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INTERNATIONAL TELECOMMUNICATION UNION

RADIO REGULATIONS

A NOTE FROM THE ITU LIBRARY & ARCHIVES SERVICE

Update Pages to the Radio Regulations

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COVERING NOTE

GENERAL SECRETARIAT INTERNATIONAL TELECOMMUNICATION UNION

Subject Replacement pages for the 1988 Updating of the Radio Regulations Geneva, 15 August 1988
 (edition of 1982, revised in 1985 and 1986), as a consequence of the
 entry into force, on 1 September 1988, of the Final Acts of the World
 Administrative Radio Conference for the Planning of the HF Bands
 Allocated to the Broadcasting Service (HFBC-87), Geneva, 1987

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INTERNATIONAL TELECOMMUNICATION UNION

General Secretariat

Radio Regulations

Edition of 1982

Revised in 1985, 1986 and 1988

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Appendices 1-24 to the
Radio Regulations**

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FOREWORD

1. This edition of the Radio Regulations is published under the authority of the Secretary-General of the International Telecommunication Union. It is a consolidated document, which incorporates, in Volume 1, the provisions of the Radio Regulations (Geneva, 1979) and Appendices 1 to 24 thereto, and, in Volume 2, Appendices 25 to 44, as well as Resolutions and Recommendations, as adopted by the World Administrative Radio Conference, Geneva, 1979.

1.1 This edition includes the partial revisions of 1985, 1986 and 1988 adopted respectively by the following Conferences:

a) World Administrative Radio Conference for the Mobile Services, Geneva, 1983 (Mob-83).

b) First Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1985 (Orb-85).

c) World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, Geneva, 1987 (HFBC-87).

1.2 The Final Protocols (reservations and counter-reservations of signatory delegations) to the Final Acts of the above-mentioned World Administrative Radio Conferences (see items 1 and 1.1) have not been reproduced in the Radio Regulations.

2. Pages are separately numbered for each Article, Appendix, Resolution, Recommendation, etc. The following symbols have been used for this numbering, which appears at the top of each page:

TA	=	Analytical Table
IA	=	Analytical Index of Resolutions and Recommendations
N	=	Notes
RR	=	Radio Regulations
AP	=	Appendix
RES	=	Resolution
REC	=	Recommendation.

Examples:

TA-6	= Analytical Table, page 6
IA-3	= Analytical Index of Resolutions and Recommendations, page 3
N-2	= Notes, page 2
RR8-14	= Article 8 of the Radio Regulations, page 14
AP16-5	= Appendix 16, page 5
RES500-2	= Resolution 500, page 2
REC604-1	= Recommendation 604, page 1.

2.1 The Foreword bears arabic page numbers and the Table of Contents bears roman page numbers.

2.2 In the Table of Contents the total number of pages for each category of information is indicated.

For example:

RR1-1/23	shows that Article 1 has 23 pages;
RR3-1	shows that Article 3 has only one page.

2.3 The addition, modification or deletion of a Provision, Appendix, Resolution or Recommendation is indicated by a symbol in **bold** type particular to each World Administrative Radio Conference, these are given below:

- a) The symbol **Mob-83** for the World Administrative Radio Conference for the Mobile Services, Geneva, 1983.
- b) The symbol **Orb-85** for the First Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1985.
- c) The symbol **HFBC-87** for the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, Geneva, 1987.

2.4 All pages which have been modified, as a result of partial revisions by the World Administrative Radio Conferences listed in 2.3 above, bear an abbreviation particular to each updating at the bottom of the page (i.e. (Rev. 85), (Rev. 86) and (Rev. 88) respectively).

2.5 In the case of a deletion the symbol **SUP** is used and the conference having made the decision is indicated.

(Rev. 1988)

3. The General Secretariat has furnished, in addition to several short notes in the body of the text, the following notes:

- in Appendix 42 to the Radio Regulations, a note listing the international call sign series allocated by the Secretary-General on a provisional basis between the end of the World Administrative Radio Conference, Geneva, 1979, and 29 January 1985;
 - in Appendix 44 to the Radio Regulations, two notes listing blocks of selective call numbers for ship stations, and blocks of coast station identification numbers supplied to administrations by the Secretary-General between the end of the World Administrative Radio Conference, Geneva, 1979, and, respectively, 8 April 1988 and 5 May 1988;
 - preceding the Resolutions, a note indicating the manner in which the Resolutions have been grouped;
 - preceding the Recommendations, a note indicating the manner in which the Recommendations have been grouped;
 - in the section “Notes”:
 - a note referring to the formation and use of call signs;
 - a note listing the provisions of the Radio Regulations that contain references to CCIR Recommendations, together with the reference numbers and titles of the CCIR Recommendations;
 - flowcharts from the IFRB Handbook on Radio Regulatory Procedures (see Resolution 6).
-

kHz
7 300 — 9 995

Allocation to Services		
Region 1	Region 2	Region 3
7 300 — 8 100	FIXED Land Mobile 529	
8 100 — 8 195	FIXED MARITIME MOBILE	
8 195 — 8 815	MARITIME MOBILE 500A 500B 529A 501	
8 815 — 8 965	AERONAUTICAL MOBILE (R)	
8 965 — 9 040	AERONAUTICAL MOBILE (OR)	
9 040 — 9 500	FIXED	
9 500 — 9 900	BROADCASTING 530 531	
9 900 — 9 995	FIXED	

529 In Region 3, the stations of those services to which the band 7 995 — 8 005 kHz is allocated may transmit standard frequency and time signals.

529A The conditions for the use of the carrier frequencies 8 257 kHz, Mob-83 12 392 kHz and 16 522 kHz are prescribed in Articles **38** and **60**.

530 On condition that harmful interference is not caused to the broadcasting service, frequencies in the bands 9 775 – 9 900 kHz, 11 650 – 11 700 kHz and 11 975 – 12 050 kHz may be used by stations in the fixed service communicating only within the boundary of the country in which they are located, each station using a total radiated power not exceeding 24 dBW.

531 The bands 9 775 – 9 900 kHz, 11 650 – 11 700 kHz, 11 975 – 12 050 kHz, HFBC-87 13 600 – 13 800 kHz, 15 450 – 15 600 kHz, 17 550 – 17 700 kHz and 21 750 – 21 850 kHz are allocated to the fixed service on a primary basis subject to the procedure described in Resolution **8**. The use of these bands by the broadcasting service shall be subject to provisions established by the World Administrative Radio Conference for the Planning of HF Bands Allocated to the Broadcasting Service (see Resolution **508**). The provisions of Resolution **512 (HFBC-87)** also apply. Within these bands, the date of commencement of operations in the broadcasting service on a planned channel shall not be earlier than the date of completion of satisfactory transfer, according to the procedures described in Resolution **8**, of all assignments to stations in the fixed service operating in accordance with the Table and other provisions of the Radio Regulations, which are recorded in the Master Register and which may be affected by broadcasting operations on that channel.

- 1338 d) the notice is in conformity with the technical principles of the Plan set forth in Appendix 27 Aer2 *;
- 1339 e) the area of use is within the boundaries of the Areas as set forth in Column 2 of the Plan.
- 1340 (3) A notice which is not in conformity with the provisions of No. 1335 shall be examined with respect to Nos. 1267 and 1268. The date to be entered in Column 2b shall be determined in accordance with the relevant provisions of Section III of this Article.
- 1341 (4) In the case of a notice in conformity with the provisions
Mob-83 of Nos. 1335, 1336 and 1338, but not with those of Nos. 1337 or 1339, the Board shall examine whether the protection specified in Appendix 27 Aer2 * (Part I, Section IIA, paragraph 5) is afforded to the allotments in the Plan and to assignments already recorded in the Master Register with a favourable finding with respect to this provision. In doing so, the Board shall assume that the frequency will be used in accordance with the "Sharing conditions between areas" specified in Appendix 27 Aer2 * (Part I, Section IIB, paragraph 4).
- 1342 (5) Except for cases where No. 1268 applies, all frequency
Mob-83 assignments referred to in No. 1333 shall be recorded in the Master Register according to the findings reached by the Board. The date to be entered in Column 2a or 2b shall be that determined according to the relevant provisions of Section III of this Article.
- 1343 § 27. (1) *Examination of Notices Concerning Frequency Assignments to Aeronautical Stations in the Aeronautical Mobile (OR) Service in the Bands Allocated Exclusively to that Service Between 3 025 kHz and 18 030 kHz (see No. 1239).*
- 1344 (2) The Board shall examine each notice covered by No. 1343 to determine whether:
- 1345 a) the assignment is in conformity with the primary allotments in the Allotment Plan for the aeronautical mobile (OR) service and the conditions specified in Appendix 26 (Parts III and IV);

* Note by the General Secretariat: Appendix 27 has been replaced by Appendix 27 Aer2 which entered into force on 1 February 1983.

- 1346** *b)* the assignment is in conformity with or satisfies the requirements for secondary allotments in the Allotment Plan for the aeronautical mobile (OR) service and the conditions specified in Appendix 26 (Part III, Section II, paragraph 4, sub-paragraph *d*), and Part IV). In applying these provisions, the Board shall assume that the frequency will be used on a day-time basis;
- 1347** *c)* the assignment is the result of a permitted change from one class of emission to another, its occupied bandwidth is within the channelling arrangement provided for in Appendix 26 (Part III, Section II, paragraphs 1 and 2), and it meets all the conditions for a primary or secondary allotment in the Plan, except that the assigned frequency does not correspond numerically with one of the frequencies specified therein.
- 1348** (3) The technical criteria to be employed by the Board in its examination of these notices shall be those in Appendix 26 (Part III).
- 1349** (4) All frequency assignments referred to in No. 1343 shall be recorded in the Master Register according to the findings reached by the Board. The date to be entered in Column 2a or 2b shall be that determined according to the relevant provisions of Section III of this Article.

**Sub-Section IID. Procedure to Be Followed for
Broadcasting Stations Operating in the Bands Allocated
Exclusively to the Broadcasting Service Between 5 950 kHz and 26 100 kHz**

1350 § 28. Frequency assignments to broadcasting stations in the HFBC-87 bands allocated exclusively to the broadcasting service between 5 950 kHz and 26 100 kHz shall be dealt with in accordance with the provisions of Article 17.

service, shall apply the procedure described in this Article. When that administration arrives at a positive result in applying this procedure, the Board, at its request, shall replace the existing allotment in the Plan by the proposed allotment.

1722 § 9. The Board shall maintain an up-to-date master copy of the Plan resulting from the application of this procedure. It shall prepare in a suitable form, for publication by the Secretary-General, the whole or part of the revised version of the Plan as and when the circumstances justify and in any case once annually.

1723
to NOT allocated.
1735
HFBC-87

1739 (3) All broadcasting requirements, national ¹ and international, shall be treated on an equal basis, with due consideration of the differences between these two kinds of broadcasting requirements.
HFBC-87

1740 (4) In the planning procedure, an attempt shall be made to ensure, as far as practicable, continuity of use of a frequency or of a frequency band. However, such continuity should not prevent equal and technically optimum treatment of all broadcasting requirements.
HFBC-87

1741 (5) The periodical planning procedure shall be based solely on the broadcasting requirements expected to become operational during the planning period. It shall furthermore be flexible in order to take into account new broadcasting requirements and modifications to the existing broadcasting requirements.
HFBC-87

1742 (6) The planning procedure shall be based on double-sideband emissions. Single-sideband emissions which administrations might wish to make may, however, be permitted in place of planned double-sideband emissions, provided that the level of interference caused to double-sideband emissions is not increased.
HFBC-87

1743 (7) For efficient spectrum use, only one frequency should be used, whenever possible, to meet a given broadcasting requirement in a given required service area; in any case the number of frequencies used will be the minimum necessary to provide a specified quality of reception.
HFBC-87

1744 (8) Those broadcasting requirements for which the agreed minimum usable field strength is not ensured at any point of the required service area, through lack of the requisite technical facilities, can obtain proportionally reduced protection against interference.
HFBC-87

1739.1 ¹ An HF broadcasting use is considered as being for the purposes of national coverage when the transmitting station and its associated required service area are both located within the territory of the same country.
HFBC-87

1745 (9) In the first stage of the equitable application of a new
HFBC-87 planning procedure, an attempt will be made to include the maximum number of submitted requirements achieving the desired quality level. The remaining requirements will be processed on the understanding that lower quality levels would be acceptable.

1746 (10) The planning method shall satisfy, on an equal basis, a
HFBC-87 minimum of the broadcasting requirements submitted by administrations with the desired performance. Special consideration shall be given to the requirements of administrations which, in the first instance, are unable to achieve this performance.

HFBC-87**Section III. Planning System**

1747 § 3. The Planning System developed in accordance with the
HFBC-87 principles set out in Section II of this Article and the decisions of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), shall be improved and tested in accordance with the instructions contained in Resolution **511 (HFBC-87)** for adoption, if acceptable to a competent world administrative radio conference.

HFBC-87**Section IV. Consultation Procedure**

1748 § 4. Periodically, administrations shall submit to the International Frequency Registration Board the projected seasonal schedules of their broadcasting stations in the bands allocated exclusively to the broadcasting service between 5 950 kHz and 26 100 kHz. These schedules shall cover each of the following seasonal propagation periods and shall be implemented at 0100 UTC on the first Sunday of the period concerned:

March Schedule	– March and April
May Schedule	– May, June, July and August
September Schedule	– September and October
November Schedule	– November, December, January and February.

1749 HFBC-87 § 5. The closing dates for the receipt of schedules are set by the Board in order to permit the advance period to be reduced gradually to the minimum found practicable by the Board. Those assignments in a schedule the characteristics of which are not expected to change may be submitted up to a limit of one year in advance. Each such assignment shall be confirmed by the closing date for the submission of the schedules for the respective seasonal periods. The Board shall take appropriate steps to send reminders to administrations in carrying out this procedure.

1750 § 6. Two or more administrations may submit coordinated schedules containing their agreed projected frequency usage.

1751 § 7. The frequencies shown in the schedules shall be frequencies that actually will be used for that particular seasonal period and their number should be the minimum necessary to provide satisfactory reception of the particular programme in each of the areas for which it is intended. Each administration should prepare its schedule from season to season by using to the maximum extent practicable the same frequencies in each band as were used in previous schedules.

1752 § 8. The schedules shall be submitted in the form prescribed in Appendix 2, which specifies the data to be furnished for each assignment.

1753 HFBC-87 § 9. The frequencies included in the schedules shall be in conformity with No. 1240 of these Regulations.

HFBC-87 Section V. Preliminary Examination and Preparation of the Tentative High Frequency Broadcasting Schedule

1754 § 10. (1) On receipt of the seasonal schedules, including confirmation in appropriate cases of the continuing validity of assignments included in preceding schedules, the Board shall incorporate the proposed frequency usage of all administrations into a combined schedule and make the appropriate preliminary examination

required to prepare the “Tentative High Frequency Broadcasting Schedule” (hereafter called the *Tentative Schedule*) for the particular seasonal period. This Tentative Schedule shall include:

- 1755** *a)* all specific frequency assignments in cases where no alternatives were given by the administration concerned;
- 1756** *b)* the selections made by the Board in cases where alternatives were given by the administration concerned;
- 1757** *c)* frequencies suggested by the Board in respect of all services for which no specific frequency was included in the submitted schedule, such suggestions to be made with due overall consideration for No. **1759**, for compatibility within the Tentative Schedule, and for possible changes to the projected frequency usage which might be desirable to achieve more equitable satisfaction of administrations’ requirements;
- 1758** *d)* such apparent incompatibilities between frequency assignments which the Board can indicate within the time available.
- 1759** (2) At the request of administrations, particularly those of countries in need of special assistance and which have no suitable listings in the Master Register, the Board shall give special consideration to the requirements of those administrations in preparing the Tentative Schedule.
- 1760** (3) The Board shall begin the work outlined in Nos. **1754** to **1758** early enough for the Tentative Schedule to be issued to administrations not later than two months before the date when the particular seasonal period begins.

HFBC-87 **Section VI. Technical Examination and Revision
of the Tentative Schedule**

- 1761** § 11. (1) The Board shall continue its technical examination of the Tentative Schedule with a view not only to identifying further incompatibilities between frequency assignments which become

apparent in the technical examination and correcting them where possible, but also to improving the technical aspects of the Tentative Schedule by amendments to be agreed upon in consultation with the administrations concerned.

1762 (2) In preparing its recommendations to administrations, the Board shall take into account monitoring observations and all other available data. However, when actual frequency usage is apparently not in conformity with the assignments in a submitted schedule, the Board shall seek from the administration concerned confirmation of this information.

1763 (3) Administrations, having considered the Tentative Schedule together with such recommendations as may have been furnished by the Board, should notify, as soon as possible, preferably before the date of commencement of the seasonal period concerned, any amendments to the Tentative Schedule which are intended for implementation.

1764 (4) Changes in the assignments of broadcasting stations which are implemented after the date on which the seasonal period begins shall be notified to the Board as soon as they can be forecast.

1765 (5) For changes notified in accordance with Nos. **1763** and **1764**, the Board shall apply the same procedure as that specified in Nos. **1759**, **1761** and **1762**. Such revisions to the Tentative Schedule as result from the application of the procedure in this Section shall be published in the IFRB weekly circulars in order that administrations can keep up to date their copies of the Tentative Schedule.

HFBC-87 **Section VII. Publication of the High Frequency
Broadcasting Schedule**

1766 § 12. After the end of each seasonal period, the Board shall publish the High Frequency Broadcasting Schedule, which shall reflect the Tentative Schedule as amended by all the changes

notified to the Board since the publication of the Tentative Schedule. This High Frequency Broadcasting Schedule shall indicate by appropriate symbols:

- 1767** a) those assignments which administrations found in practice to be unsatisfactory and so notified to the Board;
- 1768** b) those assignments not included in the Tentative
HFBC-87 Schedule which were taken into account by the Board in the examination under Section VI of this Article.
- 1769** SUP
HFBC-87

HFBC-87 **Section VIII. Miscellaneous Provisions**

1770 § 13. The technical standards used by the Board when applying the provisions of this Article should be based, not only on the factors listed in No. **1454**, but also on past experience in broadcasting planning and on the experience gained by the Board in the application of the provisions of this Article.

1771 § 14. With a view to the ultimate evolution of compatible technical plans for the frequency bands concerned, the Board shall take all necessary steps to carry out engineering studies on a long-term basis. For this purpose, the Board shall use all information made available to it on frequency usage in the application of the procedure prescribed in this Article. The Board shall also keep administrations informed of the progress and results of such studies at regular intervals.

1772 § 15. In applying the provisions of Article **22** of these Regulations, problems of harmful interference which may arise in frequency usage in the bands concerned shall be resolved by administrations by exercising the utmost goodwill and mutual cooperation and by giving due consideration to all the relevant technical and operational factors involved.

1773
to
1797 NOT allocated.

ARTICLE 30

**Broadcasting Service and
Broadcasting-Satellite Service**

Section I. Broadcasting Service

2664

A. General

2665

§ 1. (1) The establishment and use of broadcasting stations (sound broadcasting and television broadcasting stations) on board ships, aircraft or any other floating or airborne objects outside national territories is prohibited.

2666

(2) In principle, except in the frequency band 3 900 - 4 000 kHz, broadcasting stations using frequencies below 5 060 kHz or above 41 MHz shall not employ power exceeding that necessary to maintain economically an effective national service of good quality within the frontiers of the country concerned.

2667

B. Broadcasting in the Tropical Zone

2668

§ 2. (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 Nos. 406 to 411, where it may be shown that because of the difficulty of high atmospheric noise level and propagation it is not possible to provide economically a more satisfactory service by using low, medium, or very high frequencies.

2669

(2) The use by the broadcasting service of the bands listed below is restricted to the Tropical Zone:

2 300 - 2 498 kHz (Region 1)

2 300 - 2 495 kHz (Regions 2 and 3)

3 200 - 3 400 kHz (all Regions)

4 750 - 4 995 kHz (all Regions)

5 005 - 5 060 kHz (all Regions)

RR30-2

2670 (3) The carrier power of the transmitters operating in this service in the bands listed in No. **2669** shall not exceed 50 kW.

2671 (4) Within the Tropical Zone, the broadcasting service has priority over the other services with which it shares the bands listed in No. **2669**.

2672 (5) However, in that part of Libya north of parallel 30° North the broadcasting service in the bands listed in No. **2669** has equal rights to operate with other services in the Tropical Zone with which it shares these bands.

2673 (6) The broadcasting service operating inside the Tropical Zone, and other services operating outside this zone, are subject to the provisions of No. **346**.

2673A *C. HF Bands Allocated Exclusively*
HFBC-87 *to the Broadcasting Service*

2673B § 2A. Double-sideband and single-sideband transmitting stations operating in the HF bands allocated exclusively to the Broadcasting Service shall meet the system specifications contained in Appendix 45.
HFBC-87

Section II. Broadcasting-Satellite Service

2674 § 3. In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum extent practicable, the radiation over the territory of other countries unless an agreement has been previously reached with such countries.

2675
to
2699 NOT allocated.

APPENDIX 2
HFBC-87

Submission of HF Broadcasting Requirements to the IFRB

(See Article 17)

Section A. Introduction

A broadcasting requirement is a requirement indicated by an administration to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitting station.

An administration wishing to notify a broadcasting requirement to the Board will do so on the basis of the information provided in Section B of this Appendix. The necessary information shall be provided on a requirement form developed by the Board.

A separate requirement form shall be sent to the IFRB for notifying:

- each requirement to be put into use for particular seasons;
- any modification in the characteristics of a requirement;
- any deletion of a requirement.

**Section B. Information relating to the broadcasting service
in the exclusive HFBC bands to be provided in requirement forms ***

1. *Notifying administration*¹

The notifying administration shall be indicated using the symbols given in the Preface to the International Frequency List.

1.1 Requirement reference number allocated by the administration.

2. *Name of transmitting station*¹

3. *Symbol of the country or geographical area in which the transmitting station is located*¹

4. *Geographical coordinates of the transmitting station*¹

When two or more transmitting stations are almost co-located, the administration shall indicate, as far as possible, the same coordinates.

¹ Basic information that must be provided by administrations.

* *Note:* The Board will develop a form for the submission of HF broadcasting requirements based on the items of information and corresponding explanations contained in this Appendix. Furthermore, the Board may add other items of an administrative nature, although provision of the information in these additional items will not be obligatory.

5. *Required service areas*¹

In specifying the required service area, reference shall be made to a combination of:

- CIRAF Zones,²
- quadrants of CIRAF Zones,
- parts of quadrants specified by the sets of test points contained within those parts.

Where it is necessary to specify a required service area which is smaller than an entire zone or quadrant, this may be done by specifying the boundaries of the area as two azimuths and two ranges from the transmitter location.

The map of the CIRAF Zones to be used in notifying a requirement is given in Section C of this Appendix.

6. *Season*¹

The season or seasons to which the requirement is intended to apply. When the requirement is not intended to be implemented on a daily basis, the days on which it will be implemented shall be indicated.

¹ Basic information that must be provided by administrations.

² CIRAF = Conferencia Internacional de Radiodifusión por Altas Frecuencias (International High Frequency Broadcasting Conference), Mexico, 1948.

7. *Hours of operation (UTC)*¹

7.1 Indicate legal clock time changes.²

8. *Indicate temporary interruptions of broadcasting services* (due, for example, to natural disasters or other types of catastrophe)

9. *Transmitting antenna characteristics*¹

9.1 For all types of antenna indicate:

9.1.1 The type of antenna to be used, with reference to the antenna type appearing in the IFRB Technical Standards (see Resolution 516 (HFBC-87)).

