformity with 421;
- the geographical name of the place followed, if necessary, by any other appropriate indication.

- 433 (6) Mobile stations other than ship and aircraft stations, which use radiotelephony, may use as a call sign:
- a call sign established in conformity with 426;
 - a call sign consisting of two or three letters followed by four digits (other than the digits 0 or 1 in cases where they immediately follow a letter);
 - the identity of the vehicle or any other appropriate indication.
- 434 § 7. (1) In the aeronautical mobile service, after communication has been established by means of the complete call sign (see 424 or 431), the aircraft station may use, if no risk of confusion is likely to arise, an abbreviated call sign consisting of:
- 435 a) in radiotelegraphy, the first character and last two letters of the complete 5-letter call sign;
 - 436 b) in radiotelephony, the abbreviation of the name of the owner of the aircraft (company or individual) followed by either the last two letters of the call sign, the last two characters of the registration mark, or the flight identification number.
- 437 (2) The provisions of 434, 435 and 436 may be amplified or modified by agreements between countries concerned.
- 438 § 8. (1) The 26 letters of the alphabet and figures in the cases indicated in §§ 5 and 6 may be used to form call signs. Accented letters are excluded.
- 439 (2) However, the following combinations may not be used as call signs:
- 440 a) combinations which might be confused with distress signals or with other signals of the same nature;

- 441 b) combinations reserved for the abbreviations to
be used in the radiocommunication services (ap-
pendix 9) ;
- 442 c) for amateur stations, combinations commencing
with a digit when the second character is one of
the letters O or I.
- 443 (3) In the case of four-letter combinations commencing
with the letter A, which are used for the geographical portion
of the International Code of Signals, their use as call signs
must be restricted to cases in which no risk of confusion is
likely to arise.
- 444 (4) The distinguishing signals allotted to ships for
visual and aural signalling must, in general, agree with the
call signs of ship stations.
- 445 § 9. Each country reserves the right to establish its
own measures for identifying its stations used for national
defence. However, it shall use, as far as possible, call signs
recognizable as such, and containing the distinctive letters of
its nationality.

CHAPTER VIII

ARTICLE 20

Service Documents

- 446 § 1. The following documents shall be published by the
Secretary General of the Union:
- 447 (I) *List I.* The International Frequency List.
- a) This shall contain details of frequency assignments recorded in the Master International Frequency Register under the provisions of article 11 (see 309 and 318). These details shall include the data enumerated in appendix 6.
- 448 b) The List shall show also those specific frequencies (for example 500 kc/s) prescribed by these Regulations for common use in certain services, together with the information with respect to the frequencies or bands of frequencies assigned by the members of the Union to stations of other classes which are not individually subject to notification to the International Frequency Registration Board; all such stations having a common frequency assignment may be shown collectively for each country.
- 449 (II) *List II.* List of Fixed Stations (alphabetical index of fixed stations, the frequencies of which are shown in List I).
- 450 (III) *List III.* List of Broadcasting Stations. This shall include those broadcasting stations shown in List I which broadcast:
- a) voice and music;

b) television;

c) facsimile.

451 (IV) *List IV.* List of Coast and Ship Stations annexed to which is a Table and a Chart showing the zones and hours of service of ships of the second category (see appendix 13).

452 (V) *List V.* List of Aeronautical and Aircraft Stations. Only stations on board aircraft making international flights are included.

453 (VI) *List VI.* List of Radiolocation Stations. This shall not include radionavigation mobile stations, or aeronautical navigational land stations on frequencies above 70 Mc/s, whenever their identifications are published elsewhere in official international documents.

454 (VII) *List VII.* List of Special Service Stations. This shall include:

455 a) Stations transmitting Time Signals.

456 b) Stations transmitting Regular Meteorological Bulletins (Weather Reports).

457 c) Stations transmitting Notices to Navigators.

458 d) Stations transmitting Medical Advice.

459 e) Stations transmitting Standard Frequencies.

460 (VIII) *List VIII.* Alphabetical List of Call Signs of all stations included in Lists I to VII having call signs from the international series, with the exception, however, of amateur and experimental stations. This List is preceded by the table of allocation of call signs given in article 19 and by a table indicating the form of call signs assigned by each administration to its amateur and experimental stations.

- 461 (IX) *Maps of:*
462 a) Coast stations open to public correspondence.
463 b) Land stations open to public correspondence with
aircraft.
464 c) Radionavigation land stations.
465 (X) *Coloured Charts* showing international and regional
allocations of the radio frequency spectrum.
466 (XI) *General Radiocommunication Statistics.*
- 467 § 2. a) The Secretary General of the Union publishes the
changes affecting the documents enumerated in
§ 1 of this article. Once a month, in the form in-
dicated for the Lists themselves by appendix 6,
the administrations shall inform him of the addi-
tions, modifications and deletions affecting Lists
IV, V, VI and VII. The necessary additions,
modifications and deletions affecting Lists I, II
and III are obtained by him from the notifica-
tions of frequency assignments made in ac-
cordance with article 11, § 2 for the purposes of
the Master International Frequency Register.
The necessary changes to List VIII are obtained
by him from the information he receives in re-
gard to Lists I to VII inclusive.
- 468 b) For permanent changes affecting the operation
of radiolocation stations (List VI) see 1018.
- 469 § 3. In Lists III, IV, V, VI and VII each class of station
shall occupy a special section.
- 470 § 4. The International Frequency List and the List of
Fixed Stations shall be published separately each year. They
shall be kept up to date by the issue of monthly supplements,
likewise published separately, every third supplement being
recapitulative.

- 471 § 5. The List of Broadcasting Stations, the List of Radio-location Stations and the List of Special Service Stations shall be re-published at intervals to be determined by the Secretary General. Recapitulative supplements shall be published every six months for the List of Broadcasting Stations and every three months for the List of Radiolocation Stations and the List of Special Service Stations.
- 472 § 6. The List of Coast and Ship Stations shall be re-published every nine months without supplements between editions.
- 473 § 7. The List of Aeronautical and Aircraft Stations shall be re-published every six months without supplements between editions.
- 474 § 8. The List of Call Signs shall be re-published at intervals to be determined by the Secretary General. It shall be kept up to date by the publication of monthly recapitulative supplements.
- 475 § 9. The General Radiocommunication Statistics shall be re-published at intervals to be determined by the Secretary General.
- 476 § 10. (1) The forms in which the lists mentioned in § 1 (Lists I to VII and General Radiocommunication Statistics) are to be prepared are given in appendix 6 of the present Regulations. Information concerning the use of these documents shall be given in the prefaces thereto. Each entry shall be accompanied by the appropriate symbol, as indicated in appendix 7, to designate the class of station concerned. Additional symbols, where necessary, may be selected by the Secretary General, any such new symbols being notified by the Secretary General to the various administrations.
- 477 (2) In the service documents, the names of coast, aeronautical, radio direction-finding and radiobeacon stations are followed by the words:

- 478 - RADIO for coast stations;
- 479 - GONIO for maritime radio direction-finding sta-
 tions;
- 480 - PHARE for maritime radiobeacon stations;
- 481 - AERADIO for aeronautical stations;
- 482 - AEROGONIO for aeronautical radio direction-
 finding stations;
- 483 - AEROPHARE for aeronautical radiobeacon sta-
 tions.

484 § 11. For the purpose of the service documents, a country shall be understood to mean the territory within the limits of which the station is located; a colony, an overseas territory, a territory under suzerainty or mandate, or a protectorate shall also be considered as a country for this purpose.

CHAPTER IX

ARTICLE 21

Secrecy

- 485 The administrations bind themselves to take the
necessary measures to prohibit and prevent:
- 486 a) the unauthorized interception of radiocommu-
 nications not intended for the general use of
 the public;
- 487 b) the divulgence of the contents, simple disclosure
 of the existence, publication or any use what-
 ever, without authorization, of information of
 any nature whatever obtained by the intercep-
 tion of the radiocommunications mentioned in
 486.

CHAPTER X

ARTICLE 22

Licences

- 488 § 1. (1) No transmitting station may be established or operated by a private person or by any enterprise without a licence issued by the government of the country to which the station in question is subject.
- 489 (2) Mobile stations which have their place of registry in a colony, a territory under suzerainty or mandate, an overseas territory or a protectorate, may be considered, as regards the grant of licences, as subject to the authority of that colony, those territories or that protectorate.
- 490 § 2. The holder of a licence is required to preserve the secrecy of telecommunication, as provided in article 32 of the Convention. Moreover, the licence must provide that if the station includes a receiver the interception of radiocommunication correspondence, other than that which the station is authorized to receive, is forbidden, and that in the case where such correspondence is involuntarily received, it must not be reproduced, nor communicated to third parties, nor used for any purpose, and even its existence must not be disclosed.
- 491 § 3. In order to facilitate the verification of licences issued to mobile stations, there shall be added, when necessary, to the text written in the national language, a translation of the text in a language widely used in international relations.
- 492 § 4. The government which issues a licence to a mobile station mentions therein in clear form, the particulars of the station, including its name, call sign and public correspondence category, as well as the general characteristics of the main and, if appropriate, the emergency (reserve) installations.

CHAPTER XI

Inspection of Mobile Stations. Operators' Certificates for Ship and Aircraft Stations

ARTICLE 23

Inspection of Mobile Stations

- 493 § 1. (1) The governments or appropriate administrations of countries where a mobile station calls may require the production of the licence. The operator of the mobile station, or the person responsible for the station, must facilitate this examination. The licence must be kept in such a way that it can be produced without delay. As far as possible, the licence, or a copy certified by the authority which has issued it, should be permanently exhibited in the station.
- 494 (2) The inspectors must have in their possession an identity card or badge, issued by the competent authority, which they must show on request of the master or his deputy.
- 495 (3) When the licence cannot be produced or when manifest irregularities are observed, governments or administrations may inspect the radio installations in order to satisfy themselves that these conform to the conditions imposed by these Regulations.
- 496 (4) In addition, inspectors have the right to require the production of the operators' certificates, but proof of professional knowledge may not be demanded.
- 497 § 2. (1) When a government or an administration has found it necessary to adopt the course indicated in 495, or when the operators' certificates cannot be produced, the government or administration to which the mobile station in article 15 is

subject must be so informed without delay. In addition, the procedure specified in article 15 is followed when necessary.

498 (2) The government or administration official who has inspected the station must, before leaving it, communicate the result of his inspection to the master or to the person responsible (see 565).

499 § 3. The countries, members of the Union, undertake not to impose upon foreign mobile stations which are temporarily within their territorial waters or make a temporary stay in their territory, technical and operating conditions more severe than those contemplated in these Regulations. This in no way affects arrangements which are made under international agreements relating to maritime or air navigation, and which are therefore not covered by these Regulations.

ARTICLE 24

Operators' Certificates for Ship and Aircraft Stations

Section I. General Provisions

500 § 1. (1) The service of every ship or aircraft radiotelegraph or radiotelephone station must be performed by an operator holding a certificate issued or recognized by the government to which the station is subject.

501 (2) Nevertheless, in the service of radiotelephone stations operating solely on frequencies above 30 Mc/s each government decides for itself whether a certificate is necessary and, if so, defines the conditions for obtaining it.

502 (3) The provision of 501 does not, however, apply to aircraft stations working on frequencies allocated exclusively to aircraft making international flights.

503 § 2. (1) In the case of complete unavailability of the operator in the course of a sea passage, a flight or a journey, the master or the person responsible for the station may authorize, solely as a temporary measure, an operator holding a certificate issued by the government of another country member of the Union to perform the radiocommunication service.

504 (2) When it is necessary to employ as a temporary operator a person without a certificate or an operator not holding an adequate certificate, his performance as such must be limited solely to signals of distress, urgency and safety, messages relating thereto, messages relating directly to the safety of life, urgent messages relating to movement of the ship and essential messages relating to the navigation and safe movement of the aircraft. Persons employed in these cases are bound by the provisions of 508 regarding the secrecy of correspondence.

505 (3) In all cases, such temporary operators must be replaced as soon as possible by operators holding the certificate prescribed in § 1 of this article.

506 § 3. (1) Each administration takes the necessary steps to prevent, to the maximum extent possible, the fraudulent use of certificates. For this purpose, such certificates shall bear the signature of the holder and shall be authenticated by the stamp of the issuing administration. Administrations may employ, if they wish, other means of authentication such as the photograph of the holder, etc.

507 (2) In order to facilitate the verification of certificates these carry, if necessary, in addition to the text in the national language a translation of this text in a language widely used in international relations.

508 § 4. Each administration takes the necessary steps to place operators under the obligation to preserve the secrecy of correspondence as provided for in 490.

Section II. Classes and Categories of Certificates

509 § 5. (1) There are two classes of certificates, as well as a special certificate, for radiotelegraph operators.¹⁾

510 (2) There are two categories of certificates (general and restricted) for radiotelephone operators.¹⁾

511 § 6. (1) The holder of a first or second class radiotelegraph operator's certificate, may perform the service of any ship or aircraft radiotelephone station.

512 (2) The holder of a general radiotelephone operator's certificate may carry out the service of any ship or aircraft station when the installation is used solely for telephony, provided that:

- the power in the antenna of the unmodulated carrier wave does not exceed 100 watts;
- or, the power in the antenna of the unmodulated carrier wave does not exceed 500 watts in cases where the operation of the transmitter requires only the use of simple external switching devices excluding all manual adjustment of frequency determining elements. Moreover, the stability of these frequencies must be maintained by the transmitter itself within the limits of tolerance specified by appendix 3.

513 (3) The holder of a radiotelephone operator's restricted certificate may carry out the service of any ship or aircraft station when the installation is used solely for telephony provided that:

- the power in the antenna of the unmodulated carrier wave does not exceed 50 watts;
- or, the power in the antenna of the unmodulated carrier wave does not exceed 250 watts in cases where the operation of the transmitter requires only the use of simple external switching devices excluding all manual adjustment of frequency

509.1 & 510.1 ¹⁾ As regards the employment of operators holders of the different certificates, see article 25.

determining elements. Moreover, the stability of these frequencies must be maintained by the transmitter itself within the limits of tolerance specified by appendix 3.

514 (4) The radiotelegraph service of ships for which a radiotelegraph installation is not made compulsory by international agreements, as well as the radiotelephone service of ship stations and aircraft stations for which only a restricted radiotelephone operator's certificate is required, may be carried out by an operator holding a radiotelegraph operator's special certificate.

515 § 7. Exceptionally, the second class radiotelegraph operator's certificate as well as the radiotelegraph operator's special certificate may be limited exclusively to the radiotelegraph service. In such case the certificate must be suitably endorsed.

Section III. Conditions for the Issue of Operators' Certificates

516 § 8. (1) The conditions to be imposed for obtaining the various certificates are contained in the following paragraphs and represent the minimum requirements.

517 (2) Each administration is free to fix the number of examinations necessary to obtain each certificate.

518 § 9. The administration which issues a certificate may, before authorizing an operator to carry out the service on board a ship or aircraft, require the fulfillment of other conditions (for example: further technical and professional knowledge relating particularly to navigation; physical fitness; for an operator of the aeronautical mobile service, the completion as an operator of a certain number of flying hours; etc.).

A. First Class Radiotelegraph Operator's Certificate

- 519 § 10. The first class certificate is issued to operators who have given proof of the technical and professional knowledge and qualifications enumerated below:
- 520 a) Knowledge both of the general principles of electricity and of the theory of radio, knowledge of the adjustment and practical working of various types of radiotelegraph and radiotelephone apparatus used in the mobile service, including apparatus used for radio direction-finding and the taking of direction-finding bearings, as well as a general knowledge of the principles of operation of other apparatus generally used for radionavigation.
- 521 b) Theoretical and practical knowledge of the operation and maintenance of apparatus, such as motor-generators, storage batteries, etc., used in the operation and adjustment of the radiotelegraph, radiotelephone and radio direction-finding apparatus mentioned in 520.
- 522 c) Practical knowledge necessary to repair with the means available on board, damage which may occur to the radiotelegraph, radiotelephone and radio direction-finding apparatus during a voyage.
- 523 d) Ability to send correctly and to receive correctly by ear, code groups (mixed letters, figures and punctuation marks), at a speed of 20 (twenty) groups a minute, and a plain language text at a speed of 25 (twenty-five) words a minute. Each code group must comprise five characters, each figure or punctuation mark counting as two characters. The average word of the text in plain language must contain five characters. The duration of each test of sending and of receiving shall be, as a rule, five minutes.

- 524 *e)* Ability to send correctly and to receive correctly by telephone.
- 525 *f)* Detailed knowledge of the Regulations applying to radiocommunications, knowledge of the documents relating to charges for radiocommunications, knowledge of the provisions of the Convention for the Safety of Life at Sea which relate to radio, and, in the case of air navigation, knowledge of the special provisions governing the aeronautical fixed, mobile, and radionavigation services. In the latter case, the certificate states that the holder has successfully passed the tests relating to these special provisions.
- 526 *g)* Knowledge of the general geography of the world, especially the principal maritime and air navigation routes and the most important telecommunication routes.
- 527 *h)* Sufficient knowledge of a language widely used in the international correspondence of the mobile service. Candidates must be able to express themselves in that language in a satisfactory manner both orally and in writing. Each government decides for itself the language or languages required.

B. Second Class Radiotelegraph Operator's Certificate

- 528 § 11. The second class certificate is issued to operators who have given proof of the technical and professional knowledge and qualifications enumerated below:
- 529 *a)* Elementary theoretical and practical knowledge of electricity and of radio, knowledge of the adjustment and practical working of the various types of radiotelegraph and radiotelephone apparatus used in the mobile service, including

apparatus used for radio direction-finding and the taking of direction-finding bearings, as well as elementary knowledge of the principles of operation of other apparatus in general use for radionavigation.

- 530 b) Elementary theoretical and practical knowledge of the operation and maintenance of apparatus, such as motor-generators, storage batteries, etc., used in the operation and adjustment of the radiotelegraph, radiotelephone and radio direction-finding apparatus mentioned in 529.
- 531 c) Practical knowledge sufficient for effecting repairs in the case of minor damage which may occur to the radiotelegraph, radiotelephone and radio direction-finding apparatus during a voyage.
- 532 d) Ability to send correctly and to receive correctly by ear, code groups (mixed letters, figures and punctuation marks) at a speed of 16 (sixteen) groups a minute. Each code group must comprise five characters, each figure or punctuation mark counting as two characters. The duration of each test of sending and of receiving is, as a rule, five minutes.
- 533 e) Ability to send correctly and to receive correctly by telephone except in the case provided for in 515.
- 534 f) Knowledge of the Regulations applying to radio-communications, knowledge of the documents relating to charges for radiocommunications, knowledge of the provisions of the Convention for the Safety of Life at Sea which relate to radio, and, in the case of air navigation, knowledge of the special provisions governing the

aeronautical fixed, mobile, and radionavigation services. In this latter case the certificate states that the holder has successfully passed the tests relating to these special provisions.

- 535 *g)* Knowledge of the general geography, especially the principal maritime and air navigation routes, and the most important telecommunication routes.
- 536 *h)* If necessary, elementary knowledge of a language widely used in the international correspondence of the mobile service. Candidates must be able to express themselves in that language in a satisfactory manner both orally and in writing. Each government decides for itself the language or languages required.

C. Radiotelegraph Operator's Special Certificate

- 537 § 12. (1) The radiotelegraph operator's special certificate is issued to candidates capable of correct transmission and correct reception by ear of code groups (mixed letters, figures and punctuation marks) at a speed of 16 (sixteen) groups a minute. Each code group must comprise five characters, each figure or punctuation mark counting as two characters. These candidates must in addition be capable of correct transmission and correct reception by telephone, except in the case provided for in 515.

- 538 (2) It rests with each government concerned to fix the other conditions for obtaining this certificate. However, except in the case provided for in 515, the conditions specified by 544, 545, 547 or 548, as the case may be, must be satisfied.

D. Radiotelephone Operator's Certificate

- 539 § 13. The general radiotelephone operator's certificate is issued to candidates who have given proof of the knowledge

and professional qualifications enumerated below (see also 511):

- 540 a) Knowledge of the elementary principles of radio-
 telephony;
- 541 b) Detailed knowledge of the practical operation
 and adjustment of radiotelephone apparatus;
- 542 c) Ability to send correctly and to receive correctly
 by telephone;
- 543 d) Detailed knowledge of the Regulations applying
 to radiotelephone communications and specifical-
 ly of that part of those Regulations relating to
 the safety of life.

544 § 14. (1) The restricted radiotelephone operator's certificate
is issued to candidates who have given proof of the knowledge
and professional qualifications enumerated below:

- 545 a) Practical knowledge of radiotelephone operation
 and procedure;
- 546 b) Ability to send correctly and to receive correctly
 by telephone;
- 547 c) General knowledge of the Regulations applying
 to radiotelephone communications and specifical-
 ly of that part of those Regulations relating to
 the safety of life.

548 (2) For ship and aircraft radiotelephone stations where
the power in the antenna of the unmodulated carrier wave
does not exceed 50 watts, each administration may itself fix
the conditions for obtaining a restricted radiotelephone oper-
ator's certificate.

549 § 15. A radiotelephone operator's certificate must show
whether it is a general certificate or a restricted certificate
and in the latter case if it has been issued in conformity with
the provisions of 548.

550 § 16. In order to meet special needs and on condition that
international services are not interfered with, special agree-

ments may fix the conditions to be fulfilled in order to obtain a radiotelephone operator's certificate, intended to be used in radiotelephone stations complying with certain technical conditions and certain operating conditions. These conditions and agreements are mentioned in the certificates issued to such operators.

Section IV. Qualifying Service

551 § 17. (1) A first class radiotelegraph operator is authorized to embark as chief operator of a ship station of the third category (see 845).

552 (2) Before becoming chief operator of a ship station of the second category (see 844), a first class radiotelegraph operator must have had at least six months' experience as operator on board ship or in a coast station.

553 (3) Before becoming chief operator of a ship station of the first category (see 843), a first class radiotelegraph operator must have had at least one year's experience as operator on board ship or in a coast station.

554 § 18. (1) A second class radiotelegraph operator is authorized to embark as chief operator of a ship station of the third category (see 845).

555 (2) Before becoming chief operator of a ship station of the second category (see 844), a second class radiotelegraph operator must have had at least six months' experience as an operator on board ship.

CHAPTER XII

Personnel of Mobile Stations

ARTICLE 25

Class and Minimum Number of Operators for Ship and Aircraft Stations

- 556 § 1. In the international service of public correspondence, each government takes the necessary steps to ensure that ship and aircraft stations of its own nationality have personnel adequate to perform efficient service during the working hours which correspond to the category in which these stations are placed.
- 557 § 2. The personnel of these stations must, having regard to the provisions of article 24 (see 551 to 555), include at least:
- 558 a) ship stations of the first category: one operator holding a first class radiotelegraph operator's certificate;
- 559 b) ship stations of the second category: one operator holding a first or second class radiotelegraph operator's certificate;
- 560 c) ship stations of the third category, except in the cases provided for in 561 and 562: one operator holding a first or a second class radiotelegraph operator's certificate;
- 561 d) ship stations in which a radiotelegraph installation is provided but not prescribed by international agreements: one operator holding a

- radiotelegraph operator's special certificate or a first or second class radiotelegraph operator's certificate;
- 562 *e)* ship stations equipped with a radiotelephone installation: one operator holding either a radiotelephone operator's certificate (see 501, 512 and 513) or a radiotelegraph operator's certificate (see 511 and 514);
- 563 *f)* aircraft stations except in the cases provided for in 564, one operator holding a first or second class radiotelegraph operator's certificate, according to the internal regulations of the governments to which the stations are subject;
- 564 *g)* aircraft stations equipped with a radiotelephone installation: one operator holding, as the case may be, a radiotelephone operator's certificate (see 501, 512 and 513) or a radiotelegraph operator's certificate (see 511) according to the internal regulations of the governments to which the stations are subject.

ARTICLE 26

Authority of the Master

- 565 § 1. The service of a mobile station is placed under the supreme authority of the master or of the person responsible for the ship, aircraft, or other vehicle carrying the mobile station.
- 566 § 2. The person holding this authority must require the operators to comply with these Regulations.
- 567 § 3. The master or the person responsible, as well as all persons who may have knowledge of the text or even of the existence of the radiotelegrams, or of any information whatever obtained by means of the radiocommunication service, are placed under the obligation of observing and ensuring the secrecy of correspondence.

CHAPTER XIII

Working Conditions in the Mobile Services

ARTICLE 27

Aircraft and Aeronautical Stations

- 568 § 1. Except as otherwise provided in these Regulations, the aeronautical mobile service may be regulated by special arrangements between the governments concerned (see article 40 of the Convention).
- 569 § 2. In the absence of special arrangements, the provisions of these Regulations concerning the exchanging of and accounting for public correspondence shall be applicable, in a general way, to the exchanging of and accounting for public correspondence by stations in the aeronautical mobile service.
- 570 § 3. (1) Aircraft stations may communicate with stations of the maritime mobile service.
- 571 (2) For this purpose only, they may utilize frequencies allocated to the maritime mobile service and must then conform to the provisions of these Regulations relating to the maritime mobile service.
- 572 (3) Aircraft stations when handling public correspondence with stations of the maritime mobile service must comply with all the provisions applicable to the handling of public correspondence in the maritime mobile service (see particularly articles 38, 39, 40 and 41).

ARTICLE 28

Conditions To Be Observed by Mobile Stations

Section I. General Provisions

573 § 1. (1) Mobile stations must be established in such a way as to conform as regards frequencies and class of emission to the provisions of chapter III.

574 (2) For the use of class B emissions on board ships, see 711.

575 § 2. The frequencies of emission of mobile stations shall be checked as often as possible by the inspection service to which these stations are subject.

576 § 3. The energy radiated by receiving apparatus must be reduced to the lowest possible value and must not cause harmful interference to other stations.

577 § 4. (1) Changes of frequency in the sending and receiving apparatus of any mobile station must be capable of being made as rapidly as possible.

578 (2) Installations of any mobile station must permit, once communication is established, of changing from transmission to reception and vice-versa in as short a time as possible.

579 § 5. Broadcasting by mobile stations at sea and over the sea is prohibited.

580 § 6. Mobile stations must be provided with the service documents enumerated in appendix 8.

Section II. Ship Stations

581 § 7. When the ship transmitter itself cannot be controlled in such a way that its frequency satisfies the tolerance specified in appendix 3, the ship station must be provided with a device, having a precision at least equal to one-half of this tolerance, for measuring the frequency of emission.

- 582 § 8. In ship stations all apparatus installed for the use
of class A1 emissions on frequencies in the authorized bands
between 110 and 160 kc/s must provide, in addition to the
frequency 143 kc/s, at least two frequencies selected within
these bands.
- 583 § 9. (1) Sending apparatus used in ship stations working on
emissions of class A2 in the authorized bands between 405 and
535 kc/s must be provided with devices readily permitting of
a material reduction of power.
- 584 (2) All ship stations working in the authorized bands
between 405 and 535 kc/s must be able to use the frequency
500 kc/s and at least one working frequency.
- 585 § 10. (1) Every station installed on board a ship compulsorily
equipped with radiotelegraph apparatus in accordance with
an international agreement must be able to send and receive
class A2 emissions:
- 586 a) on the frequency 500 kc/s, and
- 587 b) in addition on at least two working frequencies
in the authorized bands between 405 and 535 kc/s.
- 588 (2) The provisions of 587 do not apply to transmitters
on lifeboats, liferafts and survival craft or to emergency (re-
serve) transmitters of ship stations.
- 589 § 11. Any radiotelephone station installed on board a ship
which uses the frequency 2 182 kc/s for call and reply must be
provided with at least one other frequency in the bands be-
tween 1 605 and 2 850 kc/s in which radiotelephone services
are admitted.
- 590 § 12. In ship stations, all apparatus installed for the use
of class A1 emission on frequencies in the authorized bands
between 4 000 and 23 000 kc/s must satisfy the following con-
ditions:
- 591 a) in each of the bands necessary to carry on their
service, they must be equipped with at least two

- working frequencies in addition to one frequency in the calling band;
- 592 b) changes of frequency in transmitting apparatus must be effected within 5 (five) seconds if the frequencies are in the same band and within 15 (fifteen) seconds if the frequencies are in different bands;
- 593 c) receiving apparatus must be capable of a performance equal to that of the transmitting apparatus in the matter of frequency changing and must be designed in such a manner so as to ensure a satisfactory performance;
- 594 d) the provisions of 592 and 593 above shall become effective on the same dates as the tolerance requirements of column 3 of appendix 3 as applied to ship and aircraft stations.
- 595 § 13. (1) Stations in ships compulsorily equipped with radiotelegraph apparatus must be able to receive, in addition to 500 kc/s, all the frequencies necessary for their service.
- 596 (2) Such stations must be able to receive easily and efficiently on the same frequencies class A1 and A2 emissions.
- 597 (3) Ship radiotelegraph stations shall be equipped as soon as possible with devices permitting change-over from transmission to reception and vice-versa without manual switching.

Section III. Aircraft Stations

- 598 § 14. (1) Any aircraft station following a maritime course and required by national or international regulations to communicate, for safety purposes, with stations of the maritime mobile service, must be capable of transmitting and receiving on the frequency 500 kc/s, preferably class A2 emission.

- 599 (2) Aircraft stations when communicating with stations of the maritime mobile service on frequencies allocated to the maritime mobile service shall comply as far as possible with the provisions of this article.

Section IV. Lifeboat, Liferaft and Survival Craft Stations

- 600 § 15. (1) Any installation used on board a lifeboat, a life-raft, or a survival craft, compulsorily provided with radio apparatus as a result of an international agreement, must be capable of transmitting by radiotelegraphy on the frequency 500 kc/s, preferably class A2 emission. In cases where the equipment provides for the use of frequencies between 4 000 and 23 000 kc/s, it must be able to transmit on the frequency 8 364 kc/s, preferably class A2 emission.
- 601 (2) If the equipment includes a receiver, it shall be able to receive on 500 kc/s, preferably class A2 emission, and, in the case where the transmitter employs frequencies between 4 000 and 23 000 kc/s, and a receiver is provided, it must be able to receive classes A1 and A2 emissions throughout the band 8 266 to 8 745 kc/s.

ARTICLE 29.

General Radiotelegraph Procedure in the Maritime Mobile and Aeronautical Mobile Services

Section I. General Provisions

- 602 § 1. (1) In the maritime mobile and aeronautical mobile services the procedure detailed in this article is obligatory, except in the case of distress calls or of distress traffic, to which the provisions of article 37 are applicable.
- 603 (2) However, in the aeronautical mobile service the procedure contemplated in sections III, IV and V is applicable only in the absence of special arrangements to the contrary made by agreements between the governments concerned.

- 604 (3) Aircraft stations when communicating with stations of the maritime mobile service must use the procedure laid down in this article.
- 605 § 2. The use of the Morse code signals specified in the Telegraph Regulations shall be obligatory in the maritime and aeronautical mobile services. However, for radiocommunications of a special character, the use of other signals is not precluded.
- 606 § 3. (1) In order to facilitate radiocommunications, stations of the mobile service use the service abbreviations given in appendix 9.
- 607 (2) In the maritime mobile service, only the service abbreviations given in appendix 9 are to be used.
- 608 § 4. The provisions of §§ 6, 23, 24 and 25 of this article are applicable to radiotelephone communications in the mobile service.

Section II. Preliminary Operations

- 609 § 5. In areas where traffic is congested, ship stations must take into account the provisions of 721.
- 610 § 6. (1) Before emitting, every station must listen for a period long enough to satisfy itself that it will not cause harmful interference to transmissions in progress within its range; if such interference is likely, the station awaits the first break in the transmission with which it might interfere.
- 611 (2) If, these precautions having been taken, the emissions of the station happen to interfere with a radio transmission already in progress the following rules are to be applied:
- 612 a) Within the zone of communication of a coast station open to public correspondence or of any aeronautical station, the station whose emission causes the interference must cease sending at

the first request of the said coast station or aeronautical station.

- 613 b) In the case where radiocommunication already in progress between mobile stations is interfered with by the emissions of another mobile station, this station must cease sending at the first request of one of the other stations.
- 614 c) The station which requests this cessation must indicate the approximate waiting time imposed on the station whose emission it suspends.

615 Section III. Calls, Reply to Calls and Signals
Preparatory to Traffic

616 § 7. *Method of Calling.*

- 617 (1) The call is made as follows:
- call sign of the station called, not more than three times;
 - the word DE;
 - call sign of the calling station, not more than three times.

618 (2) However, in the bands of frequencies between 4 000 and 23 000 kc/s, when the conditions of establishing contact are difficult, the call signs may be transmitted more than three times, but not more than eight times.

619 § 8. *Frequency to be Used for Calling and for Preparatory Signals.*

620 (1) For making the call and for transmitting preparatory signals, the calling station uses the frequency on which the station called keeps watch.

621 (2) A ship station calling a coast station in any of the frequency bands allocated to the maritime mobile service between 4 000 and 23 000 kc/s must use a frequency in the calling band specially reserved for this purpose.

622 § 9. *Indication of the Frequency to be Used for Traffic.*

623 (1) The call, as described in 616, must be followed by the service abbreviation indicating the frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.

624 (2) When, as an exception to this rule, the call is not followed by an indication of the frequency to be used for the traffic:

625 a) if the calling station is a land station: it indicates that this station proposes to use for traffic its normal working frequency indicated in the list of stations.

626 b) if the calling station is a mobile station: it indicates that the frequency to be used for traffic is to be chosen by the station called from amongst the frequencies on which the calling station can transmit.

627 § 10. *Indication of the Number of Radiotelegrams or of Transmission in Series.*

628 (1) When the calling station has more than one radiotelegram to transmit to the station called, the above mentioned preparatory signals are followed by the service abbreviation and the figure giving the number of such radiotelegrams.

629 (2) Moreover, when the calling station wishes to send its radiotelegrams in series, it indicates this by adding the service abbreviation for requesting the consent of the station called.

630 § 11. *Form of Reply to Calls.*

The reply to calls is made as follows:

- call sign of the calling station, not more than three times;
- the word DE;
- call sign of the station called.

631 § 12. *Frequency for Reply.*

632 (1) For transmitting the reply to calls and to preparatory signals, the station called uses the frequency on which the calling station must keep watch, unless the calling station has specified a frequency for the reply.

633 (2) As an exception to this rule:

634 a) When a mobile station calls a coast station on the frequency 143 kc/s, the coast station shall transmit the reply to the call on its normal working frequency in the bands between 110 and 160 kc/s, as indicated in the List of Coast and Ship Stations.

635 b) When a mobile station calls a coast station in one of the bands authorized for radiotelegraphy between 4 000 and 23 000 kc/s, the coast station shall transmit the reply to the call on its normal working frequency in the same band, this frequency being indicated in the List of Coast and Ship Stations.

636 § 13. *Agreement on the Frequency to be Used for Traffic.*

637 (1) If the station called is in agreement with the calling station, it transmits:

638 a) the reply to the call;

639 b) the service abbreviation indicating that from that moment onwards it will listen on the frequency announced by the calling station;

640 c) if necessary, the indications referred to in 648:

641 d) the letter K if the station called is ready to receive the traffic of the calling station;

642 e) if useful, the service abbreviation and figure indicating the strength and/or readability of the signals received (see appendix 9).

643 (2) If the station called is not in agreement with the calling station on the frequency to be employed as the result of the arrangements under 623 and 624, it transmits:

- 644 a) the reply to the call;
645 b) the service abbreviation indicating the frequency
 and, if useful, the class of emission proposed;
646 c) if necessary, the indications specified in 648.
647 (3) When agreement is reached regarding the frequency which the calling station shall use for its traffic, the station called transmits the letter K after the indications contained in its reply.

648 § 14. *Reply to the Request for Transmission by Series.*

The station called, in replying to a calling station which has proposed to transmit its radiotelegrams by series (629), indicates, by means of the service abbreviation, its acceptance or refusal. In the former case it specifies, if necessary, the number of radiotelegrams which it is ready to receive in one series.

649 § 15. *Difficulties in Reception.*

650 (1) If the station called is prevented from receiving, it replies to the call as indicated in 636, but it replaces the letter K by the signal . — . . . (wait), followed by a number indicating in minutes the probable duration of the waiting time. If the probable duration exceeds 10 minutes (5 minutes in the case of aircraft stations communicating with stations of the maritime mobile service), the reason for the delay must be given.

651 (2) When a station receives a call without being certain that such a call is intended for it, it must not reply until the call has been repeated and understood. When, on the other hand, a station receives a call which is intended for it, but is uncertain of the call sign of the calling station, it must reply immediately, using the service abbreviation in place of the call sign of this latter station.

Section IV. Forwarding (Routing) of Traffic**652 § 16. *Traffic Frequency.***

653 (1) Every station of the mobile service uses, in principle, for the transmission of its traffic, one of its working frequencies as indicated in the list of stations, for the band in which the call has been made.

654 (2) In addition to its normal working frequency, printed in heavy type in the list of stations, every station may use one or more supplementary frequencies in the same band, in conformity with the provisions of article 33.

655 (3) The use of frequencies in the bands reserved for calling is forbidden for traffic with the exception of distress traffic (see article 33).

656 (4) If the transmission of a radiotelegram takes place on a frequency and/or class of emission other than that on which the call has been made the transmission of the radiotelegram is preceded by:

- call sign of the station called, not more than three times;
- the word DE;
- call sign of the calling station, not more than three times.

657 (5) If the transmission is made on the same frequency and class of emission as the call, the transmission of the radiotelegram is preceded, if need be by:

- the call sign of the station called;
- the word DE;
- call sign of the calling station.

658 § 17. *Numbering in Daily Series.*

As a general rule radiotelegrams of all kinds transmitted by ship stations and radiotelegrams in the service of public correspondence transmitted by aircraft stations are to be numbered in a daily series, number 1 being given to the first radiotelegram sent each day to each separate land station.

659 § 18. *Long Radiotelegrams.*

660 (1) In principle, any radiotelegram containing more than 100 words is regarded as forming a series, or terminates a series already in course of transmission.

661 (2) In cases where both stations are able to change from sending to receiving without manual switching, the sending station may continue to send until all its traffic has been sent or until the receiving station breaks in on the transmission with the service abbreviation BK. Before commencing, both stations normally agree on such a method of working by means of the abbreviation QSK.

662 (3) If this method cannot be employed, long radiotelegrams, whether in plain language or in code or cypher, are, as a general rule, to be transmitted in sections, each section containing 50 words in the case of plain language and 20 words or groups if code or cypher is used.

663 (4) At the end of each section the signal . . . — . . . (?) meaning "Have you received the radiotelegram correctly up to this point?" is transmitted. If the section has been correctly received, the receiving station replies by sending the letter K and the transmission of the radiotelegram is continued.

664 § 19. *Suspension of Traffic.*

When a station of the mobile service transmits on a working frequency of a land station and so causes interference with the transmission of such land station, it must suspend working at the first request of the latter.

Section V. End of Traffic and Work

665 § 20. *Signal for the End of Transmission.*

666 (1) The transmission of a radiotelegram is terminated by the signal . . . — . . . (end of transmission), followed by the call sign of the sending station and the letter K.

667 (2) In the case of transmission by series, the end of each radiotelegram is indicated by the signal . — . — . and the end of the series by the call sign of the sending station and the letter K.

668 § 21. *Acknowledgment of Receipt.*

669 (1) The acknowledgment of receipt of a radiotelegram is given by transmitting the letter R, followed by the number of the radiotelegram. Such acknowledgment of receipt is preceded by the following formula:

- call sign of the station which has been sending;
- the word DE;
- call sign of the station which has been receiving.

670 (2) The acknowledgment of receipt of a series of radiotelegrams is given by transmitting the letter R, followed by the number of the last radiotelegram received. Such acknowledgment of receipt is preceded by the above formula given in 669.

671 (3) The acknowledgment of receipt is transmitted by the receiving station on the frequency used for the reply to the call (see 631).

672 § 22. *End of Work.*

673 (1) The end of work between two stations is indicated by each of them by means of the signal . . . — . — . (end of work), followed by its own call sign.

674 (2) For these signals the sending station continues to use the working frequency and the receiving station the frequency used for the reply to the call.

675 (3) The signal . . . — . — . (end of work) is also used:

- when the transmission of radiotelegrams of general information, meteorological information and general safety notices is finished, and
- when transmission is ended in long distance radiocommunication services with deferred acknowledgment of receipt or without acknowledgment of receipt.

Section VI. Duration and Control of Work

- 676 § 23. In no case, in the maritime mobile service, must working on 500 kc/s exceed 5 minutes.
- 677 § 24. In communication between land stations and mobile stations, the mobile station shall comply with the instructions given by the land station, in all questions relating to the order and time of transmission, to the choice of frequency and of the class of emission, and to the duration and suspension of work. This provision does not apply to cases of distress.
- 678 § 25. In communication between mobile stations, except in cases of distress, the station called controls the working in the manner indicated in 677.

Section VII. Tests

- 679 § 26. Where it is necessary for a mobile station to send signals for testing or adjustment which are liable to interfere with the working of a neighbouring coast or aeronautical station, the consent of the station must be obtained before such signals are sent.
- 680 § 27. When it is necessary for a station in the mobile service to make test signals, either for the adjustment of a transmitter before making a call or for the adjustment of a receiver, they must not continue for more than 10 seconds and must be composed of a series of VVV followed by the call sign of the station emitting the test signals.

ARTICLE 30

Calls

- 681 § 1. (1) In the aeronautical mobile service the procedure contemplated in this article is applicable, except in the case of special arrangements by agreements between the governments concerned.

682 (2) Aircraft stations when communicating with stations of the maritime mobile service must use the procedure laid down in this article.

683 § 2. (1) As a general rule, it rests with the mobile station to establish communication with the land station. The mobile station may call the land station, for this purpose, only after coming within the range of action of the land station.

684 (2) However, a land station having traffic for a mobile station may call this station if it has reason to believe that the mobile station is within range and is keeping watch.

685 § 3. (1) In addition, every coast station must, so far as practicable, transmit its calls in the form of "traffic lists" consisting of the call signs in alphabetical order of all mobile stations for which they have traffic on hand. These calls are made at specified times fixed by agreement between the administrations concerned and at intervals of at least two hours and not more than four hours during the working hours of the coast station.

686 (2) Coast stations transmit their traffic lists on their normal working frequency.

687 (3) They may, however, announce this transmission by the following brief preamble sent on a calling frequency:

- CQ DE . . . (call sign of the calling station)
- QSW followed by the indication of the working frequency on which the traffic list is about to be sent.

In no case may this preamble be repeated.

688 (4) The provisions of 687 are obligatory where the frequency 500 kc/s is involved.

689 (5) They do not apply to the bands of frequencies between 4 000 and 23 000 kc/s.

690 (6) The hours at which coast stations transmit their traffic lists and the frequencies and classes of emission which

they use for this purpose must be stated in the List of Coast and Ship Stations.

691 (7) Mobile stations which hear their call sign during this transmission must reply as soon as they can do so, following as far as possible the order in which they are called.

692 (8) When the traffic cannot be sent immediately, the coast station informs each mobile station concerned of the probable time at which working can begin, and also, if necessary, the frequency and class of emission which will be used for working with it.

693 § 4. When a land station receives calls from several mobile stations at practically the same time, it decides the order in which these stations may transmit their traffic. This decision is based solely on the necessity for allowing each of the calling stations to clear the greatest number of radiotelegrams.

694 § 5. (1) When a station called does not reply to a call sent three times at intervals of two minutes, the calling must cease and must not be renewed until after an interval of fifteen minutes.

695 (2) However, in the case of a communication between a station of the maritime mobile service and an aircraft station, calling may be renewed after an interval of five minutes.

696 (3) Before renewing the call, the calling station must ascertain that the station called is not in communication with another station.

697 (4) The call may be repeated at shorter intervals if there is no reason to believe that it will interfere with communication in progress.

698 § 6. (1) When communication is first established with a land station, any mobile station may, if it deems it advisable in order to avoid confusion, transmit its name in full.

- 699 (2) When the name and address of the administration or private operating agency controlling a mobile station are not given in the list of stations or are no longer in agreement with the particulars given therein, it is the duty of the mobile station to furnish, as a matter of regular procedure, to the land station to which it transmits traffic, all the necessary information in this respect, using for this purpose the appropriate service abbreviations.
- 700 § 7. (1) The land station may, by means of the abbreviation PTR, ask the mobile station to furnish it with the following information:
- 701 a) approximate distance in nautical miles and bearing in relation to the land station, position in latitude and longitude (Greenwich), course and speed;
- 702 b) next place of call.
- 703 (2) The information referred to in 700 is furnished on the authority of the master or the person responsible for the vehicle carrying the mobile station.

ARTICLE 31

General Call "To All Stations"

- 704 § 1. Two types of calling signal "To all stations" are recognized:
- 705 a) Call CQ followed by the letter K (see 707 and 708);
- 706 b) Call CQ not followed by the letter K (see 709).
- 707 § 2. Stations desiring to enter into communication with stations of the mobile service, without, however, knowing the names of any such stations within their range of action, may use the enquiry signal CQ, in place of the call sign of the station called in the calling formula, the call being followed by the letter K (general call to all stations in the mobile service with request for reply).

708 § 3. In the maritime mobile service, in regions where traffic is congested, the use of the call CQ followed by the letter K is forbidden. As an exception it may be used with signals denoting urgency.

709 § 4. The call CQ not followed by the letter K (general call to all stations without request for reply) is used before the transmission of information of any kind intended to be read or used by anyone who can intercept it.

ARTICLE 32

Call to Several Stations Without Request for Reply

710 The call CP followed by two or more call signs or by a code word (call to certain receiving stations without request for reply) is used only for the transmission of information of any nature intended to be read or used by the persons authorized.

ARTICLE 33

Use of Frequencies for Radiotelegraphy in the Maritime Mobile and Aeronautical Mobile Services

Section I. Restrictions

711 § 1. (1) The use of class B emissions is forbidden in all stations.¹⁾

712 (2) However, it is permitted for emergency (reserve) installations of ship stations and for lifeboat, liferaft and survival craft equipments.

711.1 ¹⁾ Exceptionally, the ship stations of Australia may, when operating within proximity of the coast of that country, continue to use temporarily their existing damped wave equipment on the frequencies 425 and 500 kc/s.

Section II. Bands included between 405 and 535 kc/s

713 § 2. The provisions of this section are applicable to aircraft stations when communicating with stations of the maritime mobile service.

A. Distress.

714 § 3. (1) The frequency 500 kc/s is the international distress frequency; it is used for this purpose by ship or aircraft stations using frequencies in the band 405 to 535 kc/s when requesting assistance from the maritime services. It is used for the distress call and distress traffic, and for urgency and safety signals and messages.

715 (2) In addition it may be used only:

a) for call and reply (see 720 and 722) ;

716 b) by coast stations to announce the transmission of their traffic lists under the conditions provided for in 688.

717 (3) As an exception, however, the frequency 500 kc/s may be used for traffic, outside regions of heavy traffic, under the conditions provided for in 727, 728 and 729.

718 (4) Apart from the transmissions authorized on 500 kc/s, and taking account of 721, all transmissions on the frequencies included between 490 and 510 kc/s are forbidden.

719 (5) In order to facilitate the reception of distress calls, all stations working on the frequency 500 kc/s must reduce to the minimum their transmissions on this frequency.

B. Call and Reply.

720 § 4. (1) The general calling frequency, which must be used by any ship station or coast station engaged in radiotelegraphy in the authorized bands between 405 and 535 kc/s, and by air-

craft desiring to enter into communication with a station of the maritime mobile service using frequencies in this band, is the frequency 500 kc/s.

721 (2) However, in order to reduce interference in regions of heavy traffic, administrations reserve the right to consider the requirements of 720 as satisfied when the calling frequencies assigned to coast stations open to public correspondence are not separated by more than 5 kilocycles from the general calling frequency 500 kc/s.

722 § 5. (1) The frequency for replying to a call sent on the general calling frequency (see 720) is the frequency 500 kc/s, the same as that of the call.

723 (2) However, in regions of heavy traffic, ship stations should, as far as possible, ask coast stations to answer by means of their normal working frequency (see 632).

C. Traffic.

724 § 6. (1) Coast stations working in the authorized bands between 405 and 535 kc/s must be able to use at least one frequency in addition to 500 kc/s. One of these additional frequencies which is printed in heavy type in the List of Coast and Ship Stations is the normal working frequency of the station.

725 (2) In addition to their normal working frequency coast stations may use, in the authorized bands, additional frequencies which are shown in ordinary type in the List of Coast and Ship Stations. The band of frequencies 405 to 415 kc/s, however, is assigned to radio direction-finding; it may not be used by the mobile service except on the conditions fixed by chapter III.

726 (3) The working frequencies of coast stations must be chosen so as to avoid interference with neighbouring stations.

727 § 7. As an exception to the provisions of 714, 715 and 716 and on condition that signals of distress, urgency and safety, and calls and replies are not interfered with, the frequency 500 kc/s may also be used:

- 728 a) for the transmission of a single short radiotelegram exclusively by ship stations of Australia, India, New Zealand and Pakistan when operating in proximity to the coast of their respective countries;¹⁾
- 729 b) outside areas of heavy traffic for direction-finding but with discretion.

730 § 8. (1) Ship stations employing class A1 or A2 emissions in the authorized bands between 405 and 535 kc/s must use, wherever practicable, working frequencies chosen from amongst the following: 425, 454, 468 and 480 kc/s.

In addition, the frequency 512 kc/s may be used in regions 1 and 3 and the frequency 448 kc/s in region 2.

731 (2) No coast station is authorized to transmit on these working frequencies allocated for the use of ship stations on a world wide basis or on the working frequency allocated for the use of ship stations in the region in which the coast station is situated.

732 (3) In regions 1 and 3 the frequency 512 kc/s may also be used by ship and coast stations as a supplementary calling frequency when 500 kc/s is being used for distress purposes.

D. Watch.

733 § 9. (1) In order to increase the safety of life at sea and over the sea, all stations of the maritime mobile service normally keeping watch on frequencies in the authorized bands between 405 and 535 kc/s must, during their hours of service, take the necessary measures to ensure watch on the

728.1 ¹⁾ Certain coast stations of India and Pakistan are also permitted temporarily to transmit a single short radiotelegram on 500 kc/s.

international distress frequency 500 kc/s for three minutes twice an hour beginning at x h 15 and x h 45, Greenwich mean time (G.M.T.).

734 (2) During the periods mentioned above, except for the emissions provided for in article 37 (see 934 to 949) :

735 a) transmissions must cease within the bands 485 to 515 kc/s;

736 b) outside this band, transmissions of stations of the mobile service may continue; stations of the maritime mobile service may listen to these transmissions on the express conditions that they first ensure watch on the distress frequency as provided by 733.

737 § 10. (1) Stations of the maritime mobile service open to public correspondence and using frequencies in the authorized bands between 405 and 535 kc/s must, during their hours of service, remain on watch on the calling frequency 500 kc/s. This watch is obligatory only for class A2 emissions.

738 (2) These stations, while observing the provisions of 733, are authorized to relinquish this watch only when they are engaged in communication on other frequencies.

739 (3) When they are engaged in such communications :

- Ship stations may maintain this watch on the frequency 500 kc/s by means of an operator, a loudspeaker, or by some other appropriate means such as an automatic alarm receiver.
- Coast stations may maintain this watch on the frequency 500 kc/s either by means of an operator or by loudspeaker; in the latter case an indication may be inserted in the List of Coast and Ship Stations.

Section III. Bands included between 90 and 160 kc/s***A. Call and Reply.***

740 § 11. (1) The frequency 143 kc/s (class A1 only) is the international calling frequency used in the maritime mobile service in the bands 90 to 160 kc/s.

741 (2) Apart from the frequency 143 kc/s, the use of any frequency between 140 and 146 kc/s is forbidden.

742 § 12. The frequency for replying to a call sent on the frequency 143 kc/s is:

- for a ship station, the frequency 143 kc/s;
- for a coast station, its normal working frequency.

B. Traffic.

743 § 13. (1) The following rules must be observed by stations of the maritime mobile service using class A1 emissions in the bands 90 to 160 kc/s:

744 (2) a) Every coast station must keep watch on the frequency 143 kc/s unless the List of Coast and Ship Stations provides otherwise.

745 b) The coast station transmits its traffic on the working frequency or frequencies specially assigned to it.

746 (3) a) When a ship station desires to establish communication with another station of the maritime mobile service, it must use the frequency 143 kc/s, unless the List of Coast and Ship Stations provides otherwise.

747 b) This frequency must be used exclusively:
- for individual calls and replies to such calls;
- for the transmission of signals preparatory to traffic.

748 (4) A ship station after establishing communication with another station of the maritime mobile service on the general calling frequency 143 kc/s must, so far as practicable, transmit its traffic on some other frequency in the authorized bands, provided that it does not disturb the work in progress at another station.

749 § 14. (1) As a general rule, any ship station working in the bands 110 to 160 kc/s when it is not engaged in communication with other stations of the maritime mobile service must, during its hours of service, keep watch every hour on the frequency 143 kc/s for five minutes beginning at x h 35, Greenwich mean time (G.M.T.).

750 (2) The frequency 143 kc/s may be used for individual calls and will preferably be used for this purpose during the period indicated in 749.

Section IV. Bands included between 1 605 and 2 850 kc/s

751 § 15. Except where regional agreements specify otherwise, the frequencies assigned to ship stations for radiotelegraph communication in the bands between 1 605 and 2 850 kc/s must, as far as possible, be harmonically related (subharmonics) to the frequencies assigned to ship stations in the 4 000 kc/s radiotelegraph band (see section V).

Section V. Bands included between 4 000 and 23 000 kc/s

A. General Provisions.

752 § 16. (1) Mobile radiotelegraph stations equipped to operate in the frequency bands of the maritime mobile service between 4 000 and 23 000 kc/s must employ only class A1 emission. However, for radiocommunication of a special character, and for survival craft stations (see 600), the use of other classes of emission is not precluded.

753 (2) The rules of procedure fixed in article 29 are applicable to stations of the maritime mobile service using frequencies in the bands between 4 000 and 23 000 kc/s.

754 (3) Stations of the maritime mobile service open to public correspondence and using frequencies in the bands 405 to 535 kc/s in addition to frequencies in the band 4 000 to 23 000 kc/s are required to observe the provisions of 737.

755 § 17. (1) Beginning at the low frequency end, each of the radiotelegraph bands reserved for the use of ship stations is divided into three bands as follows:

756 a) A band of working frequencies for the use of passenger ships.¹⁾

757 b) A band of calling frequencies for the use of all ship and aircraft stations entering into communication with stations of the maritime mobile service.

758 c) A band of working frequencies for the use of cargo ships.

759 (2) For the purposes of this section:

– a passenger ship is a vessel defined as such by the Convention for the Safety of Life at Sea.

– a cargo ship is any ship that is not a passenger ship as defined above.

760 (3) The arrangement of the frequencies in the ship radiotelegraph bands is illustrated graphically in appendix 10.

761 § 18. For the exchange of radiotelegraph communications with stations of the maritime mobile service, aircraft stations may utilize the frequencies allocated to that service for radiotelegraphy between 4 000 and 23 000 kc/s. When using these frequencies, aircraft stations must comply with the provisions of this Section.

756.1 ¹⁾ Exceptionally, whaling factory vessels handling a large volume of traffic may use frequencies in this band from October to March of each year.

B. Call and Reply.

762 § 19. (1) In order to establish communication with a station in the maritime mobile service, every ship and aircraft station must use a calling frequency in the bands listed in 775.

763 (2) Frequencies in the calling bands are assigned to each mobile station in accordance with the provisions of 776 to 780 inclusive.

764 § 20. In order to reduce interference, mobile stations must, within the means at their disposal, endeavour to select for calling the band with the most favourable propagational characteristics for effecting reliable communication. In the absence of more precise data, a mobile station must, before making a call, listen for the signals of the station with which it desires to communicate. The strength and readability of such signals is a useful guide to propagational conditions and should indicate which is the preferable band for calling.

765 § 21. (1) The calling frequency to be used by a coast station, in each of the bands for which it is equipped, is its normal working frequency as shown in heavy type in the List of Coast and Ship Stations (see 774).

766 (2) A coast station, as a general rule, transmits its calls at specified times in the form of traffic lists on the frequency or frequencies indicated in the List of Coast and Ship Stations (see 685 and 686).

767 § 22. Unless the calling station specifies otherwise, the frequency for reply to a call made in any maritime mobile band is as follows:

768 a) for a mobile station, its assigned calling frequency in the same band as that used by the calling station;

769 b) for a coast station, its normal working frequency in the same band as that used by the calling station.

- 770 § 23. When notifying the transmitting frequencies of a coast station, administrations also indicate on which of the ship calling bands the station keeps watch and, as far as possible, the approximate hours of watchkeeping in Greenwich mean time (G.M.T.). This information shall be published in the List of Coast and Ship Stations.

C. Traffic.

- 771 § 24 (1) A mobile station, after establishing communication on a calling frequency (see 762), changes to a working frequency for the transmission of traffic. No traffic shall be transmitted on any frequency in the calling bands.

- 772 (2) Working frequencies shall be assigned to mobile stations in accordance with the provisions of 781 to 797 inclusive.

- 773 § 25. (1) A coast station shall transmit its traffic on its normal working frequency or on other working frequencies assigned to it.

- 774 (2) Working frequencies of coast stations using the bands between 4 000 and 23 000 kc/s are included within the following limits:

4 238	to	4 368	kc/s
6 357	to	6 525	kc/s
8 476	to	8 745	kc/s
12 714	to	13 130	kc/s
16 952	to	17 290	kc/s
22 400	to	22 650	kc/s

D. Assignment of frequencies to mobile stations.¹⁾

- 774.1 ¹⁾ Although this section requires the assignment of specific frequencies to all ship stations operating in the bands between 4 000 and 23 000 kc/s, it is recommended that in the case of certain older types of transmitters now in use, the reference point for measuring frequency deviations shall be that frequency on which the emission begins. This recommendation applies only until such transmitters have been replaced or modified so as to meet the tolerance requirements specified in column 3 of appendix 3.

1. Calling Frequencies of Ship Stations

775 § 26. (1) The calling frequencies assigned to ship stations are included within the following bands:

4 177	to	4 187	kc/s
6 265.5	to	6 280.5	kc/s
8 354	to	8 374	kc/s
12 531	to	12 561	kc/s
16 708	to	16 748	kc/s
22 220	to	22 270	kc/s

776 (2) In the 4 000 kc/s maritime mobile service band, the calling frequencies must be uniformly distributed within the calling band. They are preferably spaced 1 kc/s apart. The extreme frequencies assignable are 4 178 and 4 186 kc/s as indicated in appendix 10.

777 (3) In each of the other maritime mobile service bands between 4 000 and 18 000 kc/s, the calling frequencies must be in harmonic relationship with those in the 4 000 kc/s calling band. In the 22 000 kc/s calling band, the preferable spacing of calling frequencies is 5 kc/s.

778 § 27. The administration to which a ship station is subject shall assign to it a series of calling frequencies including one frequency in each of the bands in which the station is equipped to transmit. In the bands between 4 000 and 18 000 kc/s, the frequencies assigned to each ship station shall be in harmonic relationship. Each administration must take the necessary steps to assign such harmonic series of calling frequencies to ships in accordance with an orderly system of rotation so as to distribute these frequencies uniformly throughout the calling bands as outlined in 776. The same system of uniform distribution shall be applied in the assignment of calling frequencies in the 22 000 kc/s calling band.

779 § 28. (1) The centre calling frequency in each of the calling bands indicated in 775 shall be reserved as far as possible for

the use of aircraft desiring to communicate with stations of the maritime mobile service. These frequencies are the following: 4 182; 6 273; 8 364; 12 546; 16 728 and 22 245 kc/s.

- 780 (2) The frequency 8 364 kc/s must be used by lifeboats, liferafts and other survival craft, if they are equipped to transmit on frequencies between 4 000 and 23 000 kc/s, and if they desire to establish with stations of the maritime mobile service communications relating to search and rescue operations see (600).

2. Working Frequencies of Mobile Stations

a) General.

- 781 § 29. (1) The working frequencies for passenger ships are so spaced as to provide clear channels. In the 4 000 kc/s band, the two channels adjacent to the calling band are 5 kc/s wide and the remainder are 2.5 kc/s wide, the extreme frequencies assignable being 4 135 and 4 175 kc/s as indicated in appendix 10.
- 782 (2) In the 4 000 kc/s band, the working frequencies of cargo ships are spaced 0.5 kc/s apart, the extreme frequencies assignable being 4 188 and 4 236.5 kc/s as indicated in appendix 10.
- 783 (3) The working frequencies assigned to each ship station in the 6 000, 8 000, 12 000 and 16 000 kc/s bands must be harmonically related to those assigned in the 4 000 kc/s band.
- 784 (4) In the case of the 22 000 kc/s band, which is not in harmonic relationship with the other bands, the frequencies are spaced as follows and indicated in appendix 10:
- 785 *a)* in the passenger ship band the two channels adjacent to the calling band are 20 kc/s wide and the remaining channels are 10 kc/s wide, the extreme frequencies assignable being 22 075 and 22 215 kc/s;

786 b) in the cargo ship band the working frequencies are spaced 2.5 kc/s apart, the extreme frequencies assignable being 22 272.5 and 22 395 kc/s.

787 § 30. All mobile stations licensed to operate in the maritime mobile bands between 4 000 and 23 000 kc/s must be assigned, as soon as possible, working frequencies in the bands for which they are equipped in accordance with 788 to 797 inclusive.

b) Working frequencies of passenger ships.

788 § 31. The working frequencies assigned to passenger ships are included within the following bands:

4 133	to	4 177	kc/s
6 200	to	6 265.5	kc/s
8 265	to	8 354	kc/s
12 400	to	12 531	kc/s
16 530	to	16 708	kc/s
22 070	to	22 220	kc/s

789 § 32. (1) Each administration shall assign to each of the passenger ships under its jurisdiction two or more series of working frequencies designated in appendix 10 for vessels of this class. The total number of series assigned to each ship should be determined by the anticipated traffic volume.

790 (2) When passenger ships are assigned less than the total number of working frequencies in a band, the administration concerned shall assign working frequencies to such ships in accordance with an orderly system of rotation which will ensure approximately the same number of assignments on any one frequency.

791 (3) In each band, the two frequencies nearest to the calling frequencies, indicated by solid lines in appendix 10 are assigned to passenger ship stations the emissions of which do not already comply with the frequency tolerance of 0.02 %

specified in the 3rd column of appendix 3.¹⁾ These frequencies must also be used by mobile stations employing special types of wide band transmission which cannot be contained within the channels indicated by dashed lines in appendix 10.

- 792 § 33. For the exclusive purpose of communicating with stations of the maritime mobile service an aircraft station may be assigned one or more series of working frequencies in the passenger ship bands. These frequencies shall be assigned in accordance with the same system of uniform distribution provided for passenger ships.

c) Working frequencies of cargo ships.

- 793 § 34. Working frequencies assigned to cargo ships shall be included within the following bands:

4 187	to	4 238	kc/s
6 280.5	to	6 357	kc/s
8 374	to	8 476	kc/s
12 561	to	12 714	kc/s
16 748	to	16 952	kc/s
22 270	to	22 400	kc/s

- 794 § 35. (1) In each of the cargo ship bands the assignable frequencies are divided into two equal groups A and B, group A comprising the frequencies in the lower half of the band and group B the frequencies in the upper half (see appendix 10).

- 795 (2) Each administration shall assign to each of its cargo ships two series of working frequencies, one in group A and the other in group B. In each band these two working frequencies are separated from each other by half the width of the assignable band.

- 796 (3) For example, if the frequency assigned to a ship station is the lowest frequency assignable in group A, the

- 791.1 ¹⁾ It is anticipated that the number of these transmitters on passenger ships will decrease progressively before the effective date of the application of the tolerances specified in column 3 of appendix 3. These channels will be thus gradually cleared for the use of special types of wide-band transmission.

other must be the lowest frequency assignable in group B. If one of the frequencies assigned is the second frequency from the low frequency end of group A, then the other frequency assigned must be the second frequency from the low frequency end of group B, etc.

- 797 (4) Each administration shall assign successively one such pair of frequencies to each of its ship stations, commencing at either end of the band. When all available working frequencies in a band have been assigned in this manner the process shall be repeated as often as is necessary to satisfy all its requirements and to ensure a uniform distribution of assignments throughout the band.

d) Abbreviations for the designation of working frequencies.

- 798 § 36. The following system of abbreviations may be used to designate working frequencies:

- 799 a) In the case of a working frequency included between 4 000 and 23 000 kc/s, transmit the last three figures of the frequency excluding fractions of a kilocycle;
- 800 b) When the calling station does not know the working frequencies of a cargo ship station, it may request the ship station to reply on its working frequency in group A or on its working frequency in group B by transmitting QSW A or QSW B as the case may be.

Section VI. Aeronautical Mobile Service

- 801 § 37. Agreements between the interested governments may fix frequencies for call and reply in the aeronautical mobile service. These frequencies, as well as the conditions governing their use, are listed in the service documents published by the Secretary General of the Union.

- 802 § 38. For the use of the frequency 500 kc/s for calling and distress purposes, see 711 to 723.

- 803 § 39. In regions 1 and 3, the frequency 333 kc/s is the general calling frequency for aircraft stations operating in the bands 325 - 405 kc/s.

ARTICLE 34**Maritime Mobile Radiotelephone Service****Section I. General Provisions**

804 § 1. (1) The provisions of the present article are applicable in all cases to radiotelephone stations of the maritime mobile service.

805 (2) Aircraft stations may enter into telephone communication with stations of the maritime mobile service on frequencies allocated to that service for radiotelephony. They must then comply with the provisions of this article.

806 § 2. (1) The service of ship radiotelephone stations must be performed by an operator satisfying the conditions fixed by article 24.

807 (2) For the call signs for coast and ship radiotelephone stations see 428 and 429.

808 § 3. Automatic calling devices may be used in this service.

809 § 4. In order to obtain rapid and satisfactory communication, radiotelephone stations of the maritime mobile service should, as far as possible, be equipped with devices for instantaneous switching from transmission to reception and vice-versa. This provision is necessary for all stations establishing communication between ships or aircraft and subscribers of the land telephone system.

810 § 5. The frequencies of transmission and reception (also the pairs of frequencies in the case of duplex telephony) allocated to each coast station shall be indicated in the List of Coast and Ship Stations. This List shall also indicate any other useful information concerning the service performed by each coast station.

- 811 § 6. As far as is reasonable and practicable, the provisions concerning the radiotelegraph service relating to:
- procedure (article 29),
 - calling (article 30),
 - distress, urgency and safety signals (article 37) and
 - conditions of closure of the service (article 35)
- are applicable to the maritime mobile radiotelephone service.
- 812 § 7. Mobile stations equipped solely for radiotelephony may transmit and receive radiotelegrams by means of telephony. The procedure indicated in appendix 11 may be applied for this purpose.

Section II. Frequency Bands between 1 605 and 2 850 kc/s

A. Call, Reply and Distress.

- 813 § 8. (1) The frequency 2 182 kc/s is both a calling and the distress frequency for the maritime mobile service of radiotelephony in the portions of the band 1 605 to 2 850 kc/s in which radiotelephony is authorized (see chapter III).
- 814 (2) The administrations concerned will ensure, by special arrangements if necessary, that an adequate guard-band is provided for this frequency.
- 815 § 9. (1) The frequency 2 182 kc/s may be used for calls and replies, and it is the frequency to be used for the distress call and traffic, as well as for urgency and safety signals and messages.
- 816 (2) Its use for call and reply purposes between ship and coast stations is permitted only within the service areas of coast stations duly authorized by their administrations to this effect after a special arrangement if necessary. This information shall be indicated in the List of Coast and Ship Stations.

817 (3) However, an administration may assign to a station other frequencies for call and reply.

818 (4) The distress signal in radiotelephony is defined in 873.

B. Watch.

819 § 10. (1) Every coast station using the calling frequency 2 182 kc/s must, as far as possible, maintain watch on this frequency during its working hours.

820 (2) If this watch is not maintained by an operator, the method used shall be specifically indicated in the List of Coast and Ship Stations.

C. Traffic.

821 § 11. (1) Coast stations which use the frequency 2 182 kc/s for calling must be able to use at least one other frequency in the portions of the band 1 605 – 2 850 kc/s in which the maritime mobile radiotelephone service is admitted.

822 (2) One of these frequencies is printed in heavy type in the List of Coast and Ship Stations to indicate that it is the normal working frequency of the station. Supplementary frequencies, if assigned, are shown in ordinary type.

823 (3) Working frequencies of coast stations must be chosen in such a manner as to avoid interference with other stations.

D. Additional Provisions applying to Region 1

824 § 12. (1) In Region 1, the provisions of this sub-section apply only to the service of mobile radiotelephone stations using the frequency 2 182 kc/s as a calling and distress frequency.

825 (2) The power of the unmodulated carrier-wave in the antenna of such mobile stations shall not exceed 100 watts except in the case of special agreements as provided in 550.

826 (3) With a view to greater safety of life at sea all radiotelephone stations of the maritime mobile service which normally keep watch on frequencies in this band take steps, as far as possible, to keep watch on the distress frequency

2 182 kc/s twice each hour for three minutes commencing at x h 00 and x h 30, Greenwich mean time (G.M.T.).

- 827 (4) During the above-mentioned intervals, all transmissions in the bands between 2 167 and 2 197 kc/s, except distress, urgency and safety transmissions, must cease.

Section III. Frequency Bands between 4 000 kc/s and 23 000 kc/s

- 828 § 13. (1) The provisions of this section are applicable to the radiotelephone service between coast stations and ship stations in the frequency bands allocated for this purpose to the maritime mobile service between 4 000 and 23 000 kc/s.

- 829 (2) In duplex telephony, the frequencies of emission of coast stations and of the corresponding ship stations shall be selected, as far as possible, by pairs as indicated in appendix 12.

Section IV. Frequency Band 152-162 Mc/s

- 830 § 14. (1) The frequency 156.80 Mc/s is the frequency designated for world-wide use on a simplex basis in the maritime mobile service for calling, safety, intership and harbour control purposes.

- 831 (2) The administrations concerned will take the necessary steps, by special arrangements if necessary, to reserve a suitable guard-band for this frequency.

- 832 (3) The frequency 156.80 Mc/s must not be used for purposes other than those defined in 830 in areas where such other use is liable to cause harmful interference to the maritime mobile service.

- 833 § 15. The use of frequency modulation is compulsory in Region 2 and its use is strongly recommended in other regions.

- 834 § 16. The interested administrations may designate, by special arrangements if necessary, other frequencies in this band for the handling of public correspondence, communications relating to ship operation, etc., in the maritime mobile service.

ARTICLE 35

Working Hours of Stations in the Maritime and Aeronautical Mobile Services

Section I. Preamble

- 835 § 1. In order to permit the application of the following rules on the subject of hours of watch, every station of the maritime and aeronautical mobile services must have an accurate clock and the necessary steps must be taken to keep it correctly regulated to Greenwich mean time (G.M.T.).
- 836 § 2. Greenwich mean time (G.M.T.) (reckoned from 0000 to 2400 hours beginning at midnight) must be used for all entries in the radiocommunication service log and in all similar documents of ships compulsorily equipped with radiocommunication apparatus in compliance with an international agreement; the same will apply, as far as possible, to other ships.

Section II. Coast Stations

- 837 § 3. The service of coast stations is, as far as possible, continuous (day and night). Certain coast stations, however, may have a service of limited duration. Each administration or recognized private operating agency duly authorized to that effect, fixes the hours of service for coast stations under its jurisdiction.
- 838 § 4. Coast Stations whose service is not continuous may not cease before:
- 839 a) finishing all operations resulting from a distress call, urgency or safety signals;

- 840 b) exchanging all traffic originating in or destined for mobile stations which are situated within their range and have indicated their presence before the actual cessation of work.

Section III. Aeronautical Stations

- 841 § 5. The service of an aeronautical station shall be continuous throughout the period during which it bears primary responsibility for the radiocommunication service to aircraft in flight.

Section IV. Ship Stations

- 842 § 6. (1) For the international service of public correspondence, ship radiotelegraph stations are divided into three categories:

- 843 - Stations of the first category: these stations maintain a continuous service.
- 844 - Stations of the second category: these stations maintain a service of limited duration as indicated in 847 and 848.
- 845 - Stations of the third category: these stations maintain a service the duration of which is either shorter than that of stations of the second category, or is not fixed by these Regulations.

- 846 (2) Each government shall itself determine the rules under which ship radiotelegraph stations subject to it are to be placed in one or the other of the above three categories.

- 847 § 7. (1) Ship stations of the second category must provide service at least during the hours fixed by appendix 13. These hours are mentioned in the license.

- 848 (2) In case of short voyages, they provide service during the hours fixed by the administration to which they are subject.

- 849 § 8. When practicable, the hours of service of ship stations of the third category may be mentioned in the List of Coast and Ship Stations.
- 850 § 9. As a general rule, when a coast station has traffic on hand for a ship station of the third category not having fixed hours of service and assumed to be within range of the coast station, the latter calls the ship station during the first half-hour of the first and third periods of service for ships of the second category performing an eight-hour service, in accordance with the provisions of appendix 13.
- 851 § 10. For the international service of public correspondence, ship stations equipped exclusively for the use of radio-telephony constitute a single category. These stations carry on a service the duration of which is not determined by these Regulations.
- 852 § 11. (1) Ship stations whose service is not continuous may not close before:
- 853 a) finishing all operations resulting from a distress call, urgency or safety signal;
- 854 b) exchanging so far as practicable all traffic originating in or destined for coast stations situated within their range and mobile stations which, being within their range, have indicated their presence before the actual cessation of work.
- 855 (2) Any ship station not having fixed working hours must inform the coast stations, with which it is in communication, of the time of closing and the time of reopening its service.
- 856 § 12. (1) a) Any mobile station arriving in port, and whose service is therefore about to close, must so notify the nearest coast station and, if necessary, the other coast stations with which it generally communicates.

857 *b)* It must not close until after the disposal of traffic
 on hand, unless the regulations in force in the
 country where it is calling do not permit this.

858 (2) Upon departure from port the mobile station must
 notify the coast station or stations concerned that its service
 is reopening from the moment when such reopening is per-
 mitted by the regulations in force in the country where the
 port of departure is situated.

Section V. Aircraft Stations

859 § 13. For the international service of public correspon-
 dence, aircraft stations constitute a single category. The dura-
 tion of the service of such stations is not fixed by these Regu-
 lations.

CHAPTER XIV

Distress, Alarm, Urgency and Safety Signals

ARTICLE 36

Emergency (Reserve) Lifeboat, Liferaft and Survival Craft Installations

- 860 § 1. The Convention for the Safety of Life at Sea prescribes which ships must be fitted with an emergency (reserve) installation and which lifeboats, liferafts and other survival craft on ships must be fitted with radio equipment. It prescribes also the requirements which must be complied with by such installations.
- 861 § 2. The present Regulations do not define which aircraft must be fitted with emergency (reserve) installations, which liferafts and other survival craft on aircraft must be fitted with radio equipment, or the requirements which must be complied with by these installations.
- 862 § 3. The provisions of the present Regulations must, however, be observed in the use of emergency (reserve) installations and of installations in lifeboats, liferafts and other survival craft of both ships and aircraft.
- 863 § 4. Ships fitted with a transmitting installation of class A1 or A2 emission in working order must not use the emergency (reserve) installations of class B except for the transmission of distress signals and distress traffic.

ARTICLE 37

**Distress Signal and Traffic.
Alarm, Urgency and Safety Signals****Section I. General**

- 864 § 1. In the maritime mobile and aeronautical mobile services, the procedure laid down in this article is obligatory.
- 865 § 2. No provision of these Regulations shall prevent the use by a mobile station in distress of any means at its disposal to attract attention, make known its position, and obtain help.
- 866 § 3. (1) The speed of telegraph transmission in cases of distress, urgency or safety must not in general exceed 16 words a minute.
- 867 (2) The speed of transmission for the alarm signal is indicated in 920.

Section II. Frequencies to Be Used in Case of Distress

- 868 § 4. *Ships.*

(1) In case of distress, the frequency to be used shall be the international distress frequency, that is, 500 kc/s (see 714) ; it must preferably be used on class A2 or B emissions.

- 869 (2) In case of distress for radiotelephone stations working in the authorized bands between 1 605 and 2 850 kc/s, the frequency to be used is the distress frequency 2 182 kc/s (see article 34 and particularly 815).

- 870 (3) Ship stations which cannot transmit on the above distress frequencies shall use their normal calling frequency.

- 871 § 5. *Aircraft.*

Any aircraft in distress must transmit the distress call on the frequency on which the land or mobile stations capable of helping it, keep watch. When the call is addressed

to stations of the maritime mobile service, the frequencies to be used shall be the international distress frequency 500 kc/s or other watchkeeping frequencies of these stations.

Section III. Distress Signal

872 § 6. (1) In radiotelegraphy, the distress signal consists of the group . . . — — — . . . transmitted as a single signal in which the dashes must be emphasized so as to be distinguished clearly from the dots.

873 (2) In radiotelephony, the distress signal consists of the word MAYDAY pronounced as the French expression "m'aider".

874 § 7. These distress signals indicate that the ship, aircraft, or other vehicle sending the distress signal is threatened by grave and imminent danger and requests immediate assistance.

Section IV. Distress Call

875 § 8. The distress call and message are sent only on the authority of the master or person responsible for the ship, aircraft or other vehicle carrying the mobile station.

876 § 9. (1) The distress call, when sent by radiotelegraphy on 500 kc/s is, as a general rule, preceded by the alarm signal as defined in 920.

877 (2) When circumstances permit, the transmission of the call is separated from the end of the alarm signal by an interval of two minutes. In this case, the alarm signal must be followed immediately by the distress signal . . . — — — . . . sent three times, in order to operate the automatic apparatus mentioned in 931.

878 § 10. The distress call sent by radiotelegraphy comprises:
— the distress signal transmitted three times;
— the word DE;

- the call sign of the mobile station in distress, sent three times.

879 § 11. The distress call, when sent by radiotelephony, is generally preceded by the signal . . . — — . . . produced by a whistle or any other suitable means.

880 § 12. The distress call sent by radiotelephony comprises:
- the distress signal MAYDAY spoken three times;
- the words THIS IS, followed by the identification of the mobile station in distress, the whole repeated three times.

881 § 13. The distress call has absolute priority over other transmissions. All stations which hear it must immediately cease any transmission capable of interfering with the distress traffic and must listen on the frequency used for the emission of the distress call. This call must not be addressed to a particular station and acknowledgment of receipt is not to be given before the distress message is sent.

Section V. Distress Message

882 § 14 (1) The distress call must be followed as soon as possible by the distress message. This message comprises:

- the distress call;
- the name of the ship, aircraft, or vehicle in distress;
- particulars of its position, the nature of the distress and the kind of assistance desired;
- any other information which might facilitate the rescue.

883 (2) As a general rule, a ship signals its position in latitude and longitude (Greenwich), using figures for the degrees and minutes, together with one of the words NORTH or SOUTH and one of the words EAST or WEST. The signal . — . — . — is used to separate the degrees from the min-

utes. When practicable, the true bearing and distance in nautical miles from a known geographical point may be given.

884 (3) As a general rule, and if time permits, an aircraft shall transmit in its distress message the following information:

- estimated position and time of the estimate;
- true heading and indicated air speed;
- altitude;
- type of aircraft;
- nature of distress;
- intention of person in command (such as forced alighting on the sea or crash landing).

885 (4) As a general rule, an aircraft in flight signals its position:

- if possible by latitude and longitude (Greenwich), using figures for the degrees and minutes, together with one of the words NORTH or SOUTH and one of the words EAST or WEST; or
- by the name of the nearest place, and its approximate distance in relation thereto, together with one of the words NORTH, SOUTH, EAST, or WEST, as the case may be, or, when practicable, by words indicating intermediate directions.

886 § 15. After the transmission of its distress message, the mobile station transmits two dashes of approximately 10 seconds' duration each, followed by its call sign, to permit direction-finding stations to determine its position. This transmission will be repeated at frequent intervals in case of necessity.

887 § 16. (1) The distress message must be repeated at intervals, especially during the period of silence prescribed in 733, until an answer is received.

888 (2) The alarm signal may also be repeated, if necessary.

889 (3) The intervals must, however, be sufficiently long to allow time for stations preparing to reply to start their sending apparatus.

- 890 (4) When the mobile station in distress receives no answer to a distress message sent on a distress frequency, the message may be repeated on any other available frequency on which attention might be attracted.
- 891 § 17. Immediately before a crash landing, a forced landing (on land or sea) of an aircraft, as well as before total abandonment of a ship or an aircraft, the radio apparatus must, if circumstances permit, be set for continuous emission.
- 892 § 18. A mobile station which learns that another mobile station is in distress may transmit the distress message in either of the following cases:
- 893 a) the station in distress is not itself in a position to transmit it;
- 894 b) the master or person responsible for the ship, aircraft or other vehicle carrying the station which intervenes, believes that further help is necessary.
- 895 § 19. (1) Stations of the mobile service which receive a distress message from a mobile station which is, beyond any possible doubt, in their vicinity, must immediately acknowledge receipt (see 913, 914 and 915). If the distress call has not been preceded by the alarm signal, these stations may transmit this alarm signal with the permission of the authority responsible for the station (for mobile stations see 565), taking care not to interfere with the transmission of acknowledgments of receipt sent by other stations.
- 896 (2) Stations of the mobile service which receive a distress message from a mobile station which, beyond any possible doubt, is not in their vicinity, must allow a short interval of time before acknowledging receipt of the message, in order to permit stations nearer to the mobile station in distress to answer and acknowledge receipt without interference.

- 897 (3) The provisions of 895 and 896 are equally applicable to all stations working in the bands of the mobile service.

Section VI. Distress Traffic

- 898 § 20. Distress traffic comprises all messages relative to the immediate assistance required by the mobile station in distress.
- 899 § 21. In distress traffic, the distress signal must be sent before the call and at the beginning of the preamble of any radiotelegram.
- 900 § 22. The control of distress traffic is the responsibility of the mobile station in distress or of the mobile station which, by the application of the provisions of 892 and 893, has sent the distress call. These stations may, however, delegate the control of the distress traffic to another station.
- 901 § 23. (1) The station in distress may impose silence either on all stations of the mobile service in the area or on any station which interferes with the distress traffic. It addresses these instructions "to all stations" or to one station only, according to circumstances. In either case, it uses the service abbreviation QRT followed by the distress signal
902 (2) If it believes it to be essential, any station of the mobile service near the ship, aircraft or other vehicle in distress, may also impose silence. It employs for this purpose the procedure prescribed in 901, substituting for the distress signal the word DISTRESS followed by its own call sign.
- 903 (3) The use of the service abbreviation QRT must be reserved, as far as possible, for the mobile station in distress and for the station controlling distress traffic.
- 904 § 24. (1) Any station which hears a distress call must comply with the provisions of 881.
- 905 (2) Any station of the mobile service which has knowledge of distress traffic must follow such traffic, even if it does not take part in it.

- 906 (3) For the entire duration of distress traffic, it is forbidden for all stations which are aware of this traffic and which are not taking part in it:
- 907 a) to transmit on the frequencies on which the distress traffic is taking place;
- 908 b) to use class B emissions.
- 909 (4) A station of the mobile service which, while following distress traffic, is able to continue its normal service, may do so when the distress traffic is well established and on condition that it observes the provisions of 906, 907 and 908 and does not interfere with the distress traffic.
- 910 § 25. A land station receiving a distress message must without delay take the necessary action to advise the authorities participating in the operation of rescue facilities.
- 911 § 26. (1) When distress traffic has ceased or when silence is no longer necessary, a station which has controlled such traffic transmits on the distress frequency and if necessary on the frequency used for distress traffic, a message addressed "to all stations" indicating that the distress traffic has ceased.
- 912 (2) This message takes the following form:
- distress signal;
 - call "to all stations" CQ, (three times);
 - the word DE;
 - call sign of the station sending the message (once);
 - time of handing in of the message;
 - name and call sign of the mobile station which was in distress;
 - service abbreviation QUM.

Section VII. Acknowledgment of Receipt of a Distress Message

- 913 § 27. The acknowledgment of receipt of a distress message is given in the following form:
- call sign of the mobile station in distress (three times);

- the word DE;
- call sign of the station acknowledging receipt (three times);
- group RRR;
- distress signal.

914 § 28. (1) Every mobile station which acknowledges receipt of a distress message must, on the order of the master or person responsible for the ship, aircraft or other vehicle, transmit, as soon as possible, the following information in the order shown:

- its name;
- its position in the form prescribed in 883 and 885;
- the speed at which it is proceeding towards the ship, aircraft or other vehicle in distress.

915 (2) Before sending this message, the station must ensure that it will not interfere with the emissions of other stations better situated to render immediate assistance to the station in distress.

Section VIII. Repetition of a Distress Call or a Distress Message

916 § 29. (1) Any station of the mobile service which is not in a position to render assistance and which has heard a distress message which has not been immediately acknowledged, must take all possible steps to attract the attention of stations of the mobile service which are in a position to render assistance.

917 (2) For this purpose, with the approval of the authority responsible for the station, the distress call or the distress message may be repeated. This repetition is made on full power either on the distress frequency or on one of the frequencies which may be used in case of distress (see 868 to 871). At the same time all necessary steps are taken to notify the authorities who may be able to intervene usefully.

918 (3) In radiotelegraphy, the repetition of the distress call or distress message is generally preceded by the transmission of the alarm signal as defined in 920. A sufficient

interval of time is to be allowed between the transmission of an alarm signal and the repetition of the distress call or distress message, so that mobile stations, which do not keep continuous watch and which are warned by the sounding of their automatic alarm apparatus, have time to go on watch.

- 919 (4) A station which repeats a distress call or distress message, follows it by the word DE and its own call sign transmitted three times.

Section IX. Alarm Signal

- 920 § 30. (1) The alarm signal shall consist of a series of twelve dashes sent in one minute, the duration of each dash being four seconds and the duration of the interval between two consecutive dashes one second. It may be transmitted by hand but its transmission by means of an automatic instrument is recommended.

- 921 (2) Any ship station working in the band 405 to 535 kc/s which is not provided with an automatic apparatus for the transmission of the alarm signal, must be permanently equipped with a clock, clearly marking the seconds, preferably by means of a sweep hand completing one revolution per minute. This clock must be placed at a point sufficiently visible from the operator's table in order that the operator may, by keeping it in view, easily and correctly time the different elements of the alarm signal.

- 922 (3) This special signal has for its sole purpose the actuation of the automatic devices giving the alarm. It must be used solely either to announce that a distress call or message is about to follow or to announce the transmission of an urgent cyclone warning; in the latter case it may be used only by the coast stations duly authorized by their government.

- 923 (4) In cases of distress, the use of the alarm signal is governed by 876; in the case of an urgent cyclone warning, the transmission of the warning must not begin until two minutes after the end of the alarm signal.

924 § 31. The automatic devices intended for the reception of
the alarm signal must fulfil the following conditions:

925 a) they must respond to the alarm signal trans-
mitted by the telegraphic emissions of at least
class A2 or B;

926 b) they must respond to the alarm signal through
interference (provided it is not continuous)
caused by atmospheric and powerful signals
other than the alarm signal; preferably without
any manual adjustment being required during
any period of watch maintained by the appa-
ratus;

927 c) they must not be actuated by atmospheric or
by strong signals other than the alarm signal;

928 d) they must possess a minimum sensitivity such
that with negligible atmospheric interference,
they are capable of being operated by the alarm
signal transmitted by the emergency (reserve)
transmitter of a ship station at any distance
from this station up to the normal range fixed
for this transmitter by the Convention for the
Safety of Life at Sea, and preferably at greater
distances;

929 e) they must give warning of any fault which
would prevent the apparatus from performing
its normal functions during watch hours.

930 § 32. Before an automatic alarm receiver may be ap-
proved for use on ships, the administration having jurisdic-
tion over those ships must be satisfied by practical tests made
under operating conditions equivalent to those obtaining in
practice (including interference, vibration, etc.), that the
apparatus complies with the provisions of these Regulations.

- 931 § 33. The adoption of the alarm signal defined in 920 does not prevent an administration from authorizing the use of an automatic apparatus which complies with the preceding conditions and can be actuated by the distress signal

. . . — — — . . .

Section X. Urgency Signal

- 932 § 34. (1) The urgency signal may be transmitted only on the authority of the master or the person responsible for the ship, aircraft or other vehicle carrying the mobile station.
- 933 (2) The urgency signal may be transmitted by a land station only with the approval of the responsible authority.
- 934 § 35. (1) In radiotelegraphy, the urgency signal consists of three repetitions of the group XXX, sent with the letters of each group and the successive groups clearly separated from each other. It is sent before the call.
- 935 (2) In radiotelephony, the urgency signal consists of three repetitions of the word PAN pronounced as the French word "panne". It is sent before the call.
- 936 § 36. (1) The urgency signal indicates that the calling station has a very urgent message to transmit concerning the safety of a ship, aircraft or other vehicle or of some person on board or within sight.
- 937 (2) The urgency signal has priority over all other communications, except distress. All mobile and land stations which hear it must take care not to interfere with the transmission of the message which follows the urgency signal.
- 938 (3) Where the urgency signal is used by a mobile station, it must, as a general rule, be addressed to a specific station.
- 939 § 37. Messages preceded by the urgency signal must, as a general rule, be drawn up in plain language, except in the case of medical messages.

940 § 38. (1) Mobile stations which hear the urgency signal must continue to listen for at least three minutes. At the end of this period, if no urgency message has been heard, they may resume their normal service.

941 (2) However, land and mobile stations which are in communication on frequencies other than those used for the transmission of the urgency signal and of the call which follows it may continue their normal work without interruption provided the urgency message is not addressed "to all stations" (CQ).

942 § 39. When the urgency signal has been sent before transmitting a message which is intended for all stations and which calls for action by the stations receiving the message, the station responsible for its transmission must cancel it as soon as it knows that action is no longer necessary. This message of cancellation must likewise be addressed "to all stations" (CQ).

Section XI. Safety Signal

943 § 40. (1) In radiotelegraphy, the safety signal consists of three repetitions of the group TTT, sent with the letters of each group and the successive groups clearly separated from each other. It is sent before the call.

944 (2) In radiotelephony, the word SÉCURITÉ pronounced as the French word "sécurité", repeated three times, is used for the safety signal.

945 § 41. (1) The safety signal indicates that the station is about to transmit a message concerning the safety of navigation or giving important meteorological warnings.

946 (2) The safety signal and the message which follows it are sent on the distress frequency or on one of the frequencies which may be used in case of distress (see 868 to 871).

947 § 42. (1) With the exception of messages transmitted at fixed times, the safety signal, when it is used in the maritime mobile service, must be transmitted towards the end of the first

available period of silence (see 733); the message is transmitted immediately after the period of silence.

948 (2) In the cases prescribed in 1050, 1053 and 1056, the safety signal and the message which follows it must be transmitted as soon as possible, but must be repeated as just indicated, at the end of the first period of silence which follows.

949 § 43. All stations hearing the safety signal must continue to listen on the frequency on which the safety signal has been transmitted until they are satisfied that the message is of no interest to them. They must, moreover, not make any transmissions likely to interfere with the message.

CHAPTER XV

Radiotelegrams

ARTICLE 38

Order of Priority of Communications in the Mobile Service

950 The order of priority of communications in the mobile service is as follows :

- 1st Distress calls, distress messages and distress traffic.
- 2nd Communications preceded by the urgency signal.
- 3rd Communications preceded by the safety signal.
- 4th Communications relative to radio direction-finding bearings.
- 5th Radiotelegrams relative to the navigation and safe movement of aircraft.
- 6th Radiotelegrams relative to the navigation, movements, and needs of ships; weather observation messages destined for an official meteorological service.
- 7th Government radiotelegrams for which priority right has been claimed.
- 8th Service radiotelegrams relating to the working of the radiocommunication service or to radiotelegrams previously transmitted.
- 9th All other communications.

ARTICLE 39

Indication of the Station of Origin of Radiotelegrams

951 § 1. When, because of duplication of names, the name of a station is followed by its call sign, the latter is separated

from the name of the station by a fraction bar. Example: Oregon /OZOC (not Oregonozoc) ; Rose /DDOR (not Rose-ddor).

952 § 2. When a coast or aeronautical station retransmits over the general telecommunication network a radiotelegram received from a mobile station, it transmits, as office of origin, the name of the mobile station in which the radiotelegram originated as this name appears in the appropriate list of stations, followed by its own name. If necessary, the provisions of 951 are also applied.

953 § 3. In order to avoid any confusion with a telegraph office or a fixed station of the same name, the coast or aeronautical station may, if desirable, complete the indication of the name of the mobile station of origin by the word "ship" or "aircraft" placed before the name of the station of origin.

ARTICLE 40

Routing of Radiotelegrams

954 § 1. (1) As a general rule, a mobile station which uses emissions of class A2 within the band from 405 to 535 kc/s transmits its radiotelegrams to the nearest coast or aeronautical station. In order to expedite or facilitate the transmission of the radiotelegrams, however, it may transmit them to another mobile station. The latter treats the radiotelegrams so received as if they originated with itself. (See Article 9 of the Additional Radio Regulations).

955 (2) If, however, the mobile station can choose between several coast or aeronautical stations at approximately the same distance, it must give the preference to that which is established on the territory of the country of destination or of normal transit of radiotelegrams. When the station chosen is not the nearest, the mobile station must cease working or must change the frequency or class of emission upon the first request made by the coast or aeronautical station which is actually the nearest, this request being based upon the inter-

ference which the working in question causes to the coast or aeronautical station.

- 956 § 2. Mobile stations using emissions of class A1, A2, or A3, outside the band from 405 to 535 kc/s must, as a general rule, give preference to the coast or aeronautical station established on the territory of the country of destination or of the country likely to be the most suitable transit route for radiotelegrams.
- 957 § 3. If the sender of a radiotelegram handed in at a mobile station has indicated the coast or aeronautical station to which he desires his radiotelegram to be sent, the mobile station must, in order to effect this transmission to the coast or aeronautical station indicated, wait, if necessary, until the conditions specified in 954, 955 and 956 above are fulfilled.
- 958 § 4. In order to facilitate disposal of traffic, and subject to such restrictions as individual governments may impose, coast stations may, in exceptional circumstances and with discretion, without incurring additional charges, exchange radiotelegrams and service messages relating thereto.

ARTICLE 41

Accounting for Radiotelegrams

Section I. Establishment of Accounts

- 959 § 1. In principle, land station and ship and aircraft charges do not enter into the international telegraph accounts.
- 960 § 2. Governments reserve to themselves the right to make, between themselves and with the private enterprises concerned, different arrangements with a view to the adoption of other accounting systems, more specifically the adoption, as far as practicable, of the system by which the land station and

ship and aircraft charges follow the radiotelegrams from country to country through the medium of the telegraph accounts.¹⁾ Such arrangements are subject to previous agreement between the administrations concerned.

961 § 3. In the absence of a different arrangement in accordance with the provisions of 960, the accounts relating to these charges are prepared monthly by the administrations to which the land stations are subject and are forwarded by them to the administrations concerned.

962 § 4. (1) Where the enterprise operating the land station is not the administration of the country, this enterprise may replace the administration of that country as far as accounts are concerned. In this event, the provisions of 964 to 999 shall apply to such enterprise in the same manner as to an administration.

963 (2) The radiotelegrams referred to in 699 can, if necessary, be included in an account destined for the administration to which the ship or aircraft is subject.

964 § 5.(1) In the case of radiotelegrams originating in ship and aircraft stations, the administration to which the land station is subject debits the administration to which the ship or aircraft station of origin is subject with:

- the land station charges,
- the charges relating to transmission over the general telecommunication network, which will hereafter be called telegraph charges,
- the total charges collected for prepaid replies, land station and telegraph charges made for collation,
- charges collected for delivery by express, by post or by air mail and charges for copies of multiple telegrams.

960.1 ¹⁾ The United States and Canada request that this system should be adopted to the greatest possible extent in relations between themselves and other countries.

- 965 (2) So far as concerns transmission over the telegraph communication routes, radiotelegrams are treated, from the point of view of accounting, in conformity with the Telegraph Regulations.
- 966 § 6. (1) For radiotelegrams to a country beyond that to which the land station belongs, the telegraph charges to be settled in accordance with the above provisions are the charges shown in the table of rates relating to international telegraph correspondence, or those fixed by special arrangements between the administrations of adjacent countries and published by those administrations, and not the charges which might be made by applying minimum charges per telegram or by methods of rounding the charges per telegram in any manner.
- 967 (2) The regulation five-word minimum charge must, however, be taken into account for CDE radiotelegrams and for radiotelegrams within the European system.
- 968 § 7. (1) In the case of radiotelegrams addressed to ship and aircraft stations, the administration to which the office of origin is subject is debited direct by the administration to which the land station is subject, with the land station and ship or aircraft charges plus the land station and ship or aircraft charges applicable to collation, but only where the radiotelegram has been transmitted to the ship or aircraft station. In the case provided for in 2109, however, the administration to which the office of origin is subject is debited with the land station charge by the administration to which the land station is subject.
- 969 (2) The administration to which the office of origin is subject is always debited through the medium of the telegraph accounts, from country to country if necessary, by the administration to which the land station is subject, with the telegraph charges, the total charges for prepaid replies, and the telegraph charges for collation. As regards charges for copies of multiple telegrams, the procedure, as far as the telegraph accounts are concerned, is in conformity with the normal telegraph procedure.

- 970 (3) When the radiotelegram has been transmitted, the administration to which the land station is subject credits the administration to which the ship or aircraft station of destination is subject:
- 971 a) with the ship or aircraft charge;
- 972 b) if occasion arises, with
- the charges due to intermediate ship or aircraft stations,
 - the total charge collected for prepaid replies,
 - the ship or aircraft charge for collation,
 - the maximum charges fixed by the Telegraph Regulations for copies of multiple telegrams.
- 973 § 8. Replies to radiotelegrams with prepaid reply are treated in all respects like other radiotelegrams in the accounts of the mobile service.
- 974 § 9. Radiotelegrams exchanged between stations in ships or aircraft
- 975 a) *without the intervention of land stations:*
- except when other arrangements have been made, the enterprise to which the station of destination is subject debits the enterprise to which the station of origin is subject with all charges collected, less the charges due to this latter station;
- 976 b) *through the medium of a single land station:*
- the administration to which the land station is subject debits the administration to which the ship or aircraft station of origin is subject with all the charges collected, less the charges due to that ship or aircraft station, in accordance with the provisions of 964 and 965. Thereafter the provisions of 968 to 972 are applied;
- 977 c) *through the medium of two land stations:*
- the administration to which the first land station is subject debits the administration to

which the ship or aircraft station of origin is subject with all charges collected less the charge due to that ship or aircraft station, in accordance with the provisions of 964 and 965. The provisions of 968 to 972 are then applied, the first land station being regarded as the office of origin as far as the accounts are concerned.