9.1.2 The azimuth of maximum radiation in degrees from true North in clockwise direction.

9.1.3 The maximum gain (isotropic, G_i , dB) if different from that associated with the relevant pattern in the reference antenna set. In the case of slewed horizontal dipole arrays this maximum gain is the gain in the slewed mode.

9.1.4 The lowest and highest frequency bands (in MHz) for multi-band antennas, or the frequency band for single band antennas.

¹ Basic information that must be provided by administrations.

² For information only.

9.2 For horizontal dipole arrays, indicate in addition to the above parameters:

9.2.1 Type of radiator (end-fed or centre-fed dipole elements).

9.2.2 Type of reflector (tuned dipoles or aperiodic screen).

9.3 For multi-band horizontal dipole arrays, indicate in addition to the above parameters:

9.3.1 Design frequency, in MHz. If not indicated, the design frequency will be assumed as the arithmetic mean of the centre frequencies of the lowest and highest frequency bands covered by the antenna.

9.4 For slewed horizontal dipole arrays, indicate in addition to the above parameters:

9.4.1 Azimuth of the normal to the plane of the radiating elements (in degrees from true North in the clockwise direction).

10. *Transmitter power (dBW)*¹

- 1) For double-sideband emissions, indicate the carrier power in dBW.
- 2) For single-sideband emissions, indicate the peak envelope power in dBW.
- 3) Indicate the range of available powers.

¹ Basic information that must be provided by administrations.

11. *Class of emission*¹

Indicate whether it is a double-sideband emission, or a single-sideband emission with a carrier reduced by 6 dB or by 12 dB relative to peak power (see Article 4).

11.1 Indicate if the transmitter can operate in either mode (double-sideband and single-sideband).²

12. *Assigned frequency* (for application of Article 17 or Section 2 of Annex 1 to Resolution 515 (HFBC-87))

Administrations may indicate:

- the assigned frequency (in kHz);³
- alternative frequencies (in kHz);³
- the frequency band (in MHz).

If no information is provided, the Board will select the appropriate band and frequency in accordance with Annex 1 to Resolution 515 (HFBC-87).

¹ Basic information that must be provided by administrations.

² For information only.

³ a) For a double-sideband emission, the assigned frequency shall be expressed in kHz ending with 0 or 5.

b) For a single-sideband emission, the assigned frequency shall be expressed in kHz ending with 2.5 or 7.5.

13. *Preset frequencies (in kHz)¹*
14. *Preferred frequency (in kHz)¹*
15. *Preferred frequency band (in MHz)*
16. *Equipment availability*

Indicate the number of transmitters that can be used simultaneously and the associated bands for possible use in case more than one frequency has to be used to achieve the required basic broadcast reliability (BBR) (see the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**).

17. *Requested types of frequency continuity (types 2, 3, 4 and/or 5) (see IV.3 of the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**)*
- 17.1 Identify requirements which are related by these types of continuity.
18. *Lowest value of BBR to be used for this requirement (see IV.3.3 of the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**)*

¹ a) For a double-sideband emission, the assigned frequency shall be expressed in kHz ending with 0 or 5.

b) For a single-sideband emission, the assigned frequency shall be expressed in kHz ending with 2.5 or 7.5.

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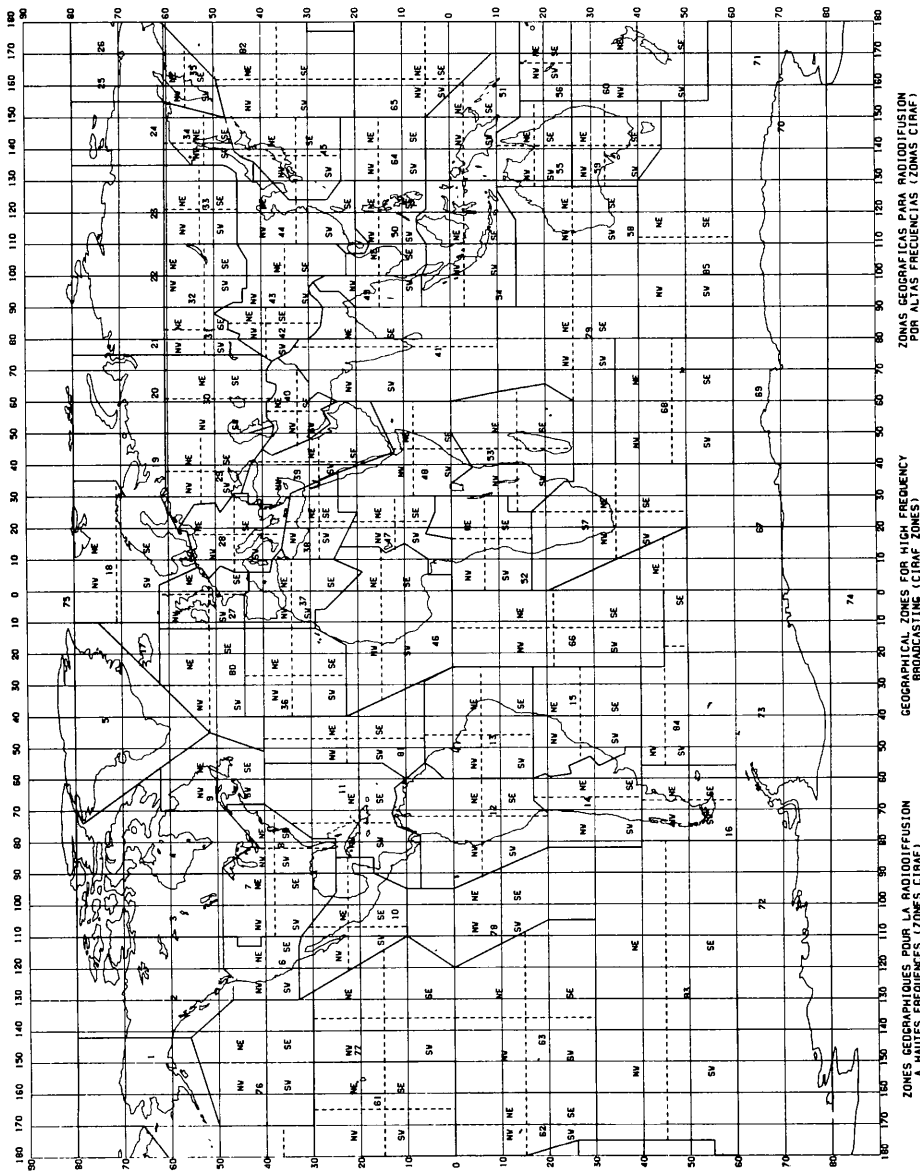
19. *Indicate the use of synchronized transmitters*
20. *Indicate equipment limitations (e.g. frequency bands available)*
21. *Indicate whether consultations are required when the co-channel RF protection ratio is less than 17 dB*
22. *Nature of requirement (for instance, national or international)¹*
23. *Postal and telegraphic addresses of the administration responsible for the station*
24. *Remarks and supplementary information*

Indicate, after the symbol COORD/, the name of any administration with which coordination has been effected for use of the frequency.

Indicate any other information that the Board may require for the evaluation of the improved HFBC Planning System (see Resolution **515 (HFBC-87)**).

¹ For the purpose of Resolution **515 (HFBC-87)** only. See also No. **1739.1**.

SECTION C. Map of CIRAF Zones



Note - Information concerning the test points associated with these CIRAF Zones and quadrants is given in the IFRB Technical Standards.

(Rev. 1988)

AP7-2

1	2	3
<p>3. Mobile Stations:</p> <p>a) Ship Stations</p> <p>b) Ship's Emergency Transmitters</p> <p>c) Survival Craft Stations</p> <p>d) Aircraft Stations</p> <p>4. Radiodetermination Stations</p> <p>5. Broadcasting Stations</p>	<p>1 000 3)</p> <p>5 000</p> <p>5 000</p> <p>500</p> <p>100</p> <p>10 Hz</p>	<p>200 4)</p> <p>500 5)</p> <p>500</p> <p>100</p> <p>100</p> <p>10 Hz</p>
<p>Band: 535 kHz to 1 606.5 kHz (1 605 kHz in Region 2)</p> <p>Broadcasting Stations</p>	<p>10 Hz 6)</p>	<p>10 Hz 6)</p>
<p>Band: 1 606.5 kHz (1 605 kHz in Region 2) to 4 000 kHz</p> <p>1. Fixed Stations:</p> <p>— power 200 W or less</p> <p>— power above 200 W</p> <p>2. Land Stations:</p> <p>— power 200 W or less</p> <p>— power above 200 W</p> <p>3. Mobile Stations:</p> <p>a) Ship Stations</p> <p>b) Survival Craft Stations</p> <p>c) Emergency Position-Indicating Radiobeacons</p> <p>d) Aircraft Stations</p> <p>e) Land Mobile Stations</p> <p>4. Radiodetermination Stations:</p> <p>— power 200 W or less</p> <p>— power above 200 W</p> <p>5. Broadcasting Stations</p>	<p>100</p> <p>50</p> <p>100 2) 9) 10)</p> <p>50 2) 9) 10)</p> <p>200 3) 11)</p> <p>300</p> <p>300</p> <p>100 10)</p> <p>200</p> <p>100</p> <p>50</p> <p>20</p>	<p>100 7) 8)</p> <p>50 7) 8)</p> <p>100 1) 7) 10)</p> <p>50 1) 7) 10)</p> <p>40 Hz 12)</p> <p>100</p> <p>100</p> <p>100 10)</p> <p>50 13)</p> <p>20 14)</p> <p>10 14)</p> <p>10 Hz 15)</p>

- 12) For A1A emissions the tolerance is 50 parts in 10^6 .
- 13) For transmitters used for single-sideband radiotelephony or for frequency shift keying radiotelegraphy the tolerance is 40 Hz.
- 14) For radiobeacon transmitters in the band 1 606.5 (1 605 Region 2) - 1 800 kHz the tolerance is 50 parts in 10^6 .
- 15) For A3E emissions with carrier power of 10 kW or less the tolerance is 20 parts in 10^6 , 15 parts in 10^6 and 10 parts in 10^6 in the bands 1 606.5 (1 605 Region 2) - 4 000 kHz, 4 - 5.95 MHz and 5.95 - 29.7 MHz respectively.
- 16) For A1A emissions the tolerance is 10 parts in 10^6 .
- 17) In the A1A Morse working frequency bands, a frequency tolerance of 200 parts in 10^6 may be applicable to existing transmitters, provided that the emissions are contained within the band in question.
- 18) In the A1A Morse calling frequency bands frequency tolerances of 40 parts in 10^6 in the bands between 4 MHz and 23 MHz and of 30 parts in 10^6 in the 25 MHz band are recommended as far as possible.
- 19) For ship station transmitters in the band 26 175 - 27 500 kHz, on board small craft, with a carrier power not exceeding 5 W in or near coastal waters and utilizing A3E or F3E and G3E emissions, the frequency tolerance is 40 parts in 10^6 .
- 20) The tolerance is 50 Hz for single-sideband radiotelephone transmitters, except for those transmitters operating in the band 26 175 - 27 500 kHz, and not exceeding a peak envelope power of 15 W, for which the basic tolerance of 40 parts in 10^6 applies.
- 21) It is suggested that administrations avoid carrier frequency differences of a few hertz, which cause degradations similar to periodic fading. This could be avoided if the frequency tolerance were 0.1 Hz, a tolerance which would be suitable for single-sideband emissions. *

* *Note* The single-sideband system adopted for the bands exclusively allocated to HF broadcasting does not require a frequency tolerance less than 10 Hz. The above-mentioned degradation occurs when the ratio of wanted-to-interfering signal is well below the required protection ratio. This remark is equally valid for both double- and single-sideband emissions.

AP7-10

22) For non-vehicular mounted portable equipment with a transmitter mean power not exceeding 5 W, the tolerance is 40 parts in 10^6 .

23) For transmitters of a mean power of 50 W or less operating at frequencies below 108 MHz a tolerance of 3 000 Hz applies.

24) In the case of television stations of:

- 50 W (vision peak envelope power) or less in the band 29.7 - 100 MHz;
- 100 W (vision peak envelope power) or less in the band 100 - 960 MHz

and which receive their input from other television stations or which serve small isolated communities, it may not, for operational reasons, be possible to maintain this tolerance. For such stations, the tolerance is 2 000 Hz.

For stations of 1 W (vision peak envelope power) or less this tolerance may be relaxed further to:

- 5 kHz in the band 100 - 470 MHz;
- 10 kHz in the band 470 - 960 MHz.

25) For transmitters for system M (NTSC) the tolerance is 1 000 Hz. However, for low power transmitters using this system note 24) applies.

26) For multi-hop radio-relay systems employing direct frequency conversion the tolerance is 30 parts in 10^6 .

27) For coast and ship station transmitters in the band 156 - 174 MHz put into service after 1 January 1973 a tolerance of 10 parts in 10^6 shall apply. This tolerance is applicable to all transmitters, including survival craft stations, after 1 January 1983.

28) For a channel spacing of 50 kHz the tolerance is 50 parts in 10^6 .

29) These tolerances apply to channel spacings equal to or greater than 20 kHz.

30) This tolerance is not applicable to survival craft stations operating on the frequency 243 MHz.

31) For transmitters used by on-board communication stations a tolerance of 5 parts in 10^6 shall apply.

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32) For non-vehicular mounted portable equipment with a transmitter mean power not exceeding 5 W the tolerance is 15 parts in 10^6 .

33) Where specific frequencies are not assigned to radar stations, the bandwidth occupied by the emissions of such stations shall be maintained wholly within the band allocated to the service and the indicated tolerance does not apply.

34) For transmitters using time-division multiplex the tolerance of 300 may be increased to 500.

35) This tolerance applies only to such emissions for which the necessary bandwidth does not exceed 3 000 kHz; for larger bandwidth emissions a tolerance of 300 applies.

36) In applying this tolerance administrations should be guided by the latest relevant CCIR Recommendations.



INTERNATIONAL TELECOMMUNICATION UNION

General Secretariat

Radio Regulations

Edition of 1982

Revised in 1985, 1986 and 1988

2

**Appendices 25-45 to
the Radio Regulations.
Resolutions and
Recommendations.**

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APPENDICES 25-45
TO THE RADIO REGULATIONS

1	2	3
4 374.3 (4 372.9) (Ch. No. 406)	Alaska Albania Saudi Arabia Argentina China Cyprus Colombia Congo Spain United States of America (Central) United States of America (East) United States of America (West) United States of America (South) Fiji Finland Guam Hawaii Iceland Madagascar Panama Poland Puerto Rico United Kingdom Sri Lanka Tunisia	
4 377.4 (4 376) (Ch. No. 407)	Alaska Argentina Australia Barbados Cameroon Canada (Central) Spain United States of America (East) United States of America (West)	ADD
<i>(cont.)</i>		

1	2	3
<p>4 377.4 (4 376)</p> <p>(Ch. No. 407) (cont.)</p>	<p>Guam</p> <p>Hawaii</p> <p>India (East)</p> <p>Iran</p> <p>Italy</p> <p>Japan</p> <p>Norway</p> <p>Netherlands</p> <p>Peru</p> <p>Puerto Rico</p> <p>German Democratic Republic</p> <p>Singapore</p> <p>South Africa</p> <p>Turkey</p> <p>U.S.S.R. (Northern Asia)</p> <p>U.S.S.R. (North West)</p>	<p>ADD</p>
<p>4 380.5 (4 379.1)</p> <p>(Ch. No. 408)</p> <p>(cont.)</p>	<p>Alaska</p> <p>Netherlands Antilles</p> <p>Argentina</p> <p>Belgium</p> <p>Brazil</p> <p>Canada (East)</p> <p>Canada (West)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Guam</p> <p>Hawaii</p> <p>Indonesia</p> <p>Iran</p> <p>Italy</p> <p>Japan</p> <p>Liberia</p> <p>Maldives</p> <p>Mexico</p> <p>Mozambique</p>	<p>ADD</p> <p>ADD</p>

1	2	3
4 380.5 (4 379.1) (Ch. No. 408) <i>(cont.)</i>	New Zealand Poland American Samoa Sudan Switzerland Yugoslavia	 ADD ADD
4 383.6 (4 382.2) (Ch. No. 409)	Saudi Arabia Brazil China Cuba Denmark United States of America (Central) United States of America (East) United States of America (West) United States of America (South) India (West) Italy Norway Papua New Guinea Philippines Sweden Thailand Turkey Zaire	
4 386.7 (4 385.3) (Ch. No. 410) <i>(cont.)</i>	Algeria Argentina (South) Bermuda Canada (West) Canary Islands China United States of America (East) Greece Guam	

1	2	3
<p>4 386.7 (4 385.3)</p> <p>(Ch. No. 410) (cont.)</p>	<p>Hungary</p> <p>Iran</p> <p>Israel</p> <p>Jamaica</p> <p>Malta</p> <p>Mauritania</p> <p>New Zealand</p> <p>Netherlands</p> <p>German Democratic Republic</p> <p>Romania</p> <p>United Kingdom</p> <p>Seychelles (Republic of)</p> <p>Sri Lanka</p>	
<p>4 389.8 (4 388.4)</p> <p>(Ch. No. 411)</p>	<p>Argentina (North)</p> <p>Bangladesh</p> <p>Belgium</p> <p>Spain</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Falkland Islands (Malvinas)</p> <p>Hongkong</p> <p>Indonesia</p> <p>Iran</p> <p>Italy</p> <p>Japan</p> <p>Kiribati</p> <p>Liberia</p> <p>S. Paul and Amsterdam Islands</p> <p>Turkey</p> <p>Ukraine</p> <p>U.S.S.R. (North West)</p>	<p>ADD</p> <p>ADD</p> <p>ADD</p>

1	2	3
<p>4 411.5 (4 410.1)</p> <p>(Ch. No. 418) (cont.)</p>	<p>Denmark</p> <p>Djibouti</p> <p>Egypt</p> <p>Spain</p> <p>United States of America (Central)</p> <p>Hawaii</p> <p>Indonesia</p> <p>Israel</p> <p>Italy</p> <p>Japan</p> <p>Mauritania</p> <p>Norway</p> <p>Philippines</p> <p>Reunion (French Dep. of)</p> <p>Romania</p> <p>S. Pierre and Miquelon (French Dep. of)</p> <p>Sweden</p> <p>U.S.S.R. (Southern Asia)</p>	<p>ADD</p>
<p>4 414.6 (4 413.2)</p> <p>(Ch. No. 419)</p> <p>(cont.)</p>	<p>Australia</p> <p>Brazil</p> <p>Chile</p> <p>China</p> <p>Korea</p> <p>Ivory Coast</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>France</p> <p>Guam</p> <p>Hawaii</p> <p>Iceland</p> <p>Japan</p> <p>Kuwait</p> <p>Libya</p> <p>Pakistan</p> <p>Netherlands</p> <p>Puerto Rico</p>	

1	2	3
<p>4 414.6 (4 413.2)</p> <p>(Ch. No. 419) <i>(cont.)</i></p>	<p>German Democratic Republic Tanzania Czechoslovakia U.S.S.R. (North West) Yugoslavia</p>	<p>ADD</p>
<p>4 417.7 (4 416.3)</p> <p>(Ch. No. 420)</p>	<p>Alaska Bulgaria Cameroon Denmark United States of America (East) United States of America (West) Guam Hawaii India (East) Iran Italy Japan Jordan Malaysia Morocco Norway Panama Puerto Rico Sweden Turkey U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia)</p>	
<p>4 423.9 (4 422.5)</p> <p>(Ch. No. 422) <i>(cont.)</i></p>	<p>Alaska Belgium Canada (West)</p>	

1	2	3
<p>4 430.1 (4 428.7)</p> <p>(Ch. No. 424)</p>	<p>Alaska</p> <p>Algeria</p> <p>Argentina</p> <p>Australia (East)</p> <p>Australia (West)</p> <p>China</p> <p>Denmark</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Guadeloupe (French Dep. of)</p> <p>Guam</p> <p>Hawaii</p> <p>Morocco</p> <p>Martinique (French Dep. of)</p> <p>Norway</p> <p>Panama</p> <p>Puerto Rico</p> <p>Sweden</p> <p>Switzerland</p> <p>Thailand</p>	<p>ADD</p> <p>ADD</p>
<p>4 433.2 (4 431.8)</p> <p>(Ch. No. 425)</p> <p><i>(cont.)</i></p>	<p>Alaska</p> <p>Belgium</p> <p>Brazil</p> <p>Chile</p> <p>Denmark</p> <p>Spain</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Guam</p>	<p>ADD</p>

1	2	3
6 507.8 (6 506.4) (Ch. No. 601)	Alaska	
	Algeria	
	Germany (Federal Republic of)	
	Saudi Arabia	
	Argentina (Central)	
	Argentina (South)	
	Bangladesh	
	Canada (West)	
	Chile (Central)	
	Chile (North)	
	China	
	Congo	
	United States of America (Central)	
	United States of America (East)	
	United States of America (West)	
	United States of America (South)	
	Greece	
	Guam	
	Hawaii	
	Hungary	
	Indonesia	
	Iran	
	Iraq	
	Iceland	
	Italy	ADD
	Japan	
	Libya	
	Malaysia	
Maldives	ADD	
Mexico (East)		
Mexico (West)		
New Caledonia and Dependencies	ADD	
New Zealand		
Peru		
Puerto Rico		
Romania		
Sri Lanka		
Czechoslovakia		
Ukraine		
U.S.S.R. (Southern Asia)		
U.S.S.R. (Europe)		
Yugoslavia		

1	2	3
<p>6 510.9 (6 509.5)</p> <p>(Ch. No. 602)</p>	<p>Alaska</p> <p>Bangladesh</p> <p>Belgium</p> <p>Brazil</p> <p>Bulgaria</p> <p>Canada (East)</p> <p>Canada (West)</p> <p>Korea</p> <p>Ivory Coast</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Fiji</p> <p>Guam</p> <p>Hawaii</p> <p>Indonesia</p> <p>Iran</p> <p>Italy</p> <p>Kuwait</p> <p>Madagascar</p> <p>Monaco</p> <p>Netherlands</p> <p>Peru</p> <p>Poland</p> <p>Puerto Rico</p> <p>Portugal</p> <p>Singapore</p> <p>South Africa</p> <p>Tunisia</p> <p>Turkey</p> <p>U.S.S.R. (Southern Asia)</p> <p>U.S.S.R. (Northern Asia)</p> <p>U.S.S.R. (Europe)</p> <p>U.S.S.R. (Far East)</p> <p>Yugoslavia</p>	<p>ADD</p> <p>ADD</p>

1	2	3
<p>6 520.2 (6 518.8) (Ch. No. 605) (cont.)</p>		
	Norway New Zealand Netherlands	ADD
	Peru Philippines Puerto Rico	
	Sudan Sweden Thailand	ADD
	Ukraine Uruguay U.S.S.R. (Far East)	
	Yugoslavia	

1	2	3
8 729.6 (8 728.2) (Ch. No. 804) (cont.)		
	Greece	
	Iraq	
	Japan	
	Jordan	ADD
	Monaco	
	Peru	
	Poland	
	Qatar	ADD
	Sierra Leone	
	Singapore U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Far East)	
8 732.7 (8 731.3) (Ch. No. 805)		
	Albania	
	Belgium	
	Spain	
	United States of America (East)	
	United States of America (West)	
	United States of America (South)	
	Ethiopia	
	Finland	
	Iran	
	Iceland	
	Israel	
	Japan	
	Liberia	
	New Caledonia and Dependencies	
	Papua New Guinea	
Netherlands		
South Africa		
U.S.S.R. (Europe)		
U.S.S.R. (Far East)		