- 978 § 10. In the case of radiotelegrams which, at the request of the sender, are forwarded through one or two intermediate ship or aircraft stations, each such intermediate station debits with the charge accruing to it for transit:
- 979 a) the ship or aircraft station of destination, in the case of a radiotelegram originating on land and destined for a ship or aircraft station, or in the cases contemplated in 976 and 977 (second radiotelegraph transmission) ;
- 980 b) the ship or aircraft station of origin, in the case of a radiotelegram originating on a ship or aircraft station and destined for the land, or in the cases contemplated in 975 and in 976 and 977 (first radiotelegraph transmission).

Section II. Exchange, Verification and Settlement of Accounts

- 981 § 11. In principle, radiotelegrams are entered individually, with all necessary particulars, in the monthly accounts which serve as a basis for the radiotelegram accounting mentioned in this article. A specimen statement is given in appendix 14. The accounts are forwarded within a period of three months counting from the month to which they relate.
- 982 § 12. The acceptance of an account is notified or observations thereon are made within a period of six months from the date of its dispatch.
- 983 § 13. The periods mentioned in 981 and 982 may be exceeded when exceptional difficulties occur in the transmission of the documents by post between the land stations and the administrations to which they are subject. However, the

debtor administration may refuse the settlement and adjustment of accounts presented more than eighteen months after the date of handing-in of the radiotelegrams to which the accounts relate.

984 § 14. In the absence of an agreement to the contrary, the following provisions are applicable to the radiotelegraph accounts referred to in the present article.

985 § 15. (1) The monthly accounts are admitted without revision when the difference between the accounts prepared by the two administrations concerned is not more than ten francs (10 fr.) or does not exceed one per cent of the account of the creditor administration, provided that the amount of this account is not more than one hundred thousand francs (100 000 fr.); when the amount of the account prepared by the creditor administration is more than this sum the difference must not exceed a total amount comprising:

- 1 per cent of the first hundred thousand francs (100 000 fr.);
- 0.5 per cent of the remainder.

986 (2) A revision which is in process is stopped as soon as, following the exchange of observations between the administrations concerned, the difference is brought down to a sum not exceeding the maximum fixed by 985.

987 § 16. (1) Immediately after the acceptance of the accounts proper to the last month of a quarter, a quarterly account showing the balance for the entire quarter is, unless otherwise arranged between the two administrations concerned, prepared by the creditor administration and forwarded in duplicate to the debtor administration which, after verification, returns one of the copies endorsed with its acceptance.

988 (2) In default of acceptance of any of the monthly accounts of a given quarter before the expiration of the sixth month following the quarter to which the accounts relate, the quarterly account may, nevertheless, be prepared by the creditor administration with a view to a provisional settlement

which becomes obligatory for the debtor Administration under the conditions fixed by 989. Adjustments subsequently agreed upon are included in a later quarterly settlement.

- 989 § 17. The quarterly account must be verified and the amount must be paid within a period of six weeks dating from the day on which it is received by the debtor administration. Beyond this period, the sums due to one administration by another are subject to interest at the rate of six per cent per annum reckoned from the day following the date of expiration of the said period.
- 990 § 18. (1) The balance of the quarterly account in gold francs is paid by the debtor administration to the creditor administration, by a sum equivalent to its value; this payment may be effected :
- 991 a) at the choice of the debtor administration, in gold or by means of cheques or drafts fulfilling the conditions prescribed in 994 and 995 and payable at sight on the capital or on a commercial centre of the creditor country ;
- 992 b) by agreement between the two administrations, through the intermediary of a bank clearing through the Bank of International Settlements at Basle ;
- 993 c) by any other means agreed upon between the administrations concerned.
- 994 (2) In the case of payment by means of cheques or drafts, these instruments are drawn in the money of a country where the central bank of issue or other official institution of issue buys and sells gold or gold currency for the national money at fixed rates determined by law or by virtue of an agreement with the government.
- 995 (3) If the currencies of several countries fulfil these conditions, the creditor administration indicates the currency which is convenient to it. The conversion is effected at the gold par rate.

- 996 (4) Where the currency of the creditor country does not fulfil the conditions specified under 994, the cheques or drafts may also be expressed in the currency of the creditor country if the two countries are agreed on this procedure. In this case the balance is converted at the gold par rate into the currency of a country fulfilling the above-mentioned conditions. The result arrived at is then converted into the currency of the debtor country, and from this into the currency of the creditor country, at the rate of exchange current in the capital or at a commercial centre of the debtor country on the date of purchase of the cheque or draft.
- 997 (5) When the amount of the balance is more than 5 000 gold francs, the date of the dispatch of the cheque or draft, the date of its purchase and its amount must, upon a request by the creditor administration, be notified by the debtor administration by means of a service telegram.
- 998 § 19. The costs of payment are borne by the debtor administration.

Section III. Period of Retention of Accounting Records

- 999 § 20. The originals of radiotelegrams and the corresponding documents retained by the administrations are held, with all necessary precautions from the point of view of secrecy, until the settlement of the relative accounts and, in any case, for at least ten months counting from the month following the month of handing-in of the radiotelegrams.

CHAPTER XVI

Miscellaneous Stations and Services

ARTICLE 42

Amateur Stations

- 1000 § 1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.
- 1001 § 2. (1) When transmissions between amateur stations of different countries are permitted they must be made in plain language and must be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.
- 1002 (2) The preceding provisions may be modified by special arrangements between the countries concerned.
- 1003 § 3. (1) Any person operating the apparatus in an amateur station must have proved that he is able to transmit, and to receive by ear, texts in Morse code signals. Administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 1 000 (one thousand) Mc/s.
- 1004 (2) Administrations shall take such measures as they judge necessary to verify the qualifications, from a technical point of view, of any person operating the apparatus of an amateur station.
- 1005 § 4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the

technical qualifications of the operators and to the conditions under which these stations must work.

1006 § 5. (1) All the general rules of the Convention and of the present Regulations shall apply to amateur stations. In particular, the transmitting frequency must be as constant and as free from harmonics as the state of technical development for stations of this nature permits.

1007 (2) During the course of their transmissions amateur stations must transmit their call sign at short intervals.

ARTICLE 43

Experimental Stations

1008 § 1. (1) An experimental station may enter into communication with an experimental station of another country only after it has been authorized to do so by its administration. Each administration notifies other administrations concerned when such authorizations are issued.

1009 (2) The administrations concerned determine by special arrangement the conditions under which communications may be established.

1010 § 2. (1) In experimental stations any person operating radiotelegraph apparatus, either on his own account or for another, must have proved his ability to transmit and to receive by ear, texts in Morse code signals.

1011 (2) Administrations shall take such steps as they think necessary to verify the qualifications, from the technical point of view, of any person operating the apparatus of an experimental station.

1012 § 3. The administrations concerned fix the maximum power of experimental stations, having regard to the conditions under which the stations are to work.

- 1013 § 4. (1) All the general rules of the Convention, and these Regulations, apply to experimental stations. In particular, experimental stations must comply with the technical conditions imposed upon transmitters operating in the same frequency bands, except where the technical principles of the experiments prevent this.
- 1014 (2) During their emissions, experimental stations must transmit, at short intervals, their call sign, or, in the case of stations not yet provided with a call sign, their name.
- 1015 § 5. Where there is no risk of an experimental station causing harmful interference with a service of another country, the administration concerned may, if considered desirable, adopt different provisions from those contained in this article.

ARTICLE 44

Radiolocation Service

Section I. General Provisions

- 1016 § 1. Administrations which have established a radiolocation service must take the necessary steps to ensure the effectiveness and regularity of that service; but they accept no responsibility for the consequences that might arise from the use of inaccurate information furnished, defective working, or failure of their stations.
- 1017 § 2. In the case of a doubtful or unreliable bearing or position, the station taking the bearing or fixing the position must, whenever possible, notify the station for which the information is being obtained of any such doubt or unreliability.
- 1018 § 3. Administrations notify to the Secretary General of the Union the characteristics of each radiolocation station in the international service and, if considered necessary, for each station or group of stations, the sectors in which the informa-

tion furnished is normally reliable. This information is published in the List of Radiolocation Stations, and the Secretary General of the Union is notified of any change of a permanent nature.

1019 § 4. The method of identification of radiolocation stations must be so chosen as to avoid any doubt when it is necessary to identify a station.

1020 § 5. Signals sent by radiolocation stations must permit accurate and precise observations.

1021 § 6. Any information concerning modification or irregularity of working of a radiolocation station must be notified without delay in the following manner:

1022 a) Land stations of countries operating a radiolocation service send out daily, if necessary, notices of modifications or irregularities in working until such time as normal working is restored or, if a permanent alteration has been made, until such time as it can reasonably be taken that all navigators interested have been warned.

1023 b) Permanent alterations or irregularities of long duration are published as soon as possible in the relevant notices to navigators.

1024 § 7. In the case where radiocommunication by telegraphy or telephony is part of a radiolocation service, such communication will be subject to the provisions of these Regulations.

Section II. Service of Radio Direction-Finding Stations

1025 § 8. In the maritime radionavigation service the frequency normally used for direction-finding is 410 kc/s. All direction-finding stations of the maritime radionavigation service must be able to use this frequency. They must, in addition, be able to take bearings on the frequency 500 kc/s espe-

cially for locating stations sending signals of distress, alarm and urgency.

1026 § 9. The procedure to be followed by radio direction-finding stations is given in appendix 15.

1027 § 10. In the absence of prior arrangements, an aircraft station which calls a radio direction-finding station for a bearing must use for this purpose a frequency on which the station called normally keeps watch.

1028 § 11. In the exclusively aeronautical radionavigation service, the procedure contemplated for radio direction-finding in this section is applicable, except where special procedures are in force as a result of agreements made between the administrations concerned.

Section III. Service of Radiobeacon Stations

1029 § 12. When an administration thinks it desirable in the interests of navigation to organize a service of radiobeacon stations, it may use for this purpose:

1030 a) radiobeacons properly so called, established on land or on ships permanently moored or, exceptionally, on ships navigating in a restricted area, the limits of which are known and published. The emissions of these radiobeacons may have either directional or non-directional patterns;

1031 b) fixed stations, coast stations or aeronautical stations designated to act as radiobeacons, at the request of mobile stations.

1032 § 13. (1) Radiobeacons properly so called use the frequency bands which are available to them under chapter III.

1033 (2) Other stations notified as radiobeacons use for this purpose their normal working frequency and their normal class of emission.

ARTICLE 45

Special Services

Section I. Meteorology

1034 § 1. (1) Meteorological messages comprise:

1035 a) messages addressed to meteorological services
 officially entrusted with weather forecasts, more
 specifically for the protection of maritime and
 air navigation;

1036 b) messages from these meteorological services in-
 tended specially for:

1037 - ship stations;

1038 - protection of aircraft;

1039 - the public.

1040 (2) The information contained in these messages may
be:

1041 a) observations taken at fixed times;

1042 b) warnings of dangerous phenomena;

1043 c) forecasts and warnings;

1044 d) statements of the general meteorological situa-
 tion.

1045 § 2. (1) The various national meteorological services mu-
tually agree to prepare common transmission programmes so
as to use the transmitters best situated to serve the regions
concerned.

1046 (2) The meteorological observations contained in the
classes mentioned in 1035, 1036, 1037 and 1038 are, in princi-
ple, drawn up in an international meteorological code, whether
they are transmitted by or intended for mobile stations.

1047 § 3. For observation messages intended for an official
meteorological service, use shall be made of the facilities re-
sulting from the allocation of exclusive frequencies to synoptic

meteorology and the aeronautical meteorological service, in conformity with regional agreements made by the services concerned for the use of these frequencies.

- 1048 § 4. (1) Meteorological messages intended specially for all ship stations are sent, in principle, in conformity with a fixed time table, and, as far as practicable, at times when they can be received by ship stations having only one operator. The speed of transmission is chosen so that an operator possessing only a second class certificate may be able to read the signals.
- 1049 (2) During the transmission "to all stations" of meteorological messages intended for stations of the maritime mobile service, all stations of this service whose transmissions might interfere with the reception of these messages, must keep silent in order to permit all stations which desire to do so, to receive these messages.
- 1050 (3) Meteorological warning messages for the maritime mobile service are transmitted without delay. They must be repeated at the end of the first silence period which follows (see 733) as well as at the end of the first silence period which occurs in the working hours of a ship station having a single operator. They are preceded by the safety signal and are sent on the frequencies laid down by 946.
- 1051 (4) In addition to the regular information services contemplated in the preceding sub-paragraphs, administrations take the necessary steps to ensure that certain stations shall, upon request, communicate meteorological messages to stations in the maritime mobile services.
- 1052 (5) The provisions of 1048 to 1051 are applicable to the aeronautical mobile service, insofar as they are not contrary to more detailed special arrangements ensuring at least equal protection to air navigation.
- 1053 § 5. (1) Messages originating in mobile stations and containing information concerning the presence of tropical cyclones must be transmitted, with the least possible delay, to other

mobile stations in the vicinity and to the appropriate authorities at the first point of the coast with which contact can be established. Their transmission is preceded by the safety signal.

1054 (2) Any mobile station may, for its own use, listen to messages containing meteorological observations sent out by other mobile stations, even those which are addressed to a national meteorological service.

1054a (3) Stations of the mobile services which transmit meteorological observations addressed to a national meteorological service, are not required to repeat them to other stations. However, the exchange between mobile stations, on request, of information relating to the state of the weather is authorized.

Section II. Time Signals, Notices to Mariners

1055 § 6. The provisions of 1048 to 1052 are applicable to time signals and to notices to mariners. However, the provisions of 1050 are not applicable to time signals.

1056 § 7. Messages containing information concerning the presence of dangerous ice, dangerous wrecks, or any other imminent danger to marine navigation, must be transmitted as soon as possible to other ship stations in the vicinity, and to the appropriate authorities at the first point of the coast with which contact can be established. These transmissions must be preceded by the safety signal.

1057 § 8. When thought desirable, and provided the sender agrees, administrations may authorize their land stations to communicate information concerning maritime damage or casualties or information of general interest to navigation, to the marine information agencies approved by them and subject to the conditions fixed by them.

CHAPTER XVII

ARTICLE 46

International Radio Consultative Committee (C.C.I.R.)

1058 § 1. The duties of the International Radio Consultative Committee (C.C.I.R.) shall be to study technical radio questions and operating questions the solution of which depends principally on considerations of a technical radio character, and to make recommendations on them.

1059 § 2. The questions to be studied by the C.C.I.R. and on which it shall issue recommendations are those which are submitted to it by the Plenipotentiary Conference, by the Radio Administrative Conference, by the Administrative Council of the Union, by another International Consultative Committee of the Union, or by the International Frequency Registration Board, as well as those adopted for study by the Plenary Assembly of the C.C.I.R., or those which are presented by at least twelve members of the Union in the interval between meetings of the Plenary Assembly.

1060 § 3. (1) The C.C.I.R. shall have, as members:

1061 a) administrations of countries, members of the Union; and

1062 b) such recognised private operating agencies as have expressed a desire to have their experts participate in the work of the C.C.I.R.

1063 (2) International organizations which are coordinating their work with the International Telecommunications Union

and which have related activities may be admitted to participation in the work of the C.C.I.R. in an advisory capacity.

1064 (3) Scientific or manufacturing organizations, which are engaged in the study of telecommunications problems or in the design or manufacture of telecommunications equipment and which are approved by the respective administrations of countries, members of the Union, may be admitted to meetings of the Study Groups of the C.C.I.R. in an advisory capacity.

1065 § 4. The C.C.I.R. shall work through the medium of:

- 1066 a) a Plenary Assembly, which shall normally be held every two years, provided that a meeting shall take place about one year previous to the meeting of the general Administrative Radio Conference. Each meeting of a Plenary Assembly shall be held in a place fixed by the previous meeting of the Plenary Assembly;
- 1067 b) Study Groups, which shall be set up by the Plenary Assembly to deal with questions to be studied;
- 1068 c) the Director, assisted by a Vice-Director specialized in broadcasting, both of whom shall be appointed by the Plenary Assembly for an indefinite period, but with the reciprocal rights of terminating their appointments;
- 1069 d) the specialized Secretariat, which assists the Director in the performance of the work;
- 1070 e) such laboratories or technical installations, as may be set up by the Union.

1071 § 5. The Secretary General of the Union, or his representative, the representatives of the International Frequency Registration Board, and the representatives of the other Consultative Committees of the Union may attend meetings of the C.C.I.R. in an advisory capacity.

- 1072 § 6. The C.C.I.R. may form joint Study Groups with other Consultative Committees of the Union to study, and issue recommendations, on questions of common interest.
- 1073 § 7. The C.C.I.R. may appoint a representative to attend, in an advisory capacity, meetings of other Committees of the Union or other international organizations, to which the C.C.I.R. has been invited.
- 1074 § 8. (1) The C.C.I.R. shall observe the rules of procedure contained in the General Regulations annexed to the Convention.
- 1075 (2) The Plenary Assembly of the C.C.I.R. may adopt such additional rules of procedure as may facilitate the work of the Committee, provided that they do not conflict with the General Regulations.

CHAPTER XVIII

ARTICLE 47

Effective Date of the Radio Regulations

1076 § 1. These Regulations shall come into force on January 1, 1949, except for the table of allocation of frequencies covering the bands below 27 500 kc/s¹⁾ and the provisions listed below, which shall come into force upon the effective date of the new International Frequency List, as determined by a special Administrative Radio Conference:

articles 2, 10, 11, 12, 17, 20, 28; 621; article 33; 869; article 34; 1025 and 1032; appendices 1, 3, 4, 5, 6, 7, 8, 10 and 12.

1077 § 2. The procedure provided in the Cairo Radio Regulations for the notification and registration of frequencies, and the Cairo allocation table below 27 500 kc/s shall remain in force until the effective date of the new International Frequency List (see 1076).

1078 § 3. In witness whereof the delegates of the countries members of the Union represented at the International Radio Conference of Atlantic City (1947) have signed in the names of their respective countries the present Regulations in a single copy which will remain in the archives of the Government of the United States of America and of which a certified copy will be delivered to every country member of the Union.

Done at Atlantic City, the 2nd of October, 1947.

1076.1 ¹⁾ However, all or any portion of the band 150-2 850 kc/s, which is not subject to consideration by the Provisional Frequency Board, may come into force in Region 2 on or after January 1, 1949, in accordance with special arrangements agreed upon by the interested countries of that Region.

Pour la République Populaire d'Albanie :

Enver Hoxha

Pour le Royaume de l'Arabie Saoudite :

~~*[Signature]*~~

Ahmed Abdel Ismail

Pour la République Argentine :

~~*[Signature]*~~

Leoberto T. Fierber

Eduardo Alvarez

Manuel A. Rodriguez

Olav

Ludwig

Julius Böthgen
J. Deane

Pour la Fédération Australienne:

A. Gunning
R. W. McKay

Pour l'Autriche :

Ing. F. Henneberg

Pour la Belgique :

K. Gorkin

R. Gorkin

L. Lambin
Jean Lambin

Pour la République Socialiste Soviétique de Biélorussie :

L. Kordichuk *A. Kordichuk*

Pour la Birmanie :

Mamy Mamy

Pour le Brésil :

Romulo de Faria e Silva
 Lauro de Aguiar
 João Victorio Paes
 Horacio de Oliveira

Pour la Bulgarie :

R. Th. S. S.

Pour le Canada :

Thomas A. St.

Pour le Chili :

H. S.

Pour la Chine :

盧宗陸 T. C. Loo

黃如祖 Ju-kun Huang

茅於軾 Dr. Pu-quei Ho

鄭乃皓 Tung Nai Hong

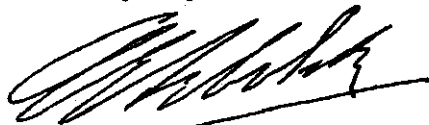
汪兆銘 Wai Kwong

王明 Wang Ming

Pour l'Etat de la Cité du Vatican :

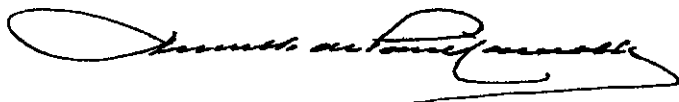
Philippe Jaccari
William C. Smith.

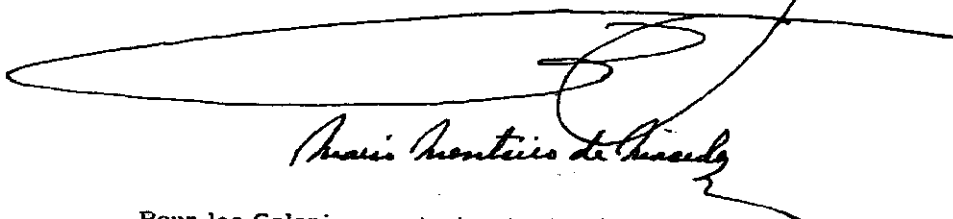
Pour la République de Colombie :



Santiago Rufaet C.
Luis Carlos Guzmán

Pour les Colonies portugaises :



Thomé de Mattos Pereira da Aguiar

 Thomé de Mattos Pereira da Aguiar

Pour les Colonies, protectorats, territoires
d'Outre-mer et territoires sous mandat ou
tutelle du Royaume Uni de la Grande-Bretagne
et de l'Irlande du Nord:

A. S. Angus

J. A. Gracie

Pour les Colonies, protectorats et territoires d'Outre-mer
sous mandat français :

J. Paling
Henri Lempereur

Pour le Congo Belge et Territoires du Ruanda-Urundi :

Genevieve

Pour Cuba :

Paulo Pina

Alfred Mery

J. H. C. C.

de l'Union L. P. de l'Union
Barabooaf

Pour le Danemark :

Villembled
Gunnar Pedersen
F. Hegant.

Pour la République Dominicaine :

Sebastian Rodriguez
M. Manita

Pour l'Egypte :

re. ne
Chahay.
Amis El Bardar
أحمد البدار

Pour la République de El Salvador :

Barthélémy Dany

B. Herrarte L.

Pour l'Equateur :

Humberto Aguilar L.

Pour les Etats-Unis d'Amérique :

Charles R. Dancy
Francis (et al) Vog

Pour l'Ethiopie :

H. Ahmayebou

H.

Pour la Finlande :

J. Ylöstalo

Pour la France :

P. Lahaye

C. L.

inam

Pour la Grèce :

Stavros Kiriakidis

Stefanos Elythessios

Pour le Guatemala :

Barbarina L.

B. Herrarte L.

Pour Haiti :

J. J. Bonheur

Pour la République de Honduras :

L. Montes

Pour la Hongrie :

Paul Frank

Pour l'Inde :

S. Banerjee

A. S. A. W.

M. R. S. S.

M. M. S. S.

Pour les Indes néerlandaises :

de Ruyter

H. van der Meer.

de Ruyter

Amén

de Ruyter

Pour l'Iran :

F. Nowroozbeigi

H. Samy

Pour l'Iraq :

عبد الوهاب
 رشيد

Jamil Maundi
Rashid Rashid

Pour l'Irlande :

J. S. Minneachan

Leon O'Brien

Mórchartaigh

Pour l'Islande :

G. H. H. H.

G. H. H.

Pour l'Italie :

G. Guenz
 Antonio Pennetta
 Attilio Turin
 Luigi Vero
 Attilio Ruc

Pour le Liban :

J. J. J.

Pour le Luxembourg :

Hugues Jaffar

Pour le Mexique :

E. Guzman
G. B. J.
~~*Agustín Plascencia*~~
J. Arayas L.

Pour Monaco :

Arthur Corette

Pour le Nicaragua :

Francisco J. Medel

Pour la Norvège :

Se Lyming-Torresen
 Olaf Moe
 Andreas Frank
 N. L. Söberg

Pour la Nouvelle-Zélande :

W. Curtis
 T. P. Clarkson

Pour le Pakistan :

M. Khan
J. H. Khan

Pour Panama :

M. L. L. L. L.

Pour les Pays-Bas, Curaçao et Surinam :

W. A. G. G. G.

W. A. G. G.

W. A. G. G.

H. Van der Ven.

Pour le Pérou :

Miguel Porcel

Pour la République des Philippines :

Marin P. P. P.
J. S. Alfonso.

Pour la République de Pologne :

Engineer *Stahnger*
A *Stahnger*
H. Brocy

Pour le Portugal :

Carlos Zilhio
Ambroz
João Ramon Tarciso
Almaro Vieira
Amiglantem
Fernando de Funchal

Pour les Protectorats français du Maroc et de la Tunisie :

Prime Schaeffer

Pour la République populaire de la Mongolie :

Mongolie

Pour la République populaire fédérative
de Yougoslavie :

Josip Čičot

Dr. J. V. Popović

Pour la République Socialiste Soviétique de l'Ukraine :

M. Golobny M. Tchernyshev

Pour la Rhodesia du Sud :

Isidore Trenchard

Pour la Roumanie :

Renus Lila

Pour le Royaume-Uni de la Grande-Bretagne
et de l'Irlande du Nord :

A. S. Angwin

J. A. Gracie

Pour le Siam :

Luang Namiam Bannurak

Pour la Suède :

Håkan Herby

Ewert Hagiussoar

Arthur Örnemark

Iren Gejer

Pour la Confédération Suisse :

Möckli

*Dr E. Meyer
C. Gillioz
A. Goldmann.*

Pour la Syrie :

Samih Mousli

Pour la Tchécoslovaquie :

*Ing. Jiří Krapka,
Ing. J. Melich
Ing. Jan Jurek
Ing. Jan Máj*

Pour la Turquie :

T. Zoney
F. B.
Sejathane

Pour l'Union de l'Afrique du Sud et Territoire du
 Sud-Ouest Africain sous mandat :

E. C. Smith
W. A. Borland
H. Mills

Pour l'Union des Républiques Socialistes Soviétiques :

A. D. Zojnyenn *A. D. Fortenshem*
Morice *L. Kopylov*
B. Dzarant *V. Bragin*
Ukolonchuk *F. Ilievich*
S. Vinitova *S. Humerief*
A. Iferensou *A. Chetichine*

Pour la République Orientale de l'Uruguay :

Paul Rafael Gilman

Pour les Etats-Unis de Vénézuéla :

Demetrio Fritzsche
Radhans
Pelny

APPENDICES TO RADIO REGULATIONS

(Atlantic City, 1947)

FIRST SERIES

APPENDIX 1

Form of Notice

For use when notifying to the International Frequency Registration Board a frequency assignment to a fixed, land, broadcasting, radionavigation land, or standard frequency station

1.
Notifying Government
2.
Date of the notice
3.
Reference to preliminary
telegraphic notice (if any)
4. Assigned frequency in kc/s (or Mc/s).
5. Class of emission [note *a*].
6. Bandwidth of emission in kc/s.
7. Power in kW.
8. Antenna Location
 - A) Country
 - B) Place
 - C) Latitude and Longitude [note *b*].
9. Directivity of Antenna [note *c*]
 - A) Azimuth of maximum radiation in degrees from true north (clockwise).

- B) Angular width of the main lobe in the horizontal plane in degrees [note *d*)].
- C) Gain in decibels (db) in direction of maximum radiation at the assigned frequency [note *e*)].
- 10. Call sign.
- 11. Class of Station [note *f*)].
- 12. Nature of Service [CP, CO, etc. – note *f*)].
- 13. Locality (or localities) or regions with which communication is established or projected [note *g*)].
- 14. Projected date of service or date put into service.
- 15. Maximum hours of use of frequency (G.M.T.) [note *h*)].
- 16. Length of the intended circuit in km [note *i*)].
- 17. Description of transmission employed [note *j*)].
- 18. Operating Administration or Company.
- 19. Postal and telegraphic address of centralizing office under whose jurisdiction the station is placed [note *k*)]
- 20. Remarks [note *l*)].
- 21. If assignment is made in accordance with a service or regional arrangement, the agreement should be identified.

.....

.....
 Signature

.....
 Title

Notes

- a) Indicate only the symbols such as A1, F2, etc. (see article 2).
Additional information regarding the emissions should be furnished under items 17 or 20.
- b) Only in degrees and minutes, except for radionavigation land stations for which the position should be given in degrees, minutes, and seconds.
- c) State whether the antenna exists or is projected.
- d) The angular width of the main lobe in the horizontal plane is that total angle, in degrees, within which the radiated power in any direction is not more than 6 db less than the power radiated in the direction of maximum radiation.
- e) Gain to be calculated with reference to a theoretical free space half-wave dipole (see article 1).
- f) Reference should be made to appendix 7.
- g) When more than one locality is served list all localities; giving the location of the control point or points in all cases.
- h) The maximum hours of use of the frequency shall be taken to mean the earliest and latest hours of use of this frequency for a complete day during all schedules for a complete sunspot cycle. For example: if during one period the schedule would be 1000 to 1500 hours (G.M.T.) and for another period of 1100 to 1600 hours (G.M.T.), the information to be shown will be 1000 to 1600 hours (G.M.T.).
- i) In the case of forked fixed circuits the distance to each locality should be shown.
In the case of fixed networks, the maximum distance between any two stations should be shown.
In the case of emissions intended to serve a large geographical region the distance to the approximate centre

of the region or the maximum and minimum distances of the extremes of the region may be furnished.

j) The information to be furnished under item 17 should include:

- in the case of telegraphy, the type of code used such as "on" "off" Morse - Frequency shift Morse - 7 unit code - Hell-Schreiber Facsimile, etc.;
- in the case of telephony, details such as the use of single sideband one or two channel working should be given.

In the case where the assigned frequency is not actually transmitted, the reference frequency should be given here.

k) The addresses required are those to which communication should be sent on urgent matters regarding interference, quality of emissions, and questions referring to the technical operation of the circuit (see article 14).

l) Any other useful data which might assist the International Frequency Registration Board should be furnished.

APPENDIX 2

Report of an Irregularity or of an Infringement of the Telecommunications Convention or of the Radio Regulations

(See articles 13, 14, 15 and 23)

Particulars concerning the station infringing the Regulations:

1. Name, if known (in BLOCK letters)
[Note a)]
2. Call sign (in BLOCK letters)
3. Nationality, if known
4. Frequency used (kc/s or Mc/s)
5. Class of Emission [Note b)]

Particulars concerning the station, the centralizing office or inspection service reporting the irregularity or infringement:

6. Name (in BLOCK letters)
7. Call sign (in BLOCK letters)
8. Nationality
9. Approximate Position [Notes c) and h)]

Details of the irregularity or infringement:

10. Name [Note d)] of the station (in BLOCK letters) in communication with the station committing the irregularity or infringement
11. Call sign (in BLOCK letters) of the station in communication with the station committing the irregularity or infringement
12. Time [Note e)] and date
13. Nature of the irregularity or infringement [Note f)]
14. Extracts from ship log and other documents supporting the report (to be continued on the back of the form, if necessary)

Information on the transmitting station which was subject to interference [Note g)]:

15. Name of the station (in BLOCK letters) which was subject to interference
16. Call sign (in BLOCK letters)
17. Frequency assigned (kc/s or Mc/s)
18. Frequency measured at the time of the interference
19. Class of emission and width of the band
20. Receiving location (in BLOCK letters) where the interference was troublesome [Notes c) and h)]

21. Certificate

I certify that the foregoing report represents, to the best of my knowledge, a complete and accurate account of what took place.

Date19....²³

²³ This report must be signed by the operator who has reported the infringement and countersigned by the Master of the ship or aircraft, or the officer in charge of the station in the case of an infringement reported by a station of the mobile service. When the report originates from a centralizing office or from an inspection service it must be signed by the head of that office or service and countersigned by an official of the administration transmitting it.

Instructions for Filling in This Form

- Note *a*) Each report will refer only to one station [see Note *d*)].
- Note *b*) See Article 2.
- Note *c*) Applicable only to ships and aircraft; the position must be expressed either in latitude and longitude (Greenwich) or by a true bearing and distance in nautical miles, or in kilometres from some well known place.
- Note *d*) If both communicating stations infringe the Regulations, a separate report shall be made for each of these stations.
- Note *e*) The time must be expressed as Greenwich mean time (G.M.T.) by a group of four figures (0000 to 2400). If the infringement covers a considerable period of time, the times must be shown.
- Note *f*) A separate report is required for each irregularity or infringement, unless they have obviously all been made by the same person and within a short time. All reports must be forwarded in duplicate and, whenever practicable, must be typewritten. (Indelible pencil and carbon paper may be used.)
- Note *g*) This information is to be given only in case of a complaint about interference.
- Note *h*) In the case of land or fixed stations position must be expressed in latitude and longitude (Greenwich).
-

For Use of Administrations Only

1. Company controlling the installation of the station against which complaint is made
2. Name of operator of the station held responsible for the irregularity or infringement of the Regulations
3. Action taken

APPENDIX 3

Table of Frequency Tolerances

(See article 17)

1. Frequency tolerance is defined in article 1.

2. For ship stations, in the absence of an assigned frequency (see article 11) to a particular ship or ship transmitter the substitute for the assigned frequency is that frequency on which an emission begins.

Table of Frequency Tolerances

Frequency Bands and Categories of Stations	Tolerances (in %) applicable until January 1st 1953 to transmitters now in use and those to be installed before January 1st 1950	Tolerances (in %) applicable: -to new transmitters installed after January 1st 1950; -to all transmitters after January 1st 1953
1	2	3
A. From 10 to 535 kc/s.		
1. Fixed Stations:		
-from 10 to 50 kc/s,	0.1	0.1
-from 50 kc/s to end of band.	0.1	0.02
2. Land Stations:		
a) Coast Stations:		
-power above 200 watts,	0.1	0.02

Frequency Bands and Categories of Stations	Tolerances (in %) applicable until January 1st 1953 to transmitters now in use and those to be installed before January 1st 1950	Tolerances (in %) applicable: -to new transmitters installed after January 1st 1950; -to all transmitters after January 1st 1953
<p style="text-align: center;">1</p> <p style="text-align: center;">-power below 200 watts.</p> <p>b) Aeronautical Stations.</p> <p>3. Mobile Stations: -Ship Stations, -Aircraft Stations, -Emergency (reserve) ship transmitters, and lifeboat, liferaft and survival craft transmitters.</p> <p>4. Radionavigation Stations.</p> <p>5. Broadcasting Stations.</p>	<p style="text-align: center;">2</p> <p style="text-align: center;">0.1</p> <p style="text-align: center;">0.1</p> <p style="text-align: center;">0.3 ^{a)} 0.3</p> <p style="text-align: center;">0.5</p> <p style="text-align: center;">0.05</p> <p style="text-align: center;">20 cycles per second</p>	<p style="text-align: center;">3</p> <p style="text-align: center;">0.05</p> <p style="text-align: center;">0.02</p> <p style="text-align: center;">0.1 ^{b)} 0.05</p> <p style="text-align: center;">0.5</p> <p style="text-align: center;">0.02</p> <p style="text-align: center;">20 cycles per second</p>
<p>B. From 535 to 1 605 kc/s.</p> <p style="text-align: center;">Broadcasting Stations.</p>	<p style="text-align: center;">20 cycles per second</p>	<p style="text-align: center;">20 cycles per second</p>
<p>C. From 1 605 to 4 000 kc/s.</p> <p>1. Fixed Stations: -power above 200 watts, -power below 200 watts.</p> <p>2. Land Stations: a) Coast Stations: -power above 200 watts, -power below 200 watts.</p>	<p style="text-align: center;">0.01 ^{a)}</p> <p style="text-align: center;">0.02</p> <p style="text-align: center;">0.02</p> <p style="text-align: center;">0.02</p>	<p style="text-align: center;">0.005</p> <p style="text-align: center;">0.01</p> <p style="text-align: center;">0.005</p> <p style="text-align: center;">0.01</p>

Frequency Bands and Categories of Stations	Tolerances (in %) applicable until January 1st 1953 to transmitters now in use and those to be installed before January 1st 1950	Tolerances (in %) applicable: -to new transmitters installed after January 1st 1950; -to all transmitters after January 1st 1953
1	2	3
b) Aeronautical Stations:		
-power above 200 watts,	0.02	0.005
-power below 200 watts.	0.02	0.01
c) Base Stations:		
-power above 200 watts,	0.02	0.005
-power below 200 watts.	0.02	0.01
3. Mobile Stations:		
-Ship Stations,	0.05 ³⁾	0.02 ³⁾
-Aircraft Stations,	0.05	0.02 ³⁾
-Land Mobile Stations.	0.05	0.02
4. Radionavigation Stations:		
-power above 200 watts,	0.02	0.005
-power below 200 watts.	0.02	0.01
5. Broadcasting Stations.	0.005	0.005
D. From 4 000 to 30 000 kc/s.		
1. Fixed Stations:		
-power above 500 watts,	0.01	0.003
-power below 500 watts.	0.02	0.01
2. Land Stations:		
a) Coast Stations:	0.02	0.005

Frequency Bands and Categories of Stations	Tolerances (in %) applicable until January 1st 1953 to transmitters now in use and those to be installed before January 1st 1950	Tolerances (in %) applicable: -to new transmitters installed after January 1st 1950; -to all transmitters after January 1st 1953
1	2	3
b) Aeronautical Stations: -power above 500 watts,	0.02	0.005
-power below 500 watts.	0.02	0.01
c) Base Stations: -power above 500 watts,	0.02	0.005
-power below 500 watts.	0.02	0.01
3. Mobile Stations: -Ship Stations,	0.05 ^{a)}	0.02 ^{a)}
-Aircraft Stations,	0.05	0.02 ^{a)}
-Land Mobile Stations,	0.05	0.02
-Transmitters in lifeboats, liferafts and survival craft.	0.05	0.02
4. Broadcasting Stations.	0.005	0.003
E. From 30 to 100 Mc/s.		
1. Fixed Stations.	0.03	0.02
2. Land Stations.	0.03	0.02
3. Mobile Stations.	0.03	0.02
4. Radionavigation Stations.	0.02 ^{a)}	0.02 ^{a)}
5. Broadcasting Stations.	0.01	0.003
F. From 100 to 500 Mc/s.		
1. Fixed Stations.	0.03	0.01
2. Land Stations.	0.03	0.01
3. Mobile Stations.	0.03	0.01 ^{a)}
4. Radionavigation Stations.	0.02 ^{a)}	0.02 ^{a)}
5. Broadcasting Stations.	0.01	0.003

Frequency Bands and Categories of Stations	Tolerances (in %) applicable until January 1st 1953 to transmitters now in use and those to be installed before January 1st 1950	Tolerances (in %) applicable: -to new transmitters installed after January 1st 1950; -to all transmitters after January 1st 1953
1 G. From 500 to 10 500 Mc/s.	2 0.75	3 0.75 Until C.C.I.R. opinion is available, no closer tolerances can be specified for this column.

Notes Referring to Table of Tolerances

¹⁾ It is recognized that certain countries will encounter difficulties in fitting, prior to 1953, all their ships with equipment which will satisfy the indicated tolerance; however, it is requested that these countries complete the necessary conversion as soon as possible.

²⁾ The frequency tolerance of 0.02% is maintained temporarily for fixed station transmitters now in operation using a power between 200 and 500 watts.

³⁾ For this category, the final date of January 1st 1953, is extended until the date when the Radio Regulations of the next Conference are put into force.

⁴⁾ In this band and for this category, it is recognized that certain countries are not sure that their equipment can satisfy a stricter frequency tolerance than that fixed for the 30-100 Mc/s band; however, these countries will endeavour to satisfy the tolerance for the band 100-500 Mc/s.

⁵⁾ In bands E and F it is recognized that there are in service in category 4 pulse transmitters which cannot meet tolerances closer than 0.5%.

⁶⁾ Frequency deviations are to be measured over a period not exceeding ten minutes from the commencement of an emission.

This provision, however, is applicable only to transmitters in service before January 1st, 1950 and until the replacement of these transmitters by modern equipment, and only in exclusive maritime mobile bands, and excepting such parts of these bands as are reserved for ship radiotelephony. Thereafter the frequency tolerances specified shall be adhered to during the whole period of an emission.

APPENDIX 4

**Table of Tolerances for the Intensity of Harmonics and
Parasitic Emissions ¹⁾**

(See article 17)

Frequency Band	Tolerances
10 to 30 000 kc/s	The power ²⁾ of a harmonic or a parasitic emission must be at least 40 db below the power of the fundamental, and in no case shall it be above 200 milliwatts. ³⁾

¹⁾ For mobile stations, endeavour will be made, as far as practicable, to reach the figures specified.

²⁾ The power here referred to is the power supplied to the antenna on the frequency of the harmonic or of the parasitic emission.

³⁾ The latter limiting figure refers to the mean power.

APPENDIX 5

Band of Frequencies Required for Certain Types of Radiocommunication.

The width of the frequency band which is necessary in the overall system, including both the transmitter and the receiver, for the proper reproduction at the receiver of the desired information, does not necessarily indicate the interfering characteristics of an emission.

For the determination of this necessary bandwidth, the following table may be considered as a guide.

In the formulation of the table, the following working terms have been employed:

B = Telegraph speed in bauds.

$\frac{N}{T}$ = Maximum possible number of black plus white elements to be transmitted per second, in facsimile and television.

M = Maximum modulation frequency expressed in cycles per second.

D = Half the difference between the maximum and minimum values of the instantaneous frequencies; D being greater than $2M$, greater than $\frac{N}{T}$ or greater than B , as the case may be. Instantaneous frequency is the rate of change of phase.

t = Pulse length expressed in seconds.

K = An overall numerical factor which differs according to the emission and depends upon the allowable signal distortion and, in television, the time lost from the inclusion of a synchronizing signal.

Table of Necessary Bandwidths

Description and Class of Emission	Necessary Bandwidth in Cycles per Second	Examples	
		Details	Designation of Emission
I. AMPLITUDE MODULATION			
Continuous wave Telegraphy	BK $K = 5$ for fading circuits	Morse code at 25 words per minute, $B = 20$, Bandwidth: 100 c/s	0.1A1
A1	$K = 3$ for non-fading circuits	Four channel multiplex, 7 unit code, 60 words per minute per channel, $B = 170$, $K = 5$, Bandwidth: 850 c/s	0.85A1
Telegraphy modulated at audio frequency	$BK + 2M$ $K = 5$ for fading circuits	Morse code at 25 words per minute with 1 000-cycle tone, $B = 20$, Bandwidth: 2 100 c/s	2.1A2
A2	$K = 3$ for non-fading circuits		
Commercial Telephony	M , for single sideband	For ordinary single sideband telephony, $M = 3\ 000$	3A3a
A3	$2M$, for double sideband	For high-quality single sideband telephony, $M = 4\ 000$	4A3a
Broadcasting	$2M$	M may vary between 4 000 and 10 000 depending upon the quality desired.	8A3 to 20A3
A3			

Description and Class of Emission	Necessary Bandwidth in Cycles per Second	Examples	
		Details	Designation of Emission
Facsimile Carrier modulated by tone and by keying A4	$\frac{KN}{T} + 2M$ $K = 1.5$	The total number of picture elements (black and white) transmitted per second = the circumference of the cylinder (height of picture) \times number of lines per unit length \times speed of rotation of cylinder in revolutions per second Diameter of cylinder = 70 mm. Number of lines per mm = 3.77 Speed of rotation 1 turn per second Frequency of modulation = 1 800 c/s Bandwidth: 3 600 + 1 242 = 4 842 c/s	4.84A4
Television A5	$\frac{KN}{T}$ $K = 1.5$ (this allows for synchronization and filter shaping) Note: This band can be appropriately reduced when asymmetrical transmission is employed.	The total number of picture elements (black and white) transmitted per second = the number of lines forming each image \times number of elements per line \times number of pictures transmitted per second. Number of lines = 500 Number of elements per line = 500 Number of pictures per second = 25 Bandwidth: approximately 9 Mc/s	9 000A5

Description and Class of Emission	Necessary Bandwidth in Cycles per Second	Examples	
		Details	Designation of Emission
II. FREQUENCY MODULATION			
Frequency-shift Telegraphy F1	$BK + 2D$ $K = 5$ for fading circuits $K = 3$ for non-fading circuits	Four-channel multiplex with 7-unit code. 60 words per minute per channel $B = 170$ $K = 5$ $D = 425$ Bandwidth: 1 700 c/s	1.7F1
Commercial Telephony and Broadcasting F3	$2M + 2DK$ For commercial telephony, $K = 1$. For high-fidelity transmission, higher values of K may be necessary	For an average case of commercial telephony with $D = 15\ 000$ $M = 3\ 000$ Bandwidth: 36 000 c/s	36F3
Facsimile F4	$\frac{KN}{T} + 2M + 2D$ $K = 1.5$	(See facsimile, amplitude modulation) Cylinder diameter = 70 mm Lines per mm = 3.77 Cylinder speed = 1 rps Modulation tone = 1 800 c/s $D = 10\ 000$ c/s Bandwidth: 25 000 c/s (approximately)	25F4

Description and Class of Emission	Necessary Bandwidth in Cycles per Second	Examples	
		Details	Designation of Emission
III. PULSE EMISSIONS			
Unmodulated pulse P0	$2 \frac{K}{t}$ K varies from 1 to 10 according to the permissible deviation in each particular case from a rectangular pulse shape. In many cases the value of K does not need to exceed 6.	$t = 3 \times 10^{-6}$ K = 6 Bandwidth: 4×10^6 c/s	4 000P0
Modulated pulse P2 or P3	The bandwidth depends upon the particular types of modulation used, many of these being still in the development stage.	—	—

APPENDIX 6

Service Documents

(See articles 10, 11 and 20)

List I. International Frequency List

1	Assigned Frequency (kc/s or Mc/s)				Dates		Circuits			Radiation Characteristics ⁴⁾					10	11	12	13
2a	Of registration ¹⁾	Of notification ¹⁾	Of putting into service	Call sign	Name, geographical position ²⁾ of transmitting station and indication of country to which the station belongs	Locality or area(s) with which it is intended to establish communication	Length of circuit (kms)	Class of station and nature of service	Class and bandwidth of emission	Description of transmission	Power in kW	Azimuth of maximum radiation of antenna, in degrees (clockwise) from true north	Angular width of main lobe in the horizontal plane, in degrees	Gain of the antenna in decibels (db) in direction of maximum radiation at the assigned frequency	Maximum schedule of use in G.M.T.	Operating Administration or Company ³⁾	Postal and telegraphic address of centralizing office responsible for control of station (see art. 14) ³⁾	Remarks
2b	2c	3	4a	4b														

¹⁾ For exact significance of these dates see article 11.²⁾ In degrees and minutes (Meridian of Greenwich), except for radionavigation stations for which the position should be given in degrees, minutes, and seconds.³⁾ Columns 11 and 12 will contain only reference numbers to lists to be printed in the front of the volume.⁴⁾ See appendix 1.

List II. List of Fixed Stations

(Index to the List of Frequencies of fixed stations shown in List I).

Alphabetical index of stations arranged:

a) by stations

Station	Call sign ¹⁾	Frequency kc/s or Mc/s
1	2	3

¹⁾ The distinguishing call sign of each frequency must be indicated opposite this frequency.*b) by countries*

Station	Call sign ¹⁾	Frequency kc/s or Mc/s	Remarks
1	2	3	4

¹⁾ The distinguishing call sign of each frequency must be indicated opposite this frequency.**List III. List of Broadcasting Stations***Part A. Alphabetical index of stations.*

Name of the station	Call sign	See Part B page
1	2	3

*Part B. Particulars of stations.**1. LF, MF and HF broadcasting stations using AM.*

{Name of the country }
{Names of the stations } in alphabetical order.

Name of the station	Call sign ¹⁾	Frequencies kc/s	Latitude and longitude of the transmitting antenna, in degrees and minutes	Power kW	Name and address of the administration or operating agency	Remarks
1	2	3	4	5	6	7

¹⁾ The identifying call sign of each frequency must be shown opposite that frequency.

2. FM broadcasting stations.

{Name of the country }
{Names of the stations } in alphabetical order.

Name of the station	Call sign	Frequencies Mc/s	Latitude and longitude of the transmitting antenna, in degrees and minutes	Power kW	Name and address of the administration or operating agency	Remarks
1	2	3	4	5	6	7

3. Television broadcasting stations.

{Name of the country }
{Names of the stations } in alphabetical order.

Name of the station	Call sign	Channel limits Mc/s	Frequencies		Latitude and longitude of the transmitting antenna, in degrees and minutes
			Television carrier Mc/s	Sound carrier Mc/s	
1	2	3	4	5	6

Power		Class of Emission		Name and address of the administration or operating agency	Remarks
Television Channel kW	Sound Channel kW	Television Channel	Sound Channel		
7	8	9	10	11	12

4. *Facsimile broadcasting stations.*

{ Name of the country }
{ Names of the stations } in alphabetical order.

Name of the station	Call sign	Frequency Mc/s	Latitude and longitude of the transmitting antenna, in degrees and minutes	Power kW	Class of emission	Name and address of the administration or operating agency	Remarks
1	2	3	4	5	6	7	8

List IV. List of Coast and Ship Stations

Part A. Alphabetical index of coast stations.

Name of the station	Call sign	See part B page
1	2	3

Part B. Particulars of coast stations.

{ Name of the country }
{ Names of the stations } in alphabetical order.

Name of the station ³⁾	Call sign	Emission			Service		Charges ^{5) 6)}	Exact geographical position of the transmitting antenna ⁷⁾	Remarks ⁷⁾
		Frequencies ¹⁾ kc/s or Mc/s	Class	Power ²⁾ kW	Nature	Hours of service ⁴⁾			
1	2	3	4	5	6	7	8	9	10

¹⁾ The normal working frequency is printed in heavy type. In the case of duplex telephony, frequencies used for transmission and reception are indicated in conformity with 810.

²⁾ Meridian of Greenwich in degrees, minutes and seconds.

³⁾ In the case of directive antennae, indicate under the power, the azimuth of the direction or directions of maximum gain, in degrees, beginning from true north clockwise.

⁴⁾ Greenwich mean time (G.M.T.).

⁵⁾ The internal telegraph charge of the country to which the coast station is subject and the charge applied by this country to telegrams destined for adjacent countries are given at the end of the present List.

⁶⁾ If the accounts for charges are settled by a private enterprise, the name and address of such private enterprise should be stated, if necessary.

⁷⁾ Special information concerning the times for calling, for the transmission of traffic lists, and the times during which the coast station keeps watch on the various frequencies, etc.

⁸⁾ There must be indicated, for each country, the coast station or coast stations to which radiotelegrams intended for high frequency transmission to ship stations must be sent.

Part C. Particulars of ship stations.

The information concerning these stations is published in two or three lines in the following order:

1st line:

– call sign, name of the ship in alphabetical order irrespective

of nationality, followed by the call sign in the case of duplication of names; in that case the name and the call sign are separated by a fraction bar; then the service symbols (see appendix 7);-

- power in the antenna in kW;
- metre-amperes, between brackets, for frequency 500 kc/s.¹⁾

To obtain the product "metre-amperes" the actual height of the aerial in metres from the loadline is multiplied by the effective current in amperes at the base of the aerial;

- nature of service;
- hours of service in the form of a symbol or a reference.

Times indicated otherwise than by a symbol must be given in Greenwich mean time (G.M.T.).

2nd and 3rd lines:

- below the call sign is shown the ship charge, followed by a note to indicate the administration or private enterprise to which the accounts for charges must be addressed. In the case of change of address of the operating authority, a second note after the charge gives the new address and the date from which the change will take effect;
- when two or more ships of the same nationality bear the same name, and also where the accounts for charges must be sent direct to the owner of the ship, the name of the shipping line or of the firm to whom the ship belongs is given by means of a note;
- country to which the station is subject (abbreviated indication);
- indication of the classes of emission and frequency bands.

¹⁾ If the Safety of Life at Sea Conference should adopt a different system of rating the normal range of a ship station, the information published here shall conform to the system adopted by that Conference.

The bands of frequencies are indicated by means of the following abbreviations printed in heavy type:

w = 110 to 150 kc/s
x = 405 to 535 kc/s
y = 1 605 to 2 850 kc/s
z = 4 000 to 23 000 kc/s
v = 152 to 162 Mc/s

These abbreviations are printed at the foot of every second page of the List.

These abbreviations are, if necessary, followed by references to brief notes and indications of the frequencies for which the transmitter is adjusted, the normal working frequencies being printed in heavy type, which appear at the end of the List.

List V. List of Aeronautical and Aircraft Stations

Part A. Alphabetical index of aeronautical stations.

Name of the station	Call sign	See Part B page
1	2	3

Part B. Particulars of aeronautical stations.

{ Name of the country }
{ Names of the stations } in alphabetical order.

Name of the station	Call sign	For trans- mission		For reception		Power ³⁾ kW	Service		Charges ⁵⁾ ⁶⁾	Exact geo- graphical position of the trans- mitting antenna ²⁾	Remarks
		Frequencies ¹⁾	Class of emission	Frequencies	Class of emission		Nature	Hours of service ⁴⁾			
		kc/s or Mc/s		kc/s or Mc/s							
1	2	3	4	5	6	7	8	9	10	11	12

¹⁾ The normal working frequency is printed in heavy type.

²⁾ Meridian of Greenwich in degrees and minutes.

³⁾ In the case of directive antennae, indicate under the power, the azimuth of the direction or directions of maximum gain, in degrees, beginning from true North clockwise.

⁴⁾ Greenwich mean time (G.M.T.).

⁵⁾ The internal telegraph charge of the country to which the aeronautical station is subject and the charge applied by that country to telegrams destined for adjacent countries are given at the end of this List.

⁶⁾ If the accounts for charges are settled by a private enterprise, the name and address of the private enterprise should be given.

Part C. Particulars of aircraft stations.

The stations are arranged in alphabetical order of their call signs irrespective of nationality.

Call sign	Name of the station or mark of nationality and registration	Emission			Country	Nature of service	Charges	Name and address of the administration to which accounts must be sent	Type and make of aircraft	Remarks
		Frequencies ^{1) 2)} kc/s or Mc/s	Class	Power Watts						
1	2	3	4	5	6	7	8	9	10	11

¹⁾ The normal working frequency is printed in heavy type.

²⁾ The bands of frequencies are indicated by means of the following abbreviations:

a = below 415 kc/s

b = 415 to 2 850 kc/s

c = 2 850 to 25 000 kc/s

d = 118 to 132 Mc/s

List VI. List of Radiolocation Stations*Part A. Alphabetical index of stations.*

Name of the station	Call sign	Nature of the station	See Part B page
1	2	3	4

*Part B. Particulars of stations.**1. Direction-finding stations.*

{Name of the country }
{Names of the stations } in alphabetical order.

1	Name of the station Exact geographical position ¹⁾ of a) the receiving antenna of the direction-finding station b) the transmitting antenna of the direction-finding station c) the transmitting antenna of the station mentioned in column 8.	3 Call sign	Frequencies and classes			7 Power kW	8 Name and call sign of the station with which communication must be established if the direction-finding station is not equipped with a transmitter	9 Charges	10 Remarks a) Sectors in which bearings are normally accurate and references to national or international publications other than these Lists. b) Hours of services ²⁾ , etc.
			4 For calling the direction-finding station ke/s or Mc/s	5 For transmitting to the direction-finding station the signals necessary for taking bearings ke/s or Mc/s	6 For the transmission of the bearings by the direction-finding station ke/s or Mc/s				
1	2	3	4	5	6	7	8	9	10

¹⁾ Meridian of Greenwich, in degrees, minutes and seconds.

²⁾ Greenwich mean time (G.M.T.).

2. Radiobeacon stations.

Radiobeacons are arranged in two sections:

- a) Maritime Service.
- b) Aeronautical Service.

{ Name of the country }
{ Names of the stations } in alphabetical order.

Name of the station	Exact geographical position of the transmitting antenna of the radiobeacon ¹⁾	Characteristic signal of the radiobeacon	Call sign of the radiobeacon (if any)	Emission			Normal range ²⁾	Name and call sign of the station to which requests for the emission of beacon signals may be addressed	Calling frequency	Remarks a) sectors normally reliable and references to national or international publications other than these Lists; b) hours or service ³⁾ ; c) charges, etc.; d) description of the emission
				Frequency kc/s or Mc/s	Class	Frequency of modulation (if any) c/s				
1	2	3	4	5	6	7	8	9	10	11

¹⁾ Meridian of Greenwich, in degrees, minutes and seconds.

²⁾ Ranges are indicated in nautical miles for stations of the maritime service and in statute miles or kilometres for stations of the aeronautical service.

³⁾ Greenwich mean time (G.M.T.).

Note: The Secretary General of the Union, if he considers it necessary, will introduce in this List additional sections to cover new radiolocation systems that may be developed and used.

List VII. List of Special Service Stations

Part A. Alphabetical index of the stations

Name of station	Call sign	Nature of service	See Part B, page
1	2	3	4

*Part B. Particulars of stations**1. Stations transmitting time signals.*

{Name of the country }
{Names of the stations } in alphabetical order.

Name of the station	Call sign	Frequencies kc/s or Mc/s	Class of emission	Times of emission ¹⁾	Method ²⁾
1	2	3	4	5	6

¹⁾ Greenwich mean time (G.M.T.).

²⁾ General instructions concerning time signals.

2. Stations transmitting regular meteorological bulletins.

{Name of the country }
{Names of the stations } in alphabetical order.

Name of the station	Call sign	Frequencies kc/s or Mc/s	Class of emission	Times of emission ¹⁾	Remarks ²⁾
1	2	3	4	5	6

¹⁾ Greenwich mean time (G.M.T.).

²⁾ General instructions concerning meteorological bulletins, including Code used.

3. Stations transmitting Notices to Navigators.

-(Names of the stations by countries with the necessary particulars.)

a) Maritime service.

b) Aeronautical service.

4. Stations transmitting medical advice.

The information should include the name of the country, the name of the station, its call sign, frequency used, class of emission, hours of service and remarks. (Indicate whether the radiotelegram of enquiry and/or reply is chargeable and whether any charge is made for medical advice.)

5. Stations transmitting standard frequencies.

The frequency stability should be indicated.

APPENDIX 7

Service Document Symbols

(See article 20 and appendix 6)

✕	station on board a warship or a military or naval aircraft
Ⓐ	automatic alarm apparatus
■	station classified as situated in a region of heavy traffic (article 33)
○	by day
●	by night
[]	a ship which carries lifeboats equipped with radio apparatus; a number inside the brackets shows the number of such lifeboats
Δ	radio direction-finder on board a mobile station
AL	aeronautical radionavigation land station
AM	aeronautical radionavigation mobile station
BC	broadcasting station
CF	coastal telephone station
CO	station open to official correspondence exclusively
CP	station open to public correspondence
CR	station open to limited public correspondence
CT	coastal telegraph station
CV	station open exclusively to the correspondence of a private agency
D 30°	directive antenna having maximum radiation in the direction of 30° (expressed in degrees from the true north, from 0 to 360 clockwise)
DR	directive antenna provided with a reflector
FA	aeronautical station
FAX	aeronautical fixed station

FB	base station
FC	coast station
FR	receiving station only, connected with the general network of telecommunication channels
FS	land station established solely for the safety of life
FX	fixed station
G.M.T.	Greenwich mean time
H 8	ship station of the second category carrying on 8 hours of service
H 16	ship station of the second category carrying on 16 hours of service
H 24	station having a continuous day and night service
HJ	station open from sunrise to sunset (day service)
HX	station having no specific working hours
OT	stations open exclusively to operational traffic of the service concerned
RC	non-directional radiobeacon
RD	directional radiobeacon
RG	radio direction-finding station
RM	maritime radionavigation mobile station
RT	revolving radiobeacon
SF	ship telephone station
SS	standard frequency station
ST	ship telegraph station.

APPENDIX 8

Documents with which Ship and Aircraft Stations must be provided

(See articles 20, 22, 23, 24, 28 and appendix 6)

Section I. For Stations on Board Ships Compulsorily Equipped with a Radiotelegraph Installation:

- 1st license provided for by article 22;
- 2nd certificates of the operator or operators;
- 3rd log (diary of the radio service) in which the following are recorded as they occur, together with the time of their occurrence:
 - a) all communications relating to distress traffic in full,
 - b) urgency and safety communications,
 - c) communications exchanged between the ship station and land or mobile stations,
 - d) service incidents of all kinds,
 - e) if the ship's rules permit, the position of the ship at least once a day;
- 4th alphabetical List of Call Signs;
- 5th List of Coast and Ship Stations;
- 6th List of Radiolocation Stations;
- 7th List of Stations performing Special Services;
- 8th Radio Regulations and Additional Radio Regulations, also such provisions of the Convention as relate to the radiocommunication service on board ship;
- 9th telegraph tariffs of the countries for which the station most frequently accepts radiotelegrams;
- 10th if administrations concerned consider it necessary, the Telegraph Regulations.

Section II. For other Radiotelegraph Stations on Ships:

- the documents mentioned in items 1 to 5 of Section I.

Section III. For Ship Stations Equipped Solely for Radiotelephony:

- 1st the documents mentioned in items 1 and 2 of section I;
- 2nd the log (diary of the radio service) in which the following are recorded as they occur, together with the time of their occurrence:
 - a) a summary of all communications relating to distress, urgency and safety traffic,
 - b) a summary of communications exchanged between the ship station and land or mobile stations,
 - c) a reference to important service incidents;
- 3rd documents containing information necessary for the operation of the service.

Section IV. For Ship Stations Equipped with Multiple Installations:

- 1st for each station, if necessary, the documents mentioned in items 1 to 3 of section I,
- 2nd for only one of them, the other documents mentioned in sections I or III, as appropriate.

Section V. For Aircraft Stations:

- 1st the documents mentioned in items 1 and 2 of section I,
- 2nd the log (diary of the radio service) as defined in item 3 of section I, unless administrations have adopted other arrangements for recording all information which the log should contain,
- 3rd the List of Aeronautical and Aircraft Stations, the List of Radiolocation Stations, or other documents containing official information relating to stations which the aircraft station may use for the execution of its service.

APPENDIX 9

Miscellaneous Abbreviations and Signals to be used in Radiocommunications

(See article 29)

SECTION I. Q CODE

Introduction

1. The series of groups QRA to QUZ listed in this Appendix, is for use by all services.

2. The QAA to QNZ series are reserved for the aeronautical service and the QOA to QQZ series are reserved for the maritime services. These series are not listed in these regulations.

3. Certain abbreviations may be given an affirmative or negative sense by sending "C" or "N" respectively, immediately following the "Q" code abbreviation.

4. The meanings assigned to "Q" code abbreviations may be amplified or completed by the addition of appropriate other groups, call signs, place names, figures, numbers, etc. It is optional to fill in the blanks shown in parentheses. Any data which is filled in where blanks appear should be sent in the same order as shown in the significations.

5. Abbreviations are given the form of a question when followed by a question mark. When an abbreviation is used as a question and is followed by additional or complementary information, the question mark should follow this information.

6. Abbreviations, with numbered alternative significations, must be followed by the appropriate figure to indicate the exact meaning intended. This figure should be sent immediately following the abbreviation.

7. All time should be given in Greenwich mean time (G.M.T.) unless otherwise indicated in the question or reply.

Abbreviations Available for All Services

A. List of Abbreviations in alphabetical order

Abbreviation	Question	Answer or Advice
QRA	What is the name of your station?	The name of my station is ...
QRB	How far approximately are you from my station?	The approximate distance between our stations is ... nautical miles (or kilometres)
QRC	By what private enterprise (or State Administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise ... (or State Administration)
QRD	Where are you bound and where are you from?	I am bound for ... from ...
QRE	What is your estimated time of arrival at ... (place)?	My estimated time of arrival at ... (place) is ... hrs.
QRF	Are you returning to ... (place)?	I am returning to ... (place) or Return to ... (place).
QRG	Will you tell me my exact frequency (or that of ...)?	Your exact frequency (or that of ...) is ... kc/s (or Mc/s).
QRH	Does my frequency vary?	Your frequency varies.
QRI	How is the tone of my transmission?	The tone of your transmission is ... (1. Good; 2. Variable; 3. Bad).
QRK	What is the readability of my signals (or those of ...)?	The readability of your signals (or those of ...) is ... (1. Unreadable; 2. Readable now and then; 3. Readable, but with difficulty; 4. Readable; 5. Perfectly readable).
QRL	Are you busy?	I am busy (or I am busy with ...). Please do not interfere.
QRM	Are you being interfered with?	I am being interfered with.
QRN	Are you troubled by static?	I am troubled by static.
QRO	Shall I increase power?	Increase power.
QRP	Shall I decrease power?	Decrease power.

Abbreviation	Question	Answer or Advice
QRQ	Shall I send faster?	Send faster (... words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at ... words per minute.
QRS	Shall I send more slowly?	Send more slowly (... words per minute).
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRW	Shall I inform ... that you are calling him on ... kc/s (or Mc/s)?	Please inform ... that I am calling him on ... kc/s (or Mc/s).
QRX	When will you call me again?	I will call you again at ... hours [on ... kc/s (or Mc/s)].
QRY	What is my turn? (Relates to communication)	Your turn is Number ... (or according to any other indication.) (Relates to communication.)
QRZ	Who is calling me?	You are being called by ... [on ... kc/s (or Mc/s)].
QSA	What is the strength of my signals (or those of ...)?	The strength of your signals (or those of ...) is... <ol style="list-style-type: none"> 1. Scarcely perceptible; 2. Weak; 3. Fairly good; 4. Good; 5. Very good).
QSB	Are my signals fading?	Your signals are fading.
QSC	Are you a cargo vessel? (See article 33, section V)	I am a cargo vessel.
QSD	Is my keying defective?	Your keying is defective.
QSG	Shall I send ... telegrams at a time?	Send ... telegrams at a time.
QSI		I have been unable to break in on your transmission. or Will you inform ... (call sign) that I have been unable to break in on his transmission [on ... kc/s (or Mc/s)].

Abbreviation	Question	Answer or Advice
Q SJ	What is the charge to be collected per word to ... including your internal telegraph charge?	The charge to be collected per word to ... including my internal telegraph charge is ... francs.
Q SK	Can you hear me between your signals?	I can hear you between my signals.
Q SL	Can you acknowledge receipt?	I am acknowledging receipt.
Q SM	Shall I repeat the last telegram which I sent you, <i>or</i> some previous telegram?	Repeat the last telegram which you sent me [<i>or</i> telegram(s) number(s) ...].
Q SN	Did you hear me [<i>or</i> ... (call sign)] on ... kc/s (<i>or</i> Mc/s)?	I did hear you [<i>or</i> ... (call sign)] on ... kc/s (<i>or</i> Mc/s).
Q SO	Can you communicate with ... direct or by relay?	I can communicate with ... direct (<i>or</i> by relay through ...).
Q SP	Will you relay to ... free of charge?	I will relay to ... free of charge.
Q SQ	Have you a doctor on board [<i>or</i> is ... (name of person) on board]?	I have a doctor on board [<i>or</i> ... (name of person) is on board].
Q SU	Shall I send or reply on this frequency [<i>or</i> on ... kc/s (<i>or</i> Mc/s)] (with emissions of class ...)?	Send or reply on this frequency [<i>or</i> on ... kc/s (<i>or</i> Mc/s)] (with emissions of class ...).
Q SV	Shall I send a series of V's on this frequency [<i>or</i> ... kc/s (<i>or</i> Mc/s)]?	Send a series of V's on this frequency [<i>or</i> ... kc/s (<i>or</i> Mc/s)].
Q SW	Will you send on this frequency [<i>or</i> on ... kc/s (<i>or</i> Mc/s)] (with emissions of class ...)?	I am going to send on this frequency [<i>or</i> on ... kc/s (<i>or</i> Mc/s)] (with emissions of class ...).
Q SX	Will you listen to ... [<i>call sign(s)</i>] on ... kc/s (<i>or</i> Mc/s)?	I am listening to ... [<i>call sign(s)</i>] on ... kc/s (<i>or</i> Mc/s).
Q SY	Shall I change to transmission on another frequency?	Change to transmission on another frequency [<i>or</i> on ... kc/s (<i>or</i> Mc/s)].
Q SZ	Shall I send each word or group more than once?	Send each word or group twice (<i>or</i> ... times).

Abbreviation	Question	Answer or Advice
QTA	Shall I cancel telegram number ... as if it had not been sent?	Cancel telegram number ... as if it had not been sent.
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have ... telegrams for you (or for ...).
QTE	What is my TRUE bearing from you?	Your TRUE bearing from me is ... degrees (at ... hours)
	or What is my TRUE bearing from ... (call sign)?	or Your TRUE bearing from ... (call sign) was ... degrees (at ... hours)
	or What is the TRUE bearing of ... (call sign) from ... (call sign)?	or The TRUE bearing of ... (call sign) from ... (call sign) was ... degrees at ... hours.
QTF	Will you give me the position of my station according to the bearings taken by the direction finding stations which you control? (see appendix 15)	The position of your station according to the bearings taken by the direction finding stations which I control was ... latitude, ... longitude, class ... at ... hours. (see appendix 15)
QTG	Will you send two dashes of ten seconds each followed by your call sign (repeated ... times) [on ... kc/s (or Mc/s)]?	I am going to send two dashes of ten seconds each followed by my call sign (repeated ... times) [on ... kc/s (or Mc/s)]
	or Will you request ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kc/s (or Mc/s)?	or I have requested ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kc/s (or Mc/s).

Abbreviation	Question	Answer or Advice
QTH	What is your position in latitude and longitude (<i>or according to any other indication</i>)?	My position is ... latitude ... longitude (<i>or according to any other indication</i>).
QTI	What is your TRUE track?	My TRUE track is ... degrees.
QTJ	What is your speed? (<i>Requests the speed of a ship or aircraft through the water or air respectively.</i>)	My speed is ... knots (<i>or kilometres per hour</i>). (<i>Indicates the speed of a ship or aircraft through the water or air respectively.</i>)
QTK	What is the speed of your aircraft in relation to the surface of the earth?	The speed of my aircraft in relation to the surface of the earth is ... knots (<i>or kilometres per hour</i>).
QTL	What is your TRUE heading (TRUE course with no wind)?	My TRUE heading is ... degrees.
QTN	At what time did you depart from ... (<i>place</i>)?	I departed from ... (<i>place</i>) at ... hours.
QTO	Have you left dock (<i>or port</i>)? <i>or</i> Are you airborne?	I have left dock (<i>or port</i>) <i>or</i> I am airborne.
QTP	Are you going to enter dock (<i>or port</i>)? <i>or</i> Are you going to alight (<i>or land</i>)?	I am going to enter dock (<i>or port</i>) <i>or</i> I am going to alight (<i>or land</i>).
QTT	Can you communicate with my station by means of the International Code of Signals?	I am going to communicate with your station by means of the International Code of Signals.
QTR	What is the correct time?	The correct time is ... hours.
QTS	Will you send your call sign for ... minute(s) now (<i>or at ... hours</i>) [on ... kc/s (<i>or Mc/s</i>)] so that your frequency may be measured?	I will send my call sign for ... minute(s) now (<i>or at ... hours</i>) [on ... kc/s (<i>or Mc/s</i>)] so that my frequency may be measured.
QTT	What are the hours during which your station is open?	My station is open from ... to ... hours.

Abbreviation	Question	Answer or Advice
QTV	Shall I stand guard for you on the frequency of ... kc/s (or Mc/s) (from ... to ... hours)?	Stand guard for me on the frequency of ... kc/s (or Mc/s) (from ... to ... hours).
QTX	Will you keep your station open for further communication with me until further notice (or until ... hours)?	I will keep my station open for further communication with you until further notice (or until ... hours).
QUA	Have you news of ... (call sign)?	Here is news of ... (call sign).
QUB	Can you give me, in the following order, information concerning: visibility, height of clouds, direction and velocity of ground wind at ... (place of observation)?	Here is the information requested ...
QUC	What is the number (or other indication) of the last message you received from me [or from ... (call sign)]?	The number (or other indication) of the last message I received from you [or from ... (call sign)] is ...
QUD	Have you received the urgency signal sent by ... (call sign of mobile station)?	I have received the urgency signal sent by ... (call sign of mobile station) at ... hours.
QUF	Have you received the distress signal sent by ... (call sign of mobile station)?	I have received the distress signal sent by ... (call sign of mobile station) at ... hours.
QUG	Will you be forced to alight (or land)?	I am forced to alight (or land) immediately. or I shall be forced to alight (or land) at ... (position or place).
QUH	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... (units).
QUI	Are your navigation lights working?	My navigation lights are working.

Abbreviation	Question	Answer or Advice
QUJ	Will you indicate the TRUE course for me to steer towards you (or ...) with no wind?	The TRUE course for you to steer towards me (or ...) with no wind is ... degrees at ... hours.
QUK	Can you tell me the condition of the sea observed at ... (place or coordinates)?	The sea at ... (place or coordinates) is ...
QUL	Can you tell me the swell observed at ... (place or coordinates)?	The swell at ... (place or coordinates) is ...
QUM	Is the distress traffic ended?	The distress traffic is ended
QUN	Will vessels in my immediate vicinity [(or in the vicinity of ... latitude ... longitude) (or of ...)] please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...
QUO	Shall I search for ... (1. Aircraft; 2. Ship; 3. Survival craft) in the vicinity of ... latitude ... longitude (or according to any other indication)?	Please search for ... (1. Aircraft; 2. Ship; 3. Survival craft) in the vicinity of ... latitude ... longitude (or according to any other indication).
QUP	Will you indicate your position by ... (1. Searchlight; 2. Black smoke trail; 3. Pyrotechnic lights)?	My position is indicated by ... (1. Searchlight; 2. Black smoke trail; 3. Pyrotechnic lights).
QUQ	Shall I train my searchlight nearly vertical on a cloud, occulting if possible and, if your aircraft is seen, deflect the beam up wind and on the water (or land) to facilitate your landing?	Please train your searchlight on a cloud, occulting if possible and, if my aircraft is seen or heard, deflect the beam up wind and on the water (or land) to facilitate my landing.

Abbreviation	Question	Answer or Advice
QUR	Have survivors ... (1. Received survival equipment; 2. Been picked up by rescue vessel; 3. Been reached by ground rescue party)?	Survivors ... (1. Are in possession of survival equipment dropped by ...; 2. Have been picked up by rescue vessel; 3. Have been reached by ground rescue party).
QUS	Have you sighted survivors or wreckage? If so, in what position?	Have sighted ... (1. Survivors in water; 2. Survivors on rafts; 3. Wreckage) in position ... latitude ... longitude (or according to any other indication).
QUT	Is position of incident marked?	Position of incident is marked (by ...)
QUU	Shall I home ship or aircraft to my position?	Home ship or aircraft [1. ... (call sign) to your position by transmitting your call sign and long dashes on ... kc/s (or Mc/s); 2. ... (call sign) by transmitting on ... kc/s (or Mc/s) courses to steer to reach you].
QUV	What is my MAGNETIC bearing from you (or from ...)? <i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>	Your MAGNETIC bearing from me (or from ...) was ... degrees at ... hours. <i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>
QUX	Will you indicate the MAGNETIC course for me to steer towards you (or ...) with no wind? <i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>	The MAGNETIC course for you to steer to reach me (or ...) with no wind was ... degrees at ... hours. <i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>

*B. List of Signals According to the Nature of Questions,
Answer or Advice.*

Abbreviation	Question	Answer or Advice
	Name	
QRA	What is the name of your station?	The name of my station is ...
	Route	
QRD	Where are you bound and where are you from?	I am bound for ... from ...
	Position	
QRB	How far approximately are you from my station?	The approximate distance between our stations is ... nautical miles (or kilometres).
QTH	What is your position in latitude and longitude (or according to any other indication)?	My position is ... latitude ... longitude (or according to any other indication)
QTN	At what time did you depart from ... (place)?	I departed from ... (place) at ... hours.
	Quality of Signals	
QRI	How is the tone of my transmission?	The tone of your transmission is ... (1. good; 2. variable; 3. bad).
QRK	What is the readability of my signals (or those of ...)?	The readability of your signals (or those of ...) is ... (1. Unreadable; 2. Readable now and then; 3. Readable, but with difficulty; 4. Readable; 5. Perfectly readable).
	Strength of Signals	
QRO	Shall I increase power?	Increase power.
QRP	Shall I decrease power?	Decrease power.
QSA	What is the strength of my signals (or those of ...)?	The strength of your signals (or those of ...) is ... (1. Scarcely perceptible; 2. Weak; 3. Fairly good; 4. Good; 5. Very good).

Abbreviation	Question	Answer or Advice
QSB	Are my signals fading?	Your signals are fading.
	Keying	
QRQ	Shall I send faster?	Send faster (... words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at ... words per minute.
QRS	Shall I send more slowly?	Send more slowly (... words per minute).
QSD	Is my keying defective?	Your keying is defective.
	Interference	
QRM	Are you being interfered with?	I am being interfered with.
QRN	Are you troubled by static?	I am troubled by static.
	Adjustment of Frequency	
QRG	Will you tell me my exact frequency (or that of ...)?	Your exact frequency (or that of ...) is ... kc/s (or Mc/s).
QRH	Does my frequency vary?	Your frequency varies.
QTS	Will you send your call sign for ... minute(s) now (or at ... hours) [on ... kc/s (or Mc/s)] so that your frequency may be measured?	I will send my call sign for ... minute(s) now (or at ... hours) [on ... kc/s (or Mc/s)] so that my frequency may be measured.
	Choice of Frequency and/or Class of Emission	
QSN	Did you hear me [or ... (call sign)] on ... kc/s (or Mc/s)?	I did hear you [or ... (call sign)] on ... kc/s (or Mc/s).
QSU	Shall I send or reply on this frequency [or on ... kc/s (or Mc/s)] (with emissions of class ...)?	Send or reply on this frequency [or on ... kc/s (or Mc/s)] (with emissions of class ...).

Abbreviation	Question	Answer or Advice
QSV	Shall I send a series of V's on this frequency [or ... kc/s (or Mc/s)]?	Send a series of V's on this frequency [or ... kc/s (or Mc/s)].
QSW	Will you send on this frequency [or on ... kc/s (or Mc/s)] (with emissions of class ...)?	I am going to send on this frequency [or on ... kc/s (or Mc/s)] (with emissions of class ...).
QSX	Will you listen to ... [call sign(s)] on ... kc/s (or Mc/s)?	I am listening to ... [call sign(s)] on ... kc/s (or Mc/s).
	Change of Frequency	
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency [or ... kc/s (or Mc/s)].
	Establishing Communication	
QRL	Are you busy?	I am busy (or I am busy with ...). Please do not interfere.
QRV	Are you ready?	I am ready.
QRX	When will you call me again?	I will call you again at ... hours [on ... kc/s (or Mc/s)].
QRY	What is my turn? (Relates to communication.)	Your turn is Number ... (or according to any other indication). (Relates to communication.)
QRZ	Who is calling me?	You are being called by ... [on ... kc/s (or Mc/s)].
QSC	Are you a cargo vessel? (See article 33, section V)	I am a cargo vessel.
QTQ	Can you communicate with my station by means of the International Code of Signals?	I am going to communicate with your station by means of the International Code of Signals.
	Time	
QTR	What is the correct time?	The correct time is ... hours.
QTU	What are the hours during which your station is open?	My station is open from ... to ... hours.

Abbreviation	Question	Answer or Advice
Charges		
QRC	By what private enterprise (or State Administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise ... (or State Administration).
QSJ	What is the charge to be collected per word to ... including your internal telegraph charge?	The charge to be collected per word to ... including my internal telegraph charge is ... francs.
Transit		
QRW	Shall I inform ... that you are calling him on ... kc/s (or Mc/s)?	Please inform ... that I am calling him on ... kc/s (or Mc/s).
QSO	Can you communicate with ... direct or by relay?	I can communicate with direct (or by relay through ...).
QSP	Will you relay to ... free of charge?	I will relay to ... free of charge.
QSQ	Have you a doctor on board [or is ... (name of person) on board]?	I have a doctor on board [or ... (name of person) is on board].
QUA	Have you news of ... (call sign)?	Here is news of ... (call sign).
QUC	What is the number (or other indication) of the last message you received from me [or from ... (call sign)]?	The number (or other indication) of the last message I received from you [or from ... (call sign)] is ...
Exchange of Correspondence		
QRU	Have you anything for me?	I have nothing for you.
QSG	Shall I send ... telegrams at a time?	Send ... telegrams at a time.
QSI		I have been unable to break in on your transmission. or Will you inform ... (call sign) that I have been unable to break in on his transmission [on ... kc/s (or Mc/s)].
QSK	Can you hear me between your signals?	I can hear you between my signals.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.

Abbreviation	Question	Answer or Advice
QSM	Shall I repeat the last telegram which I sent you; <i>or</i> some previous telegram?	Repeat the last telegram which you sent me [<i>or</i> telegram(s) number(s) ...]
QSZ	Shall I send each word or group more than once?	Send each word or group twice (<i>or</i> ... times).
QTA	Shall I cancel telegram number ... as if it had not been sent?	Cancel telegram number ... as if it had not been sent.
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have ... telegrams for you (<i>or</i> for ...).
QTV	Shall I stand guard for you on the frequency of ... kc/s (<i>or</i> Mc/s) (from ... to ... hours)?	Stand guard for me on the frequency of ... kc/s (<i>or</i> Mc/s) (from ... to ... hours).
QTX	Will you keep your station open for further communication with me until further notice (<i>or</i> until ... hours)?	I will keep my station open for further communication with you until further notice (<i>or</i> until ... hours).
Movement		
QRE	What is your estimated time of arrival at (<i>place</i>)?	My estimated time of arrival at ... (<i>place</i>) is ... hrs.
QRF	Are you returning to (<i>place</i>)?	I am returning to ... (<i>place</i>) <i>or</i>
QTI	What is your TRUE track?	Return to ... (<i>place</i>). My TRUE track is ... degrees.
Q TJ	What is your speed? (Requests the speed of a ship or aircraft through the water or air respectively.)	My speed is... knots (<i>or</i> kilometres per hour). (Indicates the speed of a ship or aircraft through the water or air respectively.)

Abbreviation	Question	Answer or Advice
QTK	What is the speed of your aircraft in relation to the surface of the earth?	The speed of my aircraft in relation to the surface of the earth is ... knots (or kilometres per hour).
QTL	What is your TRUE heading (TRUE course with no wind)?	My TRUE heading is ... degrees.
QTN	At what time did you depart from ... (place)?	I departed from ... (place) at ... hours.
QTO	Have you left dock (or port)? or Are you airborne?	I have left dock (or port). or I am airborne.
QTP	Are you going to enter dock (or port)? or Are you going to alight (or land)?	I am going to enter dock (or port). or I am going to alight (or land).
QUG	Will you be forced to alight (or land)?	I am forced to alight (or land) immediately. or I shall be forced to alight (or land) at ... (position or place).
QUJ	Will you indicate the TRUE course for me to steer towards you (or ...) with no wind?	The TRUE course for you to steer towards me (or ...) with no wind is ... degrees at ... hours.
QUN	Will vessels in my immediate vicinity [(or in the vicinity of ... latitude ... longitude) (or of ...)] please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...
QUX	Will you indicate the MAGNETIC course for me to steer towards you (or ...) with no wind? (This signal, in general, will not be used in the Maritime Mobile Service)	The MAGNETIC course for you to steer to reach me (or ...) with no wind was ... degrees at ... hours. (This signal, in general, will not be used in the Maritime Mobile Service)

Abbreviation	Question	Answer or Advice
	Meteorology	
QUB	Can you give me, in the following order, information concerning: visibility, height of clouds, direction and velocity of ground wind at ... (<i>place of observation</i>)?	Here is the information requested ...
QUH	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... (<i>units</i>).
QUK	Can you tell me the condition of the sea observed at ... (<i>place or coordinates</i>)?	The sea at ... (<i>place or coordinates</i>) is ...
QUL	Can you tell me the swell observed at ... (<i>place or coordinates</i>)?	The swell at ... (<i>place or coordinates</i>) is ...
	Radio Direction-finding	
QTE	What is my TRUE bearing from you? <i>or</i> What is my TRUE bearing from ... (<i>call sign</i>)?	Your TRUE bearing from me is ... degrees (at ... hours) <i>or</i> Your TRUE bearing from ... (<i>call sign</i>) was ... degrees at ... hours.
	<i>or</i> What is the TRUE bearing of ... (<i>call sign</i>) from ... (<i>call sign</i>)?	<i>or</i> The TRUE bearing of ... (<i>call sign</i>) from ... (<i>call sign</i>) was ... degrees at ... hours.
QTF	Will you give me the position of my station according to the bearings taken by the direction-finding stations which you control? (<i>See Appendix 15.</i>)	The position of your station according to the bearings taken by the direction-finding stations which I control was ... latitude, ... longitude, class ... at ... hours. (<i>See Appendix 15.</i>)

Abbreviation	Question	Answer or Advice
QTF	Will you send two dashes of ten seconds each followed by your call sign (repeated ... times) [on ... kc/s (or Mc/s)]?	I am going to send two dashes of ten seconds each followed by my call sign (repeated ... times) [on ... kc/s (or Mc/s)].
	<i>or</i> Will you request ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kc/s (or Mc/s)?	<i>or</i> I have requested ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kc/s (or Mc/s).
QUV	What is my MAGNETIC bearing from you (or from ...)?	Your MAGNETIC bearing from me (or from ...) was ... degrees at ... hours.
	<i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>	<i>(This signal, in general, will not be used in the Maritime Mobile Service)</i>
	Suspension of Work	
QRT	Shall I stop sending?	Stop sending.
	Urgency	
QUD	Have you received the urgency signal sent by ... (call sign of mobile station)?	I have received the urgency signal sent by ... (call sign of mobile station) at ... hours.
QUG	Will you be forced to alight (or land)?	I am forced to alight (or land) immediately.
		<i>or</i> I shall be forced to alight (or land) at ... (position or place).
	Distress	
QUF	Have you received the distress signal sent by ... (call sign of mobile station)?	I have received the distress signal sent by ... (call sign of mobile station) at ... hours.
QUM	Is the distress traffic ended?	The distress traffic is ended.
	Search and Rescue	
QUI	Are your navigation lights working?	My navigation lights are working.

Abbreviation	Question	Answer or Advice
QUN	Will vessels in my immediate vicinity [(or in the vicinity of ... latitude ... longitude) (or of ...)] please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...
QUO	Shall I search for ... (1. Aircraft; 2. Ship; 3. Survival craft) in the vicinity of ... latitude ... longitude (or according to any other indication)?	Please search for ... (1. Aircraft; 2. Ship; 3. Survival craft) in the vicinity of ... latitude ... longitude (or according to any other indication).
QUP	Will you indicate your position by ... (1. Searchlight; 2. Black smoke trail; 3. Pyrotechnic lights)?	My position is indicated by ... (1. Searchlight; 2. Black smoke trail; 3. Pyrotechnic lights).
QUQ	Shall I train my searchlight nearly vertical on a cloud, occulting if possible and, if your aircraft is seen, deflect the beam up wind and on the water (or land) to facilitate your landing?	Please train your searchlight on a cloud, occulting if possible and, if my aircraft is seen or heard, deflect the beam up wind and on the water (or land) to facilitate my landing.
QUR	Have survivors ... (1. Received survival equipment; 2. Been picked up by rescue vessel; 3. Been reached by ground rescue party)?	Survivors ... (1. Are in possession of survival equipment dropped by ...; 2. Have been picked up by rescue vessel; 3. Have been reached by ground rescue party).

Abbreviation	Question	Answer or Advice
QUS	Have you sighted survivors or wreckage? If so, in what position?	Have sighted ... (1. Survivors in water; 2. Survivors on rafts; 3. Wreckage) in position ... latitude ... longitude (or according to any other indication).
QUT	Is position of incident marked?	Position of incident is marked (by ...)
QUU	Shall I home ship or aircraft to my position?	Home ship or aircraft [1. ... (call sign) to your position by transmitting your call sign and long dashes on ... kc/s (or Mc/s); 2. ... (call sign) by transmitting on ... kc/s (or Mc/s) courses to steer to reach you].

SECTION II. MISCELLANEOUS ABBREVIATIONS AND SIGNALS

Abbreviation or Signal	Definition
AA	All after ... (<i>used after a question mark to request a repetition</i>).
AB	All before ... (<i>used after a question mark to request a repetition</i>).
ABV	Repeat (<i>or I repeat</i>) the figures in abbreviated form.
ADS	Address (<i>used after a question mark to request a repetition</i>).
AR	End of transmission (<i>• — • — • to be sent as one signal</i>)..
AS	Waiting period (<i>• — • • • to be sent as one signal</i>).
BK	Signal used to interrupt a transmission in progress.
BN	All between ... and ... (<i>used after a question mark to request a repetition</i>).
BQ	A reply to an RQ.
C	Yes.
CFM	Confirm (<i>or I confirm</i>).
CL	I am closing my station.
COL	Collate (<i>or I collate</i>).
CP	General call to two or more specified stations (<i>see article 32</i>).
CQ	General call to all stations (<i>see article 31</i>).
CS	Call sign (<i>used to request a call sign</i>).
DB	I cannot give you a bearing, you are not in the calibrated sector of this station.
DC	The minimum of your signal is suitable for the bearing.
DF	Your bearing at ... (<i>time</i>) was ... degrees, in the doubtful sector of this station, with a possible error of ... degrees.
DG	Please advise me if you note an error in the bearing given.
DI	Bearing doubtful in consequence of the bad quality of your signal.
DJ	Bearing doubtful because of interference.
DO	Bearing doubtful. Ask for another bearing later [<i>or at ... (time)</i>].
DP	Possible error of bearing may amount to . . degrees.

Abbreviation or Signal	Definition
DS	Adjust your transmitter, the minimum of your signal is too broad.
DT	I cannot furnish you with a bearing; the minimum of your signal is too broad.
DY	This station is not able to determine the sense of the bearing. What is your approximate direction relative to this station?
DZ	Your bearing is reciprocal. <i>(To be used only by the control station of a group of direction-finding stations when it is addressing stations of the same group.)</i>
DE	Used to separate the call sign of the station called from the call sign of the calling station.
ER	Here ...
ETA	Estimated time of arrival.
ITP	The punctuation counts.
JM	Make a series of dashes if I may transmit. Make a series of dots to stop my transmission <i>(not to be used on 500 kc/s except in cases of distress)</i> .
K	Invitation to transmit.
MN	Minute <i>(or Minutes)</i> .
MSG	Prefix indicating a message to or from the master of a ship concerning its operation or navigation.
N	No.
NIL	I have nothing to send to you.
NW	Now.
OK	We agree <i>(or It is correct)</i> .
P	Prefix indicating a private radiotelegram.
PBL	Preamble <i>(used after a question mark to request a repetition)</i> .
PTR	Used by a coast station to request the position and next port of call of a mobile station. <i>(See 700.)</i>
R	Received.
REF	Reference to ... <i>(or Refer to ...)</i> .
RPT	Repeat <i>(or I repeat) (or Repeat ...)</i> .
RQ	Indication of a request.

Abbreviation or Signal	Definition
SIG	Signature (<i>used after a question mark to request a repetition</i>).
SOS	Distress Signal (. . . — — — . . . to be sent as one signal).
SS	Indicator preceding the name of a ship station.
SVC	Prefix indicating a service telegram.
SYS	Refer to your service telegram.
TFC	Traffic.
TR	Used as a prefix to indicate reply to PTR.
TTT	This group when sent three times constitutes the safety signal (<i>see 943</i>).
TU	Thank you.
TXT	Text (<i>used after a question mark to request a repetition</i>).
VA	End of work (. . . — — — to be sent as one signal).
W	Word(s) or [Group(s)].
WA	Word after . . . (<i>used after a question mark to request a repetition</i>).
WB	Word before . . . (<i>used after a question mark to request a repetition</i>).
XXX	This group when sent three times constitutes the urgency signal (<i>see 934</i>).

APPENDIX 10 (see article 33)

(APP. 10 RR)

273-E

FREQUENCIES ASSIGNABLE TO SHIP RADIOTELEGRAPH STATIONS USING THE MARITIME MOBILE SERVICE BANDS BETWEEN 4 000 AND 23 000 KC/S																			
BAND (kc/s)	Limits										Limits								
	Assignables Working Frequencies - Passenger Ships										Assignables Calling Frequencies -								
4 000	4 133	4 137.5	4 142.5	4 147.5	4 152.5	4 157.5	4 162.5				4 176	4 180	4 182	4 184	4 186	Assignables Working Frequencies - Cargo Ships			
																Group A	Group B		4 238
																(98 Freq. @ 0.5 kc/s)			
6 000	6 200	6 206.25	6 213.75	6 221.25	6 228.75	6 236.25	6 243.75				6 267	6 270	6 273	6 276	6 279				6 367
																(98 Freq. @ 0.75 kc/s)			
8 000	8 265	8 275	8 285	8 295	8 305	8 315	8 325				8 358	8 360	8 364	8 368	8 372				8 476
																(98 Freq. @ 1 kc/s)			
12 000	12 460	12 472.5	12 485	12 497.5	12 510	12 522.5	12 535				12 594	12 596	12 598	12 600	12 602				12 714
																(98 Freq. @ 1.5 kc/s)			
16 000	16 530	16 550	16 570	16 590	16 610	16 630	16 650				16 712	16 720	16 728	16 736	16 744				16 952
																(98 Freq. @ 2 kc/s)			
22 000	22 070	22 085	22 105	22 125	22 145	22 165	22 185				22 225	22 235	22 245	22 255	22 265				22 400
																(50 Freq. @ 2.5 kc/s)			

APPENDIX 11

Procedure in the Mobile Radiotelephone Service

(See article 34)

§ 1. The following procedure is given as an example for the transmission of a radiotelegram:

1. A calls:
Hullo B, Hullo B, this is A, this is A, radiotelegram for you, radiotelegram for you, over.
2. B replies:
Hullo A, Hullo A, this is B, this is B, send your radiotelegram, send your radiotelegram, over.
3. A replies:
Hullo B, this is A, radiotelegram begins from number..... number of words..... date..... time..... address..... text..... signature.....
.....transmission of radiotelegram ends, I repeat, radiotelegram begins from..... number..... number of words..... date..... time..... address..... text..... signature..... radiotelegram ends, over.
4. B replies:
Hullo A, this is B, your radiotelegram begins, from number..... number of words..... date..... time..... address..... text..... signature....., your radiotelegram ends, over.
5. A replies:
Hullo B, this is A, correct, correct, switching off.
6. A then breaks the communication and both stations resume their normal watch.

Note: At the beginning of a communication, the calling formula is spoken twice by both the calling station and the station called. It is spoken once only when communication has been established.

§ 2. When the station receiving is certain that it has correctly received the radiotelegram, the repetition contemplated under § 1, 4 is unnecessary, except for a collated radiotelegram. If repetition is dispensed with, station B acknowledges the receipt of the radiotelegram in the following manner:

Hullo A, this is B, your radiotelegram correctly received, over.

§ 3. (1) When it is necessary to spell out call signs, service abbreviations and words, the following table is used:

<i>Figure to be transmitted*</i>	<i>Letter to be transmitted</i>	<i>Word to be used</i>
1	A	Amsterdam
2	B	Baltimore
3	C	Casablanca
4	D	Danemark
5	E	Edison
6	F	Florida
7	G	Gallipoli
8	H	Havana
9	I	Italia
0	J	Jerusalem
Comma	K	Kilogramme
Fraction bar	L	Liverpool
Break signal	M	Madagascar
Full stop (period)	N	New York
	O	Oslo
	P	Paris
	Q	Quebe
	R	Roma
	S	Santiago
	T	Tripoli
	U	Upsala
	V	Valencia
	W	Washington
	X	Xantippe
	Y	Yokohama
	Z	Zurich

* Each transmission of figures is preceded and followed by the words "as a number" spoken twice.

(2) However, stations of the same country may use, when communicating between themselves, any other table recognized by their administration.

APPENDIX 12

Recommended Duplex Channeling of the Maritime Mobile Radiotelephone Bands 4 000 – 23 000 kc/s.

(See article 34)

This table is a recommendation for the channels to be used by coast and ship stations in the bands allocated to the maritime mobile radiotelephone service between 4 000 and 23 000 kc/s. It is recommended to administrations for use as a guide in the choice of frequencies for their stations.

One or more series of frequencies are assigned to each coast station, which uses these frequencies associated, as far as possible, in pairs; each pair comprising a transmitting and a receiving frequency. The series shall be selected with due regard to the areas served and so as to avoid, as far as possible, harmful interference between the services of different coast stations.

If an administration assigns frequencies other than those indicated in the table, its radiotelephone service must not cause harmful interference to radiotelephone stations of the maritime mobile service which use frequencies assigned to them from this table in accordance with these Regulations.