1	2	3
<p>8 735.8 (8 734.4)</p> <p>(Ch. No. 806)</p>	<p>Alaska</p> <p>Argentina</p> <p>Australia</p> <p>Bahrain</p> <p>Bangladesh</p> <p>Belgium</p> <p>Ivory Coast</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>Italy</p> <p>Japan</p> <p>Panama</p> <p>Netherlands</p> <p>Poland</p> <p>Puerto Rico</p> <p>American Samoa</p> <p>Thailand</p> <p>Ukraine</p>	<p>ADD</p> <p>ADD</p>
<p>8 738.9 (8 737.5)</p> <p>(Ch. No. 807)</p> <p>(cont.)</p>	<p>Canada (West)</p> <p>Chile</p> <p>Cyprus</p> <p>Congo</p> <p>Cuba</p> <p>United States of America (Central)</p> <p>Iceland</p> <p>Italy</p> <p>Japan</p> <p>Kuwait</p> <p>Madagascar</p> <p>Malta</p> <p>Mauritania</p>	<p>ADD</p> <p>ADD</p>

1	2	3
8 738.9 (8 737.5) (Ch. No. 807) <i>(cont.)</i>	New Zealand S. Helena Czechoslovakia U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
8 742 (8 740.6) (Ch. No. 808)	Alaska Saudi Arabia Argentina Bahamas Denmark Spain United States of America (East) United States of America (West) Greece Guam Hawaii Italy Japan Norway Philippines Romania Sri Lanka South Africa Sweden	ADD
8 745.1 (8 743.7) (Ch. No. 809) <i>(cont.)</i>	Algeria Australia (West) Canary Islands Chile Cuba United States of America (East) United States of America (West) Finland Greece	

1	2	3
<p>8 745.1 (8 743.7)</p> <p>(Ch. No. 809) <i>(cont.)</i></p>	<p>Iceland</p> <p>Japan</p> <p>Kuwait</p> <p>Mexico</p> <p>Monaco</p> <p>Norway</p> <p>Pakistan</p> <p>German Democratic Republic</p> <p>Czechoslovakia</p> <p>Thailand</p>	
<p>8 748.2 (8 746.8)</p> <p>(Ch. No. 810)</p>	<p>Argentina</p> <p>Bangladesh</p> <p>Bulgaria</p> <p>Canada (East)</p> <p>China</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Fiji</p> <p>Indonesia</p> <p>Iran</p> <p>Japan</p> <p>Mozambique</p> <p>Norway</p> <p>Poland</p> <p>Portuguese Timor</p> <p>Togo</p> <p>Turkey</p> <p>Yugoslavia</p>	

1	2	3
<p>8 751.3 (8 749.9)</p> <p>(Ch. No. 811)</p>	<p>Saudi Arabia</p> <p>Argentina</p> <p>Australia</p> <p>Denmark</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>France</p> <p>Hongkong</p> <p>Hungary</p> <p>Japan</p> <p>Norway</p> <p>Peru</p> <p>Sweden</p> <p>Turkey</p> <p>Yugoslavia</p>	
<p>8 754.4 (8 753)</p> <p>(Ch. No. 812)</p> <p><i>(cont.)</i></p>	<p>Alaska</p> <p>Argentina (South)</p> <p>Belgium</p> <p>Canada (North)</p> <p>China</p> <p>Spain</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Hawaii</p> <p>Indonesia</p> <p>Israel</p> <p>Italy</p> <p>Jamaica</p> <p>Japan</p> <p>New Zealand</p> <p>Pakistan</p> <p>Poland</p>	<p>ADD</p>

1	2	3
8 754.4 (8 753) (Ch. No. 812) <i>(cont.)</i>	U.S.S.R. (Europe) U.S.S.R. (North West) Zaire	
8 757.5 (8 756.1) (Ch. No. 813)	Azores Alaska Algeria Angola Australia Belgium Cape Verde Chile (North) China Denmark United States of America (Central) United States of America (East) United States of America (West) United States of America (South) Greece Guam Guinea-Bissau Hawaii Hungary India (West) Madeira Mozambique Norway Panama Puerto Rico Portugal	
8 760.6 (8 759.2) (Ch. No. 814) <i>(cont.)</i>	Alaska Argentina Canada (West)	

1	2	3
<p>8 773 (8 771.6)</p> <p>(Ch. No. 818) <i>(cont.)</i></p>	<p>Sweden Ukraine</p>	
<p>8 776.1 (8 774.7)</p> <p>(Ch. No. 819)</p>	<p>Alaska Brazil Canada (West) United States of America (Central) United States of America (East) United States of America (West) United States of America (South) Greece Guam Hawaii Indonesia Italy Japan Easter Island Reunion (French Dep. of) United Kingdom Thailand U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe) U.S.S.R. (North West) Yemen (P.D.R. of)</p>	
<p>8 779.2 (8 777.8)</p> <p>(Ch. No. 820)</p> <p><i>(cont.)</i></p>	<p>Alaska Germany (Federal Republic of) Argentina Cyprus United States of America (East) United States of America (West)</p>	

1	2	3
<p>8 779.2 (8 777.8)</p> <p>(Ch. No. 820) (<i>cont.</i>)</p>	<p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>India (East)</p> <p>Iran</p> <p>Italy</p> <p>Japan</p> <p>Panama</p> <p>Philippines</p> <p>Puerto Rico</p> <p>German Democratic Republic</p> <p>Western Samoa</p> <p>Tanzania</p> <p>U.S.S.R. (North West)</p> <p>Zaire</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>ADD</p> <p>ADD</p>
<p>8 785.4 (8 784)</p> <p>(Ch. No. 822)</p>	<p>Australia</p> <p>Bangladesh</p> <p>Brazil</p> <p>China</p> <p>Ivory Coast</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Hungary</p> <p>Iran</p> <p>Kenya</p> <p>Morocco</p> <p>United Kingdom</p> <p>Switzerland</p> <p>Thailand</p> <p>Ukraine</p> <p>Yugoslavia</p>	<p></p> <p>ADD</p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p>

1	2	3
<p>8 788.5 (8 787.1)</p> <p>(Ch. No. 823)</p>	<p>Argentina</p> <p>Canada (East)</p> <p>Denmark</p> <p>Greece</p> <p>India (West)</p> <p>Iraq</p> <p>Italy</p> <p>Jamaica</p> <p>Japan</p> <p>Norway</p> <p>Romania</p> <p>Sweden</p> <p>Tanzania</p> <p>Portuguese Timor</p> <p>U.S.S.R. (Far East)</p> <p>U.S.S.R. (North West)</p>	<p>ADD</p>
<p>8 791.6 (8 790.2)</p> <p>(Ch. No. 824)</p>	<p>Germany (Federal Republic of)</p> <p>Brazil</p> <p>China</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Iran</p> <p>Jamaica</p> <p>Morocco</p> <p>Oman</p> <p>Peru</p> <p>Poland</p> <p>Reunion (French Dep. of)</p> <p>Singapore</p> <p>Switzerland</p> <p>Tunisia</p> <p>U.S.S.R. (North West)</p>	

1	2	3
<p>8 804 (8 802.6)</p> <p>(Ch. No. 828) (cont.)</p>	<p>Hawaii</p> <p>Hungary</p> <p>Indonesia</p> <p>Japan</p> <p>Lebanon</p> <p>Morocco</p> <p>Martinique (French Dep. of)</p> <p>Mauritius</p> <p>Mauritania</p> <p>Norway</p> <p>Panama</p> <p>Puerto Rico</p> <p>Ukraine</p>	
<p>8 807.1 (8 805.7)</p> <p>(Ch. No. 829)</p>	<p>Australia</p> <p>Bangladesh</p> <p>Belgium</p> <p>China</p> <p>Cyprus</p> <p>Denmark</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Finland</p> <p>Gambia</p> <p>Iran</p> <p>Libya</p> <p>Maldives</p> <p>Mexico</p> <p>Norway</p> <p>Paraguay</p> <p>French Polynesia</p> <p>Sweden</p> <p>Ukraine</p>	<p>ADD</p>

1	2	3
<p>8 810.2 (8 808.8)</p> <p>(Ch. No. 830)</p>	<p>Brazil</p> <p>Bulgaria</p> <p>United States of America (South)</p> <p>France</p> <p>India (West)</p> <p>Indonesia</p> <p>Iran</p> <p>Papua New Guinea</p> <p>Peru</p> <p>Poland</p> <p>Puerto Rico</p> <p>S. Pierre and Miquelon (French Dep. of)</p> <p>U.S.S.R. (Southern Asia)</p> <p>U.S.S.R. (Far East)</p> <p>Yemen (P.D.R. of)</p> <p>Yugoslavia</p>	
<p>8 813.3 (8 811.9)</p> <p>(Ch. No. 831)</p>	<p>China</p> <p>Congo</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Falkland Islands (Malvinas)</p> <p>Iran</p> <p>Iceland</p> <p>Italy</p> <p>Japan</p> <p>Madagascar</p> <p>Malaysia</p> <p>Morocco</p> <p>Pakistan</p> <p>Puerto Rico</p> <p>German Democratic Republic</p> <p>United Kingdom</p> <p>Switzerland</p> <p>Turkey</p>	

1	2	3
<p>13 123.9 (13 122.5)</p> <p>(Ch. No. 1208)</p>	<p>Germany (Federal Republic of)</p> <p>Argentina</p> <p>Bangladesh</p> <p>China</p> <p>Cyprus</p> <p>United States of America (East)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Hungary</p> <p>Iceland</p> <p>Italy</p> <p>Japan</p> <p>Liberia</p> <p>U.S.S.R. (Europe)</p>	<p>ADD</p>
<p>13 127 (13 125.6)</p> <p>(Ch. No. 1209)</p>	<p>Alaska</p> <p>Bahrain</p> <p>Brazil</p> <p>Canada (West)</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Finland</p> <p>Indonesia</p> <p>Italy</p> <p>Japan</p> <p>Mexico</p> <p>New Zealand</p> <p>Peru</p> <p>Poland</p> <p>South Africa</p> <p>Turkey</p> <p>U.S.S.R. (Europe)</p> <p>U.S.S.R. (North West)</p>	

1	2	3
<p>13 130.1 (13 128.7)</p> <p>(Ch. No. 1210)</p>	<p>Chile</p> <p>Denmark</p> <p>Djibouti</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Guam</p> <p>India (West)</p> <p>Indonesia</p> <p>Norway</p> <p>Reunion (French Dep. of)</p> <p>Romania</p> <p>Sweden</p> <p>Switzerland</p> <p>Uruguay</p> <p>U.S.S.R. (Northern Asia)</p> <p>U.S.S.R. (Far East)</p>	<p>ADD</p>
<p>13 133.2 (13 131.8)</p> <p>(Ch. No. 1211)</p> <p>(cont.)</p>	<p>Alaska</p> <p>Brazil</p> <p>China</p> <p>Cuba</p> <p>Denmark</p> <p>Spain</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Iraq</p> <p>Italy</p> <p>Japan</p> <p>Malaysia</p> <p>Norway</p>	

1	2	3
<p>13 133.2 (13 131.8)</p> <p>(Ch. No. 1211) (<i>cont.</i>)</p>	<p>Easter Island Sweden U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia)</p>	
<p>13 136.3 (13 134.9)</p> <p>(Ch. No. 1212)</p>	<p>Alaska Germany (Federal Republic of) Ivory Coast United States of America (East) United States of America (South) Greece Hawaii Indonesia Japan Mauritius Peru Puerto Rico Sudan U.S.S.R. (Europe) U.S.S.R. (Far East)</p>	<p>ADD</p>
<p>13 139.4 (13 138)</p> <p>(Ch. No. 1213)</p> <p>(<i>cont.</i>)</p>	<p>Argentina Barbados Belgium Canada (East) Canary Islands China Korea Finland Greece India (East) Iran Iraq</p>	

1	2	3
<p>13 139.4 (13 138)</p> <p>(Ch. No. 1213) <i>(cont.)</i></p>	<p>Israel</p> <p>Italy</p> <p>Liberia</p> <p>Norway</p> <p>Netherlands</p> <p>Western Samoa</p> <p>U.S.S.R. (Northern Asia)</p>	
<p>13 142.5 (13 141.1)</p> <p>(Ch. No. 1214)</p>	<p>Alaska</p> <p>Australia</p> <p>Brazil</p> <p>Canada (West)</p> <p>Cuba</p> <p>Denmark</p> <p>United States of America (Central)</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Guam</p> <p>Hungary</p> <p>Iran</p> <p>Norway</p> <p>Puerto Rico</p> <p>Sweden</p> <p>Thailand</p> <p>U.S.S.R. (Far East)</p>	
<p>13 145.6 (13 144.2)</p> <p>(Ch. No. 1215)</p> <p><i>(cont.)</i></p>	<p>Algeria</p> <p>Belgium</p> <p>Cameroon</p>	

1	2	3
<p>13 154.9 (13 153.5)</p> <p>(Ch. No. 1218) <i>(cont.)</i></p>	<p>United States of America (South)</p> <p>Guam</p> <p>Hawaii</p> <p>Iran</p> <p>Italy</p> <p>Japan</p> <p>Niue Island</p> <p>Norway</p> <p>Panama</p> <p>Puerto Rico</p> <p>Turkey</p> <p>U.S.S.R. (Europe)</p>	
<p>13 158 (13 156.6)</p> <p>(Ch. No. 1219)</p>	<p>Alaska</p> <p>Belgium</p> <p>Brazil</p> <p>Bulgaria</p> <p>Denmark</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Japan</p> <p>Morocco</p> <p>Norway</p> <p>Netherlands</p> <p>Singapore</p> <p>Sweden</p> <p>Ukraine</p> <p>U.S.S.R. (Europe)</p> <p>U.S.S.R. (Far East)</p> <p>U.S.S.R. (North West)</p>	
<p>13 161.1 (13 159.7)</p> <p>(Ch. No. 1220) <i>(cont.)</i></p>	<p>Alaska</p> <p>Argentina</p> <p>Bangladesh</p>	

1	2	3
<p>13 161.1 (13 159.7)</p> <p>(Ch. No. 1220) <i>(cont.)</i></p>	<p>Bermuda</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Fiji</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>Iran</p> <p>Iceland</p> <p>Japan</p> <p>Jordan</p> <p>Panama</p> <p>Philippines</p> <p>Poland</p> <p>Puerto Rico</p> <p>German Democratic Republic</p> <p>Tunisia</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>ADD</p> <p></p> <p></p> <p>ADD</p>
<p>13 167.3 (13 165.9)</p> <p>(Ch. No. 1222)</p>	<p>Argentina</p> <p>Canada (East)</p> <p>Cook Islands</p> <p>France</p> <p>Guadeloupe (French Dep. of)</p> <p>Hawaii</p> <p>India (West)</p> <p>Iran</p> <p>Japan</p> <p>Martinique (French Dep. of)</p> <p>Mexico</p> <p>Norway</p> <p>Romania</p> <p>Turkey</p> <p>U.S.S.R. (Far East)</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p>

1	2	3
<p>13 182.8 (13 181.4)</p> <p>(Ch. No. 1227) (<i>cont.</i>)</p>	<p>United States of America (East) United States of America (West) Finland Guam Hawaii India (East) Kuwait Panama Poland Puerto Rico Switzerland Tanzania U.S.S.R. (Far East) Yugoslavia Zaire</p>	<p>ADD</p>
<p>13 185.9 (13 184.5)</p> <p>(Ch. No. 1228)</p>	<p>Brazil Chile China Cuba United States of America (Central) United States of America (East) United States of America (West) Hungary Italy Maldives Norway Pakistan United Kingdom Ukraine U.S.S.R. (Europe)</p>	<p>ADD ADD</p>
<p>13 189 (13 187.6)</p> <p>(Ch. No. 1229) (<i>cont.</i>)</p>	<p>Argentina Australia Bulgaria</p>	

1	2	3
<p>13 189 (13 187.6)</p> <p>(Ch. No. 1229) (<i>cont.</i>)</p>	<p>Canada (East) Korea United States of America (West) France Japan Poland Qatar U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe) U.S.S.R. (North West) Yugoslavia</p>	<p>ADD</p>
<p>13 192.1 (13 190.7)</p> <p>(Ch. No. 1230)</p>	<p>Argentina Bangladesh Cyprus United States of America (East) United States of America (West) United States of America (South) Finland Hawaii Italy Japan Mauritania United Kingdom Switzerland Ukraine</p>	
<p>13 195.2 (13 193.8)</p> <p>(Ch. No. 1231)</p> <p>(<i>cont.</i>)</p>	<p>Alaska Australia United States of America (East) United States of America (West) France Greece</p>	

1	2	3
<p>17 262.2 (17 260.8)</p> <p>(Ch. No. 1610) <i>(cont.)</i></p>	<p>Egypt</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Indonesia</p> <p>Iran</p> <p>Mauritania</p> <p>Norway</p> <p>Tunisia</p> <p>Ukraine</p> <p>Uruguay</p> <p>U.S.S.R. (North West)</p>	
<p>17 265.3 (17 263.9)</p> <p>(Ch. No. 1611)</p>	<p>Brazil</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Finland</p> <p>Japan</p> <p>Libya</p> <p>Malaysia</p> <p>Peru</p> <p>United Kingdom</p> <p>Switzerland</p> <p>Turkey</p> <p>Yugoslavia</p>	
<p>17 268.4 (17 267)</p> <p>(Ch. No. 1612)</p> <p><i>(cont.)</i></p>	<p>Alaska</p> <p>Australia</p> <p>Cuba</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p>	

1	2	3
<p>17 268.4 (17 267)</p> <p>(Ch. No. 1612) <i>(cont.)</i></p>	<p>Guam</p> <p>Hawaii</p> <p>Morocco</p> <p>Pakistan</p> <p>Puerto Rico</p> <p>Ukraine</p> <p>U.S.S.R. (Europe)</p> <p>U.S.S.R. (Far East)</p> <p>U.S.S.R. (North West)</p>	
<p>17 271.5 (17 270.1)</p> <p>(Ch. No. 1613)</p>	<p>Alaska</p> <p>Belgium</p> <p>Brazil</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>Iran</p> <p>Israel</p> <p>Norway</p> <p>Panama</p> <p>Puerto Rico</p> <p>Romania</p> <p>Singapore</p> <p>U.S.S.R. (Far East)</p>	
<p>17 274.6 (17 273.2)</p> <p>(Ch. No. 1614)</p> <p><i>(cont.)</i></p>	<p>Canada (West)</p> <p>China</p> <p>Denmark</p> <p>Finland</p> <p>Italy</p> <p>Maldives</p> <p>Mexico</p>	<p>ADD</p>

1	2	3
17 324.2 (17 322.8) (Ch. No. 1630) <i>(cont.)</i>	U.S.S.R. (Europe)	
17 327.3 (17 325.9) (Ch. No. 1631)	Algeria Bulgaria Chile China United States of America (East) Greece Iraq Poland Sudan Switzerland Togo	ADD
17 330.4 (17 329) (Ch. No. 1632)	Azores Alaska Argentina Bangladesh Cyprus United States of America (East) United States of America (West) United States of America (South) Hungary Japan Madagascar Madeira Pakistan Portugal United Kingdom	

1	2	3
<p>17 333.5 (17 332.1)</p> <p>(Ch. No. 1633)</p>	<p>Alaska</p> <p>Brazil</p> <p>China</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>France</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>Panama</p> <p>Poland</p> <p>Puerto Rico</p> <p>German Democratic Republic</p> <p>South Africa</p> <p>U.S.S.R. (Southern Asia)</p>	
<p>17 336.6 (17 335.2)</p> <p>(Ch. No. 1634)</p>	<p>Germany (Federal Republic of)</p> <p>Canada (North)</p> <p>Korea</p> <p>Ivory Coast</p> <p>Spain</p> <p>Greece</p> <p>Japan</p> <p>Romania</p>	
<p>17 339.7 (17 338.3)</p> <p>(Ch. No. 1635)</p> <p><i>(cont.)</i></p>	<p>Azores</p> <p>Angola</p> <p>Australia</p> <p>Bangladesh</p> <p>Bulgaria</p> <p>Cape Verde</p> <p>Denmark</p> <p>Guinea-Bissau</p> <p>Italy</p> <p>Japan</p>	<p>ADD</p>

1	2	3
<p>17 339.7 (17 338.3)</p> <p>(Ch. No. 1635) (<i>cont.</i>)</p>	<p>Macao</p> <p>Madeira</p> <p>Mozambique</p> <p>Norway</p> <p>Portugal</p> <p>Sweden</p> <p>Portuguese Timor</p>	
<p>17 342.8 (17 341.4)</p> <p>(Ch. No. 1636)</p>	<p>Alaska</p> <p>Algeria</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Finland</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>India (East)</p> <p>Japan</p> <p>Pakistan</p> <p>Panama</p> <p>Netherlands</p> <p>Puerto Rico</p>	
<p>17 345.9 (17 344.5)</p> <p>(Ch. No. 1637)</p>	<p>Korea</p> <p>Spain</p> <p>Hongkong</p> <p>Jamaica</p> <p>Madagascar</p> <p>New Zealand</p> <p>United Kingdom</p> <p>U.S.S.R. (Southern Asia)</p>	

1	2	3
<p>17 349 (17 347.6)</p> <p>(Ch. No. 1638)</p>	<p>Alaska</p> <p>Bulgaria</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Finland</p> <p>Guam</p> <p>Hawaii</p> <p>Morocco</p> <p>Pakistan</p> <p>Poland</p> <p>German Democratic Republic</p> <p>American Samoa</p> <p>Yugoslavia</p>	<p>ADD</p> <p>ADD</p>
<p>17 352.1 (17 350.7)</p> <p>(Ch. No. 1639)</p>	<p>Alaska</p> <p>Albania</p> <p>Germany (Federal Republic of)</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Guam</p> <p>Hawaii</p> <p>Panama</p> <p>Netherlands</p> <p>Puerto Rico</p> <p>Zaire</p>	
<p>17 355.2 (17 353.8)</p> <p>(Ch. No. 1640)</p>	<p>Barbados</p> <p>Chile</p> <p>Greece</p> <p>Japan</p> <p>German Democratic Republic</p> <p>United Kingdom</p> <p>Sri Lanka</p> <p>Thailand</p> <p>U.S.S.R. (Europe)</p>	

1	2	3
22 612.9 (22 611.5) (Ch. No. 2206) <i>(cont.)</i>	Peru Poland Puerto Rico United Kingdom South Africa Yugoslavia	
22 616 (22 614.6) (Ch. No. 2207)	Azores Germany (Federal Republic of) Bangladesh Cape Verde China Israel Madeira Portugal Portuguese Timor Tunisia U.S.S.R. (Europe)	
22 619.1 (22 617.7) (Ch. No. 2208)	Argentina (North) Bulgaria Denmark India (East) Italy Japan Morocco Norway Sweden	ADD
22 622.2 (22 620.8) (Ch. No. 2209) <i>(cont.)</i>	Alaska Belgium Korea	

1	2	3
<p>22 622.2 (22 620.8)</p> <p>(Ch. No. 2209) (<i>cont.</i>)</p>	<p>United States of America (East) United States of America (West) Greece Guam Hawaii Morocco Panama Poland Puerto Rico Sudan U.S.S.R. (North West)</p>	<p>ADD</p>
<p>22 625.3 (22 623.9)</p> <p>(Ch. No. 2210)</p>	<p>Bangladesh Spain United States of America (East) Finland Greece Japan Netherlands Ukraine</p>	
<p>22 628.4 (22 627)</p> <p>(Ch. No. 2211)</p>	<p>Cuba Denmark Italy Japan Norway Sweden Ukraine</p>	