Table of Transmitting Frequencies (kc/s)

Bands	4 000 kc/s		8 000 kc/s		12 000 kc/s		16 000 kc/s		22 000 kc/s	
Series No.	Coast Freq.	Ship Freq.	Coast Freq.	Ship Freq.	Coast Freq.	Ship Freq.	Coast Freq.	Ship Freq.	Coast Freq.	Ship Freq.
1	4 371.9	4 066.9	8 748.9	8 198.9	13 133.9	12 333.9	17 293.9	16 463.9	22 653.9	22 003.9
2	4 379.7	4 074.7	8 756.7	8 206.7	13 141.7	12 341.7	17 301.7	16 471.7	22 661.7	22 011.7
3	4 387.4	4 082.4	8 764.4	8 214.4	13 149.4	12 349.4	17 309.4	16 479.4	22 669.4	22 019.4
4	4 395.2	4 090.2	8 772.2	8 222.2	13 157.2	12 357.2	17 317.2	16 487.2	22 677.2	22 027.2
5	4 403.0	4 098.0	8 780.0	8 230.0	13 165.0	12 365.0	17 325.0	16 495.0	22 685.0	22 035.0
6	4 410.7	4 105.7	8 787.7	8 237.7	13 172.7	12 372.7	17 332.7	16 502.7	22 692.7	22 042.7
7	4 418.5	4 113.5	8 795.5	8 245.5	13 180.5	12 380.5	17 340.5	16 510.5	22 700.5	22 050.5
8	4 426.3	4 121.3	8 803.3	8 253.3	13 188.3	12 388.3	17 348.3	16 518.3	22 708.3	22 058.3
9	4 434.0	4 129.0	8 811.0	8 261.0	13 196.0	12 396.0	17 356.0	16 526.0	22 716.0	22 066.0

APPENDIX 13

Hours of Service for Ships in the Second Category

(See articles 20 and 35)

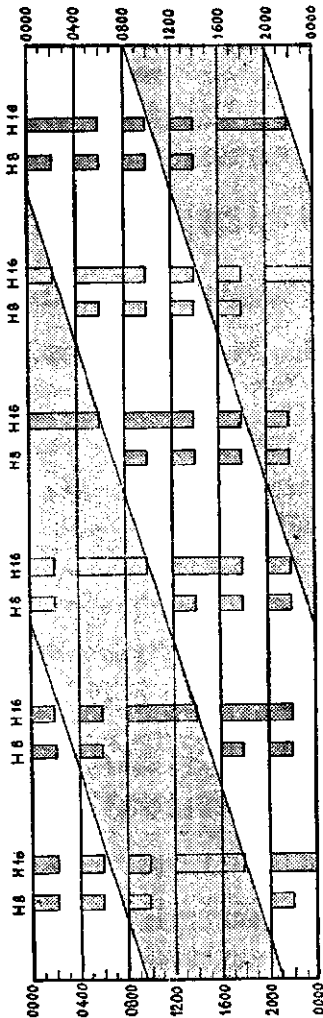
SECTION I. TABLE

Zones	Western Limits	Eastern Limits	Hours of Service (Greenwich mean time) (G.M.T.)			
			8 hours (H8)		16 hours (H16)	
A Eastern Atlantic Ocean, Mediterranean, North Sea, Baltic.	Meridian of 30° W., Coast of Greenland.	Meridian of 30° E. to the South of the Coast of Africa, Eastern limits of the Mediterranean, of the Black Sea, and of the Baltic, 30° E. to the North of Norway.	from 8h.	to 10h.	from 0h.	to 6h.
			12h.	14h.	8h.	14h.
			16h.	18h.	16h.	18h.
			20h.	22h.	20h.	22h.
B Western Indian Ocean, Eastern Arctic Sea.	Eastern Limit of Zone A.	Meridian of 80° E., Western Coast of Ceylon to Adam's Bridge, thence Westward round the coast of India.	from 4h.	to 6h.	from 0h.	to 2h.
			8h.	10h.	4h.	10h.
			12h.	14h.	12h.	14h.
			16h.	18h.	16h.	18h.
					20h.	24h.
C Eastern Indian Ocean, China Sea, Western Pacific Ocean.	Eastern Limit of Zone B.	Meridian of 160° E.	from 0h.	to 2h.	from 0h.	to 6h.
			4h.	6h.	8h.	10h.
			8h.	10h.	12h.	14h.
			12h.	14h.	16h.	22h.
D Central Pacific Ocean.	Eastern Limit of Zone C.	Meridian of 140° W.	from 0h.	to 2h.	from 0h.	to 2h.
			4h.	6h.	4h.	6h.
			8h.	10h.	8h.	10h.
			20h.	22h.	12h.	18h.
					20h.	24h.

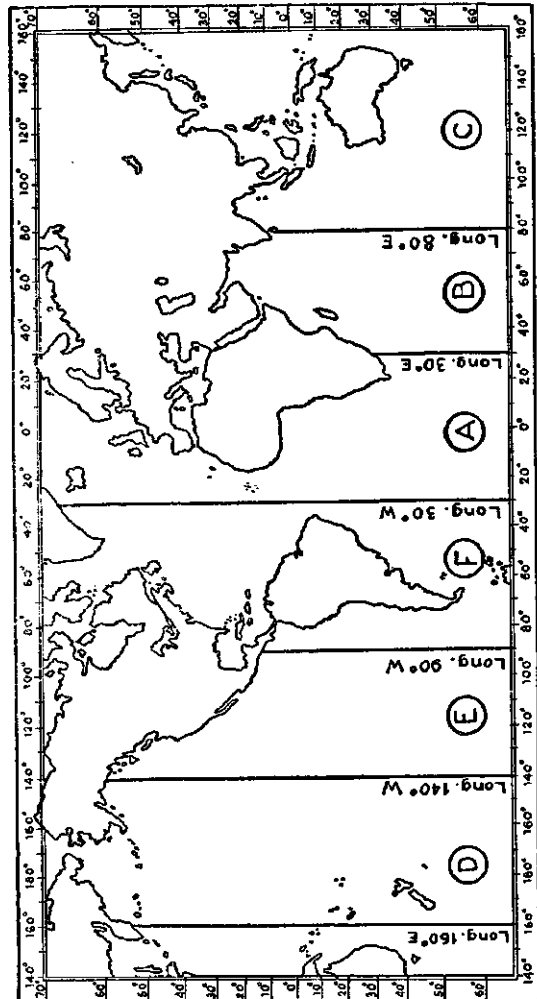
Zones	Western Limits	Eastern Limits	Hours of Service (Greenwich mean time) (G.M.T.)			
			8 hours (H8)		16 hours (H16)	
E Eastern Pacific Ocean.	Eastern Limit of Zone D.	Meridian of 90° W. as far as the Coast of Central America, then the West Coast of Central America and North America.	from 0h.	to 2h. 4h. 6h. 16h. 18h. 20h. 22h.	from 0h.	to 2h. 4h. 6h. 8h. 14h. 16h. 22h.
F Western Atlantic Ocean and Gulf of Mexico.	Meridian of 90° W., Gulf of Mexico, East Coast of North America.	Meridian of 30° W., Coast of Greenland.	from 0h.	to 2h. 12h. 14h. 16h. 18h. 20h. 22h.	from 0h.	to 2h. 4h. 10h. 12h. 18h. 20h. 22h.

SECTION II. DIAGRAM

Greenwich mean time (G.M.T.).



Greenwich mean time (G.M.T.).



APPENDIX 15

**Procedure for Obtaining Radio Direction-Finding
Bearings and Positions
(See article 44)**

Section I. General Instructions

§ 1. Before calling one or more direction-finding stations for the purpose of asking for a bearing or position, a mobile station must ascertain from the List of Radiolocation Stations:

- a) the call signs of the stations to be called to obtain the desired bearings or position;
- b) the frequency on which the radio direction-finding stations keep watch, and the frequency or frequencies on which they take bearings;
- c) the radio direction-finding stations which, being linked by special circuits, can be grouped with the radio direction-finding station to be called.

§ 2. The procedure to be followed by the mobile station depends on varying circumstances. Generally, the following must be taken into account:

- a) If the radio direction-finding stations do not keep watch on the same frequency (whether it be the frequency on which bearings are taken or another frequency), a separate request for the bearings must be made to each station or group of stations using a given frequency.
- b) If all the radio direction-finding stations concerned keep watch on the same frequency, and if they are able to take bearings on a common frequency (which may be different from the listening frequency), the mobile station must call all of them at the same time, in order that these stations may take simultaneous bearings on the same transmission.

- c) If several radio direction-finding stations are grouped by means of special circuits, only one of them, the radio direction-finding control station, must be called even if all are furnished with transmitting apparatus. In that case, however, the mobile station must, if appropriate, specify in the call, by means of call signs, the radio direction-finding stations from which it wishes to obtain bearings.

§ 3. The List of Radiolocation Stations contains information relating to:

- a) the type of signal and class of emission to be used for obtaining the bearings;
- b) the duration of the transmission to be made by the mobile station; and
- c) the time used by the radio direction-finding station in question, if different from Greenwich mean time (G.M.T.).

Section II. Rules of Procedure

§ 4. The following rules of procedure are based on the use of radiotelegraphy. For radiotelephony, appropriate phrases may replace the service abbreviations.

§ 5. *To obtain a bearing or course.*

(1) The mobile station calls the radio direction-finding station or the radio direction-finding control station on the listening frequency indicated in the List of Radiolocation Stations. Depending on the type of information desired, the calling station transmits the appropriate service abbreviation followed, if the radio direction-finding station is a mobile station, by the service abbreviation QTH? It indicates, if necessary, the frequency on which it is going to transmit to enable its bearing to be taken, and then awaits instructions.

(2) The radio direction-finding station called requests the calling station, by means of the appropriate service abbre-

viation, to transmit for the bearing. If necessary, it indicates the frequency to be used for this purpose and the number of times the transmission is to be repeated.

(3) After having changed, if necessary, to its new transmitting frequency, the calling station transmits two dashes of approximately ten seconds each, followed by its call sign. It repeats this signal as often as the radio direction-finding station requires.

(4) The radio direction-finding station determines the direction and, if possible, the sense of the bearing, and its classification [see (9)].

(5) If the radio direction-finding station is not satisfied with the operation, it requests the calling station to repeat the transmission described under (3).

(6) The radio direction-finding station transmits the information to the calling station in the following order:

- a) the appropriate service abbreviation;
- b) three digits indicating the true bearing or the true course from the radio direction-finding station;
- c) class of bearing;
- d) time of observation;
- e) if the radio direction-finding station is mobile, its own position in latitude and longitude, preceded by the service abbreviation QTH.

(7) As soon as the calling station has received the result of the observation, if it is considered necessary to obtain confirmation, it repeats back the message. The radio direction-finding station then confirms that the repetition is correct or, if necessary, corrects it by repeating the message. When the radio direction-finding station is sure that the calling station has received the message correctly, it transmits the signal "end of work." The calling station repeats this signal as an indication that the operation is finished.

(8) In the absence of information to the contrary, the calling station assumes that the sense of the bearing was determined. If the radio direction-finding station has not determined the sense, it indicates this in the information transmitted, or reports the bearing and its reciprocal.

(9) According to its estimate of the accuracy of the observation, the radio direction-finding station classifies the bearing in one of the three following classes:

Class A: bearings which the operator may reasonably consider to be accurate to within $\pm 2^\circ$ (two degrees);

Class B: bearings which the operator may reasonably consider to be accurate to within $\pm 5^\circ$ (five degrees);

Class C: bearings which the operator may reasonably consider to be accurate to within $\pm 10^\circ$ (ten degrees).

§ 6. *To obtain a position determined by two or more radio direction-finding stations organized as a group.*

(1) If the calling station wishes to be informed of its position by a group of radio direction-finding stations, it calls the control station as is indicated in § 5 (1) above, and requests a position by means of the appropriate service abbreviation.

(2) The control station replies to the call and, when the radio direction-finding stations are ready, requests, by means of the appropriate service abbreviation, the calling station to transmit. When the position has been determined, it is transmitted by the control station to the calling station in the form indicated in § 5 (6).

(3) According to its estimate of the accuracy of the observation, the control station classifies the position in one of the three following classes:

Class A: positions which the operator may reasonably expect to be accurate to within 5 nautical miles;

Class B: positions which the operator may reasonably expect to be accurate to within 20 nautical miles;

Class C: positions which the operator may reasonably expect to be accurate to within 50 nautical miles.

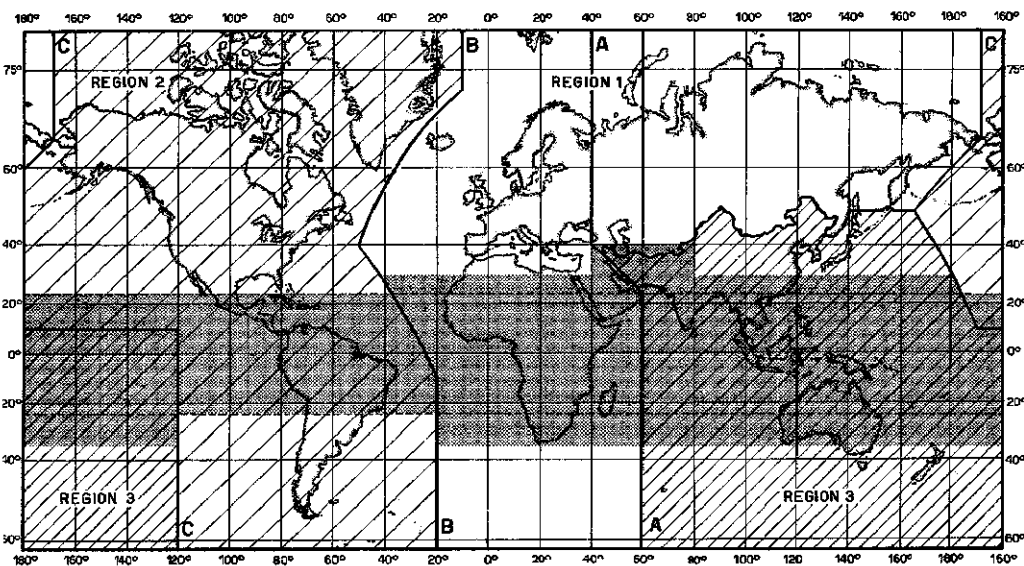
§ 7. *To obtain simultaneous bearings from two or more radio direction-finding stations organized as a group.*

On a request for bearings, the control station of a group of radio direction-finding stations proceeds as indicated in § 6 above. It finally transmits the bearings as observed by each station of the group, each bearing being preceded by the call sign of the station which observed it.

APPENDIX 16

Chart of Regions as Defined in Table of Frequency Allocations

(See 100 to 106 and 252)



The shaded part represents the tropical zone as defined in 252.

SECOND SERIES

APPENDIX A

Studies of Radio Propagation

Recognizing the dependence of efficient assignment and utilization of radio frequencies upon full use of radio propagation data, the countries, members of the Union, shall endeavour to promote the establishment and operation of a world-wide system of observation stations to obtain data on ionospheric, radio noise, and other phenomena affecting radio propagation, and also to provide for the study, coordination and dissemination of radio propagation data and predictions.

APPENDIX B

Standard Frequency and Time Broadcasts

1. The countries, members of the International Telecommunications Union, recognize that a standard frequency broadcast service available to all parts of the world is essential for maximum economy in the use of the radio frequency spectrum, the efficient operation of the telecommunication services and for the functioning of several activities of the I.T.U.

The countries, members of the I.T.U., recognize that this service may also be useful for other activities outside the Union. The addition of time signals superimposed on these same broadcasts is also highly useful and should be included, if possible.

2. To this end, administrations will endeavour to provide on an international basis a coordinated system of standard frequency broadcasts. As regards time signals, recognizing the

work already in hand by various countries aiming at the common distribution by radio of time signals and standard frequencies, the countries, members of the I.T.U. recognize that contact is to be established as soon as possible with the International Committee of Time to promote coordination on an international basis.

APPENDIX C

International Monitoring

The International Radio Conference at Atlantic City (1947),
recognizing:

1. the desirability of a coordinated service of monitoring on a world-wide basis for the purpose of undertaking such measurements of frequencies, field strengths, band widths of emissions, and other characteristics as may be required by the International Frequency Registration Board (I.F.R.B.) for the efficient conduct of its duties;
2. the desirability of the adoption of uniform standards of measurement technique at all monitoring stations participating in such a service;
3. the desirability that, except for monitoring under private arrangements, all monitoring stations of one country, which participate in such an international monitoring service, should report and transmit their results through one national centralizing office;
4. the desirability that this office should receive all requests for monitoring originating in the I.F.R.B., or in similar offices of other countries or international organizations concerned, and should forward the results to the I.F.R.B. as well as to the administrations or organizations which have requested the monitoring;
5. the desirability that the I.F.R.B. should be aware of the standards used in each monitoring station, so that it may use-

fully compare the results furnished by different monitoring stations and determine whether these results meet the needs of the I.F.R.B.;

6. the desirability of establishing monitoring stations in such special locations as may be required to provide the I.F.R.B. with comprehensive information;
7. the possibility that individual monitoring stations, in conformity with the desires of the administration concerned, may not participate in the whole field of monitoring, but may operate only within a limited part of the field;
8. the possibility that administrations may not be able to undertake, through the monitoring stations under their control, all monitoring requested by the I.F.R.B. or by other administrations;

recommends:

- a) that, until a coordinated service of monitoring, on a world-wide basis, with generally agreed technical standards of measurements, can be better organized, administrations and organizations should endeavour, as far as they consider practicable, to undertake such monitoring as may be requested by the I.F.R.B., or by administrations of countries, members of the I.T.U., or by other international organizations operating within the framework of the I.T.U., taking into careful consideration points mentioned in paragraphs 1 to 8 above;
- b) that administrations and organizations which are able to undertake such monitoring should inform the Secretary General of the names and locations of the stations under their control which may participate, and the addresses to which requests for monitoring should be sent.

ADDITIONAL RADIO REGULATIONS

ARTICLE 1

Application of the Telegraph and Telephone Regulations to Radiocommunications

- 2001 § 1.** The provisions of the Telegraph and Telephone Regulations and the Protocols annexed thereto are applicable to radiocommunications insofar as the provisions of the Radio Regulations do not provide otherwise.
- 2002 § 2. (1)** With the exceptions mentioned in the following articles, radiotelegrams are drawn up and treated in accordance with the provisions of the Telegraph Regulations for telegrams.
- 2003 (2)** The use of groups of letters from the International Code of Signals is permitted in radiotelegrams in the maritime mobile service.
- 2004 § 3.** Since the word RADIO or AERADIO, as the case may be, is always included in the list of stations and in the address of a radiotelegram, as part of the name of the land station, this word must not be given as a service indication at the beginning of the preamble in the transmission of a radiotelegram.

ARTICLE 2

Address of Radiotelegrams

- 2005 § 1. (1)** The address of radiotelegrams destined for mobile stations must be as complete as possible and must include:
- 2006 a.)** name or designation of the addressee, with supplementary particulars, if necessary;

- 2007 b) name of the ship station or, in the case of aircraft stations, its call sign, as shown in the appropriate list of stations;
- 2008 c) name of the land station through which the message is to be forwarded, as it appears in the appropriate list of stations.
- 2009 (2) However, the name and call sign required under 2007 may be replaced, at the risk of the sender, by particulars of the passage made by such mobile station, indicated by the names of the ports or airports of departure and of destination, or by any equivalent indication.
- 2010 (3) In the address, the name of the mobile station and that of the land station, written as they appear in the appropriate lists of stations are, in all cases and irrespective of their length, each counted as one word.
- 2011 § 2. (1) Mobile stations not supplied with the International List of Telegraph Offices may add to the name of the telegraph office of destination,
- the name of the territorial subdivision, or
 - the country of destination, or
 - both of the above,
- if it is doubtful whether, without such addition, the message could be correctly routed without difficulty.
- 2012 (2) In that case the name of the telegraph office and the supplementary particulars are counted and charged for as a single word. The land station operator receiving the radiotelegram retains or deletes these particulars, or further amends the name of the office of destination as is necessary or sufficient for forwarding the radiotelegram to its proper destination.

ARTICLE 3

Time of Handing-in of Radiotelegrams

- 2013 § 1. In the transmission of radiotelegrams originating in

a mobile station, the date and time of handing-in at this station are given in the preamble.

2014 § 2. The time of handing-in is indicated in Greenwich mean time (G.M.T.) from 0 to 24 h. beginning at midnight, and is always expressed and transmitted by means of four figures (0000 to 2400).

2015 § 3. Administrations of countries situated outside zone A (appendix 13 to the Radio Regulations) may, however, authorize ship stations passing along the coasts of their countries to use zone time for giving, in a group of four figures, the time of handing-in. In that case the group must be followed by the letter F.

ARTICLE 4

Charges for Radiotelegrams

Section I. General. Full-rate Radiotelegrams

2016 § 1. The charge for a radiotelegram originating in and/or intended for a mobile station comprises, according to circumstances:

- 2017 a) the ship or aircraft charge or charges accruing to the mobile station of origin or destination, or to both of these stations;
- 2018 b) the land station charge (see 2026) accruing to the land station or stations which participate in the transmission;
- 2019 c) the charge for transmission over the general telecommunication network, reckoned in accordance with the ordinary rules;
- 2020 d) the charges for accessory services requested by the sender.

2021 § 2. (1) The land station charge and the ship or aircraft charge are fixed on the basis of a word rate, pure and simple,

with no minimum charge, except in the case provided for in article 5 of these Regulations.

2022 (2) The maximum land station charge is sixty centimes (0 fr. 60) per word; the maximum ship or aircraft charge is forty centimes (0 fr. 40) per word. Administrations shall notify to the Secretary General of the Union the rates fixed by them.

2023 (3) Each administration, however, reserves to itself the right to fix and authorize land station or aircraft station charges higher than the maximum charges indicated in 2022 in the case of land or aircraft stations which are exceptionally costly on account of their installation or working.

2024 (4) The minimum charge as for five words, mentioned in 172 and 173 of the Telegraph Regulations (Cairo Revision, 1938) is not applicable to the radiotelegraph portion of the route over which a radiotelegram is transmitted.

2025 § 3. (1) When a single land station is used as an intermediary between mobile stations, only one land station charge is collected. If the land station charge applicable to traffic with the mobile station of origin is different from that applicable to traffic with the mobile station of destination, the higher of these two charges is collected. In addition, a land telegraph charge may be collected equal to that indicated in 2028 and 2029 as applicable to transmission over the telecommunication network.

2026 (2) When, at the request of the sender, two land stations are used as intermediaries between two mobile stations, the land station charge of each station is collected and also the telegraph charge for the section between the two stations.

2027 § 4. The retransmission service and charges are governed by article 9 of these Regulations.

2028 § 5. (1) Where radiotelegrams originating in or destined for a country pass through land stations of that country, the telegraph charge applicable to the transmission over the internal telecommunication system of that country is, in principle,

reckoned on the basis of a word rate, pure and simple, without collection of a minimum charge. This rate is notified in gold francs to the Secretary General of the Union by the administration to which the land stations are subject.

2029 (2) When, by reason of the fact that its internal telecommunication system is not operated by the Government, a country has to apply a minimum charge, it must inform the Secretary General of the Union, which shall note the amount of this minimum charge in the appropriate list of stations, following the indication of the rate per word. In the absence of such note, the charge to be applied is the word rate pure and simple, without a minimum.

2030 § 6. Additional charges collected by mobile stations for multiple radiotelegrams (see 2091) and radiotelegrams to be delivered by post (see 2092) are the maximum charges fixed by the Telegraph Regulations.

2031 § 7. The country on whose territory is established a land station serving as intermediary for the exchange of radiotelegrams between a mobile station and another country, is considered, as far as the application of telegraph charges is concerned, as the country of origin or destination of the radiotelegrams, and not as a transit country.

2032 § 8. (1) For the purpose both of transmission and of international accounting, the word count of the office of origin is decisive in the case of radiotelegrams destined for mobile stations, and that of the mobile station of origin is decisive in the case of radiotelegrams originating in mobile stations.

2033 (2) Nevertheless, when a radiotelegram is expressed wholly or partly either:

- in one of the languages of the country of destination (in the case of radiotelegrams originating in mobile stations), or
- in one of the languages of the country to which the mobile station is subject (in the case of radiotelegrams destined for mobile stations),

and when the radiotelegram contains combinations or altera-

tions of words contrary to the usage of that language, the office or the mobile station of destination, as the case may be, has the right to recover from the addressee the amount of the charge not collected. Where payment is refused, the radiotelegram may be withheld.

- 2034 § 9. The total charge for radiotelegrams is collected from the sender, with the exception of:
- 2035 a) express charges to be collected on delivery (see 542 of the Telegraph Regulations, Cairo Revision, 1938) ;
- 2036 b) the charges applicable to inadmissible combinations or alterations of words, observed by the office or mobile station of destination [see 2033] which are collected from the addressee.
- 2037 § 10. Mobile stations must be acquainted with the tariffs necessary for charging for radiotelegrams. However, they are authorized, where necessary, to obtain such information from land stations; rates furnished by land stations are expressed in gold francs.
- 2038 § 11. The land station or ship or aircraft charges for radiotelegrams concerning stations not yet included in the appropriate list of stations are fixed, as part of its duties, by the office which collects the charge. The ship or aircraft charges pertaining to radiotelegrams intended for mobile stations the names or call signs of which are replaced by the indication of the route followed or by any other equivalent indication (see 2009), are also fixed, as part of its duties, by the office which collects the charge. They are the normal rates notified by the administration in question or, in the absence of such notification, they are the maximum charges prescribed in 2022.
- 2039 § 12. (1) No new rate, and no modification either general or of detail relative to tariffs shall become effective until 15 days after its notification by the Secretary General of the Union (excluding the day of dispatch) and shall not be applied until the 1st or 16th of the month, whichever date next follows the expiration of this period.

2040 (2) Nevertheless, for radiotelegrams originating in mobile stations, modifications of tariffs are not applicable until a month after the periods laid down in 2039.

2041 (3) The provisions of 2039 and 2040 admit of no exception.

Section II. Reduced-rate Radiotelegrams

A. Radiotelegrams of Immediate General Interest

2042 § 13. No charge for radio transmission in the mobile service is made for radiotelegrams of immediate general interest, which fall within the following classes:

2043 a) distress messages and replies thereto;

2044 b) messages originating in mobile stations notifying the presence of icebergs, derelicts and mines, or announcing cyclones and storms;

2045 c) messages announcing unexpected phenomena threatening air navigation or the sudden occurrence of obstacles at airports;

2046 d) messages originating in mobile stations notifying sudden changes in the position of buoys, the working of lighthouses, devices connected with buoyage, etc.;

2047 e) service messages relating to the mobile service.

B. Meteorological Radiotelegrams

2048 § 14. (1) The term "meteorological radiotelegram" denotes a radiotelegram consisting solely of meteorological observations or meteorological forecasts, which is sent by an official meteorological service or by a station in official relation with such a service, and addressed to such a service or to such a station.

2049 (2) Meteorological radiotelegrams must bear the paid service indication — OBS — before the address. This paid service indication is the only one admitted.

2050 (3) If requested, the sender must affirm that the text of his radiotelegram complies with the above conditions.

2051 § 15. (1) Land station and ship or aircraft charges applicable to meteorological radiotelegrams are reduced by at least 50 per cent in all relations.

2052 (2) For land stations, the date on which this provision is put into force is fixed by agreement between the administrations and operating companies on the one hand, and the official meteorological services concerned on the other hand.

C. CDE Radiotelegrams

2053 § 16. Radiotelegrams in secret language which pass over the telecommunication channels of countries belonging to the extra-European system are called CDE radiotelegrams.

2054 § 17. (1) The radiotelegraph charge for CDE radiotelegrams is reduced in the same proportion as the telegraph charge for such radiotelegrams.

2055 (2) In traffic between ship stations, direct or through the intermediary of a single coast station of a country of the extra-European system, radiotelegrams in secret language are considered as CDE radiotelegrams, and the rate to be charged shall be reduced in the same proportions as apply to CDE radiotelegrams in the extra-European system.

2056 (3) The reduction granted is always applicable to the charges, if any, for radiotelegraphic retransmission.

D. Press Radiotelegrams

2057 § 18. (1) The land station and ship or aircraft charges are reduced by 50 per cent for press radiotelegrams originating in a ship or aircraft station and destined for places on land. These radiotelegrams are subject to the conditions of acceptance laid down in articles 77 and 78 of the International Telegraph Regulations (Cairo Revision, 1938). For those which are addressed to a destination in the country of the land station, the telegraph charge to be collected is one-half of the telegraph charge applicable to an ordinary radiotelegram

2058 (2) Press radiotelegrams destined for a country other than that of the land station are subject to the press rate in force between the country of the land station and the country of destination.

ARTICLE 5

Radiomaritime Letters and Radio Air Letters

- 2059 § 1. Each administration may organize a service of radiomaritime letters between ships at sea and its coast stations, and radio air letters between aircraft in flight and its land stations. Such correspondence is transmitted by radio between the ships or aircraft and the land stations. They may be forwarded on the land section:
- 2060 a) wholly or partly by post (ordinary or airmail) ;
- 2061 b) exceptionally by telegraph, in which case delivery is subject to the periods of delay fixed for letter telegrams of the European or extra-European systems.
- 2062 § 2. Radiomaritime letters and radio air letters do not admit of any radio retransmission in the mobile service.
- 2063 § 3. Radiomaritime letters and radio air letters must be exchanged only with places in the country in which the land station is situated, unless other arrangements have been made with the administrations concerned. In that event, an additional charge may be collected in accordance with the agreement between these administrations.
- 2064 § 4. Radiomaritime letters bear the paid service indication = SLT = and radio air letters the paid service indication = ALT =. These indications precede the address.
- 2065 § 5. (1) Other paid service indications which may be admitted are:
- = RPx = = PR = = GP = = GPR = = PAV =

2066 (2) Where the transmission over the land section is exceptionally performed by telegraph, the only paid service indications which may be admitted are:

== RP_x == GP == TR == LX == Redirected from x ==

2067 § 6. The address must enable delivery to be effected without enquiry or requests for information. Registered or abbreviated addresses are admitted when, exceptionally, radiomaritime letters and radio air letters are forwarded telegraphically on the land section.

2068 § 7. As a general rule, the text is subject to the regulations applicable to letter telegrams, namely:

- 2069 a) When asked to do so by the office of origin, the sender must sign a declaration that the text is expressed in plain language in one and the same language, and that it bears no meaning other than that which appears on the face of it. The declaration must indicate the language used.
- 2070 b) Exceptionally, proper names, names of firms, and expressions denoting goods or brands of goods are admitted in a language other than that in which the radiomaritime letter or radio air letter is written.
- 2071 c) The usual signs of punctuation of the Morse code are admitted.
- 2072 d) If numbers written in figures, commercial marks or abbreviated expressions are used in the text, the number of these words or groups reckoned in accordance with the normal rules of charging must not exceed one-third of the total number of chargeable words in the text, including the signature. For this evaluation a radiomaritime letter or radio air letter is always considered as

comprising at least 20 words, even if the actual number is less than 20.

2073 § 8. (1) The ship or aircraft charge for radiomaritime letters and radio air letters is fixed at 2 fr. 50 up to 20 words. For each word in excess of twenty: 0 fr. 125.

2074 (2) The land station charge up to 20 words and the charge per word in excess shall be determined by the administrations concerned subject to a maximum of 4 francs for the first and 0 fr. 20 for the second. The land station charge must include the postal charge (by ordinary letter) due for routing in the country to which the land station is subject.

2075 (3) The following charges are added where applicable:

2076 - charges due for authorized accessory services and, if necessary, the further charge mentioned in 2063;

2077 - the telegraph charge when, exceptionally, transmission on the land section is by telegraph.

2078 § 9. Radiomaritime letters and radio air letters rank for radio transmission after ordinary radiotelegrams on hand. Those which have not been transmitted within 24 hours of handing-in are sent concurrently with ordinary radiotelegrams.

2079 § 10. The normal rules of accounting as regards radio-communications are applicable to radiomaritime letters and to radio air letters, in accordance with the provisions of 2073 and 2074.

2080 § 11. (1) When a radiomaritime letter or a radio air letter fails to reach its destination due to the failure of the postal service, only the charges in respect of the services not carried out are refunded.

2081 (2) Reimbursement of charges is admitted in the cases provided in 842, 859, and 862 of the Telegraph Regulations (Cairo Revision, 1938).

ARTICLE 6

Special Radiotelegrams. Paid Service Indications

- 2082 § 1. The following special radiotelegrams are admitted provided the administrations concerned accept them:
- 2083 1st Press radiotelegrams originating in mobile stations and destined for the land.
- 2084 2nd Meteorological radiotelegrams (=OBS=).
- 2085 3rd Greetings radiotelegrams (subject to the conditions laid down in article 86 of the Telegraph Regulations, Cairo Revision, 1938).
- 2086 4th Paid service advices, except those requesting a reply by post. These are forwarded, as far as practicable, by the same route as that of the original radiotelegram. In the case of diversion (for example, in case of interruption or where the mobile station proceeds beyond the range of the land station which has acted as intermediary for the transmission of the original radiotelegram) they bear the indication "dévité" and particulars of the route followed by the original radiotelegram. All paid service advices are admitted over the general telecommunication network.
- 2087 5th Urgent radiotelegrams and deferred radiotelegrams but only over the general telecommunication network.
- 2088 6th Radiotelegrams with prepaid reply. The reply voucher issued on board a mobile station gives the right to send a radiotelegram to any destination, but only from the mobile station which issued the voucher, and only up to the value of the voucher.
- 2089 7th Collated radiotelegrams.
- 2090 8th Radiotelegrams with notification of delivery destined for mobile stations, but only as far as

concerns the notification to the telegraph office of origin of the date and time at which the land station has transmitted the radiotelegram to the mobile station of destination.

- 2091 9th Multiple radiotelegrams.
- 2092 10th Radiotelegrams to be delivered by express or by post (direction ship or aircraft to land).
- 2093 11th De luxe radiotelegrams (subject to the conditions laid down in article 63 of the Telegraph Regulations, Cairo Revision, 1938).
- 2094 12th Radiotelegrams to be retransmitted by a station of the mobile service at the sender's request (= RM =).
- 2095 13th Radiomaritime letters and radio air letters.
- 2096 14th Radiotelegrams to be delivered to the addressee in person.
- 2097 15th Radiotelegrams to be delivered unsealed.
- 2098 § 2. In addition the following paid service indications are admitted in radiotelegrams:
= GP =, = GPR =, = TR =, =TFx = (direction ship or aircraft to land), = Jx = (direction land to ship or aircraft), = Redirected from x = (only when the charge for forwarding can be collected), = Day =. = Night =.
- 2099 § 3. Radiotelegrams are not admitted as letter telegrams. Radiotelegrams to follow the addressee at the request of the sender are not admitted.

ARTICLE 7

Period of Retention of Radiotelegrams at Land Stations

Section I. Radiotelegrams Destined for Ships at Sea

- 2100 § 1. (1) The sender of a radiotelegram destined for a ship at sea may specify the number of days during which the coast station may hold the radiotelegram.

- 2101 (2) In that case, the sender writes before the address the paid service indication =Jx= (x days) specifying the number of days (ten at the most) exclusive of day of handing-in of the radiotelegram.
- 2102 § 2. (1) When it has not been possible to transmit within the prescribed period a radiotelegram bearing the paid service indication =Jx=, the coast station informs the office of origin, which notifies the sender. The latter may ask, by paid service advice telegraphic or postal, addressed to the coast station, that his radiotelegram be cancelled as regards the section between the coast station and the ship station, or kept for a further period of not more than seven days to be transmitted to the ship station. Failing such a request, the radiotelegram is treated as undelivered three days after the despatch of the advice of non-transmission. The office of origin is immediately advised if the coast station transmits the radiotelegram during the above mentioned three days. The same applies when the coast station transmits the radiotelegram during the further period which may be requested by the sender.
- 2103 (2) When a ship station to which is addressed a radiotelegram not bearing the paid service indication =Jx= has not notified its presence by the morning of the fourth day following the date of handing-in, the coast station informs the office of origin, which then notifies the sender. The latter may request, by means of paid service advice telegraphic or postal addressed to the coast station, that his radiotelegram be cancelled as regards the section between the coast station and the ship station, or held until the end of the tenth day, counting from the day following the day of handing-in. Failing such a request, the radiotelegram is treated as undelivered at the end of the seventh day counting from the day following the day of handing-in. The office of origin is immediately advised if the coast station transmits the radiotelegram between the fourth and seventh days from the day following the day of handing-in. The same applies when the coast station transmits the radiotelegram during the period which may have been requested by the sender.

- 2104 § 3. On the morning of the day following that on which a radiotelegram is treated as undelivered the coast station advises the office of origin in order that coast station and ship station charges may be refunded to the sender.
- 2105 § 4. The lapse of any of the periods mentioned in 2102 and 2103 is ignored if the coast station is sure that the ship station will soon come within its range.
- 2106 § 5. (1) On the other hand, the lapse of those periods is not awaited when the coast station is sure that the ship station being in course of a voyage either has definitely left its range of action or will not enter it. If it believes that no other coast station of the administration or of the private enterprise to which it is subject is or will be in touch with it, the coast station cancels the radiotelegram as far as concerns the section between itself and the ship station and informs the office of origin which notifies the sender. In the contrary case, the coast station forwards the radiotelegram to the coast station believed to be in touch with the ship station, provided, however, that no additional charge results therefrom.
- 2107 (2) The coast station which carries out the redirection by wire, alters the address of the radiotelegram by placing after the name of the ship station that of the new coast station charged with the transmission and inserting at the end of the preamble the service instruction "redirected from x Radio" which must be transmitted throughout the course of the radiotelegram.
- 2108 (3) If, within the limits of the requisite period of retention of radiotelegrams, the coast station which has redirected a radiotelegram to another coast station is subsequently in a position to transmit the radiotelegram direct to the mobile station of destination, it does so by inserting the service instruction "ampliation" before the preamble. It shall then transmit to the coast station to which the radiotelegram had been redirected a service notice informing the latter of the transmission of the said radiotelegram.

- 2109 § 6. When a radiotelegram cannot be transmitted to a ship station owing to the arrival of the latter in a port near the coast station, the latter station may, according to circumstances, forward the radiotelegram to the ship station by other means of communication, at the same time informing the office of origin by service advice of the delivery. In this case the coast station charge is retained by the administration to which the coast station is subject and the ship charge is refunded to the sender by the administration to which the office of origin is subject.

Section II. Radiotelegrams Destined for Aircraft Stations in Flight

- 2110 § 7. (1) Radiotelegrams intended for aircraft in flight must be sent by land stations with the least possible delay. When the land station is certain that the aircraft station cannot be reached, it immediately informs the office of origin by service advice, so that the land station and aircraft charges, and any charges for special services not performed, may be refunded to the sender.
- 2111 (2) When, however, a radiotelegram can not be transmitted to an aircraft station due to the latter's arrival at an airport (other than that where the land station happens to be situated) and if the stay of the aircraft is prolonged, the land station may, if necessary, forward the radiotelegram to the aircraft station by other means of communication, and advise the office of origin of this transmission by a service message. In this case, the land station charge is retained by the administration to which the land station belongs, and the aircraft charge is refunded to the sender by the administration to which the office of origin is subject.
- 2112 (3) The radiotelegram may be delivered to the aircraft station at the airport where the land station, which should have made the transmission, happens to be situated.
- 2113 (4) In this case, the land station notifies the office of origin of this delivery by service advice, and the office of origin refunds the land station and aircraft charges to the sender.

ARTICLE 8

**Doubtful Reception. Transmission by "Ampliation"
Long-distance Radiocommunications**

- 2114 § 1. (1) In the mobile service, when communication becomes difficult, the two stations in communication make every effort to complete the radiotelegram in course of transmission. The receiving station may request not more than two repetitions of a radiotelegram of which the reception is doubtful. If this triple transmission is ineffective, the radiotelegram is kept on hand in case a favourable opportunity for completing its transmission occurs.
- 2115 (2) If the transmitting station considers that it will not be possible to re-establish communication with the receiving station within twenty-four hours, it proceeds as follows:
- 2116 *a) If the transmitting station is a mobile station,*
 it immediately informs the sender of the reason for the non-transmission of his radiotelegram. The sender may then request:
- 2117 – that the radiotelegram be transmitted through another land station or through other mobile stations; or
- 2118 – that the radiotelegram be held until it can be transmitted without additional charge; or
- 2119 – that the radiotelegram be cancelled.
- 2120 *b) If the transmitting station is a land station,*
 it applies the provisions of article 7 to the radiotelegram.
- 2121 § 2. When a mobile station subsequently transmits a radiotelegram thus held to the land station which incompletely received it, this new transmission must bear the service instruction "ampliation" in the preamble of the radiotelegram. If the radiotelegram is transmitted to another land station subject to the same administration or the same private enter-

prise, the new transmission must bear the service instruction "ampliation via . . ." (insert here the call sign of the land station to which the radiotelegram was transmitted in the first instance) and the administration or private enterprise in question may claim only the charges relating to a single transmission. The "other land station" which thus forwards the radiotelegram may claim from the mobile station of origin any additional charges resulting from the transmission of the radiotelegram over the general communication network between itself and the office of destination.

2122 § 3. When the land station designated in the address as the station by which the radiotelegram is to be forwarded cannot reach the mobile station of destination, and has reason to believe that such mobile station is within range of another land station of the administration or private enterprise to which it is itself subject, it may, if no additional charge is incurred thereby, forward the radiotelegram to this other land station.

2123 § 4. (1) A station of the mobile service which has received a radiotelegram and has been unable to acknowledge its receipt in the usual way, must take the first favourable opportunity to give such acknowledgment.

2124 (2) When the acknowledgment of receipt of a radiotelegram transmitted between a mobile station and a land station cannot be given direct, it is forwarded through another mobile or land station, if the latter is able to communicate with the station which has transmitted the radiotelegram in question. In any case no additional charge must result.

2125 § 5. (1) Administrations reserve the right to organize a long-distance radiocommunication service between land stations and mobile stations, with deferred acknowledgment of receipt or without any acknowledgment of receipt.

- 2126 (2) When there is doubt about the accuracy of any part of a radiotelegram transmitted under either of these systems, the indication "doubtful reception" is entered on the copy delivered to the addressee, and the doubtful words or groups of words are underlined. If words are missing, blanks are left in the places where these words should be.
- 2127 (3) In the long-distance radiocommunication service with deferred acknowledgment of receipt, when the transmitting land station has not, within a period of 5 days, received the acknowledgment of receipt of a radiotelegram sent by it, the station notifies the office of origin. The reimbursement of the land station and ship or aircraft charges must be postponed until the office of origin has ascertained from the land station in question that an acknowledgment of receipt has not been received subsequently, within a period not exceeding one month.
- 2128 (4) Each administration designates the long-distance land station or stations for which its mobile stations keep watch.

ARTICLE 9

Retransmission by Stations of the Mobile Service

Section I. Retransmission at the Request of the Sender

- 2129 § 1. Stations of the mobile service must, if the sender so requests, serve as intermediaries for the exchange of radiotelegrams originating in or destined for other stations of the mobile service; the number of intermediary stations of the mobile service, is, however, limited to two.
- 2130 § 2. Radiotelegrams forwarded as described in 2129 above must bear, before the address, the paid service indication = RM = (retransmission).
- 2131 § 3. The transit charge, whether two intermediary stations are concerned or only one, is fixed uniformly at forty centimes (0 fr. 40) per word pure and simple, without the collection of a minimum charge. When two stations of the

mobile service have participated this charge is divided equally between them.

Section II. Routine Retransmission

- 2132 § 4. (1) When a land station cannot reach the mobile station for which a radiotelegram is destined and no payment for retransmission of the radiotelegram has been deposited by the sender, the land station may, in order to forward the radiotelegram to its destination, have recourse to the help of another mobile station provided that the latter consents. The radiotelegram is then transmitted to this other mobile station. The help of the latter is given free of charge.
- 2133 (2) The same provision is also applicable to traffic from mobile stations to land stations, when necessary.
- 2134 (3) The station assisting in the free retransmission in accordance with the provisions of 2132 and 2133 must enter the service abbreviation QSP . . . (name of the mobile station) in the preamble of the radiotelegram.
- 2135 (4) In order that a radiotelegram thus forwarded may be considered as having reached its destination, the station which has made use of this indirect route must have obtained the regular acknowledgment of receipt, either direct or by an indirect route, from the mobile station for which the radiotelegram was destined or from the land station to which it was to be forwarded, as the case may be.

ARTICLE 10

Advice of non-delivery

- 2136 § 1. When, for any reason, a radiotelegram originating in a mobile station and destined for a place on land cannot be delivered to the addressee, an advice of non-delivery is addressed to the land station which received the radiotelegram. After checking the address, the land station forwards the advice, when possible, to the mobile station, if necessary, by way of another land station of the same country or of a neigh-

bouring country, as far as existing conditions or special agreements permit.

- 2137 § 2. When a radiotelegram received at a mobile station cannot be delivered, that station so informs the office or mobile station of origin by a service advice. In the case of a radiotelegram originating on land, this service advice is sent, whenever possible, to the land station through which the radiotelegram passed or, if necessary, to another land station of the same country or of a neighbouring country, as far as existing conditions or special agreements permit.

ARTICLE 11

Radiotelegrams Originating in or Destined for Aircraft

- 2138 In the absence of special arrangements the provisions of the Additional Radio Regulations are applicable generally to public correspondence radiotelegrams originating in or destined for aircraft.

ARTICLE 12

Radiocommunications for Multiple Destinations

- 2139 Radiocommunications for multiple destinations shall be carried on in accordance with the provisions of the Telegraph Regulations.

ARTICLE 13

Effective Date of the Additional Radio Regulations

- 2140 These Additional Radio Regulations shall come into force on January 1, 1949.
- 2141 In witness whereof the delegates of the following countries, represented at the International Radio Conference of Atlantic City (1947), have signed in the names of their

respective countries the present Regulations in a single copy which will remain in the archives of the Government of the United States of America and of which a certified copy will be delivered to every country member of the Union.

Done at Atlantic City, the 2nd of October 1947.

The signatures follow.

The countries which signed the Additional Radio Regulations are the same as those which signed the Radio Regulations (see pages 195 to 216), with the exception of Canada, Ecuador, Mexico, Panama, Peru, United States of America, Uruguay and Venezuela (see Reservations I, IV, V, X, XII, XIII, XV and XVI of the Final Protocol to the International Telecommunication Convention).

ADDITIONAL PROTOCOL

to the Acts of the International Radio Conference of Atlantic City, 1947, signed by the Delegates of the European Region

- (1) The undersigned Delegates, Plenipotentiaries of their respective Governments,
- considering that the European Radio Convention of Montreux (April 15, 1939) has not been ratified and that the Frequency Allocation Plan annexed thereto was not applied;
 - considering that European broadcasting on long and medium waves is in fact still governed by the Lucerne Convention (1933) and the Plan attached thereto;
 - recognize the necessity for setting up a new Regional Broadcasting Agreement and a new Frequency Allocation Plan for the broadcasting stations of the European Area, based on the provisions established at the International Radio Conference of Atlantic City (1947);¹⁾ consider that it is advisable to call a meeting of a new European Regional Broadcasting Conference entrusted with the task of drawing up this new Regional Agreement and this Plan and request the Government of Denmark to call this meeting.

¹⁾ *Definition of the European broadcasting area:* The European area is bounded on the west by the western boundary of Region 1. on the east by the meridian 40° E. of Greenwich and on the south by the parallel 30° N., so as to include the western part of the U.S.S.R. and the territories bordering on the Mediterranean, with the exception of the parts of Arabia and Saudi Arabia which are included in this sector.

- (2) They entrust a Committee composed of the delegates of the administrations of the following eight countries:

Belgium, France, Netherlands, United Kingdom of Great Britain and North Ireland, Sweden, Switzerland, U.S.S.R., Yugoslavia, under the chairmanship of Belgium,

with the task of preparing, on the basis of the directives included in the annex attached hereto, a preliminary draft plan for the allocation of frequencies to broadcasting stations and of presenting it to the Government of Belgium not later than March 15th, 1948.

These delegates shall be considered as the representatives of all the countries of the European region.

Any administration of this region wishing to do so, may, at the proper time, and when points of interest to that country are being examined, send a delegation to the Committee to express its views.

The Belgian Government will communicate the preliminary draft to the managing Government of the Conference as well as to all the Governments of the European broadcasting area through the Bureau of the International Telecommunications Union.

- (3) The Committee may decide, by agreement between its members, to call for competent experts.

The Committee shall begin its work on the 15th of January 1948. Its headquarters shall be in Brussels.

For the composition, the preparation and the powers of the new Conference, the undersigned delegates recommend the directives contained in the document attached hereto.

In witness whereof, the delegates of the respective administrations have signed the present Protocol in a single copy which will remain in the archives of the Government of the United States of America, and of which a copy will be delivered to each Party.

Done at Atlantic City, the 2nd of October 1947.

Pour la République Populaire d'Albanie :

Mesodor Haxho

Pour l'Autriche :

Ing. F. Heimeberg.

Pour la Belgique :

R. Borhin

R. Borhin

L. Lambin

Jean Lamber

Pour la République Socialiste Soviétique de Biélorussie :

L. Kostinshko *S. Klementyenko*

Pour la Bulgarie :

B. Thanasie

Pour l'Etat de la Cité du Vatican :

*Philippe Socors
William C. Smith.*

Pour le Danemark :

*W. H. Embell
Jenssen Ledert
H. H. H. H.*

Pour l'Egypte :

*re me
Anabaz
Amis El Bardan
أحمد الباردان*

Pour la Finlande :

V. Ylö-Oja.

Pour la France :

Lassay
Chap
transf

Pour la Grèce :

Stavros Nidis
Georgios Eleftheriou

Pour la Hongrie :

Paul Ivanik

Pour l'Irlande :

J. S. MinicassanLeón O'Brien

Mó Dochartaigh

Pour l'Islande :

Hiddall -
Griener

Pour l'Italie :

G. Guey
Antonio Perrotti
Leone Loring
Luigi Tass
J. Horvath

Pour le Liban :

J. J. L.

Pour le Luxembourg :

Hyacinthe

Pour Monaco :

Arthur Gorette

Pour la Norvège :

Le Rynning-Torresen

Blaf Moe

Andreas Thomsen

N. L. Söberg

Pour le Portugal :

Carlos T. Ribeiro
 Am. B. B. B.
 José Ramos Lacerda
 Am. B. B. B.
 Am. B. B. B.
 Am. B. B. B.