1	2	3
<p>22 647 (22 645.6)</p> <p>(Ch. No. 2217)</p>	<p>Alaska</p> <p>Germany (Federal Republic of)</p> <p>Bangladesh</p> <p>Spain</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>Greece</p> <p>Guam</p> <p>Hawaii</p> <p>Hongkong</p> <p>Iran</p> <p>Israel</p> <p>Liberia</p> <p>Panama</p> <p>Peru</p> <p>Puerto Rico</p>	
<p>22 650.1 (22 648.7)</p> <p>(Ch. No. 2218)</p>	<p>Alaska</p> <p>Cyprus</p> <p>Denmark</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>France</p> <p>Guam</p> <p>Hawaii</p> <p>Norway</p> <p>Puerto Rico</p> <p>Sweden</p> <p>Ukraine</p>	

1	2	3
<p>22 653.2 (22 651.8)</p> <p>(Ch. No. 2219)</p>	<p>Bangladesh</p> <p>Belgium</p> <p>China</p> <p>Cuba</p> <p>Greece</p> <p>Liberia</p> <p>Monaco</p> <p>Poland</p> <p>Western Samoa</p>	
<p>22 656.3 (22 654.9)</p> <p>(Ch. No. 2220)</p>	<p>Canada (West)</p> <p>Greece</p> <p>German Democratic Republic</p> <p>United Kingdom</p> <p>Senegal</p> <p>Switzerland</p> <p>Czechoslovakia</p>	<p>ADD</p>
<p>22 662.5 (22 661.1)</p> <p>(Ch. No. 2222)</p>	<p>Azores</p> <p>Germany (Federal Republic of)</p> <p>Saudi Arabia</p> <p>Cape Verde</p> <p>Korea</p> <p>United States of America (East)</p> <p>United States of America (West)</p> <p>United States of America (South)</p> <p>Finland</p> <p>Greece</p> <p>Madeira</p> <p>Maldives</p> <p>Portugal</p> <p>Portuguese Timor</p>	<p>ADD</p>

1	2	3		4	5	6	7				8	9		10			
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)				
401	AUS	GF CARPENTARIA	800	CV	J3E	0.1	ND				2200-1000	2200-1000	30	MAR/54/1640/021084			
405	USA	GREAT LAKES (CL USA)	800	CP	J3E	1 0.032	ND				1100-2300 2300-1100	1200-1800	180	MAR/50/1609/280284			
407	AUS	-	800	CO CP	J3E R3E	5	ND				0000-2400			MAR/48/1602/100184			
407	I	17	1200	CO	J3E	1.5	ND				0500-2200	0700-1100	60	MAR/58/1682/300785			
408	B	-	800	CV	J3E	0.15	ND				0000-2400		120	MAR/69/1712/040386			
408	MLD	6	-	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388			
408	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	84	9	2030-2200			AR16/80/1824/100588			
408	SMA	SO PACIF	1000	CP	J3E	1	ND				1800-0400		30	MAR/10/1305/280278			
411	AMS	10	-	CP	J3E R3E	0.3	ND				0430-0445 0830-0845 1230-1245		5-25	MAR/15/1347/191278			
411	I	17	-	CO	J3E	1.5	ND				0500-2200	0700-1100	60	AR16/75/1747/041186			
411	KIR	-	500	CP	J3E	0.5	ND				0800-1800			MAR/59/1686/270885			
417	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186			
418	B	-	800	CV	J3E	0.15	ND				0000-2400	0700-1100	240	MAR/69/1712/040386			
418	I	17	-	CO	J3E	1.5	ND				0500-2200	0700-1100	60	AR16/75/1747/041186			
419	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/57/1680/160785			
422	SUI	15, 17	4000	CP	J3E	5	D	ROT	30	8	1900-0200	2000-2200	20	MAR/62/1694/221085			
423	B	-	800	CV	J3E	0.5	ND				0000-2400			MAR/16/1350/160179			
423	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HN	2000-2100	60	MAR/41/1565/190483			
423	QAT	GULF, INDN OC GULF, INDN OC GULF, INDN OC GULF, INDN OC	800 1500 1500 1500	} CP	J3E R3E	5	ND	}	130	60	9	} 0000-2400	200	MAR/23/1412/010480			
			D														
			D														
			D														
424	AUS	-	800	CO CP	J3E R3E	1	ND				0000-2400			MAR/48/1602/100184			
424	PNR	9, 18	500	CP	J3E	1	ND				0800-1200		> 25	AR16/73/1742/300986			
425	B	-	800	CV	J3E	0.5	ND				1000-2300	1900-2200	100	MAR/16/1350/160179			
425	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				1700-0500			MAR/49/1604/240184			

1	2	3		4	5	6	7				8	9		10
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
601	I	17	-	CO	J3E	1.5	ND				0400-2200	0600-1400	60	AR16/75/1747/041186
601	MLD	6	-	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
601	NCL	7, 8, 12	2500	CP	J3E	0.5	ND				0000-2400			AR16/71/1737/260886
602	B	-	800	CP	J3E	1	ND				0000-2400			MAR/69/1712/040386
602	FJI	12	1000	CP	J3E	1	ND				1800-0600	2000-0500	120	MAR/37/1519/180582
603	AUS	AUSTRALIAN COASTAL	4000	CP	J3E	1	ND				HX	HJ	30	MAR/55/1651/181284
603	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HJ	0900-1100	60	MAR/41/1565/190483
604	ATN	CL ATLANT, CARIB SEA, GF MEX	1500	CP	J3E R3E	1	ND				0000-0200 0600-1000		120	MAR/35/1495/171181
604	B	-	800	CP	J3E	1	ND				1000-1300 1700-2000			MAR/69/1712/040386
605	B	-	800	CP	J3E	1	ND				1000-1300 1700-2000			MAR/69/1712/040386
605	F	GOLFE DE GASCOGNE / BAY OF BISCAY / MAR CANTÁBRICO, MEDIT	2500	CP	J3E	10	ND				0600-0900 1700-2200	1800-2200	300	MAR/56/1679/090785
605	NZL	7, 8, 11, 12, 13	6000	CP	J3E	5	ND				0000-2400	0400-0900	90	MAR/63/1695/291085
605	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	70	13	2030-2200			AR16/80/1824/100588
803	SUI	15, 16, 17, 18, 19	6000	CP	J3E	10	D	ROT	30	8	0600-0200	0600-1000 1700-2200	50	MAR/62/1694/221085
804	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				0500-1700			MAR/49/1604/240184
804	QAT	GULF, RED SEA, INDN OC	1500	CP	J3E R3E	5	ND	130	60	10	0000-2400		200	MAR/23/1412/010480
		GULF, INDN OC	2500				D							
		GULF, RED SEA, INDN OC	2500				D							
		GULF, RED SEA, INDN OC, MEDIT	2500				D							
806	AUS	COTE / COAST / COSTA: AUS NW, W, SW	2000	CP	J3E	1	ND				2100-0500	2100-0500	90	MAR/52/1631/310784
806	SMA	SO PACIF	3000	CP	J3E	1	ND				1800-0400		30	MAR/11/1310/040478
807	I	15, 17	-	CO	J3E	1.5	ND				0000-2400	0500-1300	60	AR16/75/1747/041186
807	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HJ	0100-1100	60	MAR/41/1565/190483
808	I	15, 17	-	CO	J3E	1.5	ND				0000-2400	1300-2100	60	AR16/75/1747/041186
812	I	15, 17	-	CO	J3E	1.5	ND				0000-2400	2100-0500	60	AR16/75/1747/041186

1	2	3		4	5	6	7				8	9		10	
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)		
814	KIR	-	500	CP	J3E	0.5	ND				1800-0800			MAR/65/1702/171285	
817	NRU	PACIF	2500	CP	J3E R3E	1	ND				2030-0500		3	MAR/28/1440/141080	
817	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	70	13	0430-0600			AR16/80/1824/100588	
820	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588	
820	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186	
822	AUS	COTE / COAST / COSTA: AUS N, NE	3000	CP	J3E	1	ND				HJ	HJ	90	MAR/64/1696/051185	
823	TZA	6, 10, 19, 21	3200	CO CP	J3E	1	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186	
825	AMS	10	-	CP	J3E R3E	0.3	ND				0445-0500 0845-0900 1245-1300		5-25	MAR/15/1347/191278	
825	S	5, 6, 10, 15, 16, 17, 18, 19, 21		CP	J3E	10	D		10 50 130 170 210 250 310	60	11	0000-2400	0800-1000	90	AR16/70/1730/080786
829	MLD	6	-	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388	
1207	NRU	CL PACIF	3000	CP	J3E R3E	1	ND				HX	2000-0530	20	MAR/34/1475/300681	
1208	I	6, 15, 16, 17, 18	-	CO	J3E	1.5	ND				0300-2200	0600-1100	30	AR16/75/1747/041186	
1210	SUI	6, 10, 15, 16, 17, 18, 19, 20, 21	9000	CP	J3E	10	D	ROT	30	8	0600-0200	0800-1200 1600-2100	60	MAR/62/1694/221085	
1212	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	0400-0600			AR16/80/1824/100588	
1216	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-2400			MAR/22/1399/030180	
1220	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588	
1220	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				0500-1700			MAR/49/1604/240184	
1226	S	5, 6, 10, 15, 16, 17, 18, 19, 21		CP	J3E	10	D		10 50 130 170 210 250 310	60	11	0000-2400	0800-1000	90	AR16/70/1730/080786

1	2	3		4	5	6	7				8	9		10
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
1227	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186
1228	I	6, 15, 16, 17, 18	—	CO	J3E	1.5	ND				2200-0500	2300-0200	30	AR16/75/1747/041186
1228	MLD	6	—	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
1229	QAT	GULF, RED SEA, INDN OC, MEDIT GULF, INDN OC GULF, RED SEA, INDN OC, MEDIT GULF, RED SEA, INDN OC, MEDIT	2000 3000 3000 3000	CP	J3E R3E	5	{ ND D D D	{ 130 200 310	{ 60 60 60	{ 11 11 11	{ 0400-0600 1400-1600		200	MAR/23/1412/010480
1232	SMA	SO PACIF	3000	CP	J3E	1	ND				1800-0400		30	MAR/11/1310/040478
1603	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-1159			MAR/21/1379/070879
1614	MLD	6	—	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
1622	SUI	3, 4, 5, 6, 7, 9, 10, 15, 16, 17, 18, 19, 20, 21	10000	CP	J3E	10	D	ROT	30	8	0600-0200	0800-1700	60	MAR/62/1694/221085
1626	QAT	INDN OC, RED SEA, MEDIT INDN OC INDN OC, RED SEA, MEDIT RED SEA, MEDIT, ATLANT	4000 6000 6000 6000	CP	J3E R3E	10	{ ND D D D	{ 130 200 310	{ 60 60 60	{ 11 11 11	{ 0600-0800 1200-1400		200	MAR/23/1412/010480
1631	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	1230-1400			AR16/80/1824/100588
1635	I	5, 6, 7, 9, 10, 14, 15, 16, 18, 20, 21	—	CO	J3E	1.5	ND				0400-2400	0600-1600	30	AR16/75/1747/041186
1638	SMA	SO PACIF	4000	CP	J3E	1	ND				1800-0400		30	MAR/10/1305/280278
1638	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588
2208	I	5, 6, 7, 9, 10, 14, 15, 16, 18, 20, 21	—	CO	J3E	1.5	ND				0500-2400	0700-2200	30	AR16/75/1747/041186
2209	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	1200-1400			AR16/80/1824/100588
2220	SUI	6, 10, 18, 20, 21	14000	CP	J3E	10	D	ROT	70	8,5	0600-1800	0900-1600	60	MAR/27/1431/120880
2222	MLD	6	—	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
2223	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-1159			MAR/20/1372/190679
2233	GRC	17 (MEDIT)	2600	CO	J3E	1	ND				0500-2200	0600, 1000, 2200	30	MAR/51/1621/220584
2235	QAT	INDN OC, MEDIT INDN OC INDN OC, MEDIT, ATLANT MEDIT, ATLANT	5000 8000 8000 8000	CP	J3E R3E	10	{ ND D D D	{ 130 200 310	{ 60 60 60	{ 11 11 11	{ 0800-1200		200	MAR/23/1412/010480

Note by the General Secretariat

**Bringing up to date the Frequency Allotment Plan for Coast
Radiotelephone Stations Operating in the Exclusive Maritime
Mobile Band Between 4 000 kHz and 23 000 kHz**

(Article 16 of the Radio Regulations)

June 1979 – First Revision

1. This revision of the Plan is published in accordance with No. **1722**.
2. The present revision contains the following new allotments:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
AMS	St Paul and Amsterdam Islands	411 825
B	Brazil	423 425
MLT	Malta	1603 2223
SMA	American Samoa	408 806 1232 1638

3. The allotments of channels 411 and 825 to Kerguelen Islands have been deleted from the Plan at the request of the Administration concerned.
4. The present revision takes into account the deletion of the following allotments in application of No. **1720**:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
ASC	Ascension	414 808
BEN	Benin	412 605 809 1201 1624 2209
BER	Bermuda	2204
BHR	Bahrain	415 812 818
BOL	Bolivia	402 409 602 605 801 805 1204 1603 2209

4. (cont.)

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
BRB	Barbados	405 412 605 822
CNR	Canaries	409 416 601 804 808 818 1208 1620 2226 2234
COG	Congo (Brazzaville)	1204 1216 1604 1609 2205 2208
COM	Comoro Islands	414
DOM	Dominican Republic	819
E	Spain	1228
EGY	Egypt	408 601 807 1203 1614 2233
FJI	Fiji	403 410 801 816
G	United Kingdom	809 812 814 824 1212 1214 1220 1222 1609 1626 1629 1635 2202 2214 2233 2240
GIB	Gibraltar	401 404 602 807 1212 1611 2212
GIL	Gilbert and Ellice Islands	411 814 1207 1607
GUB	Guyana	824
HKG	Hongkong	603 805 1227 1626 2218
HND	Honduras	402
IOB	Turks and Caicos Islands	401 816
IRQ	Iraq	1634 1639
KEN	Kenya	407 423 603 804 809 814 826 1208 1213 1229 1230 1624 2228
NHB	New Hebrides	406 808 818
PHL	Philippines	420 806 2220
SLM	Solomon Islands	830

These deletions have been published in Sub-section C of Special Section No. MAR/21/1397 of 7 August 1979.

5. The present revision contains the following modification of country name or area:

<i>From</i>	<i>To</i>	<i>Channel(s)</i>
AFI	French Territory of the Afars and Issas	DJI Djibouti 418 827 1210

November 1980 – Second Revision

1. This revision of the Plan is published in accordance with No. **1722**.
2. The present revision contains the following new allotments:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
MLT	Malta	1216
NRU	Nauru	817
QAT	Qatar	423 804 1229 1626 2235
SUI	Switzerland	2220

3. The present revision takes into account the deletion of the following allotments in application of No. **1720**:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
AGL	Angola	2207 2222
CBG	Khmer Republic	406 410 604 828 830 1206 1604 2203
CLM	Colombia	1615
CTI	Ivory Coast	1605 2203
ETH	Ethiopia	413 425 602 812 827 829 1201 1204 1214 1228 1231 1604 1611 1614 1620 1627 1640 2201 2212 2216 2226 2229 2234
GAB	Gabon	401 403 602 603 806 811 1201 1210 1614 1617 2211
GHA	Ghana	402 409 601 602 823 825 1202 1224 1616 1622 2213 2215
GMB	Gambia	831
GNB	Guinea-Bissau	1207
GTM	Guatemala	402
MOZ	Mozambique	2207 2222
NIG	Nigeria	414 423 425 601 604 605 801 817 819 1220 1225 1231 1625 1627 1640 2202 2204 2206
PAK	Pakistan	403 406 414 424 426 601 807 826 828 1201 1204 1207 1215 1608 2201 2209 2211 2218 2220
PNR	Panama	401 403 424 602 817 819 1204
PRG	Paraguay	410 826 1217 1227 1637
PRU	Peru	1617 2211
STP	Sao Tome and Principe	413 426 802 813 1203 1207 1615 1635
SUR	Surinam	408 808 1207 1608

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<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
TGK	Tanzania (Tanganyika)	417 419 820 823 1227
TMP	Portuguese Timor	802 813
TUR	Turkey	822 828 1211 1227 1615 1624 2239
VEN	Venezuela	409 419 602 827 829 1203 1219 1604 1622 2203 2206
ZAN	Tanzania (Zanzibar)	417 419 820 823 1227

These deletions have been published in Sub-section C of Special Sections Nos. MAR/22/1399 of 3 January 1980 and MAR/29/1441 of 21 October 1980.

February 1984 – Third Revision

1. This revision of the Plan is published in accordance with No. 1722.
2. The present revision contains the following new allotments:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
ATN	Netherlands Antilles	604
AUS	Australia	407 424
FJI	Fiji	602
JOR	Jordan	425 804 1220
MLT	Malta	423 603 807
NRU	Nauru	1207
USA	United States of America	405

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July 1986 – Fourth Revision

1. This revision of the Plan is published in accordance with No. **1722**.
2. The present revision contains the following new allotments:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
AUS	Australia	401 603 806 822
B	Brazil	408 418 602 604 605
F	France	605
GRC	Greece	2233
I	Italy	407
KIR	Kiribati	411 814
NZL	New Zealand	605
S	Sweden	825 1226
SUI	Switzerland	422 803 1210 1622
TZA	Tanzania	417 419 820 823 1227

May 1988 – Fifth Revision

1. This revision of the Plan is published in accordance with No. **1722**.
2. The present revision contains the following new allotments:

<i>Symbol</i>	<i>Country or area</i>	<i>Channel(s)</i>
DDR	German Democratic Republic	820 1220 1638
I	Italy	411 418 601 807 808 812 1208 1228 1635 2208
MLD	Maldives	408 601 829 1228 1614 2222
NCL	New-Caledonia and Dependencies	601
PNR	Panama	424
SDN	Sudan	408 605 817 1212 1631 2209

Note by the General Secretariat

The following blocks of selective call numbers for ship stations and selective call numbers for groups of ship stations were supplied to Administrations by the Secretary-General between the end of the WARC-79 and 8 April 1988:

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
01000-01009	Australia
01011-01099	Australia
01400-01499	Bolivia (Republic of)
01600-01699	Burma (Socialist Republic of the Union of)
02100-02199	Bangladesh (People's Republic of)
02200-02299	Cape Verde (Republic of)
02300-02399	Saint Vincent and the Grenadines
02400-02499	Cook Islands
02500-02599	Niue Island
02600-02699	Western Samoa (Independent State of)
02700-02799	Mauritius
02800-02999	Antigua and Barbuda
03300-04039	Denmark
04041-05049	Denmark
05051-05199	Denmark
05400-05899	Denmark
06000-06059	Denmark
06061-06299	Denmark
07000-07069	Denmark
07071-08079	Denmark
08081-08399	Denmark
08500-09089	Spain
09090*	Spain
09091-09499	Spain
10101*	Spain
11400-11999	United States of America
12121*	United States of America
12500-12599	Sweden

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
14200-14699	France
15600-16160	France
16162-16699	France
18700-18999	Honduras (Republic of)
19600-19699	China (People's Republic of)
20200-20201	China (People's Republic of)
20203-20299	China (People's Republic of)
20800-21211	Italy
21213-21299	Italy
21800-22199	Norway
22600-22699	Kuwait (State of)
22900-22999	Indonesia (Republic of)
23000-23231	Chile
23232*	Chile
23233-23299	Chile
24100-24199	Colombia (Republic of)
25300-25999	Sweden
27000-27271	Japan
27272*	Japan
27273-27999	Japan
28000-28281	Norway
28282*	Japan
28283-29291	Norway
29292*	Japan
29293-30302	Norway
30303*	Japan
30304-31299	Norway
31300-31312	Morocco (Kingdom of)
31313*	Morocco (Kingdom of)
31314-31399	Morocco (Kingdom of)

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
31400-31899	France
32100-32322	Norway
32324-32399	Norway
34500-35352	Norway
35354-35999	Norway
36363*	Japan
41500-41899	Germany (Federal Republic of)
42200-42423	Panama (Republic of)
42425-42599	Panama (Republic of)
42700-42899	Norway
44100-44443	Sweden
44445-45453	Sweden
45455-45499	Sweden
46900-47473	United Kingdom of Great Britain and Northern Ireland
47475-48483	United Kingdom of Great Britain and Northern Ireland
48484*	United Kingdom of Great Britain and Northern Ireland
48485-48499	United Kingdom of Great Britain and Northern Ireland
49494*	United Kingdom of Great Britain and Northern Ireland
50300-50399	United Kingdom of Great Britain and Northern Ireland
50700-51099	Norway
51500-51514	Switzerland (Confederation of)
51516-51599	Switzerland (Confederation of)
51600-51799	Norway
51800-51999	Portugal

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
52200-52299 52525* 56400-56564 56565* 56566-56599 56600-56699 57100-57499 57575* 57600-57699 58300-58399 58400-58584 58585* 58586-58899 58900-58999 59000-59099 59100-59199 59200-59399 59500-59594 59595* 59596-59699 60000-60099 60700-60999 61200-61299 61400-61499 61600-61615 61616* 61617-61799 62100-62625 62627-62999 63700-64599	Vanuatu (Republic of) United Kingdom of Great Britain and Northern Ireland Turkey Turkey Turkey Thailand Norway Yugoslavia (Socialist Federal Republic of) Uruguay (Eastern Republic of) Costa Rica Brazil (Federative Republic of) Brazil (Federative Republic of) Brazil (Federative Republic of) Sri Lanka (Democratic Socialist Republic of) Ecuador Brazil (Federative Republic of) Iran (Islamic Republic of) Brazil (Federative Republic of) Brazil (Federative Republic of) Brazil (Federative Republic of) Brazil (Federative Republic of) Brazil (Federative Republic of) Pakistan (Islamic Republic of) Brazil (Federative Republic of) Bahamas (Commonwealth of the) Bahamas (Commonwealth of the) Bahamas (Commonwealth of the) Bahamas (Commonwealth of the) Germany (Federal Republic of) Germany (Federal Republic of) Germany (Federal Republic of)

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
64800-65599 65800-65999 74300-74499 74800-75499 76000-76599 76700-76766 76767* 76768-76799 76800-77499 77800-77999 78200-78399 78400-78499 79500-79599 79797* 79900-80807 80809-81799 81800-81817 81818* 81819-81899 81900-81999 82000-82827 82829-82899 82900-83799 83900-84799 84800-84847 84849-84899 84900-85857 85859-86867 86869-87799	Germany (Federal Republic of) Turkey Austria Germany (Federal Republic of) Germany (Federal Republic of) Philippines (Republic of the) Philippines (Republic of the) Philippines (Republic of the) Denmark Denmark Singapore (Republic of) Denmark Senegal (Republic of) United Kingdom of Great Britain and Northern Ireland Netherlands (Kingdom of the) Netherlands (Kingdom of the) Czechoslovak Socialist Republic Czechoslovak Socialist Republic Czechoslovak Socialist Republic Djibouti (Republic of) Germany (Federal Republic of) Germany (Federal Republic of) France France Netherlands (Kingdom of the) Netherlands (Kingdom of the) Denmark Denmark Denmark

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
87800-87877 87879-88887 88889-89897 89899-89999 90000-90908 90910-91918 91920-92928 92930-93938 93940-94899 94900-94948 94950-95958 95960-96968 96970-96999 97000-97899 98000-98599 98900-98988 98990-99998	Germany (Federal Republic of) Germany (Federal Republic of) Germany (Federal Republic of) Germany (Federal Republic of) Norway Norway Norway Norway Norway Norway Sweden Sweden Sweden Sweden Sweden France France Germany (Federal Republic of) Germany (Federal Republic of)