Pour les Protectorats français du Maroc et de la Tunisie :

Pierre Schaeffer

Pour la République populaire fédérative
 de Yougoslavie :

Josip Culjet
 Dr. J. V. Popovic

Pour la République Socialiste Soviétique de l'Ukraine :

M. Golovny M. T. Oukhtom

Pour la Roumanie :

Henri. Lulu

Pour le Royaume-Uni de la Grande-Bretagne
et de l'Irlande du Nord :

A. S. Angwin

J. A. Gracie

Pour la Suède :

Håkan Ståhl

Perst, Hoagnesson

Arthur Omermark

Iven Sejer

Pour la Confédération Suisse :

Alöckli

*Dr. S. W. W. W.
C. Gillioz
Agoldmann.*

Pour la Syrie :

Samih Moursly

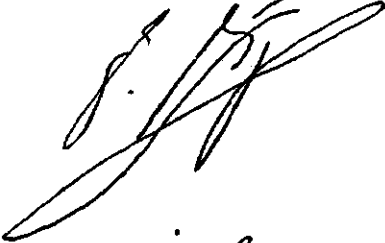
Pour la Tchécoslovaquie :

Ing. Jindřich Krapke,

Ing. J. Křelich

*Ing. Jaromír Jovák
Václav Máš*

Pour la Turquie :

G. Conze

 Nejatlar

Pour l'Union des Républiques Socialistes Soviétiques :

A. D. Gouzenko A. D. Jartoushenn
 M. Kopey L. Kopytin.
 B. Spazny V. Bragin
 M. Kopey F. Ilkovic
 A. V. Nitou A. H. H. H.
 A. H. H. H. A. Chelkine

DOCUMENT

annexed to the
Additional Protocol

Directives for the European Regional Broadcasting Conference**§ 1**

1. The Conference will be composed of representatives of all the countries comprised in the European Area which have signed the International Telecommunications Convention of Atlantic City (1947) or have adhered thereto. The Conference will have the power to invite other countries of the European area.
2. Any extra-European country, signatory of this Convention or which has adhered thereto, shall have the right to be represented at this Conference by observers who will be permitted to attend all meetings of this Conference and to speak on any question which they consider affects the interests of the radio services of their countries. These observers shall not be entitled to vote.
3. The telecommunications operating services of the United Nations shall be entitled to take part in the Conference, in accordance with the provisions of article 41 of the International Telecommunications Convention of Atlantic City (1947).
4. International Organizations, which have so requested, may be authorized to participate in the Conference in an advisory capacity in the manner and to the extent fixed by the Rules of Procedure (see § 12).

§ 2

1. The purpose of the Conference shall be to draw up a new Regional Agreement for European Broadcasting and a Frequency Allocation Plan for the European stations.

2. In principle it shall meet on July 1st 1948 at Copenhagen.

§ 3

1. The Conference, complying with the relative provisions of Chapter III of the Radio Regulations of Atlantic City, will allocate (either in the bands authorized for broadcasting services, or in the bands shared with other services, or in derogation, outside those bands) frequencies below 1 605 kc/s in accordance with the provisions of §§ 7 and 8 below.
2. It will deal with any related questions.

§ 4

1. In taking its decisions, this Conference will have regard to the requirements of all the countries of the European Area ¹⁾.
2. To enable each country to ensure a national service of a reasonably satisfactory quality, the Conference shall make every effort to allocate to each country of the European Area the adequate number of waves adapted to that purpose, and, in particular, one or more exclusive waves if general and technical conditions render this necessary.

It will be advisable to take into account, as equitably as possible, the special conditions of each country on the one hand, and, on the other, the existing economic situation which makes it advisable to introduce the minimum number of changes in the installations in service.

3. Where it is not possible to assign a frequency below 525 kc/s, either in the bands authorized for broadcasting services, or in derogation, outside these bands, to certain countries of which the size and orographical structure may warrant such an allocation, these countries will, so far as possible, receive a frequency from among the lowest in the band from 525 to 1 605 kc/s.

¹⁾ The needs of the United Nations shall be considered as a special case.

§ 5

1. Each country shall communicate its broadcasting requirements as soon as possible, not later than January 1st, 1948, to the Belgian Government which shall transmit them without delay to the Committee of eight countries (see para. 2 of the Additional Protocol).
2. This Committee shall meet in Brussels not later than January 15, 1948, shall proceed to the study of these requirements and shall obtain all other useful information from any available source, if necessary, by calling in experts.
3. It shall, in due time, announce to the various countries that they may send delegates to state their views.
4. The Committee shall then draw up a first preliminary draft of a Plan.
5. It shall forward this preliminary draft to the countries of the European Area through the Belgian Government. Each Government shall have the right, not later than two months after the sending of the Plan, to submit its observations to the Belgian Government so that they may be communicated to the other Governments of the European Area as well as to the Committee of eight countries.
6. In principle, six weeks before the date fixed for the European Conference, the Committee shall meet again in Brussels to proceed to the study of the observations received.
In the case of detailed remarks, the Committee may limit itself to analyzing them in a report.
On the other hand, if the observations are important, the Committee may be disposed to alter its work and to present a second preliminary draft.
7. The final document shall be transmitted to the managing Government of the Conference as well as to the Governments of the countries of the European Area through the Bureau of the International Telecommunications Union.

§ 6

1. In its decisions relative to the allocations of frequencies to the various broadcasting stations, the Conference will apply the rules of the Radio Regulations of Atlantic City destined to regulate and to ensure the better working of broadcasting services. The Conference will fix the upper limit of unmodulated power measured in the aerial of each station for the frequency in question.
2. The arrangement adopted at the Conference will include, among the general rules to be observed in future, provisions similar to those cited above as well as those included in Chapter III of the Radio Regulations of Atlantic City (1947) 89, 90, 96, 242, 243, 245 to 249, and 374.

§ 7

If the European Regional Conference is led to contemplate the use by a broadcasting station of a frequency in one of the bands reserved for other European regional services, the arrangement adopted will stipulate that if this use causes interference which was not foreseen at the time of the admission of the broadcasting station, the administrations concerned will do their utmost to obtain agreements capable of eliminating this interference and, in this case, the authorized services will have the preference in relation to the broadcasting services.

§ 8

If the European Regional Conference is led to contemplate the use by a broadcasting station of a frequency in one of the bands reserved internationally, in the general table of allocation of frequencies, for the mobile services, it will, before coming to a decision, make an exhaustive study of the technical conditions under which this service could be carried out without interference with the authorized inter-

national mobile services and will do its utmost to obtain the agreements necessary to such use. In any case, it is understood that if a broadcasting station thus allowed to use such a frequency, in derogation, should cause interference with another service already authorized, it could not continue to use that frequency unless the interference is eliminated.

§ 9

1. In principle, the power of broadcasting stations must not exceed the value which enables an efficient national service of reasonably satisfactory quality to be economically provided.
2. In virtue of this principle, the Conference will fix for each station or each type of station the maximum authorized power, taking into consideration:
 - a) the conditions of use of waves: exclusive waves, shared waves, synchronized waves;
 - b) the position of frequencies, either in the authorized bands, or in the bands of other services in which exceptions will be admitted;
 - c) special geographical, orographical, demographical, etc., conditions.
3. In principle, the sites of broadcasting stations, and more particularly of those which work near the limits of frequency bands, reserved for broadcasting, must be chosen, with due regard to the power and the frequency, in such a manner as to avoid, so far as possible, interference with broadcasting services of other countries or with other services working on nearby frequencies.
4. In order to use with the maximum efficiency the possibilities which the provisions of the Radio Regulations of Atlantic City (1947) afford, the Conference must take into account, as fully as possible, the most recent state of the technique, particularly as regards:
 - aerials designed to overcome fading,

- directive aerals,
 - synchronisation of groups of national transmitters,
 - wave sharing and utilization of the zone of secondary night sevice,
 - installation of frequency modulation stations.
5. In order to study the possibilities of the exceptional admission of certain broadcasting stations, in bands allocated to other services, particular account will be taken of the following factors.
- a) the intensity of field necessary to ensure normal communication between the stations of the services in question;
 - b) the necessary relation between such intensity and the level of interference;
 - c) the selectivity curves of receivers normally used in those services.

§ 10

The European Conference will fix the date of the entry into force of the new Regional Agreement and of the Plan annexed thereto.

§ 11

Since the work of the Committee of eight countries must be considered as the first stage of this Conference, and the delegates of the various administrations to this Committee must not themselves be considered as authorized agents of their own countries but as entrusted with a work of general European interest, the expenses of this Committee shall in principle, like those of the Conference itself, be borne by all of the European countries.

However, to reduce the expenses indicated to a minimum, it is agreed as follows:

- a) the salaries of the said delegates shall be borne by their administrations;
- b) this shall also be the case with regard to their travelling expenses;

- c) the only reimbursement made to the delegates shall be that of a single and identical contractual allowance in Belgian francs corresponding to the daily travel allowance, calculated only for the days that the delegates are actually in Belgium, at the rate of one delegate per country. The Chairman of the Committee shall fix this allowance, make the calculations for it and come to an agreement with the Belgian Government on the payment, which will be reimbursed to it through the Bureau of the International Telecommunications Union, acting in the name of all the countries participating in the European Regional Broadcasting Conference;
- d) the funds necessary for the operation of the Secretariat, which shall be as small as possible, shall be advanced by the Belgian Government under the same conditions of reimbursement in effect for allowances to the delegates;
- e) if the Committee of eight countries should decide, by agreement among their members, to call for the collaboration of competent experts, it may make a recommendation to the European Regional Broadcasting Conference, concerning the payment of the reasonable expenses of these experts;
- f) the final apportionment of the expenses of the Committee of eight countries and of the Conference itself, shall be made in accordance with the provisions of article 14 of the Telecommunication Convention of Atlantic City (1947);
- g) it may be decided that the international organizations which may in future participate in the Conference will be invited to participate in all of the expenses of this Conference.

§ 12

The Conference shall adopt its own Rules of Procedure.

Reservation

**Made by the Delegation of the Union of Soviet Socialist Republics
Relating to the Additional Protocol to the Acts of the
International Radiocommunications Conference
of Atlantic City, 1947**

The Soviet delegation is in accord with all the decisions of the present protocol, with the exception of § 1 of the directives for the European Conference.

The wording and sense of this paragraph practically exclude several sovereign European Soviet Republics with completely independent broadcasting organizations of their own, from participation in the Conference. Such disregard of the Soviet Republics makes doubtful the possibility of participation in the European Conference of other Soviet Republics as well as the Soviet Union as a whole.

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RECOMMENDATIONS AND RESOLUTIONS

**adopted by the International
Radio Conference**

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**Recommendations and Resolutions
adopted by the
International Radio Conference
of Atlantic City (1947)**

**Recommendation No. 1 to the C.C.I.R.
Relating to International Coordination of
Studies of Radio Propagation**

A. The International Radio Conference of Atlantic City (1947) invites the C.C.I.R. to initiate, and thereafter to continue on a permanent basis, the study of measures for the coordination of observations on propagation carried out by different countries, in order to provide, on a world-wide basis, coordinated data immediately applicable by the telecommunications services and, in a more general way, to ensure the speediest possible progress in scientific knowledge and corresponding techniques.

B. In this respect, the Conference invites the C.C.I.R. to study, in particular, the following questions:

1. Standardization of symbols and of the presentation of the results of ionospheric sounding and, if appropriate, of certain methods of measurement, in order to ensure that measurements from different sources may be directly comparable.

2. Suitability of the geographical locations of existing ionospheric sounding and other observation stations and requirements for future observations at new locations.

3. Coordination of investigations on absorption carried out by means of measurements at vertical and oblique inci-

dence, by recording of field strengths of existing radio stations, or by any other method.

4. Coordination of investigations of natural radio noise.

5. Determination of the best practical means for a rapid exchange, on an international basis, of information of all kinds relating to propagation.

6. Determination of the best practical means for the publication of scientific and technical investigations submitted by participating administrations and, in addition periodical publication of results such as propagation forecasts having immediate application to radio services.

7. Review of the value and importance of various phases of propagation work and of publications relating thereto, and the publication of regular recommendations accordingly.

8. Any other new matter of general interest.

C. In order to attain the maximum possible degree of co-operation with organizations concerned with propagation work such as the International Scientific Radio Union, the Conference invites the C.C.I.R. to consult regularly with such organizations.

Recommendation No. 2 to the C.C.I.R. Relating to Standard Frequency Broadcasts and Time Signals

With a view to determining the technical means appropriate for the realization of the objective specified in appendix B annexed to the Radio Regulations, the International Radio Conference of Atlantic City (1947) invites the C.C.I.R. to:

1. Examine in cooperation with the International Committee of Time and other competent international organizations having a direct and substantial interest in this subject, suitable methods of assuring the coordination of the various standard frequency and time signal transmissions.

2. a) Recommend to administrative conferences of the Union such action as is necessary to attain the objective specified in appendix B.
- b) Study the operation and functioning of the coordinated services of standard frequency and time signal transmissions.
- c) Recommend further improvements to make these services more generally useful.

**Recommendation No. 3 to the C.C.I.R.
on International Monitoring**

The International Radio Conference of Atlantic City (1947) invites the C.C.I.R. to make an urgent study of the following questions:

- a) technical recommendations for a coordinated world-wide service of monitoring to fulfil the requirements stated in appendix C and the provisions of article 18 of the Radio Regulations;
- b) the technical standards and procedures of measurement to be adopted by stations participating in the service, taking into consideration the requirements of the International Frequency Registration Board (such recommendations should indicate the field of activity of each class of station and the technical standards required for each type of measurement undertaken) ;
- c) to recommend the form in which results of observations and measurements should be presented.

**Recommendation No. 4 to the C.C.I.R.
Relating to the Review of Appendices 3, 4 and 5
of the International Radio Regulations**

The C.C.I.R. is invited to study as soon as possible the following questions, arranged according to their urgency.

1. In respect of the various classes of emission in use, determination of:

- the bandwidth strictly necessary to ensure a service of the appropriate quality;
- practical methods of measuring the bandwidth actually occupied by each particular emission.

2. Determination of:

- the bandwidth which should be accepted by the various types of apparatus used for the reception of different classes of emission in the different services;
- the filter characteristics and especially their effectiveness in eliminating interference outside the nominal acceptance band;
- the practical methods of obtaining the necessary characteristics;
- the corresponding methods of measurement.

3. Determination of:

- the level of radio-frequency harmonics radiated by the stations of the different services;
- the level to which it is practicable to reduce such harmonics;
- the methods of achieving this result;
- the corresponding methods of measurement.

4. Consideration of the desirable conditions to be fulfilled by the complete systems employed by the different services in order to determine the required technical performance of the equipment (including the station terminal apparatus and the antennas) and of the measuring apparatus used to ascertain whether the equipment satisfies the recommendations of the C.C.I.R.

The C.C.I.R. is further invited to carry on permanently the study of the above mentioned questions and to publish its recommendations and possible revisions as soon as practicable.

**Recommendation No. 5 to the C.C.I.R.
Relating to the Study of the Efficacy
of Signals MAYDAY and PAN**

The International Radio Conference of Atlantic City
(1947),

considering:

- a) number 873 of the Radio Regulations (Atlantic City Revision), quoted as follows:
"In radiotelephony, the distress signal consists of the word MAYDAY, pronounced as the French expression 'm'aider'";
- b) number 935 of the Radio Regulations (Atlantic City Revision), quoted as follows:
"In radiotelephony, the urgency signal consists of three repetitions of the word PAN, pronounced as the French word 'panne'. It is sent before the call";
- c) a proposal presented during the Conference to substitute the spoken letters SOS for the word MAYDAY;
- d) the reasons, according to those to whom the use of the word MAYDAY presents difficulties, are that this word does not have in all languages the significant meaning of distress, that operators of different nationalities have difficulty in pronouncing and understanding it, and that it is not capable of fully modulating radiotelephone emissions;
- e) a proposal presented during the Conference to replace the word PAN by the word URGENT;

invites the C.C.I.R.:

- to study the suitability of the signals MAYDAY and PAN with a view to determining if other signals are more suitable, and
- to formulate the necessary recommendations.

**Recommendation No. 6 to the C.C.I.R.
Relating to the Watch on the Distress Frequency 2 182 kc/s**

The International Radio Conference of Atlantic City
(1947),

considering:

a) that the Radio Regulations of Atlantic City (1947) designate in 148 the frequency 2 182 kc/s as a world-wide calling and distress frequency in the maritime mobile radio-telephone service in the bands between 1 605 and 2 850 kc/s and regulate its use (article 34) ;

b) that most of the ships equipped to work in these bands are not required by international regulations to carry radio equipment;

c) that the safety of life at sea will be enhanced if watch on the frequency 2 182 kc/s is kept by as many stations as possible;

d) in order that the keeping of this watch may be as economical as possible, it is desirable to envisage the possibility of employing automatic devices for this purpose and further that these may be combined with automatic calling devices;

e) that if such devices are employed, an international warning signal will be required, of which the signal described in 879 of the Radio Regulations may be a part;

invites the C.C.I.R.:

to study the possibility of ensuring the watch on the frequency 2 182 kc/s by the aid of automatic devices, and if a practical solution is found, to make the necessary recommendations.

**Recommendation No. 7 to the C.C.I.R. Relating
to the Standardization of Performance Requirements for
Radiophoto Equipment**

The International Radio Conference of Atlantic City
(1947),

considering:

- a) that the standardization of the performance requirements for radiophoto and telephoto equipment would promote efficiency in use of the equipment and spectrum space, and would facilitate the inter-connection of radio circuits with wire line systems;
- b) that this standardization was the subject of question No. 18 on the Agenda of the meeting of the C.C.I.R. in Bucharest (1937);

invites the C.C.I.R.:

- a) to study, in conjunction with the C. C. I. T. if necessary, the standardization of the performance requirements of radiophoto and telephoto equipment;
- b) to make the necessary recommendations.

**Recommendation No. 8 to the C.C.I.R.
on Desired to Undesired Signal Ratio for Each One of the
Services Which Share a Band of Frequencies and on the Per-
missible Frequency Tolerance for the Services that Share the
Frequency Bands with Broadcasting Services.**

The International Radio Conference at Atlantic City (1947),

considering:

- a) that in the allocation table it has been provided that certain bands shall be shared by different services;
- b) that the principle of equality of right to operate on the basis of non harmful mutual interference between the services has been agreed upon;
- c) that the ratio of the desired signal to the undesired signal in each service is different because the basic requirements of the various services are different, e.g., the requirement for fixed service being intelligibility whereas that for broadcasting includes also fidelity; that also certain services require intelligibility at one point and broadcasting requires equally good reception over an extended area;

requests the C.C.I.R. to study and formulate recommendations on:

- 1) - desired to undesired signal ratio for each service, which defines the threshold of harmful interference.

In this connection, consideration should be given to appendix 2 of the annex to the Resolution relating to the Preparation of the new International Frequency List.

- 2) - permissible frequency tolerance for the service that share the frequency bands with broadcasting services to ensure the realisation of the recommendations regarding 1) in practice.

In this connection, consideration may be given to Document No. 61 of the International High Frequency Broadcasting Conference of Atlantic City (1947) (Curve of Ratio between the Interfering Field and the Desired Field).

Recommendation to the International Maritime Organization, when formed, and to the International Code of Signals Committee.

The International Radio Conference of Atlantic City (1947),

considering:

- (1) that an International Maritime Consultative Organization is to be established in the near future;
- (2) that the International Code of Signals was designed primarily for the use of mariners;
- (3) that endeavour has been made, but without success, to make the International Code of Signals suitable for the use of aircraft;
- (4) that the expansion and development of the "Q" code for the use of aeronautical services is now well advanced;
- (5) that the International Code of Signals is likely therefore to remain of interest only to mariners;

is of the opinion that no useful purpose would be served in associating the International Code of Signals Committee directly with the International Telecommunications Union;

suggests:

that the International Code of Signals Committee should affiliate with the International Maritime Organization upon the formation of the latter.

The Conference requests the Secretary General of the International Telecommunications Union to communicate this suggestion to the International Maritime Organization, upon its formation, and to the International Code of Signals Committee.

**Recommendation to the Governments Signatory to the International
Convention for the Safety of Life at Sea and to the Governments
Members of the International Civil Aviation Organization**

Coded Passive Reflectors

The International Radio Conference of Atlantic City
(1947) ;

considering:

- a) that the indiscriminate erection of passive reflectors may cause confusing indications in the radiolocation service when it makes use of such reflectors;
- b) that the preparation of regulations for control of the location of radionavigation apparatus such as passive reflectors appears to relate to the Convention for the Safety of Life at Sea and the International Civil Aviation Organization ;

recommends:

That the next Safety of Life at Sea Conference and the International Civil Aviation Organization include, within their regulations, provisions:

- a) to prevent the unauthorized erection of coded passive reflectors;
- b) to ensure that coded passive reflectors are so located as not to cause confusing indications in the radio location service.

**Recommendation Relating to a New Method of Generating
Call Signs**

**The International Radio Conference of Atlantic City (1947),
*considering that:***

1. the delegate of the Republic of the Philippines has proposed an entirely new method of forming call signs (Doc. No. 358 R-E, Proposal No. 2519 R-E) ;
2. this proposal, in particular, provides that the call signs for each country, or its territories or possessions should be identified by the group of the first two letters exclusively allocated to that country, its territories or possessions ;
3. the new method proposed permits the identification of the nationality of stations more readily than the system at present in use ;
4. the system now in use for the formation of call signs, as well as the new table of allocation of call signs, will only satisfy temporarily the needs for call signs ;
5. the proposal of the Republic of the Philippines may offer a solution to many of the existing difficulties ;
6. the adoption of the principles contained in this proposal would necessitate an almost complete change of call signs throughout the world ; and
7. in view of the considerable amount of work which such a change would impose on administrations, the Conference has hesitated to adopt the proposal ;

recommends that:

1. all countries should make a careful study of Proposal No. 2519 R-E submitted by the Republic of the Philippines prior to the convening of the next Radio Conference ; and

2. should some future Radio Conference consider it necessary to revise the Table of Allocation of Call Signs (article 19), particular attention should be given to this proposal, or to any similar proposals, intended to establish a method of formation of call signs which will solve, as far as possible, the problem of allocation of call signs and so avoid their periodic re-arrangement.

**Resolution Relating to the Preparation of the New International
Frequency List**

Whereas:

A. In order to provide a basis for the formulation of a new International Frequency List, countries participating in the Atlantic City Radio Conference have undertaken to furnish Committee 6 of the Conference by September 15, 1947, with information regarding circuit requirements for fixed stations, together with information regarding requirements for tropical broadcasting stations and all classes of land stations, shown on Forms 1 and 2 formulated by Committee 6.

B. These countries have found that the compilation of such a List is necessary in order to implement the application of the Atlantic City allocation table.

C. These countries have agreed that the compilation of such a List is necessary in order that the International Frequency Registration Board (I.F.R.B.) may function most effectively.

D. The compilation of world frequency requirements as an initial step in the compilation of a new List has now begun and is hoped to be completed by October 15, 1947, and to be published and circulated by January 1st, 1948.

E. It is recognized that it is essential to continue the work of preparing a new frequency list with minimum delay upon the conclusion of the Atlantic City Radio Conference.

F. It is recognized that until frequency assignments for all services can be completely engineered, it will not be cer-

tain that the most effective use possible can be made of the frequency spectrum or that the frequency requirements of any service can be satisfied.

G. It is recognized that it is necessary that an appropriate international group or committee continue with the preparation of the new International Frequency List after the close of the Atlantic City Radio Conference in order that such a List may be available for review and approval at a special international conference to be called for that purpose.

Therefore, it is resolved that:

§ 1. A Board, to be designated the Provisional Frequency Board (P.F.B.), shall be established, and shall be charged with the preparation of a draft new International Frequency List. This Board shall have as members:

- a) Members of the International Frequency Registration Board (I.F.R.B.), hereinafter referred to as "International members".
- b) Representatives of Administrations which have expressed a desire to have their experts participate in the work, hereinafter referred to as "National members".

- § 2.
- a) To enable the members of the I.F.R.B. to participate as members in the work of the P.F.B. (as provided for in § 1 a) above), the Radio Conference shall recommend to the Plenipotentiary Conference that the I.F.R.B. shall be established as from 1st January 1948.
 - b) If this recommendation is accepted by the Plenipotentiary Conference, the members of the

I.F.R.B. shall assemble at the seat of the International Telecommunications Union on 8th January 1948.

- c) In the work of preparing the new International Frequency List the members of the I.F.R.B. in their capacity as International members of the P.F.B., shall be authorized to observe the directives to the P.F.B. laid down in subsequent paragraphs of this resolution. However, they shall act, both in discussions and in voting, as international officials and not as representatives of their country or region.

§ 3. (1) To enable representatives of administrations to participate as National members in the work of the P.F.B. (as provided for in § 1 b) above), any country, signatory to the Atlantic City Radio Regulations, which desires to do so, shall designate one representative, who is technically expert and experienced in frequency assignment problems to serve on the P.F.B. Any such National member may attend for the whole or part of the period required for the drafting of the new International Frequency List. Each National member may be assisted by such advisers as desired. A country may, if it desires, designate a National member from another country to represent its interests. Where an international regional organization of telecommunications exists, this regional organization may send a duly qualified representative to participate in the work of the P.F.B.

(2) Each administration shall advise the Bureau of the Union, before October 31, 1947, whether it intends to send a representative to the P.F.B. to serve as a National member, and, if so, of the number of advisers who will also attend.

Each administration shall also advise the Bureau of the Union before December 31, 1947, whether its interests

will be represented by a National member of another country and, if so, the name of the country concerned.

§ 4. The Chairman of the I.F.R.B. shall be the Chairman of the P.F.B.

§ 5. The P.F.B. shall adopt any necessary rules of procedure provided that these are not inconsistent with the general rules annexed to the Convention or those laid down in this resolution.

§ 6. The P.F.B. shall arrive at its conclusions, as a general rule, by unanimous agreement. Any member of the P.F.B. may have a statement included in the report of the P.F.B. giving his views on any matter on which unanimous agreement has not been obtained. Should, however, a vote on any matter concerning the preparation of the new frequency assignment plan prove to be necessary, a decision shall be taken by a simple majority of those present and voting. In such a vote:

- a) each International member may cast a single vote, as an International official, in accordance with the provision of § 2 c);
- b) each National member of the P.F.B. may cast a single vote as a representative of his country;
- c) each National member of the P.F.B. who is duly authorized to represent other countries may in view of the long period during which the P.F.B. is expected to be in session, cast a single vote on behalf of each such country, subject to the proviso that no member may cast more than two such proxy votes in addition to the vote cast for his own country;
- d) representatives of international regional organizations of telecommunications may not vote.

§ 7. Each country shall defray the salary and expenses of its representative who will serve as a National member of the P.F.B. and of his advisers. The expenses of representa-

tives of international regional organizations shall be defrayed by the organization concerned.

§ 8. All other expenses of the P.F.B. shall be defrayed by the Union.

§ 9. The P.F.B. shall receive from the Bureau of the Union, such secretarial assistance as is necessary for the efficient carrying out of its work.

§ 10. The P.F.B. shall convene at the seat of the International Telecommunications Union on January 15, 1948.

§ 11. The P.F.B. shall have as its objective the preparation of an International Frequency List based on an engineering plan which will improve the utilization of the radio spectrum by providing for the continued operation of all services in every country, while eliminating harmful interference. In addition, the P.F.B. shall endeavour, in formulating such a plan, to make adequate provision for the future development of new radio services and the expansion of existing services, so that all countries may improve and increase their services to the fullest extent practicable. The P.F.B. shall treat communications services which were interrupted by the World War II and which have not yet been restored, on the same basis as existing services, and, in addition, shall give special consideration to the needs of countries where natural developments have been impeded, especially as a result of the World War II.

§ 12. The P.F.B. shall operate under the following directives:

- a) Before undertaking the preparation of a new Frequency List, the P.F.B. shall determine in detail the engineering framework to be applied in the preparation of such a List. The engineering principles shall be based, among other things, on the technical regulations and recommendations adopted by the Atlantic City Radio Conference. The formulation of the engineering framework shall be completed by the 15th of March 1948.

- b)* In preparing the draft new International Frequency List, the P.F.B. shall be guided solely by the following considerations:
1. conformity with the Atlantic City allocation table;
 2. conformity with the engineering principles referred to in *a)* above, so as to make provision for all requirements while avoiding harmful interference;
 3. the P.F.B. shall be free to recommend changes to any existing frequency assignments. Nevertheless, in preparing the final draft List for consideration at the International Conference, the Board shall take account as far as possible of the existing utilization of frequencies and the undesirability of making unnecessary changes.
- c)* The P.F.B. shall deal, in principle, with assignments of frequencies to fixed, tropical broadcasting and land stations within the frequency band included between 10 kc/s and 30 Mc/s. See article 6 of the annex to this resolution for the details of the frequency bands to be considered by the P.F.B.
- d)* In preparing the new Frequency List, the P.F.B. shall take as a basis for this work the requirements submitted on Forms 1 and 2 by the various countries.
- e)* The P.F.B. may request from any administration information, additional to that furnished at the Atlantic City Radio Conference, regarding the operation of any circuit if it deems such to be necessary in connection with the work of preparing the new International Frequency List.

- f)* The new International Frequency List shall be prepared in the form prescribed by the Atlantic City Radio Conference.
- g)* The aim shall be to complete the drafting of the new International Frequency List, if possible, by 15 November 1948.

- § 13.
- a)* Assignments entered on the new List in the band set forth in § 12 *c)* above shall bear dates as follows:
 - b)* Entries made by the P. F. B. and approved by the Special Conference shall be dated as of the date of approval of the List by the Special Conference; however, should subsequent changes prove to be necessary in the light of actual harmful interference, it is desirable that the original date of bringing the frequency into use should be taken into consideration.
 - c)* Entries approved by the Special Conference which result from notifications of assignments in the band set forth in § 12 *c)* above, which are filed with the Bureau of the Union during the period between the closing date for Forms 1 and 2 and the opening date of the Special Conference shall also be dated as of the date of approval of the List by the Special Conference.
 - d)* No entries of assignments in the band set forth in § 12 *c)* above shall be made on the basis of notifications filed while the Special Conference is in session. Such notifications shall be administered by the I.F.R.B. after the close of the Special Conference and shall bear such date as is provided for in the statutes of the I.F.R.B., but in no event shall this date be prior to the close of the Special Conference.

§ 14. If the P.F.B., after having done its utmost to assign the frequencies on a sound engineering basis, meets with cases which cannot be resolved in a satisfactory way, considera-

tion shall be given among other things, in the light of the general aim of the P.F.B., to the dates of notification contained in the archives of the B.U.I.T., as well as to the priority of establishment of the circuits under consideration.

If the P.F.B. is unable to decide in such cases on the entry to be made, such assignments will be dealt with by the Special Conference.

§ 15. On January 1, 1949, if possible, and, at the latest, three months after the date of completion of the draft of the List provided for under 12 g) above, the Bureau of the Union shall furnish by air mail all members of the Union with copies of this draft List. The Special Conference planned for study of this draft shall be convened on March 3, 1949, if possible, or, at the latest, two months after the draft List is sent out.

§ 16. During the period the new List is being prepared by the P.F.B., notices of frequency assignments in the band set forth in § 12 c) above shall be made in conformity with the Cairo Radio Regulations and sent to the Bureau of the Union for publication as at present. At the time the notice of a frequency assignment is sent to the B.U.I.T. a parallel notification on the appropriate Form 1 or 2 shall be sent to the P.F.B. After the preparation of the new List by the P.F.B. the Special Conference shall determine the procedure to be followed in incorporating into such List the foregoing assignments for meeting requirements for operations which were activated during the period between the closing date of Forms 1 and 2 and the opening of the Special Conference.

§ 17. During the period between the date on which the P.F.B. completes its preparation of the new List based on requirements set forth in Forms 1 and 2 and the date on which the Special Conference is convened, the P.F.B. shall give consideration to assignments in the band set forth in § 12 c) above, which are filed between the closing dates for Forms

1 and 2 and the convening of the Special Conference, in order to formulate recommendations to the Special Conference for the incorporation in the first edition of the new List the assignments so notified. During this period, the P.F.B. shall also give consideration to the precise procedure to be followed in order to give effect to the new International Frequency List and shall make recommendations accordingly to the Special Conference.

§ 18. The date upon which the new International Frequency List shall become effective shall be the subject of a recommendation of the P.F.B. to the Special Conference. In formulating this recommendation the P.F.B. will take into consideration the urgent need for implementation which should be commenced, if possible, by September 1st 1949.

§ 19. For the information of countries not directly represented on the P.F.B. the Board shall, every two months from May 15th 1948 onwards, draw up a progress report of its work. The Bureau of the Union shall send these reports by air mail to all member countries of the Union.

§ 20. If harmful interference develops after the effective date of the new List, from operation on frequencies, all of which are entered in the registration column of the new List, the problem may be referred to the I.F.R.B. by one or more interested countries for action in accordance with the procedures prescribed for the I.F.R.B.

§ 21. The P.F.B. shall dissolve on the date when the new List is accepted and approved by the Special Conference and members of the I.F.R.B. shall thereafter cease to be bound by the directives contained in this resolution.

Annex to Resolution**Directives for the Provisional Frequency Board (P.F.B.)*****Art. 1. Compilation of Requirements.***

1. The Atlantic City International Radio Conference has, through its Committee 6, compiled the requirements for fixed and tropical broadcasting stations on Form 1 as attached, and for land stations on Form 2, received up to September 15th 1947; and they have been transferred to the Bureau of the International Telecommunication Union (B.U.I.T.).
2. The B.U.I.T. shall arrange for the combination of the circuit and frequency requirements of all administrations into comprehensive lists and this work shall be carried out by mechanical means in order that any desired sorting and listing of the separate items of information can be made.
3. The B.U.I.T. shall circulate as early as possible to all members of the I.T.U. lists of the circuit requirements furnished to the Conference on Forms 1 and 2 arranged in alphabetical order of countries.
4. By 15th January 1948 the B.U.I.T. shall provide the P.F.B. and all members of the I.T.U. with lists by frequency order for each of the following categories of stations: fixed stations, tropical broadcasting stations, aeronautical stations, coast stations, and other land stations.
5. The P.F.B. shall indicate to the B.U.I.T. which other lists of requirements it desires to have compiled, such as lists by circuits, by geographical regions, by distance, or by any other desired group or category.

Art. 2. Technical principles

The following principles shall be applied by the P.F.B. for the preparation of a draft International Frequency List:

- a) The maximum use of frequencies shall be obtained by geographical duplication and time sharing as far as practicable.

- b) The minimum band- or channel-widths and tolerances appropriate to the type of communication, consistent with the state of the art, shall be applied.
- c) The minimum number of frequencies necessary to provide a service in accordance with sound engineering principles shall be utilized, taking into account the power of the transmitter and the directive properties of the antenna.
- d) International fixed circuit requirements submitted by each country shall be reviewed to ensure technical correlation between countries operating both ends of the circuit (with the exclusion of unilateral services of radio communication).
- e) Frequency assignments solely as a guard against interference shall be eliminated, since interference will be reduced by proper assignment on an engineering basis.
- f) Frequency space used for guard band purposes shall be reduced to a minimum consistent with the service required.

Art. 3. Technical data.

The Atlantic City International Radio Conference has, with regard to standards of satisfactory service and the separation of assigned frequencies, given consideration to:

- 1. Tolerable signal-to-interference ratio.
- 2. Conditions for entirely satisfactory service.
- 3. Fading.
- 4. Diversity help.
- 5. Allowance for directive antennas.
- 6. Spacing of adjacent channels.
- 7. Grouping of assignments for best results.
- 8. Frequency space required for minimum guard bands.

These considerations and the resulting technical data are contained in appendix 1 to this annex which the P.F.B. shall take into account as a guide as far as practicable.

Art. 4. Propagation Aspects.

The Atlantic City International Radio Conference has, with regard to the propagation aspects involved in the selection of frequencies and the simultaneous and non-simultaneous use of frequencies, given consideration to:

- a) The procedure for selecting frequencies for a given circuit.
- b) The conditions where world-wide frequency sharing is known to be readily possible.
- c) The procedure to be used to decide if and how frequency sharing is possible in other cases.

These considerations and the resulting technical data are contained in appendix 2 to this annex which the P.F.B. shall take into account, together with additional charts now being prepared, as a guide as far as practicable.

Art. 5.

The P.F.B. shall give attention to all final documents produced during the Atlantic City Conferences (International Radio Conference, Plenipotentiary Conference, and High Frequency Broadcasting Conference) in so far as such documents have a bearing on a frequency assignment plan and have not already been adopted in a binding form by any of said Conferences.

Art. 6. Frequency bands to be dealt with by the P.F.B.

a) Pursuant to § 12 c) of the resolution, the P.F.B. shall prepare a plan covering frequency assignments in the following bands under the conditions specified in the Atlantic City Regulations:

26-E

14	-	150	kc/s	
2 850	-	3 155		
3 400	-	3 500		
3 900	-	4 000	For Regions other than Region 2.	
4 000	-	4 063		
4 063	-	4 438		
4 438	-	4 650		
4 650	-	4 750		
4 750	-	4 850		
4 850	-	4 995		
5 005	-	5 250		
5 250	-	5 480		
5 480	-	5 730		
5 730	-	5 950		
5 950	-	6 200		
6 200	-	6 525		
6 525	-	6 765		
6 765	-	7 000		
7 100	-	7 300	Broadcasting as stipu- lated in the Atlantic City allocations table.	
7 300	-	8 195		
8 195	-	8 815		
8 815	-	9 040		
9 040	-	9 500		
9 500	-	9 775		
9 775	-	9 995		
10 005	-	10 100		
10 100	-	11 175		
11 175	-	11 400		
11 400	-	11 700		
11 700	-	11 975		
11 975	-	12 330		
12 330	-	13 200		
13 200	-	13 360		
13 360	-	14 000		

27-E

14 250 - 14 350 Fixed stations in the
U.S.S.R.

14 350 - 14 990
15 010 - 15 100
15 100 - 15 450
15 450 - 16 460
16 460 - 17 360
17 360 - 17 700
17 700 - 17 900
17 900 - 18 030
18 030 - 19 990
20 010 - 21 000
21 450 - 21 750
21 750 - 21 850
21 850 - 22 000
22 000 - 22 720
22 720 - 23 200
23 200 - 23 350
23 350 - 24 990
25 010 - 25 600
25 600 - 26 100
26 100 - 27 500

The frequency bands excluded from the above list are those which will be dealt with by regional administrative conferences or bands in which specific assignments are not required as in the case of amateur and standard frequency broadcast services.

b) It is contemplated that the High Frequency Broadcasting Conference will deal with assignments in the following exclusive high frequency broadcasting bands:

5 950 - 6 200 kc/s
9 500 - 9 775
11 700 - 11 975
15 100 - 15 450
17 700 - 17 900
21 450 - 21 750
25 600 - 26 100

(In addition, the shared band 7 100 – 7 300 kc/s, as stipulated in the Atlantic City allocation table.) If the High Frequency Broadcasting Conference decides to that effect, the P.F.B. would also deal with assignments to High Frequency Broadcasting.

c) If it is decided that a separate international administrative aeronautical conference under the auspices of the I.T.U. should be held, then that conference should deal with assignments in the following exclusive aeronautical mobile frequency bands:

<i>Frequency Band</i> kc/s	<i>Allocation</i>
2 850 – 3 025	R
3 025 – 3 155	OR
3 400 – 3 500	R
4 650 – 4 700	R
4 700 – 4 750	OR
5 480 – 5 680	R
5 680 – 5 730	OR
6 525 – 6 685	R
6 685 – 6 765	OR
8 815 – 8 965	R
8 965 – 9 040	OR
10 005 – 10 100	R
11 175 – 11 275	OR
11 275 – 11 400	R
13 200 – 13 260	OR
13 260 – 13 360	R
15 010 – 15 100	OR
17 900 – 17 970	R
17 970 – 18 030	OR

d) If it is decided that a separate international administrative maritime conference under the auspices of the I.T.U. should be held, then that conference should deal with assignments in the following exclusive maritime mobile frequency bands:

4 063 – 4 438 kc/s
6 200 – 6 525

8 195 - 8 815
12 330 - 13 200
16 460 - 17 360
22 000 - 22 720

e) Assignment plans prepared by administrative (regional or service) conferences within the framework of the I.T.U. for the regional or exclusive service bands, and therefore not dealt with by the P.F.B., shall be submitted to the P.F.B. for incorporation in the draft new International Frequency List. However, in any event, the P.F.B. shall have the responsibility for preparing any plans required for the bands stipulated in § 6, a) which are not prepared as a result of the conferences envisaged in § 6, b), c) and d). Additionally it shall have the responsibility for integrating all the plans which it prepares itself with any plans which may be prepared as a result of administrative (regional or service) conferences.

f) In view of the fact that the P.F.B. will be preparing a draft assignment plan for the bands of Atlantic City frequency allocation table which are shared between broadcasting and other services and since C.C.I.R. will not be able to consider in time Recommendation No. 8, the P.F.B. will formulate and apply provisional standards for the preparation of the draft assignment plan, in accordance with said Recommendation No. 8.

Clase de estaciones)
 Class of stations)
 Classe de stations)

País)
 Country)
 Pays)

Número del circuito Circuit number Numéro de la liaison	Ubicación del transmisor y de la terminal emisora Transmitter location and transmitting terminal Emplacement de l'émetteur et du point terminus	Ubicación del receptor, terminal o región de recepción Receiving location, terminal or region of reception Emplacement du récepteur ou du point terminus, ou région dans laquelle il se trouve	Distancia km Distance km Distance km	Tipo de emisión Type of emission Type of emission Type d'émission	Ancho de banda Band width Largeur de la bande (kc/s)	Horario de operación del circuito TNG Schedule of circuit operation GMT Horaire de travail de la liaison TNG	Ángulo de la antena Antenna Azimuth Azimut de l'antenne	Potencia del transmisor en kW Power into antenna kW Puissance dans l'antenne en kW
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Page No.)
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Frecuencia - Frequencies - Fréquences

Frecuencias en uso o previstas Frequencies in use or proposed for use Fréquences en service ou prévues (kc/s)	Fechas - Dates - Dates		Horas de uso según la actividad solar TNG (se posible)				Circuitos que emplean la misma frecuencia		Frecuencias deseadas en Mc/s Mc order of frequency desired Fréquence optima (ordre de grandeur) en Mc/s	Observaciones Remarks Observations	
	De notificación a la B.U.I.T. (optional) Notification to B.U.I.T. (optional) De notification au B.U.I.T. (facultative)	Prevista para entrar en servicio To be put into use Prévue de mise en service	Junio		diciembre		Simultaneament	Tiempo compartido			
			Max.	Min.	Max.	Min.					
			Hours of use throughout sunspot cycle GMT (if possible)								Circuit cross index number(s)
			June		December						
			Max.	Min.	Max.	Min.	Simultaneament	Time sharing			
			Horaire de chaque fréquence selon l'activité solaire TNG (si possible)				No. des autres liaisons utilisant la fréquence				
			juin		décembre		Simultaneament	Part variations			
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	

APPENDIX 1

For the purpose of providing data to be used for frequency assignments, consideration has been given to the following subjects:

1. Tolerable signal-to-interference ratio.
2. Conditions for entirely satisfactory service.
3. Fading.
4. Diversity help.
5. Allowance for directive antennas.
6. Spacing of adjacent channels.
7. Grouping of assignments for best results.
8. Frequency space required for minimum guard bands.

Case I. Simple Telegraphy

1. Tolerable Signal-to-Interference Ratio

For a simple telegraph transmission in which the radio-frequency output of the transmitter is turned on and off in order to form the dots and dashes, it would be possible in an ideal case, using automatic recording, to tolerate interference from another similar telegraph service which was only slightly more than 6 decibels below the desired signal. However, this is an extremely idealized condition and makes no allowance for the practical variations of conditions such as biasing potentials that occur in actual equipment. The amount of allowance needed is a matter of practical experience, and the best consensus of opinion seems to indicate that satisfactory performance may be had when the interfering signal is always at least 10 decibels below the desired signal in the case where they are both operating on the same frequency.

2. Conditions for Entirely Satisfactory Service

Here it can be said at the outset, and in extension of the above paragraph, that satisfactory service will be provided in those cases where any type of interference is sufficiently weak enough so that the power introduced into the receiver by the interfering wave, whatever its character, is always at least ten decibels below the power introduced by the desired signal, at the time when the desired signal is a minimum. Stated more precisely, the radio-frequency power available in the receiver, averaged over a cycle at the time when the amplitude of the interfering wave is a maximum, is at least 10 decibels below the available power of the desired signal, averaged in the same manner, at the time when the desired signal is a minimum. By following this rule, the simple case of interference by telegraphy operating on the same channel may be broadened to include telegraphy on adjacent channels or telephony on the same or adjacent channels, or even noise. In the case of noise the effective peak value of the powers may usually be taken about 10 decibels higher than the average value. Some numerical examples showing how this rule may be applied are given below in connection with item 6.

3. Fading

Telegraphy suffers to a considerable extent from high-speed fading which in turn, varies with many factors, including the path length, the sun spot conditions, the time of day, and of year, and the frequency employed. It would be almost impossible to take all of these things into account in making frequency assignments and, consequently, an overall figure must be sought which will ensure that a sufficiently large allowance has been made to provide satisfactory service for a sufficiently large percentage of the time. Review of existing data indicates that for transmissions between 6 and 25 Mc/s, and over distances of more than 1000 kilometres, an allowance of 35 decibels should be adequate most of the time for two

adjacent telegraph channels. Methods of applying this to specific calculations are illustrated in item 6 below.

4. Diversity Help

The advantage obtainable from diversity reception of telegraph signals depends, also, upon a large number of conditions, but, as an overall working figure, it seems safe to say that its use will allow 10 decibels to be subtracted from the fading figure of 35 decibels quoted in item 3, giving a net effective value of 25 decibels.

5. Directive Antennas

The best way to allow for the effect of directive antennas would seem to be to determine the field strengths of the desired and interfering signals and then to modify the ratio of their values by the relative directive gains of the antennas in the directions of arrival of the desired and interfering signals. In order to allow for the possibility of variations in the angle of arrival of the interfering signals, the gain in that direction should be taken as the greatest value within a solid angle of at least 10 degrees. This modified ratio may then be used in the calculations of item 6 to give the required spacing of adjacent channels. For example, if the field strength of the desired signal is 10^{-3} volts per metre and of the interfering signal is 2×10^{-3} volts per metre, and the antenna has a gain of 20 decibels for the desired signal, but of only 5 decibels for the undesired one, then the relative fieldstrength ratio of +6 decibels may be changed by 15 decibels giving an effective ratio of -9 decibels for the interference relative to the desired signal.

Gains obtained with different types and sizes of antennas vary over a considerable range of values. For the frequency range between 6 000 and 25 000 kilocycles and in the absence of specific data concerning the actual antenna used, it is estimated that an allowance of 10 decibels might be made for protection against interfering signals arriving from direc-

tions differing by more than 15 degrees from that of the desired signal.

6. Spacing of Adjacent Channels

The basis for the determination of the required spacing of adjacent channels, in order that satisfactory service may be provided, may be explained as follows with reference to the accompanying curves.

Figure I shows curves giving the envelopes of the Fourier spectra of the emission resulting from several shapes of a single telegraph dot. For the upper curve, the dot is taken to be rectangular and its length, t , is one-half of the period corresponding to the fundamental dotting frequency. Thus, if T is the period of this fundamental, and B is the dotting speed, in bauds, we have $B = 1/t = 2/T$. For the lower curve in the figure the shape of the dot is taken to be slightly rounded. It is important to note that for large values of the abscissa, f/B , the slope of the upper curve approaches 6 decibels per octave; while the lower curve approaches 9 decibels per octave.

As a next step in the illustration, a receiver fitted with filters is considered. These filters are idealized to the extent that their acceptance band is taken to be 5 units wide in terms of f/B . This is equivalent to saying that they accept the fifth harmonic of the dotting frequency. This cut-off characteristic which corresponds quite closely to the filters ordinarily used in present-day practice has a slope of 30 decibels per octave, measured from the mid-band frequency.

The mid-band frequency of these receivers is then taken as being located at various frequencies in relation to the transmitter frequency, and the resulting acceptance spectrum is found in each case. By determining the area under the derived curves of received energy versus frequency separation between transmitter and receiver, a number of values of power are obtained which may be plotted as shown in Figure 2.

This graph shows the received power as a function of frequency separation between the transmitter frequency and the mid-band frequency of the receiver, and forms the basis for

the calculation of required separation for adjacent channels. The figure gives curves for rectangular dots, and for slightly rounded dots, calculated as above, both for ordinary and for high-grade filters in the receiver. In addition, a curve has been added which applies to a transmitter whose rectangular dots have been passed through a filter with a pass band equal to the necessary band of the system as given in appendix 5 of the Radio Regulations (that is, 5 units on the f/B scale) and which, outside of the pass band, has an attenuation of 30 decibels per octave.

For most actual transmitters, the curve for rectangular dots should be used, since some of them exhibit even somewhat broader spectra. The curve for the slightly rounded dots applies only to a few of the present-day transmitters.

The curve referring to the filtered dots applies to transmitters which it may be anticipated will be built in not too distant future. These would have to comprise linear high-frequency amplifiers following the filters in order to avoid any alterations to the shaping of the dots. (In telegraphy using frequency-shift keying, the analogous technique is somewhat easier to carry out).

The method of using Figure 2 may be illustrated by a few examples.

Example 1. *Equal fields.*

In this case, with rectangular dots and no fading, in order to obtain the required 10-decibel discrimination against the unwanted signal, the frequency separation between channel assignments would have to be 3.6 units in terms of f/B . For a telegraph speed of 170 bauds this would require that the assignments differ in frequency by 3.6×170 or 612 cycles per second.

On the other hand, when the fading allowance of 35 decibels is included in addition to the 10 decibels for tolerable interference the separation becomes 125 units, that is 125×170 or 21 250 cycles per second. With slightly rounded dots, under the same conditions, this decreases to approximately 4 600 cycles per second. In all cases, the

frequency tolerance allowance must be added to these figures.

With the fading allowance of 35 decibels, the filtered dots would require a value of f/B should be 7.2, from which it follows that a frequency separation of 1 224 cycles per second is all that is required.

Example 2. *Unequal fields.*

The calculation here follows the same lines as the previous one. When the interfering signal is 20 decibels stronger than the desired one, then with 35 decibels for fading and 10 decibels for required discrimination, the level on the abscissa scale of the figure would be of $20 + 35 + 10$, or 65 decibels. For the slightly rounded dots, the value required for f/B is then 125 so that, for a speed of 170 bauds, the separation would have to be 21 250 cycles, plus the tolerance allowance would have to be added.

For the filtered dots, f/B becomes 11.5 and the required separation is then only about 2 000 cycles per second.

On the other hand, if the interfering signal were 20 decibels weaker than the desired one, the abscissa value would be $-20 + 35 + 10$ or 25 decibels, which in the case of rounded dots gives 6.9 for f/B , and, consequently 1 173 cycles per second for the frequency separation.

Example 3. *Relative effectiveness of measures taken for decreasing the channel separation.*

With equal field strengths and a 35 decibel allowance for fading, we have the channel separations:

- a) Rectangular dots, 21 250 cycles per second.
- b) Filtered dots, 1 224 cycles per second.

In both cases, the tolerance allowance must be added to these figures in order to obtain the actual separation of the frequency assignments. With the value of 0.01% appearing in appendix 1 of the Radio regulations for existing transmitters in the fixed service operating at 20 Mc/s, the separation of assigned frequencies becomes:

a) Rectangular dots, 25 250 cycles per second.

b) Filtered dots, 5 224 cycles per second.

In b) the major part of the separation is attributable to the tolerance. After January 1st, 1950, when the tolerance will be 0.003%, the separation would reduce to:

a) Rectangular dots 22 450 cycles per second.

b) Filtered dots, 2 424 cycles per second.

If, instead of filtered dots as in b) above, the unfiltered dots of a) had been used together with a directive receiving antenna giving a relative gain of 10 decibels, and, moreover, if in addition a diversity advantage of 10 decibels, were provided, then the channel separation for a) would become 3 325 cycles per second including a tolerance value of 0.003%. The use of directive antennas and diversity reception, taken together, are therefore not as effective in reducing the required separation as is the filtering technique.

Comments

The frequency separations between assignments for adjacent channels which were arrived at in the above examples apply when the services in the adjacent channels are both telegraphy and operate at the same speed. When they operate at different speeds, the width of the acceptance band of the filters in the receiver bears a different relation to the spectrum of the transmitter pulse and consequently the resulting separations are somewhat altered.

In the case of rectangular dots, the major portion of the interfering energy is that which comes within the acceptance band of the receiving filter. Consequently, very little is to be gained by using at the receiver filters with a steeper cut-off characteristic.

In the case of filtered dots, the major portion of the interfering energy lies within the attenuation band of the receiving filter. The channel separation is then, however, determined mainly by the frequency tolerance, and once again, the cut-off characteristic of the receiving filter is not a major factor.

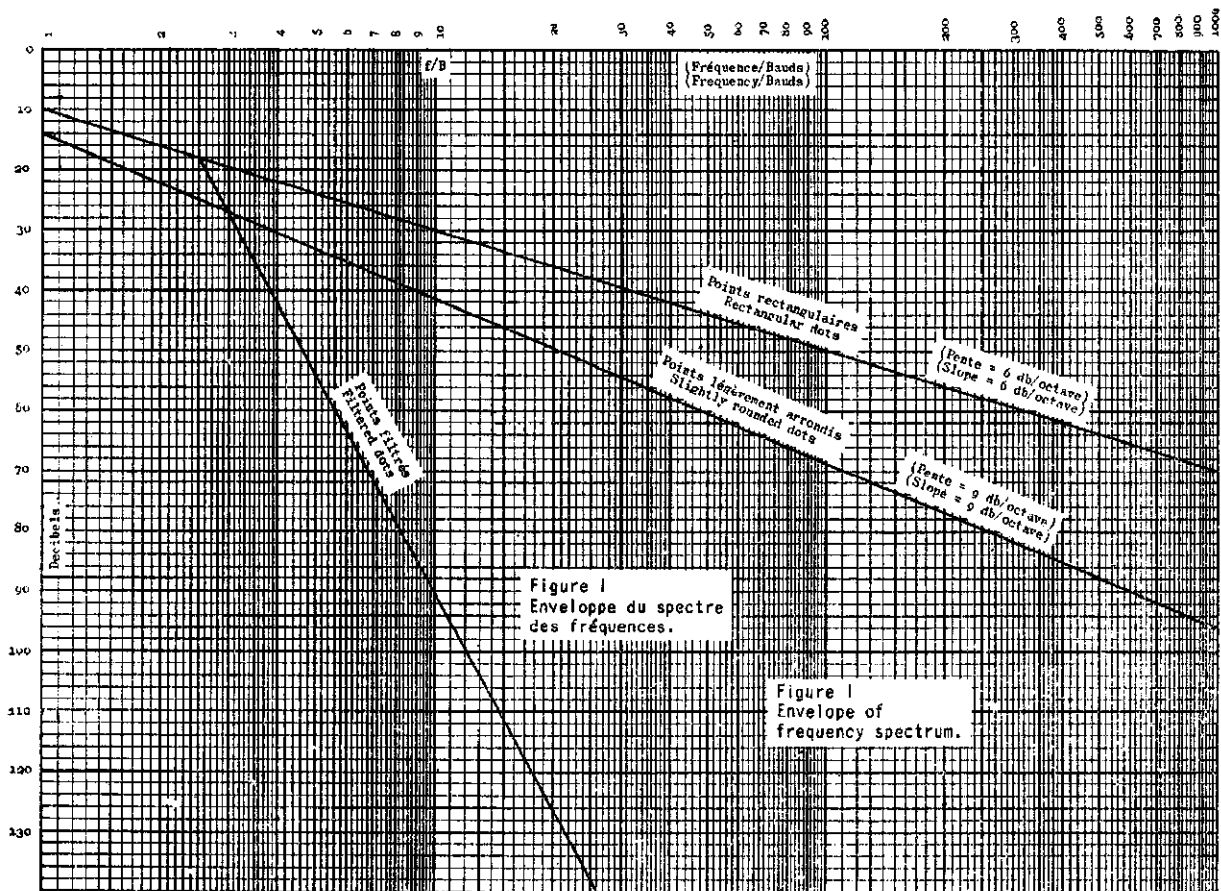
In the above examples, frequency tolerances are added one to the other in order to take into account the fact that for high stability emitters, periods during which the frequency difference is most feeble may be prolonged. This point of view may be modified in the case of low stability emitters, and a factor of probability may then be employed.

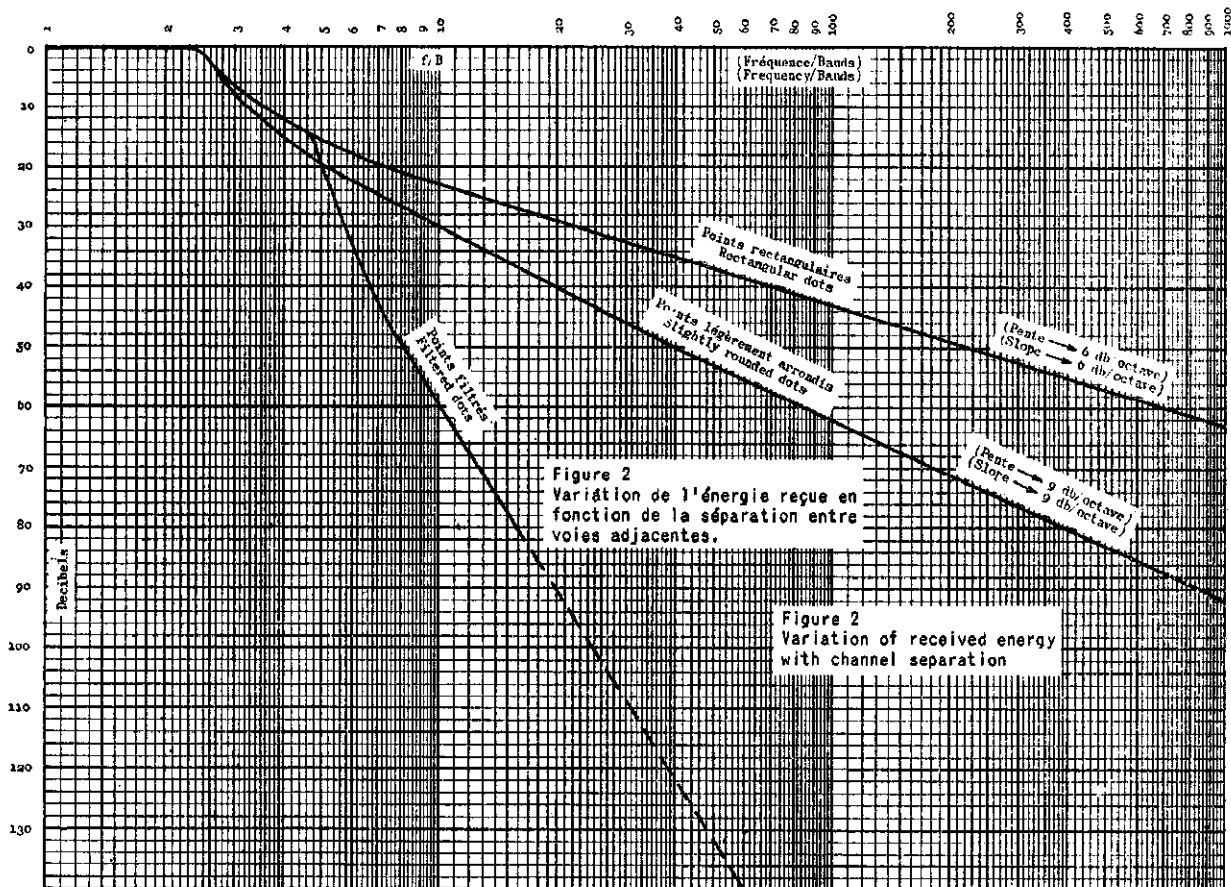
7. Grouping of Assignments for Best Results

The best opinion available indicates that other things being equal, the most advantageous use of the frequency spectrum will be used to best advantage by placing like transmissions on adjacent channels.

8. Frequency Space Required for Minimum Guard Bands

In the light of the discussion and particularly of item 6 above, the concept of a guardband as a separate entity, distinguishable from the transmitted band, loses its usefulness. It therefore appears to be preferable to consider only the necessary bandwidth and the channel separation.





Case II. Frequency Shift Telegraphy

Comments

This case resembles Case I (Simple Telegraphy) so closely that the same general analysis may be applied with suitable modifications in detail, as indicated in the following paragraphs, which are numbered to correspond with those under Case I. The principal point of difference arises because of the necessity of adding to the channel separations, calculated from Figure 2, an amount equal to twice the frequency deviation, as shown in app. 5 of the Radio Regulations.

1. Tolerable Signal-to-Interference Ratio

It is estimated that the interference level of -10 decibels, which was recommended in Case I, will also be suitable here.

2. Conditions for Entirely Satisfactory Service

When interpreted in terms of frequency shift, instead of amplitude change, the observations made in connection with Case I apply directly.

3. Fading

As in Case I, an allowance of 35 decibels for fading is appropriate when a single receiver is used, without frequency diversity.

4. Diversity

There are two types of diversity to be considered, space diversity, as in Case I, and frequency diversity, which is not usual in Case I. For space diversity alone, or for frequency diversity alone, an allowance of 10 decibels is suggested. For

a combination of both types, a total of about 12 decibels may be taken as typical.

5. Directive Antennas

The remarks made for Case I may be taken without change.

6. Spacing of Adjacent Channels

The basis for calculating the channel spacing follows the same plan which was outlined in Case I. The appropriate curve on Figure 2 is used to arrive at a value of f/B for the type of dots employed. Differing from Case I, however, the band thus obtained must be increased by twice the value of the frequency deviation ($2D$) as shown in appendix 5 of the Radio Regulations. Finally, twice the frequency tolerance must be added, just as in Case I. It is to be noted that filtered dots are much more easily obtained with frequency-shift telegraphy than in Case I, and consequently that many existing transmitters might employ them with advantage.

Example: Filtered dots, equal fields strengths, and a deviation of 425 cycles per second, with $B = 170$, from Figure 2, for 25 decibels allowance for fading with either space or frequency diversity, and 10 decibels signal-to-interference ratio, the value of f/B is about 6. The value of f is then $6 \times 170 = 1\,020$. The addition of twice the deviation brings this to 1 870. At 20 Mc/s, and with a tolerance of 0.003%, there must be added 1200 cycles per second, giving a value of 3 070 cycles per second for the channel separation.

Case III. Facsimile

Since facsimile may be thought of as telegraphy, it results that the treatment given for Case I and Case II can be

applied without change to these two types of facsimile.

Case IV. Telephony

The two types of telephony which are commonly used, namely double-sideband and single-sideband, have somewhat different interference properties and, consequently, they will be discussed separately.

A. Double-Sideband Telephony

When two double-sideband systems are operating on adjacent channels, the interfering signal, in the case of equal fields, will be located upon the sloping portion of the attenuation characteristic of the receiving filter. Consequently, the interfering signal will be produced by a carrier beating with its unequal sidebands, and, because the interfering sideband nearest to the desired signal may even exceed the interfering carrier in amplitude, an extra interference will be caused by the sideband components beating with each other. The first type of interference produces intelligible crosstalk although with considerable distortion, while the second type produces only unintelligible crosstalk. It has been found that, when the crosstalk is unintelligible, at least 10 decibels more may be tolerated than when the crosstalk is intelligible. It follows that, to a good approximation, the unintelligible crosstalk may be disregarded and attention may be focused upon the intelligible portion. Crosstalk between other components is ordinarily removed by audio-frequency filtering.

When the two carriers differ in frequency by an amount in excess of twice the highest modulation frequency M , the level of this intelligible portion, as compared with the desired signal, may be taken with fair approximation as given by the ratio of the two carrier amplitudes. This means that, with equal fields, the relative value of the interfering carrier is given by the attenuation produced by the receiving filter. In

double-sideband operation, however, the interfering value is further reduced because the weaker carrier effective on the detector beats with its own sidebands, which also have been attenuated in the receiving filter, to produce the audio-signal. Hence, if the filter has reduced the interfering carrier to a level 10 decibels lower than the desired carrier, the resulting interference will be down 20 decibels below the desired signal. This reduction holds approximately for linear detectors as well as for the square-law detector assumed above. (Butterworth, *Wireless Eng.*, Nov. 1929).

For numerical values, the acceptance band of typical receiving filters may be taken as having a width of $2M$ cycles per second, where M is the highest modulation frequency, and as having a cut-off characteristic whose slope is 30 decibels per octave. Consequently, the following table gives the data for the attenuation produced by such receiving filters in terms of the frequency separation between carriers, expressed as a multiple of the highest modulation frequency, M , and for the equivalent interfering value corresponding to these attenuations.

Table of Attenuation as a Function of Frequency Separation Between Carriers

Carrier separation (f/M)	Attenuation (decibels)	Interfering value (decibels)
0	0	0
0.5	0	0
1.0	-0	0
1.1	4	8
1.2	8	16
1.4	14.5	29
1.6	20	40
2.0	30	60
2.5	39	73
3.0	47	94
4.0	60	120
6.0	77	154
8.0	90	180

When the two carriers differ in frequency by less than twice the highest modulation frequency M , the major portion of the interference arises from beats between the carrier of the desired signal and the interfering sidebands. When the carrier frequencies differ by less than M , beats between the two carriers produce an additional interference. Both of these two types of interference vary directly as the ratios of the two carriers and not according to the square of the ratios, as was the case with the larger separations between carriers dealt with in the preceding paragraphs. The first type also varies in proportion to the frequency separation between carriers, while the latter type is independent of this separation.

By taking these facts into consideration and combining them with the results given on the preceding table, it is possible to arrive at the following more general table:

Ratio of desired to interfering carriers (decibels)	Frequency separation between carriers required for various ratios of signal to interference			
	20 db	30 db	40 db	50 db
60	0	0	0	0
50	0	0	0	0.6M
40	0	0	0.6M	1.55M
30	0	0.6M	1.55M	1.85M
20	0.6M	1.55M	1.85M	1.96M
10	1.55M	1.85M	1.96M	2 M
0	1.85M	1.96M	2 M	2.55M
-10	1.96M	2 M	2.55M	2.85M
-20	2 M	2.55M	2.85M	3.2 M
-30	2.55M	2.85M	3.2 M	3.6 M
-40	2.85M	3.2 M	3.6 M	4 M
-50	3.2 M	3.6 M	4 M	4.5 M
-60	3.6 M	4 M	4.5 M	5.1 M
-70	4 M	4.5 M	5.1 M	5.7 M
-80	4.5 M	5.1 M	5.7 M	6.4 M
-90	5.1 M	5.7 M	6.4 M	7.2 M
-100	5.7 M	6.4 M	7.2 M	8 M

Comments Concerning BROADCASTING

In the case of broadcasting, the problem at first appears to present complexities because of the subjective character of the concept of transmission quality, and also because of the large variety of receivers in use by the public. However, some time ago tests were carried out in which two modulated signals were applied to a receiver (one simulating the desired signal, and the other the interference). The intensities of the two signals at the input of the receiver were adjusted in such a way that the interference level was just tolerable; this was repeated with a wide variety of receivers and of types of modulation.

In consideration of the results of these tests, presented by Prof. Van der Pol at the Conference of Lucerne, and of more recent ones presented to the Technical Committee of the OIR, (Document No. 187 R-E) it is possible to set down the following experimental results for frequencies between 150 and 285 kc/s and between 525 and 1560 kc/s:

Frequency separation between carriers (kc/s)	Minimum Ratio of desired and interfering carriers (decibels)
11	0 (extrapolated)
10	6 (experimental)
9	14 (experimental)
8	26 (interpolated)
5 (or less)	60 (experimental)

It is seen that these experimental results agree reasonably well with the theoretical results of the preceding table with a value of M about 4500 cycles per second and with a signal-to-interference ratio of 50 decibels.

Numerical Examples

In selecting numerical values for signal-to-interference ratios, a wide range is possible, depending upon the quality of the service desired. A ratio of 20 decibels for intel-

ligible crosstalk between the desired and interfering signals, would give a service that might be capable of getting a message through in times of emergency, but would leave much to be desired in the way of satisfactory quality. A ratio of 30 decibels is decidedly better, but the crosstalk can be heard even when the ratio is 40 or more decibels.

A rounded working value for the frequency separation with equal fields might be taken as equal to $2M$, which would allow for a 40 decibel ratio of signal-to-interference. To this, of course, must be added the allowance for frequency tolerance, which at 0.003% and at 20 Mc/s would amount to 1 200 cycles per second. Hence, when the highest modulation frequency is 3 000 cycles per second, the frequency separation between adjacent carriers should be 7 200 cycles per second.

In telephony, when the frequency separation is greater than M , rapid fading decreases the intelligibility to an appreciable extent but does not produce quite the complete impairment of the circuit that it does in the case of telegraphy. Consequently, no allowance for this fading is necessary, as far as interference is concerned, as fading impairs a given channel about as much without interference as it does with it.

When the frequency separation is less than M , fading produces variations in the level of the beat note between the two carriers which results in an annoying type of interference. In such cases, an extra allowance of perhaps 15 decibels for the ratio of carriers is needed to ensure a given signal-to-interference value.

B. Single-sideband telephony

When the field strengths are equal, experience has shown that, even on fading circuits, the separation between adjacent channels need be only great enough to ensure that the nearest frequency of the interfering signal is 40 decibels down on the receiver filter characteristic and then to allow for the frequency tolerance. Since filters with steep cut-off characteristics are commonly used in the intermediate-frequency stages of

telephone receivers, an allowance of 500 cycles per second for the filter cut-off is sufficient in these receivers.

With a value of 4 000 cycles per second for the highest modulation frequency M , the channel separation would then be 4 500 cycles per second plus the allowance for frequency tolerance. At 20 Mc/s and with a tolerance of 0.003%, this allowance is 1 200 cycles per second, giving a value of 5 700 cycles per second for the separation of telephone channels of this kind.

For unequal fields, a number of considerations come into prominence and their complete evaluation appears to be too lengthy for the time now available. It is suggested that this would be a topic requiring further study, possibly by the C.C.I.R.

Note

The cases of frequency modulation, pulse emissions and television have not been studied because of insufficient information, and because these systems commonly use the higher frequency bands which are not yet used extensively for international services.

APPENDIX 2

The Selection of Frequencies and Frequency Sharing

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1.0 Introduction

Frequency sharing may be divided into two fundamental types: (a) simultaneous use of the same frequency, and (b) non-simultaneous use of the same frequency. The conditions for these two types of sharing on a purely scientific and objective basis are:

a) *Simultaneous use of the same frequency*

When the propagation conditions are favorable for

each individual transmission, and are such that mutual interference remains below a tolerable level.

b) *Non-simultaneous use of the same frequency*

When propagation conditions are favorable for the use of the frequency on two circuits at times which do not coincide.

The possibility of sharing by mutual agreement on a non-simultaneous basis, during a period when simultaneous use would be possible but for interference, is precluded from this appendix.

Basically, the work depends on a knowledge of ionospheric propagation, and in principle, once the knowledge of the ionosphere and of the processes of propagation is complete, the possibilities of frequency allocation and sharing are known. There are still many gaps in the detailed knowledge of the ionosphere, and the explanations of ionospheric propagation are still to some extent empirical as far as fitting in some of the observational data is concerned. In particular, the information on short distance propagation, both theoretical and experimental, is somewhat inadequate, but it can be said that the technique for analyzing a given service scientifically is now well established.

The methods of calculation have been described in the "Central Radio Propagation Laboratory Handbook" and similar publications, among which there is very satisfactory agreement, and as probably the most convenient, the charts and nomograms in this Handbook have been preliminarily adopted for this appendix. The

chief difficulty is to reduce the information on frequency allocation and sharing implied in the Handbook to an immediately useful form.

In this task only very partial success has so far been achieved and it may be that, on a completely general basis, it is well nigh impossible. Obviously, it is an enormous task to carry out a detailed analysis of every proposed service before deciding the possibilities of frequency sharing, but on the other hand it is difficult to find a set of simple rules sufficiently explicit to be really useful to the average engineer.

In order to obtain more than a few vague generalities without any numerical values associated with them, the construction was undertaken of graphs showing the relation of field intensity to frequency and distance for various ionospheric conditions, and other charts to be described later. These graphs and charts are derived directly from the information such as given in the above mentioned Handbook, and may be regarded as a stage in the process of reducing that information to a more readily usable form. They do, however, represent only one stage in that process, and may in turn form the basis for further reduction and simplification.

Unfortunately, the problem is very complex because of the number of variables involved: time of day or night, season, sunspot activity, geographical location of transmitter and receiver, transmitter power, frequency, etc. It was impossible to cover such a problem completely in the time available, and the work done along these lines at the Atlantic City Radio Conference should be considered as of an exploratory nature only.

It is believed that this is the first time the problem of frequency allocation and sharing has been ap-

proached in this way, and that the information already obtained has an intrinsic value, quite apart from its immediate application.

Before proceeding to a description of the work undertaken, it may be well to underline the fundamental concepts of ionospheric propagation affecting frequency allocation and sharing, though a general knowledge of the subject such as that given in the C.R.P.L. Handbook is here assumed. The two essential concepts are those of the maximum usable frequency (MUF) and of ionospheric absorption. The maximum usable frequency is determined solely by the electron density in the F (or at times, E) layer, and a frequency higher than the MUF for a given service will not be usable, quite apart from consideration of absorption. The method of deciding the MUF for a given service, using the concept of control points, is well known and will not be given here. Though the control point method for long distance routes is to some extent empirical, it is found to lead to conclusions consistent with the observational data, and it has been adopted in the work contained herein.

If transmission is possible as far as the MUF is concerned, the effect of absorption must then be considered. In theory, the effect of heavy absorption along the transmission path on the received field intensity can always be offset by a sufficient increase in power. In practice, adverse conditions are sometimes mitigated by increasing the power to a level that would normally be excessive, though such an expedient may react against the simultaneous use of the same frequency. But in general, ionospheric absorption sets a limit to the use that can be made of a given transmis-

sion, where the field intensity could only be raised to a workable value by the use of an impracticable amount of power.

In terms of these concepts, the definitions given above, may be expanded as follows:

a) *Simultaneous use of the same frequency*

When each transmission is possible as far as the MUF is concerned, and a further study of the absorption conditions shows that the wanted field intensities are sufficiently large, and the unwanted ones below the level of tolerable interference.

b) *Non-simultaneous use of the same frequency*

When at the time when the MUF and the absorption conditions allow one of the transmissions to be used, the others are unworkable, either on account of the MUF, or of absorption where the MUF would not preclude transmission.

The graphs of field intensity given in the report are based solely on absorption, and refer to a power of 1 kw radiated by an omni-directional antenna. Their use implies that the transmission under examination has been found to be possible as far as the MUF is concerned. It is assumed that they are valid under conditions when the MUF somewhere between the control points is below the working frequency. Observations on long routes where this state of affairs can occur, suggest that this assumption is justified.

2.0 General Description of the Work Undertaken

2.1 Method of Presentation of Available Data

Because of the large number of variables involved, the decision was reached that the most useful way of presenting

the required information is in the form of curves of the following types:

- a) MUF charts, for determining frequency allocations.
- b) Field intensity contours for determining the strength of an interfering signal from a given transmitter, as compared with the wanted signal from another transmitter.
- c) Curves showing the distance separation required for various protection ratios, i.e., ratios of wanted to unwanted field intensities.

These curves are described below, and samples are attached to this report. In connection with the field intensity contours, it is difficult to visualize from any flat projection the distribution of field strength over the surface of the earth, and it was found helpful to draw the contours on the surface of a globe. A large rubber ball was actually used for the purpose. It was particularly useful in studying the conditions at the antipodes of the transmitter, and in determining the point on the surface of the earth where the field intensity is a minimum. This point is called herein "the dark spot," though the term is not ideal, especially as it in general occurs somewhere in the daytime hemisphere.

2.2 Graphs and Contour Charts of MUF and Field Intensity

Graphs and contour charts of MUF and field intensity were prepared for some extreme conditions of night and day, sunspot maximum and sunspot minimum.

The following samples are attached:

FIGURE 1. *Graph of frequency versus distance*

Parameter: field intensity.

Conditions: 40° S., azimuths 0° and 180° sunspot minimum, June, 1 200 hrs. local time. Dotted portions of curves are for the "Long Route."

- FIGURE 2.** *Field intensity contour chart for 6 Mc/s*
 Parameter: field intensity.
 Conditions: 40° S., Sunspot minimum, June, Noon. Modified cylindrical projection.
- FIGURE 3.** *Field intensity contour chart*
 Same conditions as above. Large diagram azimuthal equidistant projection centred on the transmitter. (Periphery of figure represents antipodes.) Small diagram, same projection centred on antipodes, same scale but for half sphere only.
- FIGURES 4A, 4B, 4C.** *Photography of field intensity contours on a globe*
 Same conditions as Fig. 2
- FIGURE 5.** *Graph of frequency versus distance*
 Parameter: field intensity
 Modified for short distances
 Conditions: equator, all azimuths, sunspot minimum, equinox, noon.
- FIGURE 6.** *Graph of field intensity versus distance*
 Parameter: frequency
 Same conditions as above, 0-5 000 kms.
 (Short distances only.) Sky wave only.
- FIGURE 7.** *Skip zone chart*
 Conditions: 30 Mc/s., December 1946, east, west and intermediate zones, showing area in which F layer transmission is normally impossible at this frequency.

Constructions: 2 000 kms. distance guard band
for control points on the 4 000
MUF contour for a frequency
15% below 30 Mc/s.

FIGURE 8. *Skip zone chart*

Same as for Fig. 7, but for June 1947.

FIGURE 9. *Sample 4 000 MUF chart*

Type recommended for use in frequency allocation.

2.3 Graphs of Interference Range Versus Service Range

Graphs of interference range compared to service range for different protection ratios were also prepared. The following samples are attached:

FIGURE 10. *Interference range versus protection ratio*

Parameter: service range (sky wave)

Conditions: equator, sunspot minimum, equinox, night. For all frequencies below MUF.

FIGURE 11. *Interference range versus protection ratio*

Parameter: service range

Conditions: same as for Fig. 10, but for 6 Mc/s., 2 hrs. before sunset.

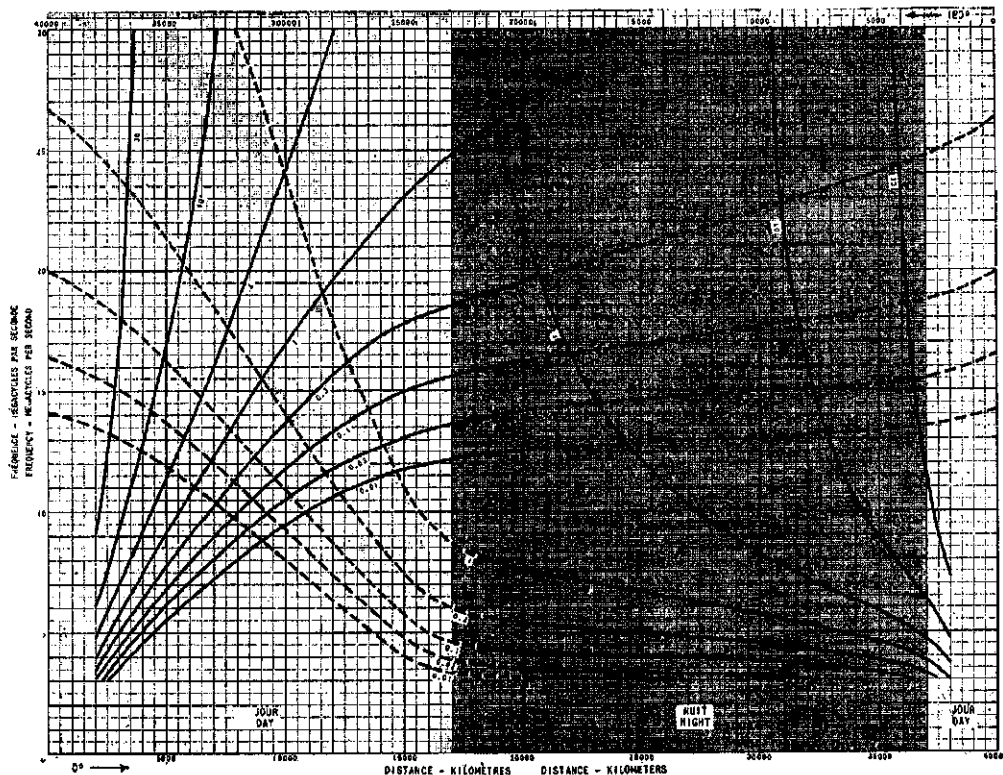


FIG.1 INTENSITÉ DE CHAMP
PAR TRAJECTS LONGS ET COURTS
AZIMUTHS 0° ET 180°
 40° LATITUDE SUD, MIDI JUIN
 MINIMUM D'ACTIVITÉ DES TACHES SOLAIRES

Courbes d'intensité de champ, microvolts par mètre, 1 kW.
 Field Intensity Contours, microvolts per meter, 1 kW.

FIG.1 FIELD INTENSITY
VIA LONG AND SHORT ROUTES
AZIMUTHS 0° AND 180°
 40° S. NOON, JUNE, SUNSPOT MINIMUM

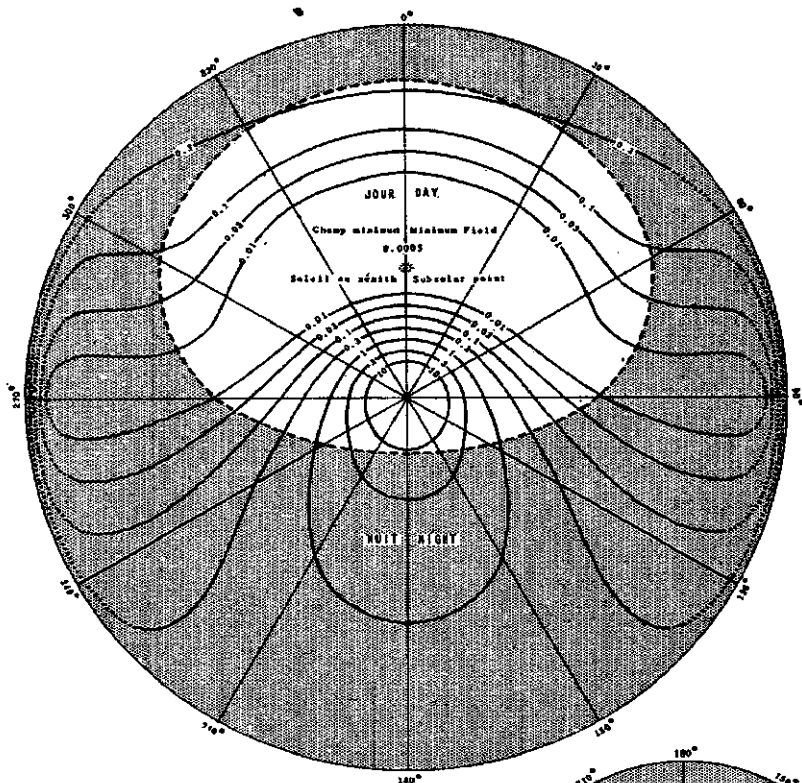
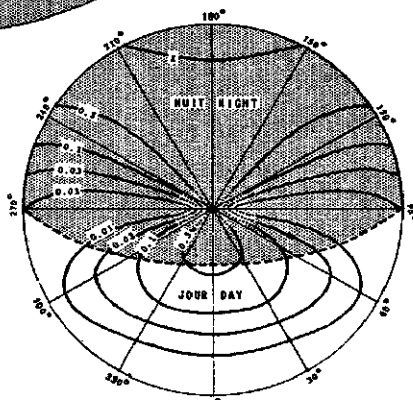


Fig. 2. Courbes équi-champ, microvolts par mètre, 1 kW. Projection azimuthale équidistante centrée sur la station, juin, midi, 40° S, 6 Mc/s., minimum de tache solaire.

Fig. 3. Field Intensity Contours, Microvolts per meter, 1 kw. Azimuthal Equidistant Projection centered on Station, June, Noon, 40° S, 6 Mc/s., Sunspot Minimum.



Intensité de champ aux antipodes
Field Intensity at Antipodes

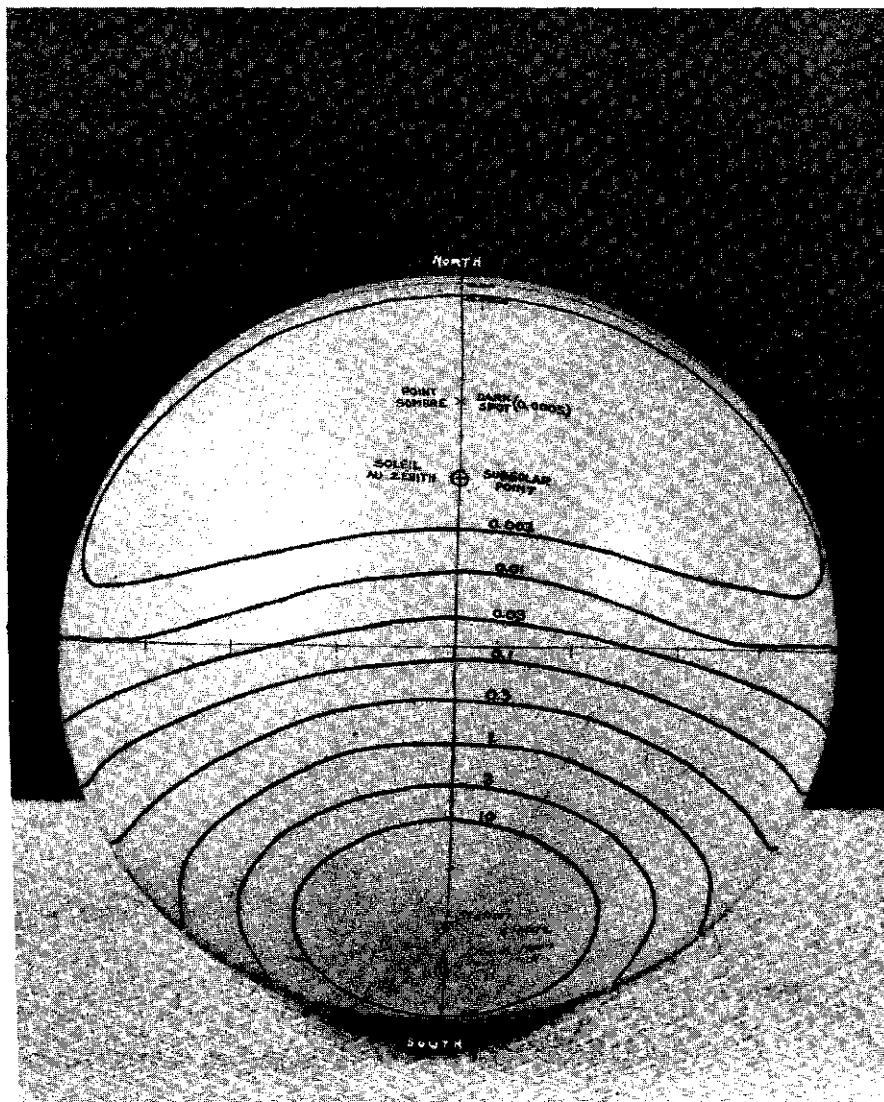


FIG. 4-A. FIELD INTENSITY CONTOURS ON GLOBE
 Microvolts per Meter. 1 kW, June, Noon, 40° S.
 6 Mc/s, Sunspot Minimum

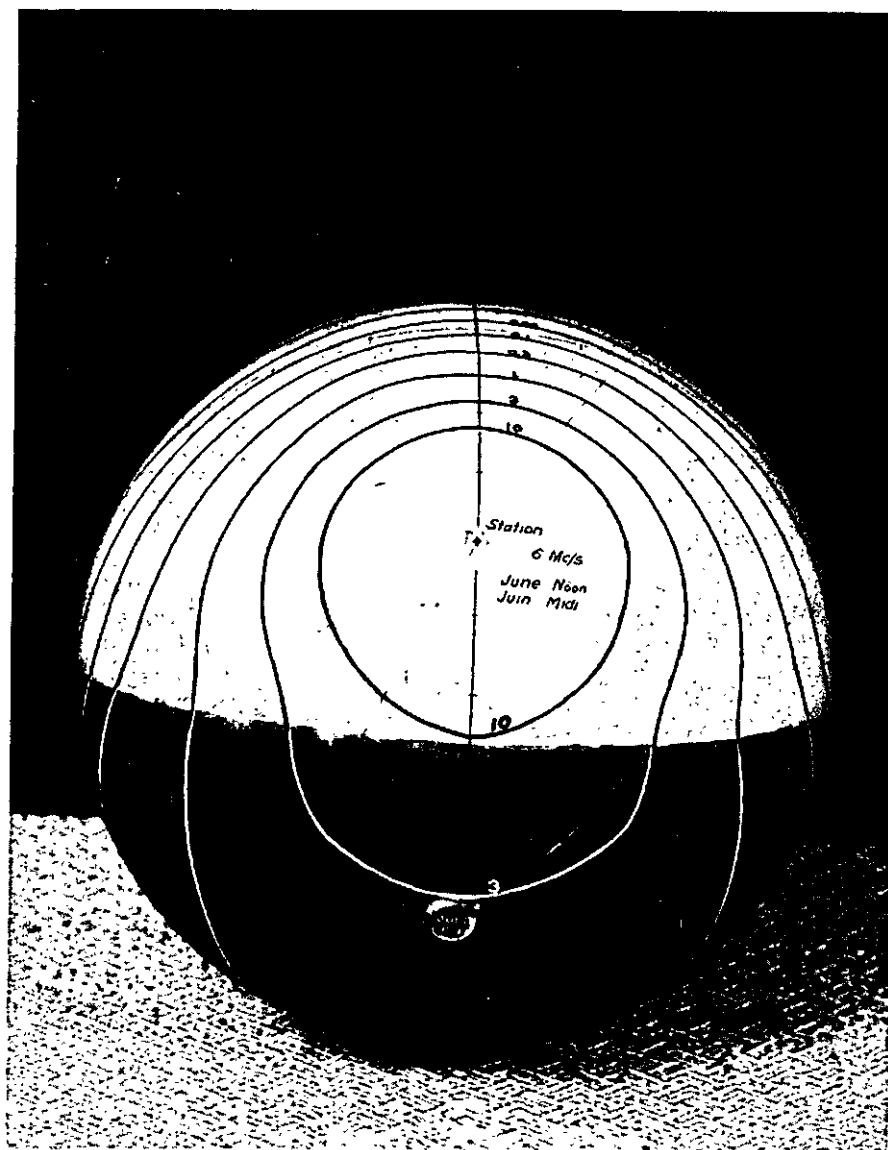


FIG. 4-B. FIELD INTENSITY CONTOURS ON GLOBE
 Microvolts per Meter. 1 kW. June, Noon, 40° S.
 6 Mc/s, Sunspot Minimum
 Transmitter Region

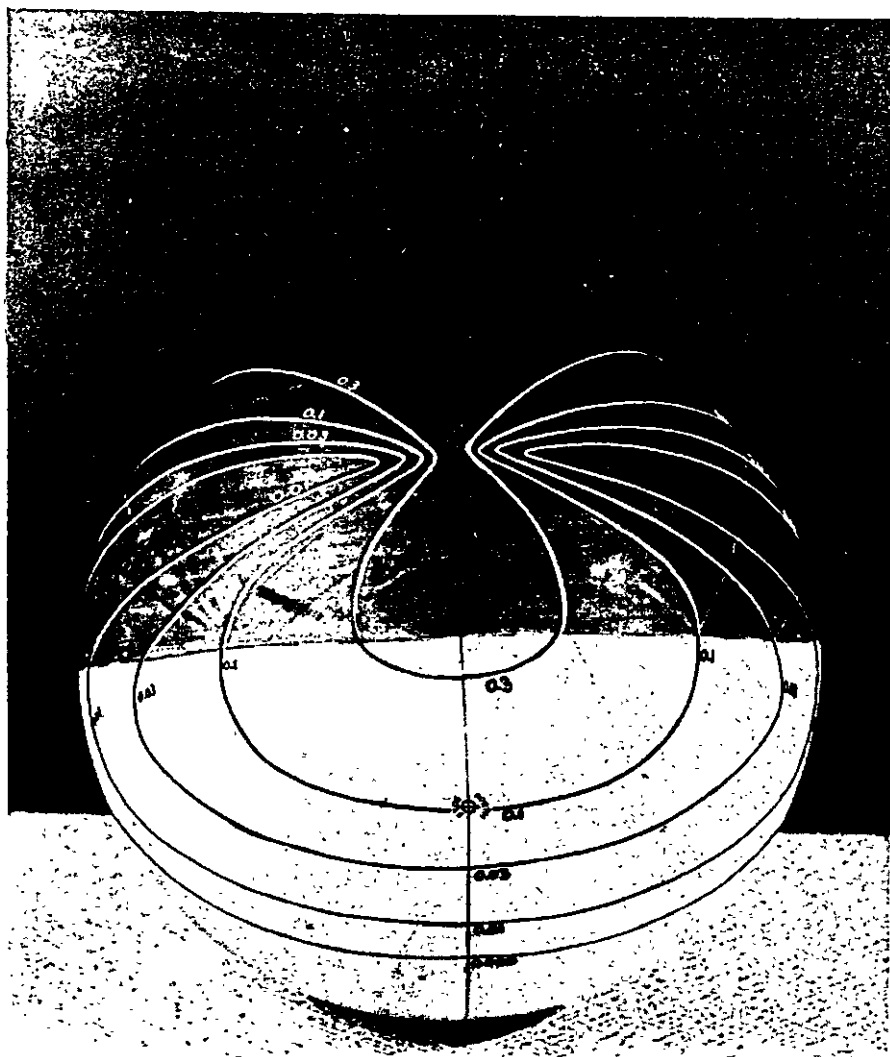


FIG. 4-C. FIELD INTENSITY CONTOURS ON GLOBE
Microvolts per Meter. 1 kW. June, Noon, 40° S.
6 Mc/s, Sunspot Minimum
Antipodes Region

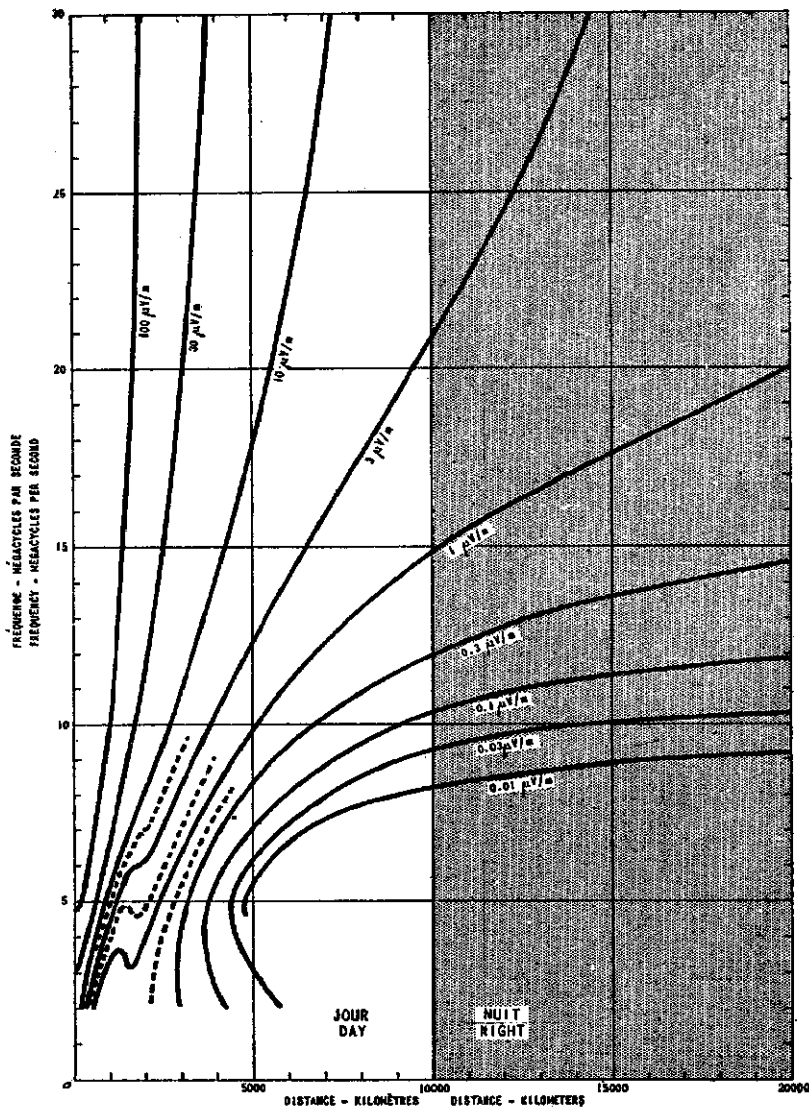
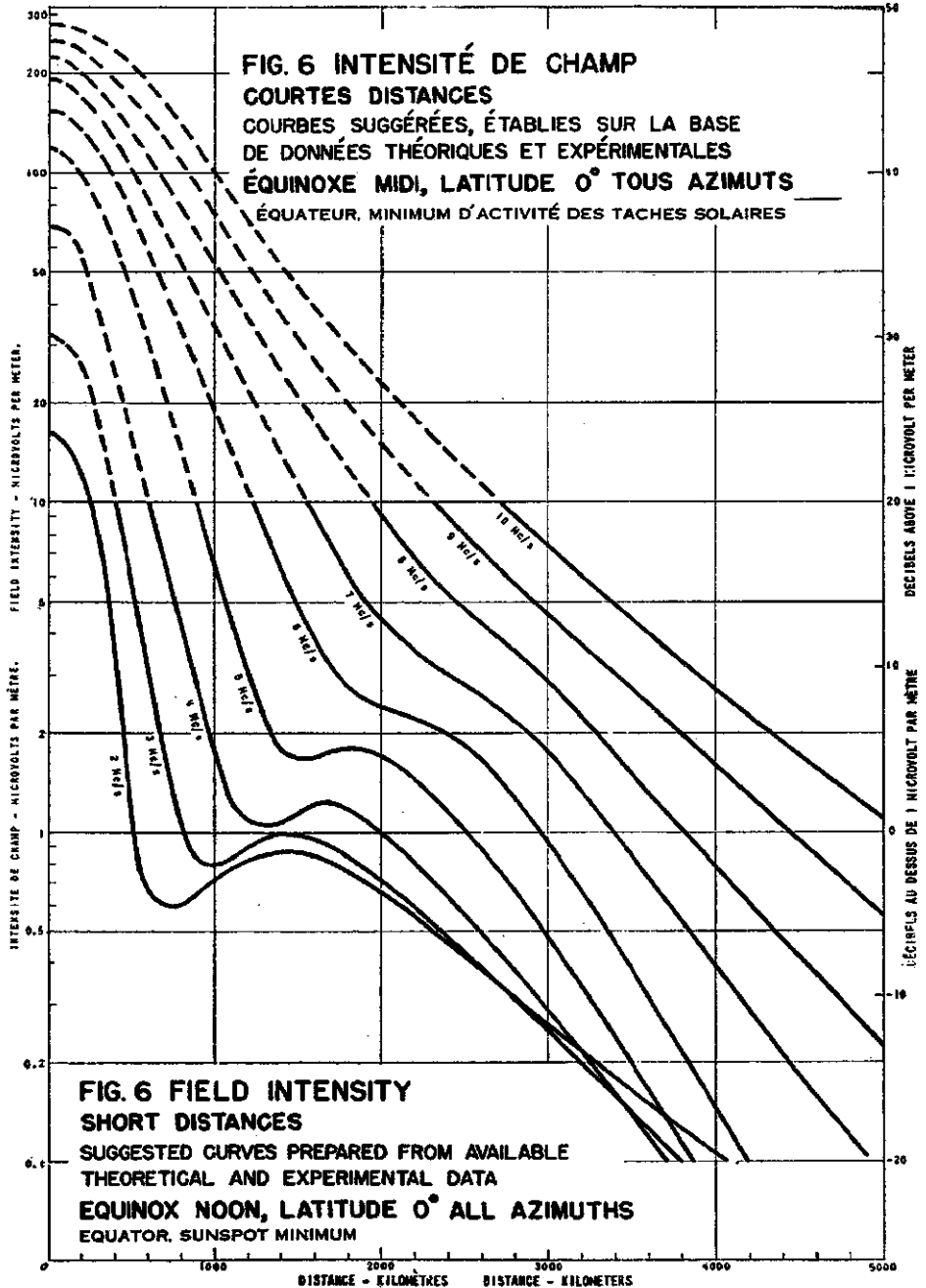


FIG. 5 INTENSITÉ DE CHAMP
 MODIFIÉE POUR DE COURTES DISTANCES SUIVANT FIG. 6
 ÉQUINOXE MIDI, LATITUDE 0° TOUS AZIMUTS
 ÉQUATEUR, MINIMUM D'ACTIVITÉ DES TACHES SOLAIRES

FIG. 5 FIELD INTENSITY
 MODIFIED FOR SHORT DISTANCES IN ACCORDANCE WITH FIG. 6
 EQUINOX NOON, LATITUDE 0° ALL AZIMUTHS
 EQUATOR, SUNSPOT MINIMUM



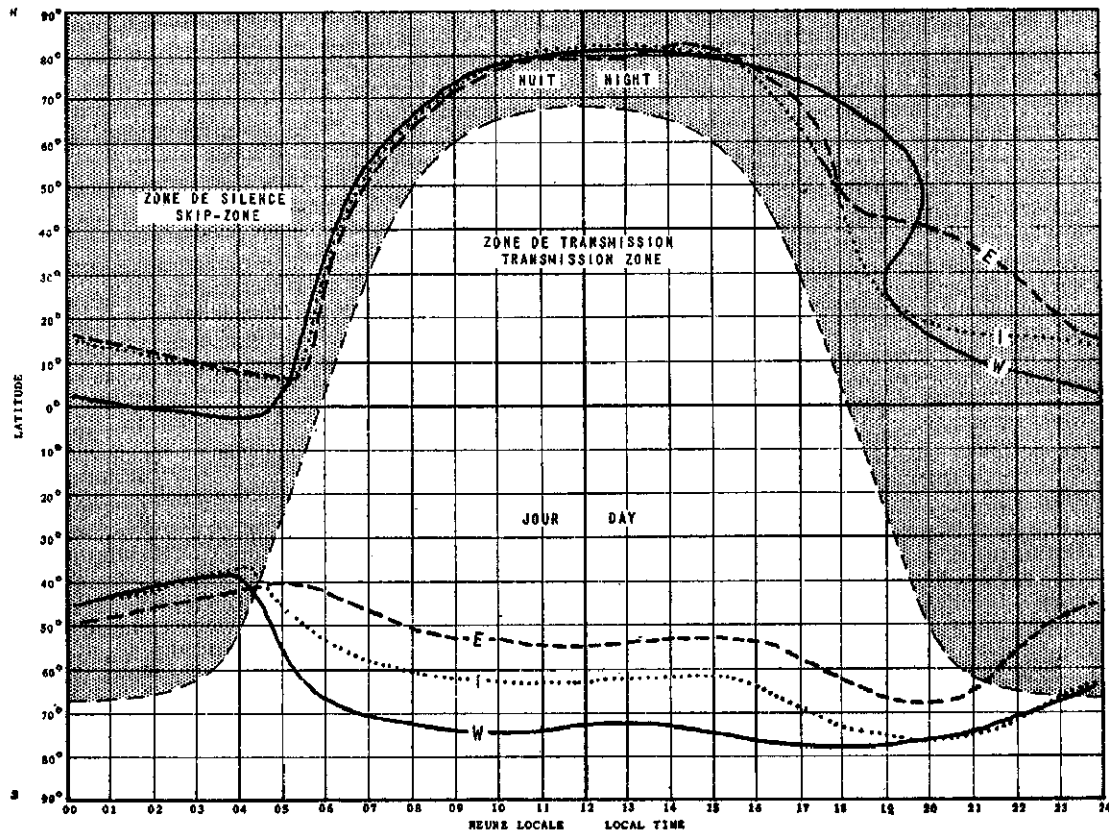


Fig. 7. Zone de silence, 30 Mégacycles par seconde, décembre 1946, Projection cylindrique modifiée.
Skip-Zone, 30 Megacycles per second, December 1946, Modified cylindrical projection.