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

**Part II. Table of Blocks
of Coast Station Identification Numbers Supplied
to Administrations**

Blocks of coast station identification numbers	Supplied to
0100 – 0119	Argentine Republic
0270 – 0279	Algeria (Algerian Democratic and Popular Republic)
0330 – 0339	Australia
0480 – 0489	Belgium
0580 – 0589	Canada
0810 – 0819	Bulgaria (People's Republic of)
0830 – 0899	Denmark
0990 – 1089	Spain
1090 – 1109	United States of America
1590 – 1609	Finland
1630 – 1669	France
1780 – 1789	Greece
1860 – 1889	Chile
1920 – 1929	Ghana
1980 – 1989	Ireland
2010 – 2019	China (People's Republic of)
2070 – 2109	Italy
2130 – 2149	Iraq (Republic of)
2180 – 2189	Kuwait (State of)
2280 – 2289	Libya (Socialist People's Libyan Arab Jamahiriya)
2300 – 2339	India (Republic of)
2480 – 2489	Malta (Republic of)
2500 – 2509	Monaco
2510 – 2519	Cuba
2550 – 2599	Norway
2740 – 2749	Iceland
2770 – 2779	Netherlands (Kingdom of the)
2830 – 2849	Germany (Federal Republic of)
2930 – 2949	Poland (People's Republic of)
2950 – 2959	Sweden
3200 – 3259	United Kingdom of Great Britain and Northern Ireland
3450 – 3459	Israel (State of)
3500 – 3509	Switzerland (Confederation of)
3620 – 3769	Union of Soviet Socialist Republics
3800 – 3809	Malaysia
3850 – 3859	Yugoslavia (Socialist Federal Republic of)
3910 – 3919	Venezuela (Republic of)
4330 – 4349	South Africa (Republic of)
4360 – 4369	Turkey
4400 – 4599	Union of Soviet Socialist Republics
4600 – 4619	German Democratic Republic
4620 – 4629	Singapore (Republic of)

Blocks of coast station identification numbers	Supplied to
4630-4639 4640-4649 4650-4659 4660-4669 4690-4699 4710-4719 4810-4819 4820-4829 4830-4839 4900-4939 4980-4999 5010-5019	United Kingdom of Great Britain and Northern Ireland Sierra Leone Bahrain (State of) Seychelles (Republic of) Qatar (State of) United Arab Emirates Yemen (People's Democratic Republic of) Egypt (Arab Republic of) Saudi Arabia (Kingdom of) Mexico Syrian Arab Republic Oman (Sultanate of)

Note by the General Secretariat

The following blocks of coast station identification numbers were supplied to Administrations by the Secretary-General between the end of the WARC-79 and 5 May 1988:

Blocks of coast station identification numbers	Supplied to
0060-0069 0140-0149 0180-0189 0210-0219 0700-0719 0770-0779 1110-1119 1820-1859 2020-2029 2200-2209 2360-2409 2450-2459 2890-2899	Ethiopia Bolivia (Republic of) Cyprus (Republic of) Bangladesh (People's Republic of) Brazil (Federative Republic of) Colombia (Republic of) United States of America Chile China (People's Republic of) Indonesia (Republic of) Japan Morocco (Kingdom of) Panama (Republic of)

Blocks of coast station identification numbers	Supplied to
3170-3179	Maldives (Republic of)
3560-3579	Portugal
3810-3819	Malaysia
3830-3839	Thailand
3870-3879	Uruguay (Eastern Republic of)
3950-3959	Sudan (Democratic Republic of the)
4010-4029	New Zealand
4050-4069	Pakistan (Islamic Republic of)
4150-4159	Philippines (Republic of the)
4670-4679	Czechoslovak Socialist Republic
4680-4689	Djibouti (Republic of)
4750-4759	Ecuador
4800-4809	Zaire (Republic of)
4860-4869	Suriname (Republic of)
5100-5109	Senegal (Republic of)
5300-5309	Iran (Islamic Republic of)

APPENDIX 45
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**Double-Sideband (DSB) and Single-Sideband (SSB)
System Specifications in the HF Bands Allocated Exclusively
to the Broadcasting Service**

PART A

Double-sideband system (DSB)

1. *System parameters*

1.1 *Channel spacing*

The nominal spacing for DSB shall be 10 kHz. However, the interleaved channels with a separation of 5 kHz may be used in accordance with the relative protection criteria, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

2. *Emission characteristics*

2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

2.2 *Audio-frequency band*

The upper limit of the audio-frequency band (at -3 dB) of the transmitter shall not exceed 4.5 kHz and the lower limit shall be 150 Hz, with lower frequencies attenuated at a slope of 6 dB per octave.

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2.3 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

2.4 *Necessary bandwidth*

The necessary bandwidth shall not exceed 9 kHz.

PART B

Single-sideband system (SSB)

1. *System parameters*

1.1 *Channel spacing*

During the transition period (see Resolution **517 (HFBC-87)**), the channel spacing shall be 10 kHz. In the interest of spectrum conservation, during the transition period, it is also permissible to interleave SSB emissions midway between two adjacent DSB channels, i.e., with 5 kHz separation between carrier frequencies, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

After the end of the transition period the channel spacing and carrier frequency separation shall be 5 kHz.

1.2 *Equivalent sideband power*

When the carrier reduction relative to peak envelope power is 6 dB, an equivalent SSB emission is one giving the same audio-frequency signal-to-noise ratio at the receiver output as the corresponding DSB

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emission, when it is received by a DSB receiver with envelope detection. This is achieved when the sideband power of the SSB emission is 3 dB larger than the total sideband power of the DSB emission. (The peak envelope power of the equivalent SSB emission and the carrier power are the same as that of the DSB emission.)

2. *Emission characteristics*

2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

2.2 *Frequency tolerance*

The frequency tolerance shall be 10 Hz.¹

2.3 *Audio-frequency band*

The upper limit of the audio-frequency band (at -3 dB) of the transmitter shall not exceed 4.5 kHz with a further slope of attenuation of 35 dB/kHz and the lower limit shall be 150 Hz with lower frequencies attenuated at a slope of 6 dB per octave.

2.4 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

¹ See Note 21) of Appendix 7.

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2.5 *Necessary bandwidth*

The necessary bandwidth shall not exceed 4.5 kHz.

2.6 *Carrier reduction (relative to peak envelope power)*

During the transition period the carrier reduction shall be 6 dB to allow SSB emissions to be received by conventional DSB receivers with envelope detection without significant deterioration of the reception quality.

At the end of the transition period, the carrier reduction shall be 12 dB.

2.7 *Sideband to be emitted*

Only the upper sideband shall be used.

2.8 *Attenuation of the unwanted sideband*

The attenuation of the unwanted sideband (lower sideband) and of intermodulation products in that part of the emission spectrum shall be at least 35 dB relative to the wanted sideband signal level. However, since there is in practice a large difference between signal amplitudes in adjacent channels, a greater attenuation is recommended.

3. *Characteristics of the reference receiver*

The reference receiver has the main characteristics as given below. For more detailed characteristics see the relevant CCIR Recommendations.

3.1 *Noise limited sensitivity*

The value of the noise limited sensitivity is equal to or less than 40 dB(μ V/m).

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3.2 *Demodulator and carrier acquisition*

The reference receiver is equipped with a synchronous demodulator, using for the carrier acquisition a device which regenerates a carrier by means of a suitable control loop which locks the receiver to the incoming carrier. The reference receiver should work as well with DSB emissions as with SSB emissions having a carrier reduced to 6 or 12 dB below peak envelope power.

3.3 *Overall selectivity*

The reference receiver has an overall bandwidth (at -3 dB) of 4 kHz, with a slope of attenuation of 35 dB/kHz.

Note: Other combinations of bandwidth and slope of attenuation are possible, as given below, and will provide the same performance at 5 kHz carrier difference.

Slope of attenuation	Overall bandwidth (-3 dB)
25 dB/kHz	3 300 Hz
15 dB/kHz	2 700 Hz

RESOLUTION No. 8

**Relating to Implementation of the Changes in Allocations
in the Bands Between 4 000 kHz and 27 500 kHz**

(See also Resolution **512 (HFBC-87)**)

The World Administrative Radio Conference, Geneva, 1979,

considering

- a)* that parts of frequency bands between 4 000 kHz and 27 500 kHz that were previously allocated on an exclusive or shared basis to the fixed service have been re-allocated to other services;
- b)* that existing fixed and mobile assignments must be removed progressively from those re-allocated bands to make way for other services;
- c)* that the assignments to be removed, termed "displaced assignments", must be re-accommodated in other frequency bands;

recognizing

the difficulties facing administrations and the IFRB during the period of transition from the previous allocations to those made by this Conference;

resolves

1. that the transitional procedure in Annex A to this Resolution shall be used for the purpose of ensuring an orderly and equitable implementation of the changeover from the previous allocations to those made by this Conference;
2. that the provisions of No. **1242** and the associated provisions of Article **12** concerning the examination and recording in the Master Register of assignments in the bands between 4 000 kHz and 27 500 kHz

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allocated on an exclusive or shared basis to the fixed service shall be suspended from 1 January 1982 to 30 June 1984;

3. that the interim procedure in Annex B to this Resolution shall be used for the purpose of dealing with any urgent new frequency assignments in the relevant bands during the period of suspension of the provisions of Article 12 as specified in *resolves 2*;

4. that the review procedure in Annex C to this Resolution shall be used for the purpose of examining any urgent new assignments notified during the period of suspension of the provisions of Article 12 as specified in *resolves 2*;

5. that a special transfer procedure, described in Resolution 404, shall apply to stations in the aeronautical fixed service operating in the band 21 924 - 22 000 kHz (band allocated by this Conference exclusively to the aeronautical mobile (R) service) and shall be terminated on 1 February 1983;

invites administrations

1. when seeking re-accommodation for their mobile assignments in the bands between 4 000 kHz and 27 500 kHz re-allocated to other services, to make every effort to find replacement assignments in the bands allocated exclusively to the mobile service concerned;

2. to cooperate by not submitting notices for assignments in the relevant bands during the period of suspension of the provisions of Article 12 as specified in *resolves 2*, except for urgent new assignments to be dealt with under the interim procedure;

requests the IFRB

not to examine any notices in the relevant bands under Article 12 during the period of suspension of the provisions of that Article as specified in *resolves 2*, other than those notices requesting deletions of existing assignments.

RESOLUTION No. 91 (HFBC-87)

Revision, Replacement and Abrogation of Resolutions and Recommendations of the World Administrative Radio Conference (Geneva, 1979)

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

its agenda as contained in Resolution No. 912 adopted by the Administrative Council at its 39th session (1984), in particular agenda item 2.1.6, and the action taken on one Resolution and three Recommendations of the World Administrative Radio Conference (Geneva, 1979),

considering further

a) that the following Resolution and Recommendation have been revised as follows:

Resolution 641 relating to the Use of the Frequency Band 7 000-7 100 kHz – superseded by Resolution **641 (Rev.HFBC-87)**,

Recommendation 503 relating to HF Broadcasting – superseded by Recommendation **503 (Rev.HFBC-87)**;

b) that all the action required by the following Recommendations has been taken:

Recommendation 500 relating to the Preparation of the Technical Information Necessary for the World Administrative Radio Conference for HF Broadcasting,

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Recommendation 501 relating to Studies for the Introduction of Single-Sideband (SSB) Techniques in the HF Bands Allocated to the Broadcasting Service, in Preparation for the World Administrative Radio Conference for HF Broadcasting,

resolves

that Resolution **641** and Recommendations **500**, **501** and **503** of the World Administrative Radio Conference (Geneva, 1979) are abrogated.

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RESOLUTION No. 511 (HFBC-87)

**Programme of Action Relating to the Improvement, Testing,
Adoption and Practical Implementation of the Planning System
for the High Frequency Bands Allocated Exclusively to the
Broadcasting Service, and Associated Provisions**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

the need to adopt a programme of action,

resolves

1. that the HFBC Planning System and associated software are to be improved in accordance with the further instructions contained in Resolution **515 (HFBC-87)**;
2. that the improved HFBC Planning System is to be tested in accordance with the instructions contained in Resolution **515 (HFBC-87)** for adoption, if acceptable to a competent world administrative radio conference and for application in the following bands allocated exclusively to the broadcasting service:

26 MHz band: 25 900 - 26 100 kHz

21 MHz band: 21 650 - 21 850 kHz

17 MHz band: 17 550 - 17 750 kHz

15 MHz band: 15 400 - 15 600 kHz

13 MHz band: 13 600 - 13 800 kHz

11 MHz band: 11 650 - 11 700/11 975 - 12 050 kHz

9 MHz band: 9 775 - 9 900 kHz¹,

¹ This band cannot be implemented before 1 July 1994 (see Resolution 8).

decides to recommend

that a world administrative radio conference (WARC) should be convened not later than 1992,

that this conference should:

- examine the results, provided by the IFRB, of the improved HFBC Planning System and the Consultation Procedure in Article 17;
- examine the effects of the interaction between the two “systems” (improved HFBC Planning System and Consultation Procedure in Article 17);
- decide on any improvements to be made to the two “systems”;
- on the basis of the analysis of test results, decide on the date of introduction of the two “systems”, which should be as soon as possible after the WARC of 1992*;
- decide on the date of introduction of the HFBC Planning System in the 9 MHz extension band;
- take the necessary steps to settle the question of the processing of national broadcasting requirements;
- establish a long-term plan with a view to planning all the bands allocated exclusively to HF broadcasting,

invites the Plenipotentiary Conference

as a matter of priority to make the necessary arrangements for including the WARC of 1992 in the schedule of conferences it is to establish,

* *Note by the General Secretariat:* Subject to the inclusion of this conference in the conference programme to be adopted by the Plenipotentiary Conference.

invites the Administrative Council

to take whatever action is necessary for convening the conference not later than 1992,

instructs the IFRB

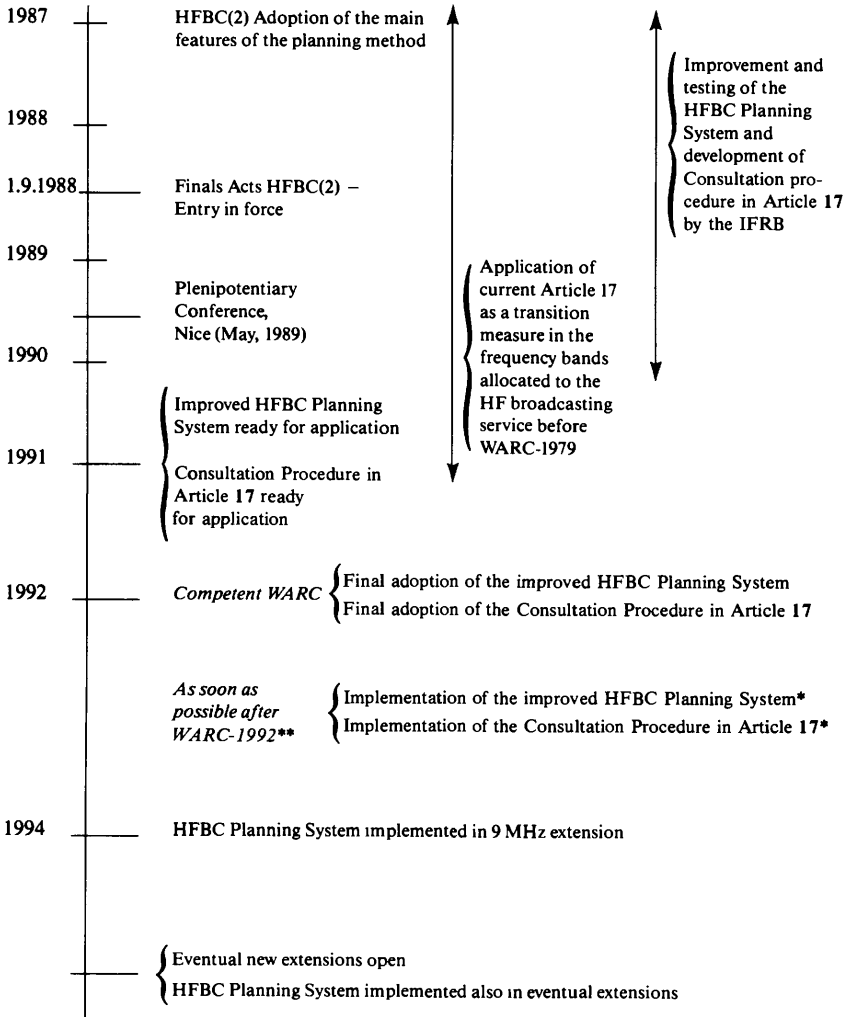
to undertake the improvements in the software of the HFBC Planning System, to test the system and to submit their results to administrations and to the WARC mentioned above,

instructs the Secretary-General

to bring this Resolution to the attention of the Administrative Council.

ANNEX TO RESOLUTION No. 511 (HFBC-87)

Programme of Action



* Frequency bands, see Resolution 515 (HFBC-87)

** Note by the General Secretariat: Subject to the inclusion of this conference in the conference programme to be adopted by the Plenipotentiary Conference

RESOLUTION No. 512 (HFBC-87)

Operation of HFBC Transmitters in the Extended Bands Above 10 MHz

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) that the World Administrative Radio Conference, Geneva, 1979 (WARC-79) allocated new HF bands to the broadcasting service on an exclusive basis;
- b) that, in accordance with Resolution **8**, these bands will be available for use by the broadcasting service on 1 July 1989 (see Resolution **8**);
- c) that, in accordance with No. **531** of the Radio Regulations, the use of these extended bands by the broadcasting service shall be subject to provisions to be established by the WARC for the Planning of HF Bands Allocated to the Broadcasting Service (see Resolution **508**),

considering further

that the improved HFBC Planning System can be applied in the extended HF bands specified in No. **531** of the Radio Regulations only after the entry into force of the provisions of the competent WARC foreseen for 1992,

resolves

1. that HFBC transmitting stations in the bands above 10 MHz specified in No. **531** of the Radio Regulations shall be brought into operation only as from the date decided by the future WARC referred to in Resolution **511 (HFBC-87)**;

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2. that the date of 1 July 1989, as indicated in Annex A, paragraph 17 of Resolution **8** shall be postponed to the date decided by the future competent WARC referred to in Resolution **511 (HFBC-87)** with respect to the following frequency bands:

11 650 - 11 700 kHz

11 975 - 12 050 kHz

13 600 - 13 800 kHz

15 450 - 15 600 kHz

17 550 - 17 700 kHz

21 750 - 21 850 kHz.

RESOLUTION No. 513 (HFBC-87)

**Improvement in the Use of the HF Bands
Allocated Exclusively to the Broadcasting Service
by Avoiding Harmful Interference**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) Article 4 (No. 19) of the International Telecommunication Convention concerning the purposes of the Union;
- b) Article 10 (Nos. 79 and 80) of the International Telecommunication Convention concerning the duties of the IFRB;
- c) Article 35 (No. 158) of the International Telecommunication Convention concerning harmful interference;
- d) Article 54 (No. 209) of the International Telecommunication Convention concerning the instructions which may be given to the IFRB by a world administrative radio conference;
- e) Article 20 of the Radio Regulations concerning the international monitoring system;
- f) Article 18 (No. 1798) of the Radio Regulations concerning measures against harmful interference;
- g) Article 22 of the Radio Regulations concerning the procedure in cases of harmful interference;
- h) Report by the IFRB on the Implementation of Resolution COM5/1 of the First Session of this Conference (Geneva, 1984),

noting

- a) that harmful interference has a negative impact on the use of the frequency spectrum in general and on the use of frequency channels available for high frequency broadcasting in particular;

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- b) that broadcasting on channels adjacent to those being affected directly may also be subject to interference;
- c) that a considerable number of high frequency broadcasting channels in various parts of the world are rendered unusable by harmful interference;
- d) that the successful implementation of an HFBC Planning System would be adversely affected by the presence of harmful interference,

recognizing

- a) that it is desirable for detailed information on the extent and impact of harmful interference to be available on a periodic basis;
- b) that an increase in the number of stations participating in the international monitoring system, and the effective use of the information obtained from such stations would be of considerable assistance,

urges administrations

to avoid causing harmful interference,

instructs the IFRB

in accordance with the provisions of the Radio Regulations,

1. to organize periodic specialized monitoring programmes in the bands allocated to the high frequency broadcasting service with a view to identifying stations causing harmful interference;
2. to seek, as appropriate, the cooperation of administrations in identifying the sources of emissions which cause harmful interference and to provide this information to administrations;
3. to issue summaries of the monitoring data, including identification of all transmissions which have been reported as having a class of emission different from the one used for broadcasting;

4. to inform the world administrative radio conference referred to in Resolution **511 (HFBC-87)** of the results of the activities specified in 1, 2 and 3 above,

invites administrations

1. to take part in the monitoring programmes set up by the IFRB in accordance with the provisions of this Resolution;
2. to apply the provisions of Article **22** of the Radio Regulations in cases of harmful interference.

RESOLUTION No. 514 (HFBC-87)

**Procedure to be Applied by the IFRB in the Revision
of the Relevant Parts of its Technical Standards
Used in the HF Bands Allocated Exclusively
to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that it has examined in detail the technical parameters used in the HF bands allocated exclusively to the broadcasting service;
- b)* that the planning exercises conducted by the IFRB in the intersessional period indicated that some of the technical parameters, such as those used in the propagation prediction method, may need to be improved, and applied with some flexibility, depending on the results of the actual regular implementation of plans and the technical studies carried out by the CCIR;
- c)* that, under No. **1001** of the Radio Regulations, the functions of the Board include the development of its Technical Standards;
- d)* that, under No. **1454** of the Radio Regulations, the Technical Standards of the IFRB shall be based, *inter alia*, on:
 - the relevant provisions of the Radio Regulations and the Appendices thereto,
 - the decisions of administrative conferences of the Union, as appropriate,
 - the Recommendations of the CCIR,

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- the state of the radio art,
- the development of new transmission techniques,

account being taken of exceptional propagation conditions which may prevail in certain regions;

e) that, in accordance with No. 1770 of the Radio Regulations, the Technical Standards of the IFRB shall be based on the items listed in paragraph *d)* above, on past experience in broadcasting planning, and on the experience gained by the Board in the application of the provisions of Article 17 of the Radio Regulations;

f) that, with respect to the Technical Standards of the IFRB, the CCIR could provide competent advice on technical matters;

g) the importance of the active involvement of administrations in the process of revising the technical parameters,

resolves

1. that, following each CCIR Plenary Assembly, the IFRB shall review its Technical Standards relating to the technical parameters of HF broadcasting in the light of new or modified CCIR Recommendations, and shall circulate to all administrations the results of its review, indicating the reasons for its proposed actions;

2. that, whenever the IFRB considers it appropriate to review its Technical Standards relating to the technical parameters of HF broadcasting without departing from the decisions of this Conference, it shall circulate to all administrations the proposed changes and the reasons for them;

3. that, before implementing any changes, the IFRB shall request administrations to provide their comments on the subjects referred to in *resolves* 1 and 2 within 4 months, and shall take them into account, unless it would be impossible to do so;

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4. that the IFRB shall circulate a summary of comments received from administrations, together with the Board's views thereon, indicating whether a meeting of experts is necessary or not, before a final decision is taken. If a significant number of replies subsequently received from administrations supports the need for such a meeting, the Board shall proceed accordingly. If not, the Board shall inform the administrations accordingly and allow an appropriate period for further comments before taking its final decision on the implementation of the proposed changes;

5. that if, on the subject referred to in *resolves* 1 above and following the action mentioned in *resolves* 3 and 4 above, the Technical Standards of the IFRB are not modified, the IFRB shall prepare a contribution to the CCIR indicating the provisions of the new or modified CCIR Recommendations that were not included in the IFRB Technical Standards, together with any information required for further study of the matter.

RESOLUTION No. 515 (HFBC-87)

**Improvements to the HFBC Planning System
and the Consultation Procedures**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that its First Session, held from 10 January to 11 February 1984, adopted a planning method based on seasonal planning and instructed the IFRB to prepare the appropriate software and to test it using variations of criteria;
- b)* the Report of the IFRB on its activities during the intersessional period;
- c)* that the planning exercises demonstrated that the HFBC Planning System, developed by the IFRB on the basis of the decisions of the First Session, did not allow all the requirements submitted by administrations to be included in the draft seasonal plans;
- d)* that, to enable all HFBC requirements of administrations to be implemented, the procedure of the present Article 17 of the Radio Regulations should be improved, and used in combination with an improved HFBC Planning System;

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e) that the working assumptions used by the IFRB in the planning exercises were reviewed and the HFBC Planning System was revised;

f) that consequently there is a need to modify the relevant software and to test the HFBC Planning System before its final adoption by a competent world administrative radio conference (see Resolution **511 (HFBC-87)**),

resolves that the IFRB

1. shall, in the post-conference period, improve the software for the procedures relating to the HFBC Planning System (Section 3 of Annex 1) and the procedures based on consultations (Section 2 of Annex 1), in accordance with the provisions contained in Annex 1 to this Resolution;

2. shall test both procedures, in the post-conference period, using the requirements in the requirements file. When submitting requirements, administrations shall indicate which of the requirements should be dealt with under the HFBC Planning System, and which under the Consultation Procedure;

3. shall carry out the above tests in the bands indicated in Annex 2 to this Resolution;

4. shall report regularly to administrations, at intervals not exceeding six months, the results of the work carried out under *resolves* 1, 2 and 3;

5. shall prepare and communicate a final report to administrations twelve months prior to the convening of the competent world administrative radio conference (see Resolution **511 (HFBC-87)**).

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ANNEX 1 TO RESOLUTION No. 515 (HFBC-87)

Section 1. HFBC Requirements File

1. Administrations shall submit to the IFRB their operational broadcasting requirements and those which are expected to become operational in the bands allocated exclusively to the broadcasting service between 5 950 and 26 100 kHz. These requirements shall be entered in the HFBC requirements file, which shall contain:

- requirements intended for use within the next seasons;
- all requirements taken into account in the preparation or during the operation of a seasonal schedule or plan;
- requirements used during the preceding five-year period.

2. An entry in the HFBC requirements file shall be defined as a requirement indicated by an administration as necessary to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitting station.

3. Each requirement listed in the HFBC requirements file shall contain at least the basic information listed in Appendix 2 together with an indication of the season(s) in which the requirement was or will be used.

4. Each seasonal schedule or seasonal plan to be established shall cover one of the seasonal propagation periods indicated below. The month shown in the parentheses indicates the month to be used for the propagation prediction:

- Season D — November-February (January);
- Season M — March-April (April);

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- Season J – May-August (July);
- Season S – September-October (October).

Each seasonal plan or seasonal schedule shall be implemented at 0100 hours UTC on the first Sunday of the season concerned.

5. Administrations shall notify the Board, using Appendix 2, of any addition, modification or deletion of a requirement in the HFBC requirements file. Additions, modifications or deletions notified to the Board for a given season shall be taken into account for updating the requirements file provided that, following their examination by the Board, they are found to contain the basic information referred to in Appendix 2.

6. On receipt of notices pursuant to paragraph 5 above, the Board shall ensure that the basic information listed in Appendix 2 has been provided and is correct and, if necessary, shall request the notifying administration to supply corrected or missing information. Following this examination the Board shall indicate those incompatibilities which can be identified without the need for detailed calculations and shall inform the administrations concerned of the results obtained together with any recommendation that may assist in avoiding this incompatibility.

7. After the end of each seasonal period the Board shall enter into the requirements file, for each requirement, the frequency or frequencies used, together with any indication from administrations of the actual use of the requirement. Requirements already used shall be kept in the HFBC requirements file for a period of five years. No priority shall be derived from this history of use.

8. An administration shall inform the Board when a broadcasting requirement is temporarily withdrawn, due to a natural disaster or other calamitous event, for a period of time not exceeding five years. The Board shall identify this requirement in the file by an appropriate symbol. When the administration concerned informs the Board that the requirement can be brought back into service and requests the removal of the symbol, the Board shall act in conformity with the request. If a request for the removal of the symbol is not received by the Board within the period of five years referred to above, the requirement shall be deleted from the file.

Section 2. Procedures Based on Consultations

9. Periodically, administrations shall confirm to the IFRB which of their requirements appearing in the HFBC requirements file are to be used in a given season. Administrations may also notify additions, modifications or deletions. For this purpose, administrations shall furnish to the Board at least the basic information listed in Appendix 2. When the Board finds that the information submitted by administrations is in conformity with the said Appendix, it shall update the seasonal file accordingly.

Administrations may:

- submit, for all or part of their requirements, the frequencies they intend to use;
- request the Board to select the appropriate frequencies for their requirements.

A seasonal file shall be established on the basis of this information.

10. The frequencies to be included in the seasonal schedule shall be in conformity with No. 1240 of the Radio Regulations.

11. The closing date for the receipt of the information referred to in paragraph 9 shall be set by the Board. The Board shall gradually reduce the period between the closing date and the start of season to the minimum possible.

12. If, in spite of reminders by the Board, no reply is received from an administration by the date set by the Board as in paragraph 11, the Board shall consider that the requirements appearing in the requirements file for the season under consideration are confirmed if they were in operation during the previous season.

13. The IFRB shall identify, for each requirement, its appropriate bands and shall calculate the field strength at each test point, and the basic broadcast reliability (BBR)¹ in each of these bands. In so doing it shall take account of the need to ensure frequency continuity as indicated in the Appendix to Section 3 of this Annex.

¹ The English acronyms are used in all three working languages for the sake of uniformity.

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14. Those requirements that cannot be included in the corresponding seasonal plan following application of the Planning System procedure contained in Section 3 of this Annex are entered in the seasonal file and dealt with in accordance with the following paragraphs.

15. The final results obtained relating to the requirements of an administration in application of paragraph 13 as well as the requirements mentioned in paragraph 14 shall be sent to the administration concerned with an indication, where appropriate, of the number of frequencies needed to achieve the required BBR.

16. When sending the results referred to in paragraph 13, the Board shall request administrations to inform it, within a period of 8 weeks, as appropriate:

- whether they intend to use some or all of the frequencies already appearing in the seasonal file;
- whether they intend to use a frequency or frequencies other than those in the seasonal file;
- of the frequency or frequencies which they intend to use for those requirements for which no frequency or frequencies appear in the seasonal file;
- whether or not the Board should select the most appropriate frequency or frequencies.

On the basis of the information referred to in paragraph 9, the Board shall select one or more frequencies for any requirement for which the information received does not specify a frequency, and for any requirement concerning which no information has been received from the administration within this period.

17. Administrations may, following receipt of the information referred to in paragraph 13, communicate additional requirements in the form prescribed in Appendix 2 with or without indication of the selected frequency. These additional requirements shall be included in the seasonal file.

18. At the end of the period indicated in paragraph 16 the Board shall repeat the calculations referred to in paragraph 13 and shall determine the number of appropriate frequencies necessary for each requirement. If an administration has indicated a number of frequencies for a requirement which exceeds the number resulting from the Board's calculations in application of the Appendix to Section 3 to this Annex, the Board shall, in consultation with the notifying administration, reduce the number of frequencies for the requirement in question to the number resulting from the Board's calculations.

19. The Board shall select frequencies for those requirements which have neither frequencies selected by the notifying administration nor preset frequencies. In so doing, the Board shall take into account the need to ensure frequency continuity as indicated in paragraph IV.3 of the Appendix to Section 3 of this Annex. The Board shall undertake a calculation of the possible incompatibilities between all requirements and an assessment of the performance of each requirement as indicated in Section VIII of the above-mentioned Appendix.

20. A seasonal schedule shall be prepared for publication, indicating for each requirement the frequency or frequencies, notified or selected, and the basic characteristics enabling administrations to identify easily the requirement concerned. This schedule shall be sent to administrations 2 months before the start of the season. At the same time the Board shall send to each administration detailed results of the calculations and performance assessment for its requirements, indicating, for each requirement, the requirements with which it is incompatible. In addition, the Board shall promptly provide, on request, all other information deemed necessary by an administration.

However, administrations are urged to take all possible action to resolve incompatibilities prior to the start of the season. In their attempts to resolve the incompatibilities, administrations will take into consideration the principles stated in Section II of Article 17.

21. Taking into account all available data, the Board shall, where practicable, make recommendations to eliminate the incompatibilities and shall send them to administrations along with the seasonal schedule.

In preparing its recommendations to administrations, the Board shall take into account monitoring observations and all other available data. However, when actual frequency usage is apparently not in conformity with the assignments in a submitted schedule, the Board shall seek confirmation of this information from the administration concerned.

22. After publication of the seasonal schedule, administrations may notify additions, modifications or deletions in their seasonal requirements. However, administrations are urged to refrain from submitting additional requirements at this stage.

23. For changes notified in accordance with paragraph 22, the Board shall apply the procedure specified in paragraph 18. Such revisions to the seasonal schedules shall be published in the IFRB weekly circular.

Record of Seasonal Usage

24. After the end of each seasonal period, the Board shall update the requirements file to reflect the actual usage during the season as notified to the Board. Those assignments which the administrations found to be unsatisfactory in practice shall be reported to the Board and marked in the requirements file by an appropriate symbol.

25. Upon request, the IFRB shall make available to administrations the information on frequency usage during the season, on computer tape or in any other machine readable form.

Miscellaneous Provisions

26. The Technical Standards used by the Board when applying the provisions of this Annex should be based not only on the factors listed in No. 1454 of the Radio Regulations but also on past experience in broadcasting planning and on the experience gained by the Board in the application of Article 17 of the Radio Regulations (see also Resolution 514 (HFBC-87)).

27. With a view to the eventual development of compatible technical plans for the frequency bands concerned, the Board shall take all necessary steps to carry out long-term engineering studies. For this purpose, the Board shall use all the information on frequency usage made available to it in the application of the procedure described in this Annex. The Board shall inform administrations at regular intervals of the progress and results of such studies.

28. In applying Article 22 of the Radio Regulations, administrations shall resolve problems of harmful interference which may arise in frequency usage in the bands concerned by exercising the utmost goodwill and mutual cooperation, and by giving due consideration to all the relevant technical and operational factors involved.

Section 3. Procedures Relating to the HFBC Planning System

29. Periodically, administrations shall confirm to the IFRB which of their requirements appearing in the HFBC requirements file are to be used in a given season. Administrations may also notify additions, modifications or deletions. When the Board finds that the information submitted by administrations is in conformity with Appendix 2, it shall establish the seasonal file accordingly.

30. The broadcasting requirements of administrations shall be submitted on the requirements form set out in Appendix 2 which specifies the data to be furnished.

31. The closing date for receipt of the information referred to in paragraph 29 shall be set by the Board. The Board shall gradually reduce the time period between the closing date and the start of the season to the minimum possible.

If, in spite of reminders by the Board, no reply is received from an administration by the closing date set by the Board, the Board shall consider that the requirements appearing in the requirements file for the season under consideration are confirmed if they were in operation during the previous season.

32. The IFRB shall calculate for each band the field strength at each test point and the basic broadcast reliability (BBR) and shall identify the appropriate bands for each requirement. In so doing it shall also take account of the need to ensure frequency continuity as indicated in the Appendix to this Section.

33. The IFRB shall, on the basis of the above calculations, apply the rules contained in the Appendix to this Section, from which the following results are derived for each hour/band:

- a) a list of resolved requirements that will be entered in the seasonal plan, including:
 - i) requirements with an RF protection ratio greater than or equal to 17 dB;
 - ii) requirements with an RF protection ratio less than 17 dB. Consultations shall be undertaken with administrations which so request in their requirements forms;
- b) a list of the requirements that could not be entered into the seasonal plan under a) above and which will be dealt with in accordance with Section 2 of this Annex.

34. The Board shall consult those administrations that wish to be consulted and have requirements of the type referred to in paragraph 33a) ii) above to ascertain whether they wish their requirements to be entered in the seasonal plan with the characteristics notified and the resulting RF protection ratios.

35. When administrations that wish to be consulted and have requirements of the type referred to in paragraph 33a) ii) above have indicated that they do not wish their requirements to be inserted in the seasonal plan under the specified conditions, the Board shall transfer those requirements to the list referred to in paragraph 33b).

36. The Board shall establish a time limit for administrations to submit new requirements, and shall process these requirements and endeavour to insert them in the seasonal plans following the steps indicated in the Appendix to this Section without adversely affecting¹ those requirements already entered in the seasonal plans.

37. Administrations that so wish may request the Board to select alternative frequencies for their requirements. The Board shall endeavour to select alternative frequencies without adversely affecting¹ the requirements appearing in the plan. If the Board receives no comment from administrations following the publication of the seasonal plan, it shall consider that the frequencies indicated in the seasonal plan will be assigned by administrations to their stations.

APPENDIX TO SECTION 3 OF ANNEX 1
TO RESOLUTION No. 515 (HFBC-87)

**Rules Applicable to the HF Bands which are
Allocated Exclusively to the Broadcasting Service
and are to be Planned**

I. *Introduction*

The application of this Appendix shall ensure the best possible use of all the available channels.

¹ The criteria to determine whether a requirement is adversely affected are to be found in paragraph IV.4.2.12 of the Appendix to this Section.

II. *Definitions*

II.1 *Appropriate frequency band*

The appropriate band for a requirement is the band which will ensure the continuity of use of the same frequency during the longest possible period of operation, with the best possible values of basic broadcast reliability (BBR), taking account of propagation conditions, operational limitations and equipment availability and constraints.

II.2 *Circuit reliability*

Probability for a circuit that a specified performance is achieved at a single frequency.

II.3 *Reception reliability*

Probability for a receiver that a specified performance is achieved, taking into account all transmitted frequencies.

II.4 *Broadcast reliability*

Probability for a service area that a specified performance is achieved, taking into account all transmitted frequencies.

Note 1: In the above terms, “circuit” means a one-way transmission from one transmitter to one receiving location.

Note 2: The term “reliability” is qualified by the word “basic” when the background consists of noise alone.

Note 3: When the background consists of both noise and interference, the term “reliability” may relate either to the effects of a single interferer or to multiple interference from co-channel and adjacent-channel transmissions.

Note 4: The specified performance is expressed by a given value of signal-to-noise ratio or signal-to-(noise plus interference) ratio.

Note 5: The time periods to which the term “reliability” relates shall be stated.

II.5 *Percentile*

The X percentile ($X\%$) value for a given set of values is defined by the following conditions:

- 1) the $X\%$ value is a member of the set of values;
- 2) the $X\%$ value is that value which is equal to or exceeded by at least X per cent of the members in the set;
- 3) the $X\%$ value is the largest value satisfying conditions 1) and 2).

II.6 *Radio-frequency (RF) wanted-to-interfering signal ratio*

The ratio, expressed in dB, between the values of the radio-frequency voltage of the wanted signal and the interfering signal, measured at the receiver input under specified conditions¹.

II.7 *Relative radio-frequency protection ratio*

The difference, expressed in dB, between the protection ratio when the carriers of the wanted and unwanted emissions have a frequency difference of ΔF (Hz or kHz) and the protection ratio when the carriers of these emissions have the *same frequency*.

¹ The specified conditions include such diverse parameters as: spacing ΔF of the wanted and interfering carrier, emission characteristics (type of modulation, modulation depth, carrier-frequency tolerance, etc.), receiver input level, as well as the receiver characteristics (selectivity, susceptibility to cross-modulation, etc.).

II.8 *Term relating to the service area*

- *Required service area (in HF broadcasting):* The area within which an administration proposes to provide a broadcasting service.

II.9 *Minimum usable field strength (E_{min})¹*

Minimum value of the field strength necessary to permit a desired reception quality, in specified receiving conditions, in the presence of natural and man-made noise, but in the absence of interference from other transmitters.

II.10 *Usable field strength (E_u)¹*

Minimum value of the field strength necessary to permit a desired reception quality, in specified receiving conditions, in the presence of noise and interference, either in an existing situation or as determined by agreements or frequency plans.

III. *Propagation prediction method*

The propagation prediction method to be used shall be that contained in the Technical Standards of the IFRB². For propagation prediction purposes, the year shall be sub-divided into four seasons and predictions shall be made for a single month to represent a season, as specified in Section 1 of Annex 1 to this Resolution (HFBC requirements file).

The solar index to be used for planning shall be the twelve-month running mean sunspot number R_{12} . The seasonal plan shall be prepared in accordance with the values of R_{12} for the period concerned. The lowest value of R_{12} predicted for any of the months in that season shall be used.

¹ The terms “minimum usable field strength” and “usable field strength” refer to the specified field strength values which a wanted signal must have in order to provide the required reception quality.

In determining whether these requirements are met, the median value (50%) of a fading signal should be used.

² See also Recommendation 512 (HFBC-87).

IV. *HFBC Planning System*

IV.1 *Test points*

The set of test points listed in the Technical Standards of the IFRB shall be used to represent the CIRAF Zones and quadrants for planning purposes (see also IV.4.1.1).

Where a required service area, as notified by an administration in conformity with Appendix 2, does not include a test point, the IFRB shall establish a new test point and include it in its Technical Standards. Such additions to its Technical Standards shall be distributed to administrations (Nos. 1001 and 1001.1 of the Radio Regulations).

IV.2 *Planning constraints*

IV.2.1 *Preset frequency*

When an administration indicates that its facilities can operate only on a limited number of fixed specified frequencies, the planning method shall take this into account as indicated in paragraph IV.4.2.10.

IV.2.2 *Limited use of the frequency bands*

- a) When an administration indicates that its facilities can operate only in a given frequency band, only frequencies from that band shall be included in the plan.
- b) When an administration indicates a preferred frequency band, the system shall attempt to select a frequency from this band. If this is impossible, frequencies from the nearest appropriate band shall be tried. Otherwise the system will select frequencies from the appropriate band, taking into account the equipment constraints referred to in paragraph IV.2.1.

IV.2.3 *Power*

- a) When an administration indicates only a single power value due to equipment constraints, it shall be used in the planning process.
- b) When an administration indicates several possible power values, the appropriate value shall be used to achieve the basic circuit reliability, and a single power value shall be determined for the duration of the emission.

IV.2.4 *Antenna*

When an administration indicates that its antenna can operate only in a given frequency band, only frequencies from that band shall be included in the plan.

IV.2.5 *Preferred frequency*

In accordance with the planning principles and without imposing constraints on planning, the following provisions shall be applied in the seasonal plans:

- 1) administrations may indicate a preferred frequency;
- 2) during the planning process, attempts shall be made to include the preferred frequency in the plan;
- 3) if this is impossible, attempts shall be made to select a frequency in the same band.

Otherwise, the HFBC Planning System shall be used to select the appropriate frequencies in such a way as to accommodate the maximum number of requirements, taking into account the constraints imposed by the technical characteristics of the equipment.

IV.3 *Frequency continuity*

IV.3.1 *Introduction*

Continuity in the use of a frequency is an important matter for both the broadcaster and the listener; it is a characteristic inherent in the broadcasting of a programme. In addition, limitations imposed by the technical characteristics of the means of transmission available to some administrations will impose mandatory requirements for frequency continuity. The desirable aim is that changes in frequency should be limited to those necessitated by variations in propagation conditions. The rules for applying frequency continuity are given in paragraph IV.3.4 below.

IV.3.2 *Definitions*

IV.3.2.1 *Intra-seasonal continuity*

IV.3.2.1.1 *Type 1 continuity*

Continuity of use of the same frequency within an hour or from one hour to the following hour for one requirement.

IV.3.2.1.2 *Type 2 continuity*

Continuity of use of the same frequency in the same season when passing from one requirement to another or one time block to another.

IV.3.2.2 *Inter-seasonal continuity*

IV.3.2.2.1 *Type 3 continuity*

Continuity of use of the same frequency for the same requirement in two consecutive seasons.

IV.3.2.2.2 *Type 4 continuity*

Continuity of use of the same frequency for the same requirement in two consecutive equinoctial seasons.

IV.3.2.2.3 *Type 5 continuity*

Continuity of use of the same frequency for the same requirement in the same season in two consecutive years.

IV.3.3 *Relationship between frequency continuity and appropriate band(s)*

IV.3.3.1 When a single frequency is sufficient to provide basic broadcast reliability (BBR) equal to or greater than the agreed reference value, the appropriate band is to be determined by the HFBC Planning System by taking account, *inter alia*, of the rules set out in paragraph IV.3.4 regarding the maintenance of the maximum frequency continuity within the limits of the agreed reference value for BBR (80%).

However, an administration may choose extended frequency continuity at the expense of BBR; in this event, it shall indicate the lower value of BBR to be used. As, in this portion of the requirement, the BBR falls below the above-mentioned reference value, the second and/or third frequencies are allowed only when the application of frequency continuity would not result in a number of additional frequencies greater than would be necessary with operation in the appropriate bands.

IV.3.3.2 When BBR obtainable by use of a single frequency is less than 80%, continuity of use of the first frequency or the single operating frequency will be assured within the lower limit of BBR indicated by the administration.

When the administration indicates that it is able to operate on more than one frequency, the use of this lower value of BBR shall not entail the use of a third frequency.

IV.3.3.3 When the requirement under consideration may use a second or third frequency according to the procedures established in Section VII of this Appendix, frequency continuity shall also be applied to the second (and third) frequency in the same manner as for the first frequency.

IV.3.3.4 When type 2 continuity is requested (from one requirement to another), the HFBC Planning System shall identify the appropriate band separately for each of the requirements concerned. The frequency assigned to the first of these requirements shall be assigned to the other related requirement if it is in its appropriate band.

IV.3.4 *Application of continuity*

IV.3.4.1 Type 1 continuity shall be applied automatically to all requirements under the conditions set out in paragraph IV.3.3 above.

IV.3.4.2 At the request of an administration, type 2 continuity shall be applied when this corresponds to equipment constraints. However, in other cases, this continuity may be applied to the extent possible (see paragraph IV.3.3.4 above).

IV.3.4.3 Continuity of types 3, 4 and 5 shall be applied to the extent possible when requested by the administration.

IV.4 *Planning steps and rules for dealing with incompatibilities*

IV.4.1 *Definitions*

IV.4.1.1 *Unit of service area*

Each CIRAF Zone is divided into one to four units of area called "quadrants"; these are depicted in the map of Section C of Appendix 2. Any such "quadrant" containing at least one test point of a given requirement is called a "unit of service area" for the given requirement.

IV.4.1.2 A *group of incompatible requirements (GIR)** is a set of requirements, each of which is incompatible¹ with all other requirements in the set.

IV.4.1.3 The *GGIR*¹ (*greatest GIR*) is a GIR which contains the largest number of requirements.

IV.4.1.4 The *MGIR*¹ (*maximal GIR*) is the set of all requirements contained in at least one GGIR.

IV.4.2 *Planning steps and rules*

IV.4.2.1 The MGIR concept is used in the planning method to evaluate congestion.

IV.4.2.2 Congestion is evaluated by determining the GGIR and by comparing the number of channels required by that group with the number of channels available in the band considered.

IV.4.2.3 When, in a given hour/band, no congestion is found, the requirements concerned, for which a frequency will be identified, shall be entered in a "file of resolved requirements".