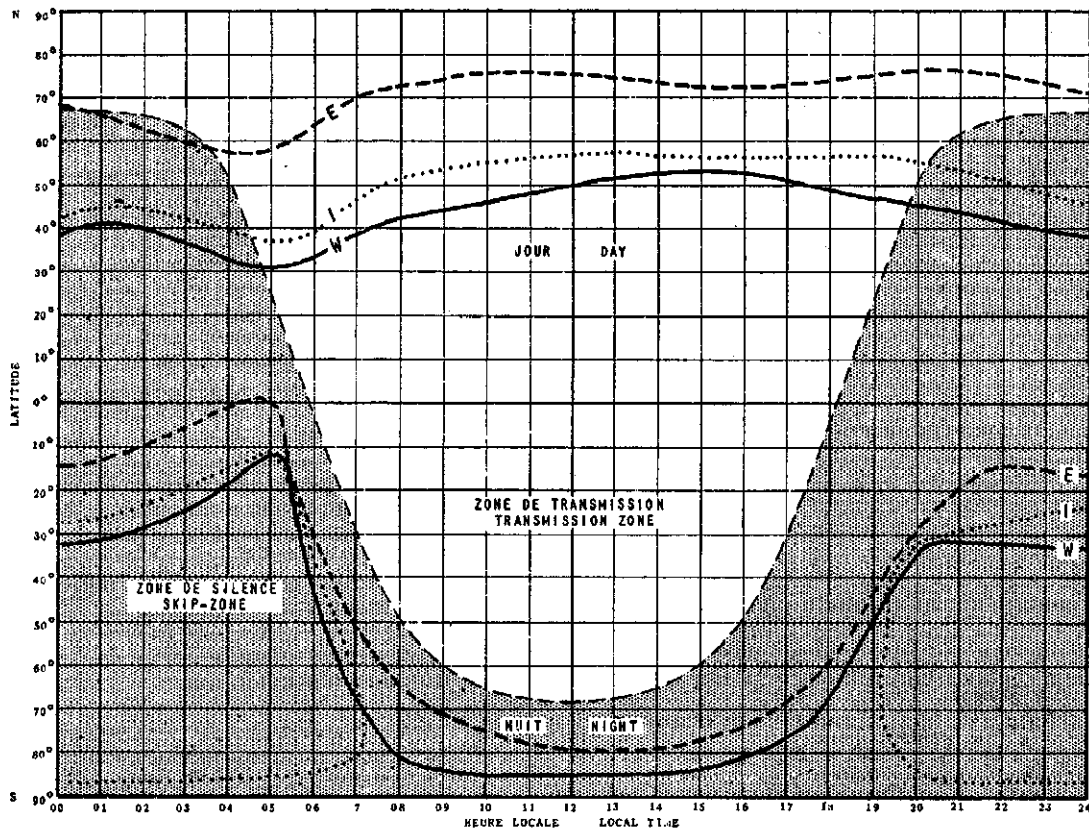


Fig. 8. Zone de silence, 30 Mégacycles par seconde, juin 1947, Projection cylindrique modifiée.
Skip-Zone, 30 Megacycles per second, June 1947, Modified cylindrical projection.

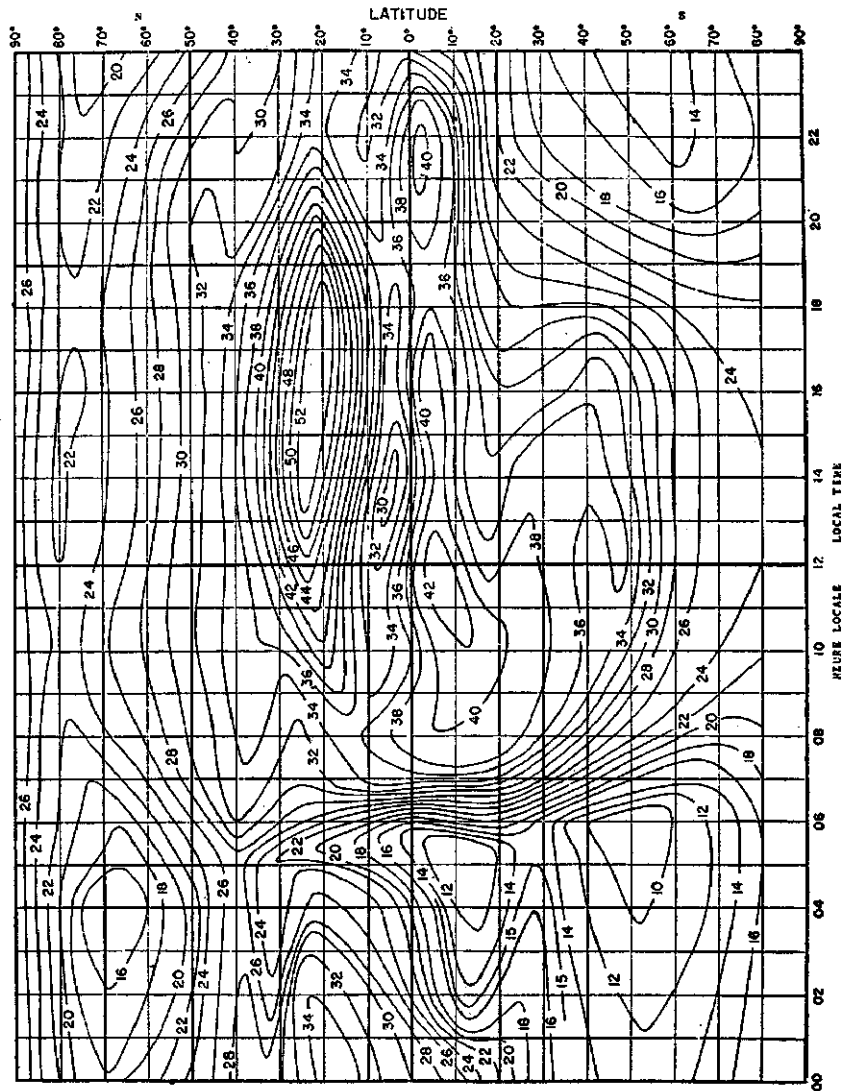


Fig. 9. Exemple de 4000 PMU en Mc/s du modèle utilisable pour l'allocation de fréquences (Août 1947).
 Sample 4000 PMU in Mc/s of Type useful for frequency allocation (August 1947).

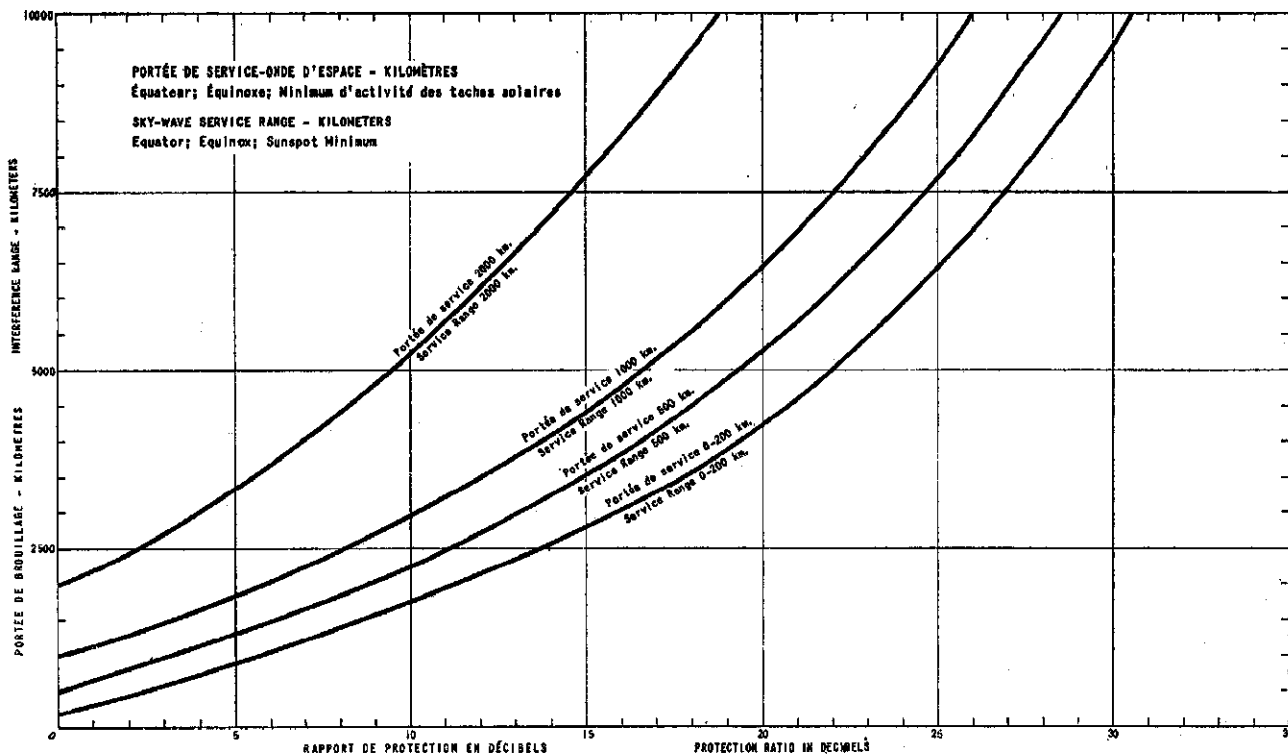


FIG. 10. GRAPHIQUE INDICANT LES CONDITIONS NÉCESSAIRES POUR L'EMPLOI SIMULTANÉ DE LA MÊME FRÉQUENCE AVEC DES PUISSANCES D'ÉMISSION ÉGALES ET POUR UN RAPPORT DE PROTECTION DONNÉ.

Condit.o. : de nuit (pas d'absorption) pour toutes les fréquences (3 à 30 Mc/s) au dessous de la F_{MU}

FIG. 10. CHART SHOWING THE CONDITIONS FOR SIMULTANEOUS USE OF THE SAME FREQUENCY WITH EQUAL TRANSMITTING POWER FOR AN ASSUMED PROTECTION RATIO. .

Night conditions (no absorption) for all frequencies (3 - 30 Mc.) below MUF.

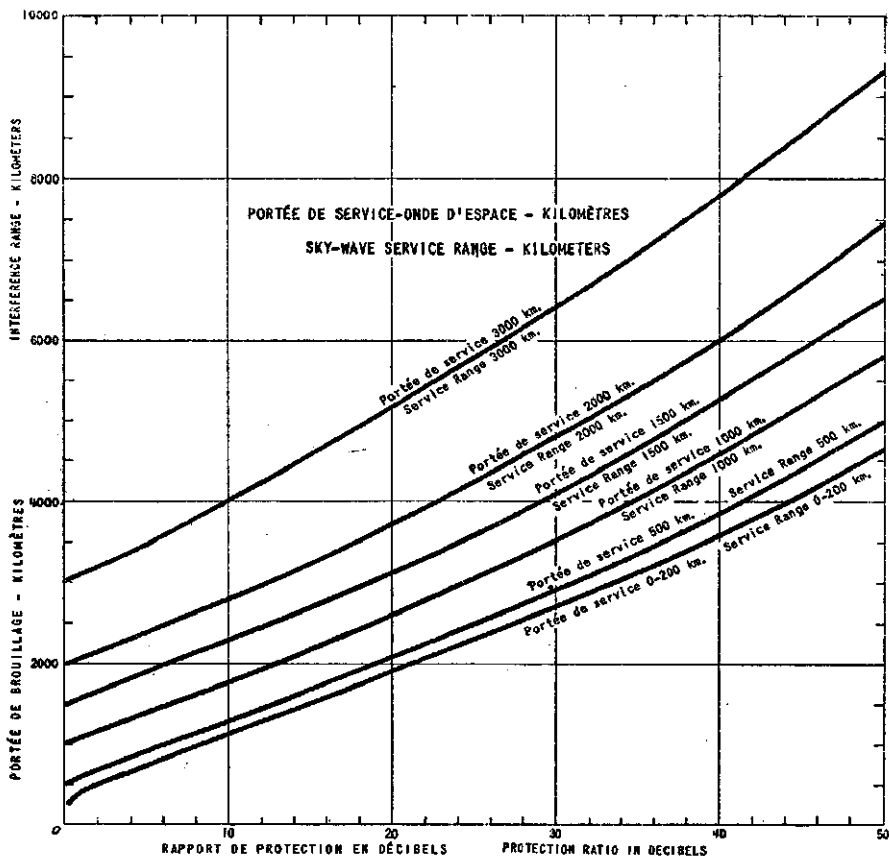


FIG. 11. GRAPHIQUE INDICANT LES CONDITIONS NÉCESSAIRES POUR L'EMPLOI SIMULTANÉ DE LA MÊME FRÉQUENCE AVEC DES PUISSANCES D'ÉMISSION ÉGALES ET POUR UN RAPPORT DE PROTECTION DONNÉ.

Équateur, Équinoxe, Minimum des taches solaires. Deux heures avant le coucher du soleil. 6 Mc/s. Sous réserve de densité électronique suffisante (FMU)

FIG. 11. CHART SHOWING THE CONDITIONS FOR SIMULTANEOUS USE OF THE SAME FREQUENCY WITH EQUAL TRANSMITTING POWER FOR AN ASSUMED PROTECTION RATIO.

Equator, Equinox, sunspot minimum, 2 hours before sunset, 6 Mc/s. subject to sufficient electron density (MUF)

3.0 Maximum Permissible Interfering Field Intensity

In order to deduce from the field intensity graphs the possibility of the simultaneous use of a frequency for two or more transmissions, some idea must be formed of the value of the maximum permissible interfering field intensity. Examination of available data concerning the requirements for satisfactory service as regards minimum field intensities, signal to noise ratios and protection ratios, leads to the conclusion that the maximum permissible interfering field intensity is roughly independent of the type of service.

It appears that a value of 0.3 microvolt per metre (i.e. 10 db. below 1 microvolt per metre) is a reasonable *median* value for the maximum permissible value for the interfering field intensity. Some details of the derivation of this value are attached.

For the lower frequencies of the 3 to 30 Mc/s band, the atmospheric noise may often be greater than 0.3 microvolt per metre for usual band widths and the protection of this minimum field of 0.3 microvolts per metre will then be greater than necessary. It does not apply to cases where the working field intensity is considerably above the minimum value required for satisfactory service, as may occur, for instance, in certain types of ground-wave working in the neighborhood of the transmitter.

4.0 Effect of Directive Antennas

The field intensity graphs refer specifically to transmitters radiating 1 kw from an omnidirectional antenna, but they may be adapted to the use of other radiated powers by the requisite decibel adjustment in level. In assessing the effect of directive antennas on the possibilities of frequency sharing, the following conclusions and definitions were adopted:

4.1 Directivity in the Horizontal Plane

a) *Transmitting antennas*

The directive antenna, as compared with a vertical dipole, is regarded as increasing the equivalent power in the wanted direction, while leaving unchanged the equivalent power in the unwanted directions. The latter definition was adopted as a simplification giving an *upper* limit of the interference in the unwanted directions, due to minor lobes. A practical average value for the increase in equivalent power in the wanted direction is 10:1 (10 decibels), and it may reach 100:1 (20 decibels) for the higher frequencies in the 3 to 30 Mc/s band.

b) *Receiving antennas*

For optimum sharing, in the case of fixed circuits, directive antennas should be used where feasible. The same conclusions with regard to their effect in the wanted and unwanted directions as for transmitting antennas are, in general, applicable.

4.2 Directivity in the Vertical Plane

For optimum sharing, transmitting antennas with high angle radiation should be used for small service ranges, e.g., for mobile services and for tropical broadcasting. Without the use of such antennas, little sharing will be possible in these cases at night. For instance, for a half wave dipole, one-eighth of a wave length above the ground, the radiation at an angle of elevation of 11° will be reduced by approximately 10 db. compared with the high angle radiation. The interference region compared with the service area could be still further reduced by the use of more elaborate antennas.

5.0 Ionospheric Abnormalities

5.1 Auroral Zones

The absorption of transmissions across the auroral zones is often very great, but cases of such transmissions, even at frequencies as low as 6 Mc/s., have been observed. From the point of view of interference, the effect of such transmissions can usually be ignored, and some successful sharing has been achieved by taking advantage of the screening effect of the auroral zones. In the present state of knowledge, however, no general rule and recommendation could be given for sharing relying solely on auroral zone absorption.

5.2 E_s (Sporadic or Abnormal E)

It is recognized that E_s can play a considerable part in high frequency transmission, allowing the use at times of frequencies higher than would otherwise be possible. Except, however, for difficult circuits where E_s offers at times the only mode of transmission (auroral zones, or long routes with contrast conditions at the control points), provision should not be made for the allocation of frequencies on the basis of E_s transmission.

5.3 Ionospheric Storms

This appendix is based upon normal ionospheric conditions. It is recognized that wide variations from normal may be encountered at times of ionospheric storms, particularly in auroral regions. The principal effect of these storms is to hamper operations on regularly allocated frequencies.

Because these are abnormal conditions, it is not considered that they should be taken into account in studies of frequency sharing, even though the interference range of a

transmitter, as well as its operating range, may be materially reduced at such times.

6.0 Material Available

6.1 Comparison of Data

Experimental and theoretical data have been examined concerning radio propagation, with a view to determining their adequacy and application to the problem of frequency allocation and sharing. The reference documents are shown in the List of Documents.

6.2 Necessity for Adaptation of Available Basic Material for Practical Purposes

While the theoretical and experimental data are adequate and of a basic nature, they are not in a suitable form for straightforward use by average engineers. Certain of these basic data can be put in special form for this purpose, but the procedure involved required more time and personnel for completion than were available, so only specimen copies were prepared.

7.0 Procedure for Selecting Frequencies for a Given Circuit

7.1 Highest and Lowest MUF

- a) The first step in the procedure should be to determine for the circuit the highest and the lowest MUF during a definite period, which will be presumed here to include the entire sunspot cycle.
- b) The highest and lowest MUF can best be determined by the use of charts such as Fig. 9. The procedure for using such charts is described in the C.R.P.L. - D Series booklets (Reference 12 in the List of Documents). In paragraph 9.2 of this appendix it is recommended that additional charts of this and other types should be prepared. For allocation purposes the fol-

lowing MUF charts are recommended: East, intermediate and west zones, solstice periods, sunspot maximum and sunspot minimum, 0 MUF and 4 000 MUF (24 charts).

Pending the preparation of such a set of charts, the $F^{\circ}F_2$ contour charts and procedures of report I.R.P.L. - R 16, or the monograms of reports I.R.P.L. - R 19 and I.R.P.L. - R 22 may be used though the results will not be so accurate or so easily obtained as with the proposed type of charts.

It may be of interest to note that from a statistical survey of a number of existing circuits it appeared that the average ratio of highest MUF to lowest MUF was about 4 to 1.

- c) The maximum, minimum and interpolated frequencies to be used should next be determined. In general, the maximum frequency to be used should be taken as about 40% of the highest MUF, and the minimum frequency to be used should be taken as approximately 85% of the lowest MUF. The average ratio of the maximum working frequency to the minimum working frequency will therefore be roughly 2 to 1 or $(40\% \times 4)$ to $(85\% \times 1)$.

In the case of difficult circuits (auroral zone or contrast conditions), in addition to the two extreme frequencies mentioned above, one interpolated frequency should be allocated. From propagation considerations, a frequency approximately equal to the highest MUF should also be allocated in these circumstances for E. working.

7.2 Maximum, Minimum and Interpolated Working Frequencies

For such services as high speed telegraphy and facsimile, for which the reduction of multipath effects requires that the MUF be followed more closely, the maximum frequency to be

used should be taken as approximately 70% of the highest MUF. The minimum frequency to be used should, as above, be taken as approximately 85% of the lowest MUF.

The average ratio of the maximum working frequency to the minimum working frequency will therefore in this case be roughly 3 to 1, and, in addition, two interpolated frequencies should normally be allocated. If the ratio comes down to 2 to 1, one interpolated frequency will normally be sufficient; if it goes up to 4 to 1, three interpolated frequencies may be needed.

If the interpolated frequencies are spaced in geometrical progression, the proposed allocation in each case corresponds to one in which each frequency is approximately 70% of the one next above it.

The remarks made above with regard to E, working on difficult circuits apply also in the case of high speed working.

8.0 Readily Known Sharing Cases

8.1 Use of Graphs

It is realized that the defining of cases in which sharing is readily known to be possible, forms the part of the task that is of the most immediate importance. It is also the part that is most difficult, as, apart from some general rules, it is usually impossible to state off-hand whether one specific circuit can share a frequency with another. The main difficulty is the finding of cases that are truly off-hand, as in general some reference has to be made to numerical values, implying some preliminary investigation with the aid of graphs and charts.

The form of presentation that offers most promise is the type of graph in Figs. 10 and 11, where the interference range is shown as a function of protection ratio for a given service range as parameter. For a given protection ratio, such a

graph immediately shows the sharing possibilities for the conditions to which it refers, and from the specimen graphs already prepared, some general conclusions may be deduced.

Such graphs by their nature refer primarily to frequency sharing by the simultaneous use of the same frequency, and from them it is possible to deduce the number of times, if any, that a given type of transmission with a given service range can be repeated over an area where the conditions are the same. The latter qualification introduces a limitation to the direct use of the graphs, as the absorption in the ionosphere may change markedly within the interference range under consideration, especially near to the day-night line. This limitation may possibly be overcome by elaborating the graphs somewhat, but in practice they would be used for the more severe condition, and so give the least favorable view of the sharing possibilities.

8.2 Simultaneous Use of the Same Frequency at Night

The graphs are based solely on considerations of absorption, assuming that the MUF conditions are suitable for transmission, and at night, when the absorption is low, the set of curves in Fig. 10 suffices for all frequencies in the range 3 to 30 Mc/s. From these curves it appears that the simultaneous use of the same frequency at night is limited to short service ranges but that for small protection ratios some useful sharing may be obtained.

a) *Non-directive antennas*

For transmitters using the same power and type of emission, the following table (night) may be given:

Maximum Service Range	Protection Ratio in Decibels	Number of Times the Frequency may be Repeated
1000 kms.	20	2 or 3
1000 kms.	10	6 or 7
2000 kms.	10	3

These figures and similar ones derivable from Fig. 11, are essentially independent of frequency.

b) *Horizontally directive antennas*

For fixed services, using horizontally directive antennas, the required protection ratio is decreased by the combined gains of transmitting and receiving antennas, provided each transmitting beam covers only its own receiving station. For instance with a transmitter gain of 10 db. and a receiver gain of 5 db., a service requiring 15 db. protection for omnidirectional antennas can operate with 0 db. actual protection ratio, i.e., the interference range is equal to the service range, and the service can be repeated with a distance of twice the service range between transmitters.

c) *Vertically directive antennas*

It is technically possible, by using for example an array of horizontal dipoles one-eighth of a wave-length above the ground, to reduce the ratio of interference range to service range for a given protection ratio for services of a few hundred kms. In this case the following values would result:

Ratio of Interference Range to Service Range	Protection Ratio in Decibels
2.0	10
3.4	20
5.0	30
6.8	40

The possibility of increasing the amount of sharing in this way has already been referred to in 4.2.

8.3 Simultaneous Use of the Same Frequency During the Day

- a) Due to the effect of absorption, more sharing is possible during the day than during the night, and the more so the lower the frequency used. The dependence upon frequency and upon location with respect to the sub-solar point makes the formulation of general rules more difficult. Fig. 11 refers to a 6 Mc/s transmission with the transmitter located on the equator at the equinox two hours before sunset, at sunspot minimum, and transmitting parallel to the day-night line.
- b) In order to cover the whole problem, similar curves should be constructed for various ionospheric conditions and some suggestions are made in 9.3 b). From such curves, general rules of the kind deduced from Fig. 10 for night-time conditions could be derived, giving for any particular case the minimum spacing between the transmitter of one circuit and the receivers of all the other circuits using the same frequency simultaneously.

8.4 Further Conditions for the Simultaneous Use of the Same Frequency

From the study of field intensity contours, and in particular from their construction on the surface of a sphere, it appears that a transmitter radiating 1 kW will produce, everywhere, day and night, a field greater than the 0.3 microvolt per metre mentioned in § 3, if the frequency is greater than 13 Mc/s and it will thus produce (at sunspot minimum) interference at the limit of the service range of any other transmitter working simultaneously on the same frequency at any other point on the earth's surface. With increased power, the same result will be produced at a correspondingly lower frequency in accordance with the following table:

Power	Frequency above which the Interference is not Tolerable
100 kW	9.6 Mc/s
10 kW	11 Mc/s
1 kW	13 Mc/s
100 Watts	17 Mc/s
10 Watts	30 Mc/s
1 Watt	30 Mc/s

The possibilities of sharing on a simultaneous basis are not confined to all day-time or all night-time operation. In particular there is a possibility of using the same frequency simultaneously for a short day route and a long night route. The essential conditions would be for the frequency to be low enough to be usable as a night wave, and for the daytime absorption to limit the day route to the short range necessary. For optimum use, the day route should be well away from the day-night line, and the long route well into the darkness, so that they would be approximately 180° apart in longitude. The graphs will indicate further conditions, as to power, etc.

The graphs of the type given in Figs. 10 and 11 can be converted with reasonable accuracy to a nomographic form, and a further extension and simplification of their use may lie in the construction of suitable nomograms.

8.5 Non-Simultaneous Use of the Same Frequency

As stated in the introduction, the technical basis for the non-simultaneous use of the same frequency is that at the time one of the circuits is using the frequency, the others would be unable to work from consideration of the propagation conditions. Stating the matter another way, it may happen that station A can use a certain frequency during a part of the 24 hours when it is unusable by another station B, whereas for another part of the 24 hours it may be usable by B and not by A.

While it is technically possible to obtain some sharing on this basis, it is realized that it may not be a practical proposition unless extended by administrative agreement. The possibility of such sharing can be illustrated by the use of skip-zone charts of the type shown in Figs. 7 and 8 derived from MUF charts by considering the limiting positions of the transmitter, when the control points lie on the 4000 MUF contour for the frequency 15% below the frequency under consideration. From such a chart, the regions where transmission is impossible is immediately shown, and the possibilities of non-simultaneous sharing are readily seen. It is, however, questionable whether the amount of sharing obtainable would justify the effort and time that would be required to construct a comprehensive set of such skip-zone charts.

The above discussion omits reference to the effect of absorption, and taking it into account, a further possibility arises of using the same frequency non-simultaneously for a short day route and a long night-route at the same longitude, since it would not be desirable to use the same frequency at the same times of day on two routes of greatly different lengths.

9.0 Sharing Cases Not Coming Under 8.0

9.1 Necessity for More Elaborate Investigation

This section covers the cases of frequency sharing which do not fall under the heading of "readily known" in 8.0, and for which a more elaborate investigation is necessary. The distinction is, however, not clear-cut, since there will here be included the proposed programme of work needed before the readily known cases can be obtained, as well as the graphs and charts needed in the further investigation of sharing.

9.2 An Atlas of Graphs and Charts

In order to make the deriving of the readily known cases of sharing and the more detailed study of other cases as simple as possible, an atlas should be prepared containing charts and graphs for this purpose.

9.3 Simultaneous Sharing

a) *For long distances*

The atlas should comprise charts of the type given in Fig. 2. For a complete coverage they should be constructed for the following conditions:

Modified cylindrical projection.

Transmitter at every 10° of latitude from 60° N. to 60° S. and also at 75° N. and 75° S.

Every 4 hours of local time.

For June, December, and equinox.

For sunspot maximum and minimum.

For frequencies 3, 4, 5, 6, 8, 10, 15, 20, 25, 30 Mc/s.

This would, however, mean a total of 5400 charts and in order to keep the amount of work involved to a more reasonable volume, a reduced number could be made that would be adequate with more interpolation. Such a reduced set of charts drawn on the azimuthal equi-distant projection shown in Fig. 3 would be recommended for the following conditions:

0, 5 000, 10 000, 15 000, and 20 000 km. from the sub-solar point.

For sunspot maximum and minimum.

For frequencies 3, 5, 7, 10, 15, 25 Mc/s.

With a table of corrections for the seasons.

Such a set would total 60 charts.

b) *For short distance*

The following charts to assist in the finding of readily known cases should be prepared:

With interference range as a function of protection ratio for various service ranges of the type given in Figs. 10 and 11, with the transmitter:

- 1) near the sub-solar point;
- 2) 30° from the day-night line and transmitting parallel to it;

- 3) 30° from the day-night line and transmitting towards it;
- 4) at the day-night line towards the sub-solar point for sunspot minimum conditions.

For each of the frequencies 4, 6, 10, 15, 20 and 25 Mc/s.

9.4 Non-Simultaneous Sharing

In view of the question of the practicable amount of non-simultaneous sharing obtainable raised in 8.5, no definite recommendation is put forward for the preparation of skip-zone charts of the type in Figs. 7 and 8. If, however, such non-simultaneous sharing should be sufficiently worth while to justify the preparation of skip-zone charts, a set for every 2 Mc/s from 10 to 30 Mc/s for June, December and equinox, for sunspot maximum and minimum should be adequate. Such a set would total 66 charts. It may, however, be pointed out that such skip-zone contour charts would be of some use in the problem of selecting frequencies for a given circuit. In the discussion of this subject given in 7.1(b), it was suggested that a set of MUF charts should be prepared for the purpose, and these charts, embodying the latest available ionospheric data, could be used for the construction of the skip-zone charts.

10.0 Summary and Conclusion

It was felt that this work should be fully objective, and provide the scientific basis for frequency allocation and sharing, therefore, these findings need to be implemented by administrative considerations. The possibilities of frequency sharing so derived can then be assessed from the practical and economic point of view by those directly concerned with the drawing up of a frequency list.

The scientific study of frequency sharing was based on the fundamental cases of (a) the simultaneous and (b) the non-simultaneous use of the same frequency, the scientific conditions for these two cases being defined. The attempt has been made to divide the cases of frequency sharing into readily known cases and those which can only be determined by a more detailed study. The distinction between these two cases is not very clear-cut, as any precise statement of frequency sharing needs a numerical backing, implying in general the preparation of charts and graphs. The readily known cases thus depend partly on material not yet produced, and, apart from recommending a programme of work which could not be undertaken at the Atlantic City Radio Conference, this appendix contains only a few specific cases from which some general conclusions may be drawn.

In particular, the night-time conditions for the simultaneous use of the same frequency are relatively simple, as the absorption is then very low, and the field strength is effectively independent of frequency, subject to the limit set by the MUF. Specimen charts have therefore been prepared, giving the interference range as a function of protection ratio for various service ranges for both night and day. These charts show that the simultaneous use of the same frequency is in general possible only for restricted service ranges. During the day, for example, some sharing is possible for mobile services and tropical broadcasting, while at night the sharing is restricted to services requiring only small protection ratios, say less than 15 db.

The effect of directive antennas, both in the horizontal and the vertical planes, can be included by an appropriate adjustment of the protection ratio, and rules are given for assessing the effect of such antennas in the wanted and unwanted directions.

Long distance simultaneous use of the same frequency is

possible only in a few exceptional cases that have to be examined very carefully on their own merits. This fact was emphasized by plotting the field contours on a large rubber ball representing the earth, since it drew attention to the fact that a region of minimum field intensity must exist somewhere on the earth. It appears that for a given radiated power, there is a frequency above which a transmitter would produce intolerable interference at the end of the service range of any other transmitter working on the same frequency simultaneously. For instance for a power of 1 kW, the limiting frequency is 13 Mc/s at sunspot minimum.

The contour charts will no doubt also be of great value to the practical engineer, as they show in simple form the strength of the signal produced at the point of reception, for a given transmitter power and antenna gain.

Non-simultaneous use of the same frequency on scientific grounds implies that there is a part of the 24 hours when the frequency is usable for only one of the circuits while for another part of the 24 hours it is usable only by the other station. In practice the amount of time available to one or other of the circuits may be small and the sharing not be economic, and the work required to investigate such possibilities may not be justifiable. Skip-zone charts are described that would be helpful in such an investigation, derived from MUF charts.

The use of MUF charts is recommended for the allocation of frequencies on a scientific basis. Some suggestions are made for the choosing of the maximum, minimum and interpolated frequencies for a given circuit in relation to the highest and lowest MUFs occurring at any time throughout the sunspot cycle for the route in question.

List of Documents

1. Report of Special Committee to study world allocations of frequencies for international point to point fixed radio service. 1946 RTPB P801
2. The Influence of Wave Propagation of Short-Wave Communication. K. W. Tremellen and J. W. Cox. 1947 Journal I.E.E., preprint
3. IRPL Radio Propagation Handbook 1943
4. Radio Transmission Handbook. National Bureau of Standards 1941
5. Considerations on the possibility of repeating short waves for broadcasting communicated by Mr. N. Sankin
6. F.C.C. Clear Channel Hearing
Report of Technical Committee 11 on what constitutes objectionable interference January 17, 1946 N. 88370
7. F.C.C. Standards of Good Engineering Practice
2nd Draft revision of Part 1 N. 96444
8. Calculation of Sky Wave Field-Intensities, MUF, and LUHF U. S. Signal Corps - Radio Propagation Unit
Technical Report N. 6 March 1947
9. Minimum required field-intensities for intelligible reception of radio-telephony in presence of atmospherics or receiving set noise. U. S. Signal Corps. Radio Propagation Unit. Technical Report No. 5 December 1945
10. Relative sky wave signal required for intelligible reception of various types of radio communications service. U. S. Signal Corps - Radio Propagation Unit Technical Report N. 4 August 1945
11. Intermediate distance sky wave field intensities
U. S. Signal Corps. Radio Propagation Unit
Technical Report Procedures N. 6 February 1946

12. Basic Radio Propagation predictives, 3 months in advance
CRPL - D series monthly
13. Active radio stations of the world.
RCA Frequency Bureau. 1938 edition
14. Predicted limits for F2-layer radio transmission through-
out the solar cycle. IRPL-R15 12 July 1945
15. Predicted F2-layer frequencies throughout the solar cycle
for summer, winter and equinox season.
IRPL-R16 18 July 1945
16. Frequency separation required for non-interference be-
tween desired signal and interfering signal
Radio Division
Canadian Department of Transport
17. A short note on the world-wide distribution of the E_s
ionization Marconi's Wireless Telegraph Co., Ltd.
Unpublished report July 1946.
18. Predicted values of MUF, OWF and LUHF for sunspot
maximum and minimum, summer and winter
Communicated by Cable and Wireless, Ltd.
19. Radio frequency prediction for Canada 1946-1955
Canadian Radio Wave Propagation Committee March
1946
20. Sporadic E_s ionization at Churchill - August 1943 - July
1946 Canadian Radio Wave Propagation Committee.
November 1946
21. Seasonal variations in WWV reception at S. John's
Canadian Radio Wave Propagation Committee - July 1946
22. An annual report of ionospheric observations above
Chungking sky in the year of 1945
Radio Wave Research Laboratories, Central Broadcasting
Administration. Chungking, China.

Table of Field Intensities and Protection Ratios

The value of 0.3 microvolt per metre for the maximum permissible interfering field intensity given in § 3.0 was derived from the following table obtained by examining the available data:

Type of Service	Minimum field intensity to be protected (median value)	Protection ratio	Maximum permissible interfering field intensity (median value)
Broadcasting	40 microvolts per metre	100:1	0.4 microvolt per metre
Phone	10 microvolts per metre	20:1	0.5 microvolt per metre
Facsimile Manual Telegraphy	1 microvolt per metre	2.5:1	0.4 microvolt per metre
High Speed Telegraphy	2 microvolts per metre	5:1	0.4 microvolt per metre

From the last column of this table, it appears that the maximum permissible field intensity is roughly independent of the type of service, and the value of 0.3 microvolt per metre (i.e., 10 db. below 1 microvolt per metre), which is somewhat below the average value, is suggested as reasonable median value.

**Resolution
Relating to Participation
in Provisional Frequency Board
of Members of the
International Frequency Registration Board**

The International Radio Conference of Atlantic City (1947),

considering:

- 1st: that the International Frequency Registration Board (I.F.R.B.) is being established on 1st January 1948 so that its members may participate as "International members" of the Provisional Frequency Board (P.F.B.) in the work of preparing the draft new International Frequency List;
- 2nd: that, until this list has been prepared and adopted by an Administrative Radio Conference
 - the members of the I.F.R.B. cannot take up their substantive functions as a corporate body for the registration of radio frequencies, and other associated duties, as laid down in the Statutes of the Board;
 - nor can the procedure laid down in article 11 be brought into force;
- 3rd: that, however, it would be desirable for the I.F.R.B. during the period of existence of the P.F.B. to be authorized to act as a corporate body in making such preparatory arrangements, within the framework of their Statutes, as they may consider necessary for the effective discharge of their later duties,

resolves:

- a) that during the period from 1st January 1948 until the new International Frequency List is adopted by an Administrative Radio Conference, the duties of the members of the I.F.R.B. shall conform to those laid down in the Resolu-

tion pertaining to the Preparation of the New International Frequency List;

- b) that as from the date when the new International Frequency List is approved by an Administrative Radio Conference;
 - the members of the I.F.R.B. shall be bound solely by the Statutes of the Board as laid down in articles 10, 11 and 12 of the Radio Regulations;
 - the procedure laid down in article 11 shall be brought into force;
- c) that, however, during the period of existence of the P.F.B., the I.F.R.B. may act as a corporate body in making such preparatory arrangements, within the framework of their Statutes, as they may consider necessary for the effective discharge of their later duties as defined in b) above.

Resolution Relating to the Preparatory Committee of Experts

To consider coordination of activities within the fields of Aviation, Shipping and Telecommunications in regard to Safety at Sea and in the Air.

Whereas:

A. the following resolution was adopted by the Economic and Social Council of the United Nations on March 28th, 1947, on coordination of activities in the fields of Aviation, Shipping and Telecommunications in regard to Safety at Sea and in the Air:

“After considering this suggestion of the Transport and Communications Commission concerning the coordination of activities in the fields of aviation, shipping and telecommunications in regard to Safety at Sea and in the Air, the economic and social council takes note of the fact that the United Kingdom government, having convened the conference on Safety of Life at Sea, is prepared to invite the necessary experts in the fields mentioned and also preliminary to the Conference to convene the Preparatory Committee of Experts to consider the coordination of activities in these fields.

The Economic and Social Council instructs the Secretary General:

- to continue the preliminary study of the problem which has already been commenced,
- to follow and assist the work of the Preparatory Committee and of the Conference itself.
- and to keep the Transport and Communications Commission informed of developments in this connection”;

B. and a proposal was made by the United Kingdom (Document No. 539 R, Proposal 2550 R) that the International Radio Conference of Atlantic City (1947) proceed to nominate three persons, expert in the particular fields of telecommunications in regard to Safety at Sea and in the Air, to represent the interests of the I.T.U. on the Preparatory Committee.

The International Radiocommunications Conference of Atlantic City (1947):

1. *Designates* the following, subject to the consent of the respective governments:
 - Arnold Poulsen, Adviser to Ministry of Commerce, Industry and Shipping, Denmark
 - Colonel A. H. Read, O.B.E., Inspector of Wireless Telegraphy, General Post Office, United Kingdom
 - Edward M. Webster, Commissioner, Federal Communications Commission, United States
 - René Petit (Alternate), Chief Engineer, Telegraph and Telephone Services, France
 - A. J. W. van Anrooy (Alternate), Superintendent of Marine Radio Communications, Netherlands;
2. *Authorizes* the Secretary General of the Union:
 - a) to arrange for the attendance of an alternate if advised of the unavailability of one of the three principals to participate in the meeting of the Preparatory Committee;
 - b) to arrange with each of the attending representatives for the provision of a secretary and a technical assistant, should these be required;
 - c) to pay the travel and other necessary expenses of the I.T.U. representatives of the Preparatory Committee (and of secretarial and technical assistants where these are needed by each of the representatives attending).

3. *Instructs* the designated representatives as follows:

- a) subject to the limitations of the present Convention, to cooperate with the representatives of the other organizations participating on the Preparatory Committee in the formulation of a draft program for the coordination of activities to the extent that the provisions of such program shall not be in conflict with the provisions, aims and principles of the International Telecommunications Convention of Atlantic City (1947) and Radio Regulations of Atlantic City (1947);
- b) to submit a joint report to the Secretary General of the Union upon termination of the Preparatory Meeting, such report to include:
 - (1) draft of the program for coordination arrived at by the Preparatory Committee;
 - (2) recommendations as to the acceptance or non-acceptance by the I.T.U. of the provisions included in such draft program;
 - (3) recommendations as to the representation of I.T.U. at the forthcoming Safety of Life at Sea Conference, including any specific instructions believed necessary for the guidance of any representatives at that Conference.

4. *Requests* the Secretary General:

- a) to accept, on behalf of the I.T.U., the official invitation, when received, which in accordance with Document No. 539 R will be issued by the United Kingdom to appoint representatives to the Preparatory Committee;
- b) to advise each of the designated representatives in writing of his designation and status, and to furnish each with copies of such material produced by the Atlantic City Conference as may be necessary for his participation in the Preparatory Meeting;

- c) to forward the report of the representatives to each administration participating in the Atlantic City Conference, with the request that such administrations consider the recommendations made therein, in the proposals which they will submit to the Safety of Life at Sea Conference;
- d) to arrange for the representation of I.T.U. at the forthcoming Safety of Life at Sea Conference should such representation be recommended by the I.T.U. representatives named herein.

Note: The International Telecommunications Convention of Atlantic City (1947) having provided for the establishment of an Administrative Council which shall take office prior to the convening of the Safety of Life at Sea Conference, the designation of I.T.U. representatives at that Conference will be subject to the approval of such Administrative Council.

**Recommendation to the Governments Signatory to the International
Convention for the Safety of Life at Sea**

**Specifications of Performance for the Automatic Alarm
Receiving Device**

The International Radio Conference of Atlantic City, considering that there is a need for uniform technical specifications of performance for the automatic alarm receiving device more detailed than the general principles set forth in article 37 of the Radio Regulations, and recognizing that the International Convention for the Safety of Life at Sea states the conditions relating to the installation and use of the automatic alarm receiving device on ships, recommends:

- 1st that the next conference for the revision of the International Convention for the Safety of Life at Sea consider the adoption of detailed technical specifications of performance for the automatic alarm device based upon the general principles contained in article 37 of the Radio Regulations.
- 2nd that, for that purpose, the Governments parties to the International Convention for the Safety of Life at Sea submit all the necessary proposals to the said Conference.

ALPHABETICAL INDEX

**of the contents of the Final Acts of the International
Radio Conference**

ATLANTIC CITY, 1947

This alphabetical index covers :

1. the Radio Regulations
2. the Appendices
3. the Additional Radio Regulations
4. the Additional Protocol to the Acts of
the International Radio Conference
5. the Recommendations and Resolutions
adopted by the International Radio Con-
ference, Atlantic City, 1947.

International Telecommunication Union
GENEVA
1949



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ALPHABETICAL INDEX

of the Radio Regulations, the Appendices,
the Additional Radio Regulations, the Additional Protocol to the
Acts of the International Radio Conference, and the Recommendations
and Resolutions adopted by the
International Radio Conference,
(Atlantic City, 1947).

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the Recommendations and Resolutions.

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