IV.4.2.4 When congestion is identified in a given hour/band by means of a GGIR, the requirements included in the MGIR will have their RF protection ratio reduced by 3 dB with a view to resolving the congestion. If, following this action, the congestion is not resolved, another MGIR is identified and the process is repeated until it is impossible to find a solution with an RF protection ratio of 17 dB. Requirements appearing in an hour/band that can be resolved in this manner are entered in the "file of resolved requirements".

¹ Refer to the Technical Standards of the IFRB.

* *Note by the General Secretariat:* The English acronyms are used in all three working languages for the sake of uniformity.

IV.4.2.5 If the congestion is not resolved following the application of IV.4.2.4, a new MGIR is identified, as well as, for each administration, a set of requirements in the band under consideration with identical service areas. The planning process then identifies for transfer to the procedure in Section 2 of Annex 1 to this Resolution a number of such requirements in order to resolve the congestion. In order to identify the requirements to be transferred first, administrations having requirements in the MGIR are sorted in decreasing order of the number of such requirements. The process is repeated as many times as necessary until the congestion is resolved or the number of such requirements becomes equal to one per administration concerned. Requirements appearing in an hour/band that can be resolved in this manner are entered in the "file of resolved requirements".

IV.4.2.6 If the congestion is not resolved following the application of IV.4.2.5, all requirements of a given administration appearing in a MGIR have different service areas, some of them having common units of service area. More transfers may be required in order to resolve the congestion; they shall be made by having recourse to the identification of the unit of service area which appears most often in the requirements of a given administration in the hour/band under consideration. Once this unit of service area is identified, administrations having it in their requirements are sorted in decreasing order of the number of their requirements where this unit appears, with a view to transferring to the procedure in Section 2, requirements containing the unit of service area which appears most often. The GGIR is re-evaluated to determine whether congestion exists and the process is repeated as many times as necessary until the congestion is resolved or the number of such requirements becomes one per administration concerned. This rule shall be applied in such a way that any quadrant notified by an administration in the hour/band under consideration appears at least once in the plan. Requirements appearing in an hour/band that can be resolved in this manner are entered in the "file of resolved requirements".

IV.4.2.7 If the congestion is not resolved following the application of IV.4.2.6 the same rule is applied taking account of the requirements in all the bands in order to identify the requirements containing the unit of service area which appears most often. Requirements appearing in an hour/band that can be resolved in this manner are entered in the "file of resolved requirements".

IV.4.2.8 If the congestion is not resolved following the application of IV.4.2.7, each requirement appearing in the MGIR is examined in order to establish whether it appears in two or three bands due to its low BBR. Such a requirement may be transferred to the procedure in Section 2 if it appears in another band with a better BBR. Requirements appearing in an hour/band that can be resolved in this manner are entered in the “file of resolved requirements”.

IV.4.2.9 If the congestion is not resolved following the application of IV.4.2.8, the requirements included in the MGIR shall have their RF protection ratio reduced by 3 dB. Following this action another MGIR is identified, and the 3 dB reduction shall be applied to requirements appearing in the new MGIR not yet affected by this reduction. The process of reduction by 3 dB shall be repeated until congestion is removed. Additional reductions of the RF protection ratio by steps of 3 dB are made in the same manner until all the remaining requirements are entered in the “file of resolved requirements”. In this manner all requirements which, as a result of the previous steps, have not been transferred to the procedure in Section 2, have been placed in a “file of resolved requirements”. This file contains, therefore, all the requirements which will always appear in the “seasonal plan”. This will be the case of requirements with an RF protection ratio less than 17 dB; however, the requirements of those administrations who so wish may be transferred to the procedure in Section 2 as a result of consultation with the IFRB.

IV.4.2.10 Following the application of the above steps for the resolution of incompatibilities, frequencies shall be identified for the requirements appearing in the “file of resolved requirements”. This process shall be applied as follows:

- requirements with a single preset frequency shall be granted this frequency;
- requirements with more than one preset frequency shall be granted that frequency that has the least degree of incompatibility;
- if two requirements have the same preset frequency, which after analysis results in an incompatibility, the case is referred to the administration(s) concerned;
- requirements with a preferred frequency, attempts shall be made to grant them this frequency.

IV.4.2.11 Before transferring a requirement to the procedure in Section 2, the Board shall verify whether the administration has indicated that the frequency continuity shall be applied in all circumstances. If so, the requirement shall be transferred to Section 2, throughout the entirety of its transmission period within the appropriate band.

IV.4.2.12 Requirements received by the IFRB after the beginning of the planning exercise are entered in the plan on condition that they do not adversely affect the requirements already entered in the plan. In applying this provision, a requirement already entered in the plan with an RF protection ratio exceeding 17 dB is deemed to be adversely affected if its RF protection ratio is reduced below 17 dB. A requirement already entered in the plan with an RF protection ratio lower than 17 dB is deemed to be adversely affected if its RF protection ratio is reduced by more than 1 dB.

IV.4.3 *Actions relating to harmful interference*

In the event of harmful interference to an HF broadcasting service which is using an assignment in accordance with a current seasonal plan, the administration concerned shall have the right to request the prompt assistance of the IFRB in finding another frequency to help restore that service to the level of performance achieved in the plan. Any new frequency proposed by the IFRB shall not adversely affect the seasonal plan in operation. The central automated system must be able to respond, as far as possible, to such requests from administrations. The cause of a situation of harmful interference shall find its definitive solution in accordance with Article 22 of the Radio Regulations. The original frequency shall be made available for future use once this problem has been solved.

V. *Reliability*

V.1 *Calculation of basic circuit reliability (BCR)**

The method for calculating basic circuit reliability (BCR) is given in Table 1 which describes steps (1) to (11). The median value of field strength for the wanted signal at step (1) is determined by the field strength

* *Note by the General Secretariat:* The English acronyms are used in all three working languages for the sake of uniformity.

prediction method. The upper and lower decile values, steps (2) to (5) inclusive, are also determined, taking account of long-term (day-to-day) and short-term (within the hour) fading. The combined upper and lower deciles of the wanted signal are then calculated at steps (6) and (7) in order to derive the signal levels exceeded for 10% and 90% of the time at steps (8) and (9).

TABLE 1
Parameters used to compute basic circuit reliability (BCR)

Step	Parameter	Description	Source
(1)	$E_w(50)$ dB(μ V/m)	Median field strength of wanted signal ¹⁾	IFRB Technical Standards
(2)	$D_U(S)$ dB	Upper decile of slow fading signal (day-to-day)	IFRB Technical Standards
(3)	$D_L(S)$ dB	Lower decile of slow fading signal (day-to-day)	IFRB Technical Standards
(4)	$D_U(F)$ dB	Upper decile of fast fading signal (within the hour)	IFRB Technical Standards
(5)	$D_L(F)$ dB	Lower decile of fast fading signal (within the hour)	IFRB Technical Standards
(6)	$D_U(E_w)$ dB	Upper decile of wanted signal	$\sqrt{D_U(S)^2 + D_U(F)^2}$
(7)	$D_L(E_w)$ dB	Lower decile of wanted signal	$\sqrt{D_L(S)^2 + D_L(F)^2}$
(8)	$E_w(10)$ dB(μ V/m)	Wanted signal exceeded 10% of the time	$E_w + D_U(E_w)$
(9)	$E_w(90)$ dB(μ V/m)	Wanted signal exceeded 90% of the time	$E_w - D_L(E_w)$
(10)	E_{min} dB(μ V/m)	Minimum usable field strength	IFRB Technical Standards
(11)	BCR	Basic circuit reliability	Formula (1) or Figure 1

¹⁾ In the calculation of BCR at the test points within the required service areas of synchronized transmitters, the field strength value to be used is obtained by the method of root sum square addition of the constituent field strengths in microvolts/metre (μ V/m).

The wanted signal probability distribution, assumed to be log-normal, is illustrated in Figure 1 (plotted on a normal probability scale for the abscissa) which indicates the signal level (in decibels) versus the probability that the value of signal level is exceeded. This distribution is used to obtain the *basic circuit reliability* (11), which is the value of probability corresponding to the minimum usable field strength (10).

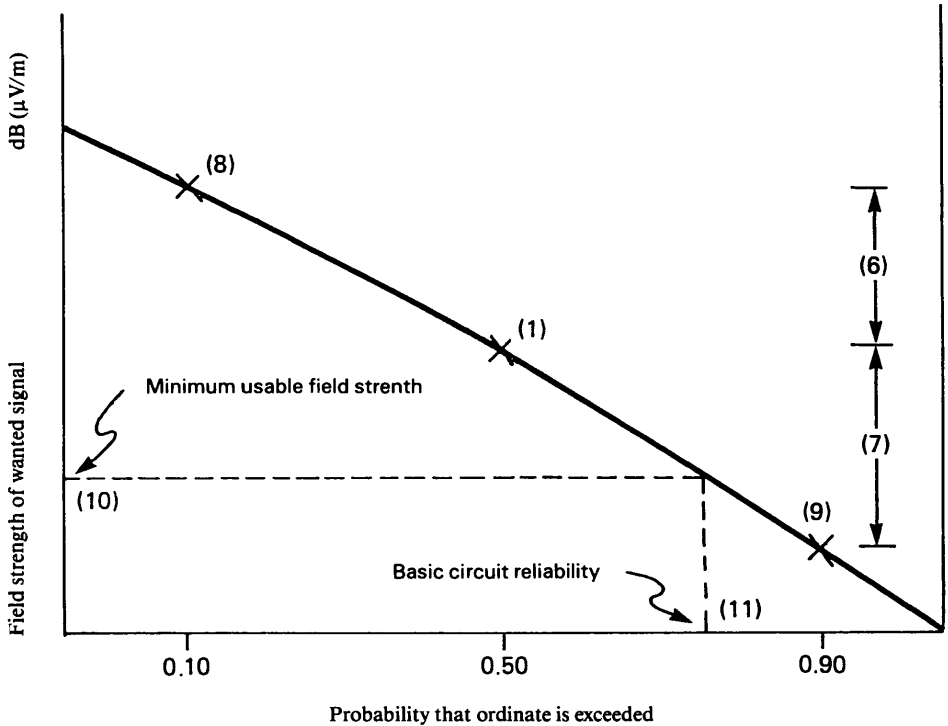


FIGURE 1
Parameters used to compute basic circuit reliability (BCR)
 (Figures appearing in brackets refer to the step numbers in Table 1.)

The basic circuit reliability is given by the formula:

$$\text{BCR} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^2/2) d\tau \quad (1)$$

when $E_w \geq E_{min}$:

$$\gamma = \frac{E_w - E_{min}}{\sigma_L}$$

$$\sigma_L = D_L(E_w)/1.282$$

when $E_w < E_{min}$:

$$\gamma = \frac{E_w - E_{min}}{\sigma_U}$$

$$\sigma_U = D_U(E_w)/1.282$$

V.2 Calculation of median signal-to-interference ratio (S/I)

The method of calculation is shown in Table 2. In step (1), the median wanted signal level is computed by the propagation prediction method.

In step (2), the median field strength levels (E_i) of each interfering source are obtained from the prediction method. In step (3), for a single source of interference the predicted median field strength is used; for multiple sources of interference the median field strength is calculated as follows: the field strengths of the interfering signals E_i are listed in decreasing order. Successive root sum square (r.s.s.) additions of the field strengths E_i are computed, stopping when the difference between the resultant field strength and the next field strength is greater than 6 dB. In step (3), the last computed value represents the resultant interference field strength I .

The values of the wanted signal and interference determined in steps (1) and (3) are combined in step (4) to obtain the median signal-to-interference ratio.

TABLE 2

Calculation of median signal-to-interference ratio (S/I)

Step	Parameter	Description	Source
(1)	E_w dB(μ V/m)	Median field strength of wanted signal	IFRB Technical Standards
(2)	E_i dB(μ V/m)	Median field strength of interfering signals $E_1, E_2, \dots E_n$	IFRB Technical Standards
(3)	I dB(μ V/m)	Resultant field strength of interference	$I = 20 \log_{10} \sqrt{\sum_{i=1}^n 10 \left(\frac{E_i + \alpha_i}{10} \right)^2}$ ¹⁾
(4)	S/I	Median signal-to-interference ratio	$E_w - I$

¹⁾ α_i is the appropriate relative protection ratio corresponding to the carrier frequency separation between the wanted signal and the unwanted signal.

V.3 Basic reception reliability (BRR)*

The method for computing basic reception reliability (BRR) is given in Table 3. With a single frequency, basic reception reliability is the same as the basic circuit reliability (BCR) defined in paragraph V.1. With multiple frequencies, the interdependence between propagation conditions at different frequencies leads to the computation method given in Table 3. In steps (4) and (6), BCR (n) is the basic circuit reliability for frequency n , where $n = F_1, F_2$, etc. The *basic reception reliability* is obtained in step (2) for a single frequency, in step (4) for a set of two frequencies and in step (6) for a set of three frequencies.

* *Note by the General Secretariat:* The English acronyms are used in all three working languages for the sake of uniformity.

TABLE 3

Basic reception reliability

The following parameters are involved:

Single-frequency operation

Step	Parameter	Description	Source
(1)	BCR (F_1) %	Basic circuit reliability for frequency F_1	Step (11), Table 1
(2)	BRR (F_1) %	Basic reception reliability	BCR (F_1)

*Two-frequency operation*¹⁾

Step	Parameter	Description	Source
(3)	BCR (F_2) %	Basic circuit reliability for frequency F_2	Step (11), Table 1
(4)	BRR (F_1) (F_2) %	Basic reception reliability	$1 - \prod_{n=F_1}^{F_2} (1 - \text{BCR}(n))$

¹⁾ The two frequencies F_1 and F_2 shall be situated in different HF bands allocated to the broadcasting service.

*Three-frequency operation*¹⁾

Step	Parameter	Description	Source
(5)	BCR (F_3) %	Basic circuit reliability for frequency F_3	Step (11), Table 1
(6)	BRR (F_1) (F_2) (F_3) %	Basic reception reliability	$1 - \prod_{n=F_1}^{F_3} (1 - \text{BCR}(n))$

¹⁾ The three frequencies F_1 , F_2 and F_3 shall be situated in different HF bands allocated to the broadcasting service.

V.4 *Basic broadcast reliability (BBR)*

The determination of basic broadcast reliability involves the use of test points within the required service area. The basic broadcast reliability is an extension of the basic reception reliability concept to an area instead of a single reception point. The method for computing basic broadcast reliability is shown in Table 4. In step (1), the basic reception reliabilities BRR (L_1), BRR (L_2), ... BRR (L_N) are computed as described in Table 3 at each test point L_1 , L_2 , ... L_N . These values are ranked in step (2) and the *basic broadcast reliability* is the value associated with the 80th percentile of the test points.

Broadcast reliability is associated with the expected performance of a broadcast service at a given hour. For periods longer than an hour, computation at one-hour intervals is required.

TABLE 4
Basic broadcast reliability

The following parameters are involved:

Step	Parameter	Description	Source
(1)	BRR (L_1), BRR (L_2), ... BRR (L_N) %	Basic reception reliability at all test points considered in the required service area	Step (2), (4) or (6), as appropriate, from Table 3
(2)	BBR (80) %	Basic broadcast reliability associated with the 80th percentile	The percentile chosen from the values ranked from (1) of this table

VI. *Proportionally reduced protection (PRP)**

Proportionally reduced protection (PRP) is a margin (M) by which the RF protection ratio to be applied at a test point may be reduced under the following specified conditions:

- 1) the BBR < 80%, *and*
- 2) only one frequency band is given by the planning system, *and*
- 3) at the test point considered the field strength E_w is less than E_{mn} and greater than or equal to $E_{mn} - 10$ dB.

In these conditions, M is determined as:

$$M = E_{mn} - E_w$$

* *Note by the General Secretariat:* The English acronyms are used in all three working languages for the sake of uniformity.

In such cases, the proportionally reduced protection ratio is used in the evaluation of S/I at the test point considered. For all the remaining points within the required service area, full protection as determined by the relevant protection ratio is given when $E_w \geq E_{min}$, and no protection is given when $E_w < E_{min} - 10$ dB.

In cases where PRP is not applicable, full protection as determined by the relevant protection ratio is given when $E_w \geq E_{min}$, and no protection is given when $E_w < E_{min}$.

VII. *Maximum number of frequencies required per requirement*

VII.1 *Introduction*

Wherever possible, only one frequency should be used for a given requirement. In certain special circumstances, it may be found necessary to use more than one frequency per requirement, i.e.:

- over certain paths, e.g., very long paths, those passing through the auroral zone, or paths over which the MUF is changing rapidly;
- areas where the depth of the area extending outwards from the transmitter is too great to be served by a single frequency;
- when highly directional antennas are used to maintain satisfactory signal-to-noise ratios, thereby limiting the geographical area covered by the station concerned.

The decision to use more than one frequency per requirement should be taken on the merits of the particular case concerned.

The use of synchronized transmitters should be encouraged whenever possible in order to minimize the need for additional frequencies.

VII.2 *Use of additional frequencies*

The number of frequencies needed to achieve the specified level of BBR¹ shall be determined by the method given below. If the calculated BBR for a single frequency does not reach the adopted value, it is necessary to consider whether the BBR could be improved by additional frequencies in separate bands and whether the improvement would justify the use of additional frequencies.

VII.3 *Determination of additional frequency bands*

In cases where the BBR for the first band, based on all test points in the required service area, is between 50% and 80%, an additional band shall be tested using the following procedure.

Those test points whose basic circuit reliability (BCR) is less than or equal to the BBR are identified, and only these points are used to determine the second band. For each band, the minimum value of BCR (BCR_{\min}) at these points is determined and that band having the highest BCR_{\min} value is selected. If more than one band has this value, the highest frequency band is selected. The two-band BBR, taking account of the BRR at all test points in the required service area, is then computed, and if it exceeds the limit specified in Figure 2, the second band is permitted. In those special cases where the two-band BBR is less than 80%, a third band shall be tested as follows.

The BBR for each of the remaining bands is computed, using all the test points in the required service area. Of these bands, that band having the highest BBR is selected as the third band. If more than one band has this value the highest frequency band is selected. If the resulting three-band BBR, taking account of the BRR at all test points, exceeds the limit specified in Figure 2, the third band is permitted.

¹ For calculation of the basic broadcast reliability (BBR), see paragraph V.4.

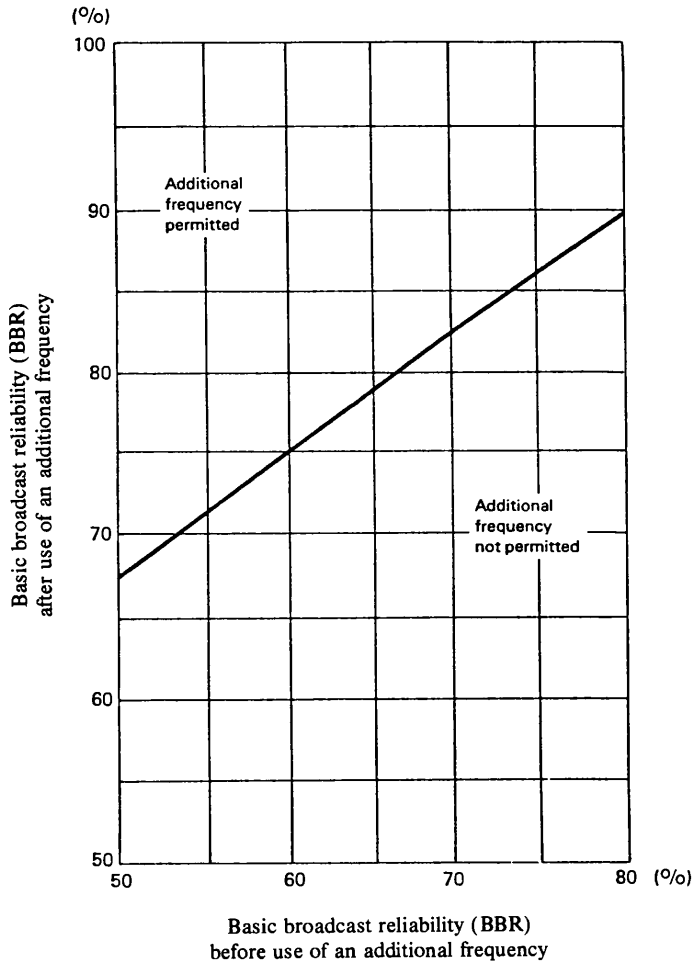


FIGURE 2

Limits for use of an additional frequency

The contents of this figure can be expressed by the following formulas:

BBR (after) > 30 + 0.75 × BBR (before) additional frequency permitted

BBR (after) ≤ 30 + 0.75 × BBR (before) additional frequency not permitted.

VIII. *Performance assessment*¹

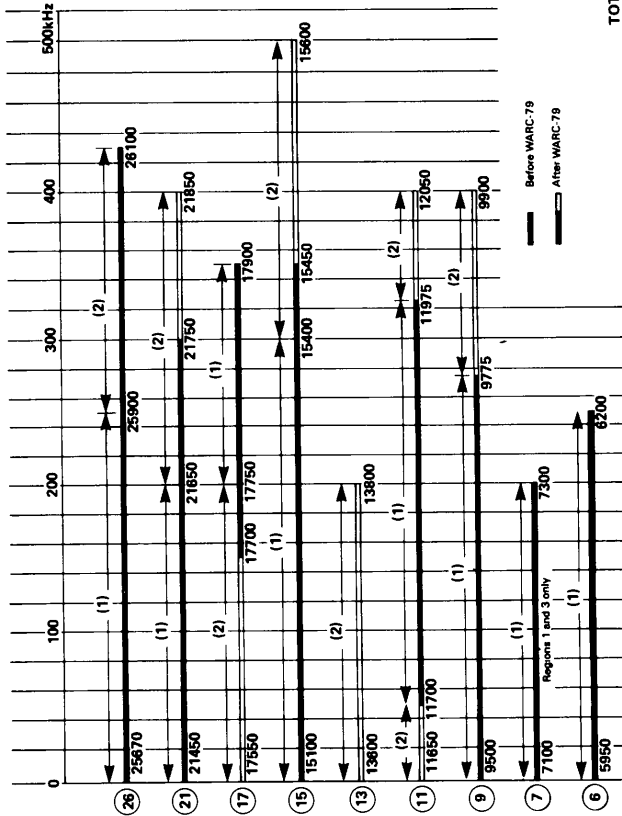
In order to assess the performance of a requirement, the following values should be given for each 15-minute period, each hour, or for the duration of the emission, as appropriate:

- 1) BBR — basic broadcast reliability at the 80th percentile of all test points;
- 2) percentages of test points for each frequency band where the field strength is equal to or greater than E_{min} , and $E_{min} - 10$ dB where proportionally reduced protection applies;
- 3) SIR (dB) — median signal-to-interference ratio obtained using the calculation procedure of paragraph V.2 at the 80th percentile of test points where the field strength is equal to or greater than E_{min} , or $E_{min} - 10$ dB where proportionally reduced protection applies. If economically practical, it would be desirable to indicate the test points which have been used in determining the median signal-to-interference ratio;
- 4) TP (%) — percentage of test points for each frequency band where the field strength is equal to or greater than E_{min} , or $E_{min} - 10$ dB where proportionally reduced protection applies, *and* the median signal-to-interference ratio is equal to or greater than 17 dB.

¹ The IFRB may develop additional parameters for assessing performance.

ANNEX 2 TO RESOLUTION No. 515 (HFBC-87)

Total (kHz)	(1) Application of the consultation procedure (Article 17) (kHz)	(2) Application of the Improved HFBC Planning System (kHz)
430	230	200
400	200	200
350	150	200
500	300	200
200		200
400	275	125
400	275	125
200	200	
250	250	
3130	1880	1250



TOTAL

RESOLUTION No. 516 (HFBC-87)

**Antennas to be Used for the Planning of the HF Bands Allocated
Exclusively to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that the IFRB Technical Standards shall be developed according to Nos. **1001, 1454** and **1770** of the Radio Regulations (see Resolution **514 (HFBC-87)**);
- b)* that the CCIR has published the Book of Antenna Diagrams (1984 Edition) and made available computer programs for HF antenna pattern calculations;
- c)* that administrations are developing improved antennas to be used for HF broadcasting;
- d)* that administrations may wish to use antenna types not included in the above-mentioned CCIR publication,

resolves

1. that the type of antenna most appropriate for the required service should be used;
2. that the use of antennas with a large number and size of side-lobes, e.g., rhombic antennas, should be avoided,

RES516-2

invites administrations

to take into account *resolves* 1 and 2 above,

further invites administrations

to provide the IFRB and the CCIR with the relevant data if they wish to use antenna types different from those included in the IFRB Technical Standards and in the CCIR Book of Antenna Diagrams,

invites the CCIR

to continue to update the Book of Antenna Diagrams,

invites the IFRB

1. to base its Technical Standards for reference antenna types on the CCIR Book of Antenna Diagrams and information supplied by administrations;
2. to publish and maintain in its Technical Standards the set of antenna characteristics to be used for HF broadcasting.

RESOLUTION No. 517 (HFBC-87)

**Transition from Double-Sideband (DSB) to
Single-Sideband (SSB) Emissions
in the HF Bands Allocated Exclusively to the
Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that the HF bands allocated exclusively to the broadcasting service are severely congested;
- b)* that the level of congestion within these HF bands is increasing;
- c)* that SSB techniques will provide a much more efficient utilization of the frequency spectrum than DSB techniques;
- d)* that SSB techniques enable reception quality to be improved;
- e)* that the lifetime of a transmitter is of the order of twenty years;
- f)* that the lifetime of a receiver is of the order of ten years;
- g)* that it is economically unattractive, using current technology, to convert existing conventional DSB transmitters to SSB operation;
- h)* Appendix 45 to the Radio Regulations concerning the SSB system specification for the HF bands allocated exclusively to the broadcasting service;
- i)* that the First Session of the Conference (Geneva, 1984), in its Report to the Second Session, dealt with the progressive introduction of SSB emissions;
- j)* that Recommendation 515 (HFBC-87) encourages the accelerated design and manufacture of SSB transmitters and receivers,

resolves

1. that the procedure in the Annex to this Resolution shall be used for the purpose of ensuring an orderly transition from DSB to SSB emissions in the HF bands allocated exclusively to the broadcasting service;
2. that the final date for the cessation of DSB emissions specified in the annex to this Resolution shall be periodically reviewed by competent future world administrative radio conferences in the light of the latest available complete statistics on the world-wide distribution of SSB transmitters and synchronous demodulator receivers, and that at least one such review shall be carried out before the year 2000,

invites the Administrative Council

to place, in conformity with *resolves* 2 above, the matter referred to in that paragraph as an additional item on the agendas of competent future world administrative radio conferences,

instructs the Secretary-General

to compile and maintain the statistics referred to in *resolves* 2, to make these statistics available to interested administrations and to submit summaries thereof to the competent future world administrative radio conferences,

invites administrations

to assist the Secretary-General in this task by providing the relevant statistical data.

ANNEX TO RESOLUTION No. 517 (HFBC-87)

**Procedure for the Transition from Double-Sideband (DSB)
to Single-Sideband (SSB) Emissions in the
HF Bands Allocated Exclusively
to the Broadcasting Service**

1. The immediate introduction of SSB emissions is encouraged, i.e., the transition period starts immediately.
2. All DSB emissions shall cease not later than 31 December 2015, at 2359 hours UTC (see also *resolves* 2 in the body of the Resolution).
3. SSB emissions shall comply with the characteristics specified in Appendix 45 to the Radio Regulations.
4. Until 31 December 2015, 2359 hours UTC, SSB emissions intended for reception by DSB receivers with envelope demodulation, as well as by SSB receivers with synchronous demodulation, shall have a carrier reduction of 6 dB relative to peak envelope power.
5. After 31 December 2015, 2359 hours UTC, only SSB emissions with a carrier reduction of 12 dB relative to peak envelope power shall be used.
6. Until 31 December 2015, 2359 hours UTC, whenever an administration replaces its DSB emission by an SSB emission, it shall ensure that the level of interference is not greater than that caused by its original DSB emission (see also Appendix 45 to the Radio Regulations and Recommendation 517 (HFBC-87)).

RESOLUTION No. 641

**Relating to the Use of the Frequency Band
7 000 - 7 100 kHz**

(Abrogated by Resolution 91 (HFBC-87))

RESOLUTION No. 641 (Rev.HFBC-87)

Use of the Frequency Band 7 000 - 7 100 kHz

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) that the sharing of frequency bands by the amateur and broadcasting services is undesirable and should be avoided;
- b) that it is desirable to have world-wide exclusive allocations for these services in Band 7;
- c) that the band 7 000 - 7 100 kHz is allocated on a world-wide basis exclusively to the amateur service,

resolves

that the broadcasting service shall be prohibited in the band 7 000 - 7 100 kHz and that the broadcasting stations operating on frequencies in this band shall cease such operation,

urges

the administrations responsible for the broadcasting stations operating on frequencies in the band 7 000 - 7 100 kHz to take the necessary steps to ensure that such operation ceases immediately,

instructs the Secretary-General

to bring this Resolution to the attention of administrations.

RECOMMENDATION No. 500

**Relating to the Preparation of the Technical Information
Necessary for the World Administrative Radio Conference
for HF Broadcasting**

(Abrogated by Resolution 91 (HFBC-87))

RECOMMENDATION No. 501

**Relating to Studies for the Introduction of Single-Sideband (SSB)
Techniques in the HF Bands Allocated to the Broadcasting
Service, in Preparation for the World Administrative
Radio Conference for HF Broadcasting**

(Abrogated by Resolution 91 (HFBC-87))

RECOMMENDATION No. 503

Relating to HF Broadcasting

(Abrogated by Resolution 91 (HFBC-87))

RECOMMENDATION No. 503 (Rev.HFBC-87)

HF Broadcasting

The World Administrative Radio Conference, for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) the congestion of the HF broadcasting bands;
- b) the extent of adjacent channel interference;

noting

the possibility of improving the situation by implementing pertinent CCIR Recommendations;

recommends that administrations

1. pay special attention to the provisions for “out-of-band spectrum” contained in CCIR Recommendation 328-6;
2. encourage, to the maximum extent possible, manufacturers to design and build HF broadcasting receivers that conform to CCIR Recommendation 332-4 concerning the selectivity of receivers;

invites administrations

to take advantage, to the maximum extent practicable, of synchronized frequency transmitter operation, taking into account CCIR Recommendation 205-2;

REC503-2

invites the CCIR

to carry out further studies in relation to the Recommendations mentioned above, taking into account the requirements of HF broadcasting, with a view to updating these three Recommendations whenever necessary.

(Rev. 1988)

RECOMMENDATION No. 509 (HFBC-87)

**Participation by Administrations in the Improvement
of the Planning System
for the HF Bands Allocated Exclusively to
the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that it has improved the planning method and instructed the IFRB to modify the HFBC Planning System accordingly;
- b)* that the work assigned to the IFRB is to be carried out in the years which follow the Conference;
- c)* that the steps of the planning method relate to technical and operational constraints which may vary from country to country and from region to region;
- d)* that the IFRB can only obtain information on these constraints through contacts with administrations;
- e)* that administrations from all the regions must have an opportunity to take part in the improvement process through the participation of qualified experts;
- f)* that administrations need to be informed periodically on the progress made and on the planning exercises and need to have the opportunity to comment on them;
- g)* that to promote the participation of countries from all the regions it may be necessary to defray the expenses involved from the Union budget,

recommends the Administrative Council

1. to establish a group of experts selected from among individuals proposed by administrations to assist the IFRB in carrying out the tasks relating to the HFBC Planning System entrusted to it by the Conference;

2. that the group shall comprise 27 experts from countries belonging to the five administrative regions, distributed as follows:

Region A (Americas): 5

Region B (Western Europe): 5

Region C (Eastern Europe and Northern Asia): 3

Region D (Africa): 7

Region E (Asia and Australasia): 7

3. that the experts shall hold one annual meeting of one week on the initiative of the Board, and that a second meeting could be organized if necessary;

4. that in order to keep all administrations informed of the progress made and the results of the experts meetings, it will be necessary to organize annual meetings to exchange information to which all administrations shall be invited;

5. that such meetings to exchange information should be held in conjunction with the experts meetings for a duration of two or three days,

also recommends the Administrative Council

1. taking into account the ordinary budget of the Union and the availability of other financial resources, to provide the necessary resources for the above activities including resources to defray the costs of participation in the group of experts meetings of one expert from each administration for the years 1988 and 1989;

2. should the experts have to meet after 1989, to include in its Report to the Plenipotentiary Conference a request for the provision of financial resources in the ordinary budget of the Union,

instructs the Secretary-General

1. to consult administrations and request them, if they so wish, to nominate an expert with the necessary experience in the HF broadcasting field to participate in the group of experts;
2. to forward the list of candidates to the 42nd Session of the Administrative Council for consideration.

RECOMMENDATION No. 510 (HFBC-87)

**Planning Parameters for the
Double-Sideband (DSB) System in the HF Bands
Allocated Exclusively to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) that the Conference has considered in detail the planning and technical parameters used for HF broadcasting;
- b) that certain DSB system characteristics for HF broadcasting are contained in Appendix 45 to the Radio Regulations;
- c) that the RF protection ratio, minimum usable field strength and signal fading allowance are basic planning parameters which may be improved as a result of further studies;
- d) that the Conference has adopted Resolution 514 (HFBC-87) relating to the procedure to be applied by the IFRB in the revision of relevant parts of its Technical Standards used for HF broadcasting,

recommends

that, subject to the procedure to be applied by the IFRB in the revision of relevant parts of its Technical Standards used for HF broadcasting given in Resolution 514 (HFBC-87), the values of the planning

REC510-2

parameters given in the Annex to this Recommendation be used by the IFRB in its Technical Standards relating to the DSB system in the HF bands allocated exclusively to the broadcasting service,

invites the CCIR

to continue to study the values of the parameters contained in the Annex to this Recommendation,

invites administrations

to participate actively in these studies.

ANNEX TO RECOMMENDATION No. 510 (HFBC-87)

Planning Parameters

1. *Radio-frequency protection ratios*

1.1 *Protection ratio for unsynchronized transmissions*

The HFBC Planning System shall endeavour to satisfy the requirements with a minimal co-channel RF protection ratio of 17 dB without taking account of the fading allowances and multiple interference entries. In cases of congestion this ratio may be lowered until the congestion is resolved.

(Rev. 1988)

1.2 *Protection ratio for synchronized transmissions*

The co-channel protection ratio between synchronized transmissions in the same network should be:

Distance L between synchronized transmitters (km)	Protection ratio (dB)
$L \leq 700$	0
$700 < L \leq 2\,500$	4
$2\,500 < L$	8

1.3 *Relative radio-frequency protection ratios*

The relative RF protection ratios (α) for carrier frequency separations¹ (Δf), with reference to the co-channel protection ratio, should be:

Δf	α
0 kHz	0 dB
± 5 kHz	-3 dB
± 10 kHz	-35 dB
± 15 kHz	-49 dB
± 20 kHz	-54 dB

¹ Frequency separations, $\Delta f < -20$ kHz, as well as $\Delta f > +20$ kHz, need not be considered.

2. *Minimum usable field strength*

The minimum usable field strength should be determined by adding 34 dB to the greater of:

- the field strength due to atmospheric radio noise as contained in CCIR Report 322-2;
- 3.5 dB($\mu\text{V}/\text{m}$), which is the intrinsic receiver noise level.

3. *Signal fading allowance*

3.1 *Short-term (within the hour) fading*

The upper-decile amplitude deviation from the median of a single signal is to be taken as 5 dB and the lower-decile deviation is to be taken as -8 dB.

3.2 *Long-term (day-to-day) fading*

The magnitude of the long-term fading, as determined by the ratio of the operating frequency to the basic MUF, is given in Table III of CCIR Report 266-6.

For synchronized transmissions, the fading allowance associated with the predominant signal should be used. In cases where the contributing wanted field strengths are equal and Note 1 of Table III of CCIR Report 266-6 applies to at least one of the paths, the values for geomagnetic latitudes $\geq 60^\circ$ should be used.

3.3 *Combined distribution of fading applicable to wanted and unwanted signals*

The fading allowances for 10% and 90% of the time are each to be taken as 10 dB, except where the provisions of the following Note apply. In the latter case, 14 dB is to be used.

Note:

- a)** If any point on that part of the great circle which passes through the transmitter and the receiver, and which lies between control points located 1 000 km from each end of the path reaches a corrected geomagnetic latitude of 60° or more, the values for latitudes $\geq 60^\circ$ must be used.
- b)** These values relate to the path of the wanted signal only.
- c)** For synchronized emissions, the fading allowance associated with the predominant wanted signal is to be used. For those conditions where the constituent wanted field strengths are equal and point *a)* above applies to at least one of the paths, the value of 14 dB is to be used for the decile values.

RECOMMENDATION No. 511 (HFBC-87)

**Possibility of Extending the Frequency Spectrum
Allocated Exclusively to HF Broadcasting at a Future Competent
World Administrative Radio Conference**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* Resolution **508** of the World Administrative Radio Conference (Geneva, 1979) inviting the Administrative Council to convene a conference in two sessions with a view to the planning of the HF bands allocated to the broadcasting service;
- b)* the Report of the First Session to the Second Session of the Conference;
- c)* that, at its 39th Session (1984), the Administrative Council adopted Resolution No. 912 establishing the agenda of the Second Session of this Conference;
- d)* the results of the planning exercises carried out by the IFRB during the intersessional period;
- e)* that this Conference, to achieve more efficient use of the HF bands allocated exclusively to the broadcasting service, has adopted a programme of action relating to the improvement, testing, adoption and practical implementation of the Planning System for these bands, and an associated timetable (see Resolution **511 (HFBC-87)**), as well as a programme of action for the introduction of single-sideband techniques (see Resolution **517 (HFBC-87)**), but has concluded that these measures might be insufficient to meet the current and future needs of HF broadcasting,

REC511-2

recognizing

that a possible extension of the frequency spectrum allocated for HF broadcasting would have an impact on other radio services operating in accordance with the Table of Frequency Allocations contained in Article 8 of the Radio Regulations,

recommends to the Administrative Council

to take the necessary steps to request the Plenipotentiary Conference (Nice, 1989) to consider whether or not to hold a world administrative radio conference, the agenda of which should include the possibility of extending the HF frequency spectrum allocated exclusively to the broadcasting service with the aim of planning that spectrum within the framework of the improved HFBC Planning System,

instructs the Secretary-General

to bring this Recommendation to the attention of all administrations and of the 42nd Session of the Administrative Council, 1987.

RECOMMENDATION No. 512 (HFBC-87)

**Propagation Prediction Method to be Used
in the HF Bands Allocated Exclusively
to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) that the First Session of the Conference (Geneva, 1984) established a propagation prediction method to be used for the planning of the HF bands allocated exclusively to the broadcasting service;
- b) the intersessional work of the CCIR in improving some aspects of the method adopted;
- c) that the IFRB has developed and used software based on the propagation prediction method established by the First Session and the further work by the CCIR, and has used this software for its intersessional work;
- d) that the propagation prediction method and the associated software used by the IFRB constitute the basis for any further improvements;
- e) Recommendation **514 (HFBC-87)** relating to improvements to the propagation prediction method to be used for the HF bands allocated exclusively to the broadcasting service,

recommends

1. that the propagation prediction method and the associated software to be used in application of Recommendation **514 (HFBC-87)** shall be those applied by the IFRB during the intersessional period;

2. that the IFRB prepare detailed documentation on the propagation prediction method, summarized in the annex to this Recommendation, for inclusion in its Technical Standards;
3. that the procedure to be applied by the IFRB in the revision of relevant parts of its Technical Standards, as established in Resolution 514 (HFBC-87), be used for any further improvement to this method.

ANNEX TO RECOMMENDATION No. 512 (HFBC-87)

Summary of the Propagation Prediction Method¹ to be Used for Determining the Sky-Wave Field Strength

1. *Introduction*

The propagation prediction method, implemented by the IFRB and to be used as a basis in the post-conference period, was established by the First Session. It is based on CCIR studies prior to the First Session, and on further CCIR studies of particular aspects of the method.

The method is used for the prediction of field strength for HF broadcasting purposes and is composed of three parts:

- a) for path lengths up to 7 000 km;
- b) for path lengths greater than 9 000 km;
- c) an interpolation procedure for path lengths between 7 000 and 9 000 km.

¹ This summary does not modify in any way the propagation prediction method implemented by the IFRB.

2. *Ionospheric parameters*

Values of the ionospheric parameters f_oF_2 , $M(3000)F_2$ and f_oE are obtained from the numerical maps (the Oslo coefficients) and the procedures set out in CCIR Report 340, at the locations of the control points required by the short- and long-range methods. The basic MUFs¹ for the required distances are obtained from these parameters, again using the procedures of Report 340. Appropriate interpolations are made for the level of sunspot activity.

3. *Distances up to 7 000 km*

The short-range prediction method, based partly on CCIR Report 252-2, is used for path lengths up to 7 000 km. Calculations are also made by this method for path lengths between 7 000 and 9 000 km and the results are used in the interpolation procedure described later.

The method assumes great-circle propagation with reflection from the E-layer (for ranges up to 4 000 km) and from the F2-layer. The path is divided into a number of hops of equal length, each less than 4 000 km, for F2-modes, and 2 000 km, for E-modes. The hops are assumed to have mirror reflections in the ionosphere at their mid-points. The equivalent reflection height is taken as 110 km for E-modes, and is a variable, depending upon the values of the ionospheric parameters, for F2-modes.

For path lengths up to 4 000 km, screening of F2 propagation modes by the lower E-layer is applied when appropriate.

¹ *Basic MUF*: The highest frequency at which a radio wave can propagate between given terminals, on a specified occasion, by ionospheric refraction alone.

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The central feature of the method is the prediction of the median field strength using the formula:

$$E_{fs} = 96.85 + P_t + G_t - 20 \log P' - L_i - L_m - L_g - L_h \quad \text{dB}(\mu\text{V}/\text{m})$$

- P_t is the transmitter output power in dB relative to 1 kW;
- G_t is the isotropic antenna gain corresponding to the azimuth of the great-circle path and the elevation angle computed for the path geometry and the number of hops considered;
- P' is the virtual slant range in km, calculated along the ray paths;
- L_i , L_m , L_g and L_h are loss terms which account for the absorption loss (calculated for each hop and the results added), the “above the MUF” loss, the ground reflection loss and the auroral plus other signal losses, respectively.

The numerical constant term includes, *inter alia*, an allowance for those effects of sky-wave propagation which would not otherwise be included in this simplified method.

Although, for an isotropic antenna, the predicted field strength would be greatest for propagation modes with the minimum number of hops, this is not necessarily the case for antennas used in practice. The calculation is repeated with progressively greater numbers of hops, taking account of the corresponding antenna gain in each case, until a maximum value is reached. To facilitate the calculation for the large number of cases considered by the IFRB, in practice, field strength values have been pre-calculated and stored as tables for six F2-modes and six E-modes for the paths between all transmitter locations and all test points. During the consideration of each case, reference is made to the appropriate entries in these tables and the antenna gains are applied.

The method selects the two strongest F2-modes (i.e., the modes with the highest field strengths) and, where appropriate, the strongest E-mode, the corresponding field-strength values being combined by r.s.s. addition.

4. Distances greater than 9 000 km

For distances greater than 9 000 km, the method is no longer based on geometric ray hops but on hypothetical ray paths with a number of equal hops each less than 4 000 km. This method is also used to calculate field strengths for path lengths between 7 000 and 9 000 km and the results are used in the interpolation procedure described later.

In the method, it is assumed that the field strength in the “transmission frequency range”, i.e., between the lower limit frequency f_L and the upper frequency limit f_M , is determined by non-deviative absorption (near f_L) and deviative absorption (near f_M). The empirical fit to observations determines the shape of the curve between f_L and f_M as a function of the solar zenith angle, the path geometry, etc. The overall median field strength is given by

$$E_{\text{fl}} = E_0 \left[1 - \frac{(f_M + f_H)^2}{(f_M + f_H)^2 + (f_L + f_H)^2} \right] + P_i + G_{\text{fl}} + G_{\text{ap}} - 32.5 \text{ dB}(\mu\text{V}/\text{m})$$

$$\left(\frac{(f_L + f_H)^2}{(f + f_H)^2} + \frac{(f + f_H)^2}{(f_M + f_H)^2} \right)$$

- $E_0 = 139.6 - 20 \log P'$ is the free space field strength where P' is the slant range assuming that the height of the ionosphere is 300 km.
- f is the frequency at which the prediction is made;
- f_M is the upper limit frequency; it is determined separately for the first and last hop of the path and the lower value is taken;
 $f_M = K \cdot f_b$, where f_b is the basic MUF and K is a correction factor taking into account the diurnal variation and the absolute value of f_b ;

- f_L is the lower limit frequency and is mainly dependent on the solar zenith angle;
- f_H is the gyro-frequency;
- P_t is the transmitter output power in dB relative to 1 kW;
- G_{it} is the isotropic antenna gain, taken as the highest value in the range of vertical radiation angles from 0° to 8° at the corresponding azimuth;
- G_{ap} is the antipodal focusing gain, taking into account the increase in field strength at distances greater than 10 000 km.

The numerical constant term includes, *inter alia*, an allowance for those effects of sky-wave propagation which are not otherwise included in the method.

5. Distances between 7 000 and 9 000 km

In this distance range, the field strengths E_{is} and E_{it} are determined by both of the above procedures and the resultant median field strength is obtained by linear interpolation, in dB, as follows:

$$E_{it} = E_{is} + \frac{D - 7\,000}{2\,000} (E_{it} - E_{is}) \quad \text{dB}(\mu\text{V}/\text{m})$$

where D is the path length in kilometres.

Note: The constant terms in the equations for E_{is} and E_{it} include the values of -7.3 dB and $+3.9$ dB for the short- and long-range parts of the method, respectively, which were determined in CCIR Recommendation 621 following intersessional studies.

RECOMMENDATION No. 513 (HFBC-87)

Broadcasting for National Coverage in the HF Bands

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* the Report to the Second Session of this Conference;
- b)* that the First Session of the present Conference (Geneva, 1984) decided that all the broadcasting requirements, national and international, shall be treated on an equal basis, with due consideration of the differences between these two kinds of broadcasting requirements;
- c)* that the HFBC Planning System should take account in particular, of the way in which administrations' requirements for longer transmission periods, mainly for national broadcasting purposes, can best be accommodated;
- d)* that continuity for national broadcasting requirements must be guaranteed by appropriate means;
- e)* that the two types of broadcasting, national and international, in the HF bands, differ as to their technical and operating conditions;
- f)* that the needs of national broadcasting in countries in the Tropical Zone are covered partially in the bands allocated to the broadcasting service for use in the Tropical Zone and partially in the HF bands allocated exclusively to the broadcasting service;
- g)* that the Second Session of the present Conference did not consider the question in detail,

noting

that an HF broadcasting use is considered as being for purposes of national coverage when the transmitting station and its associated required service area are both located within the territory of the same country,

recommends

that the Administrative Council should take the necessary steps to ensure that the agenda of the next world administrative radio conference competent to deal with HF broadcasting includes the consideration of national broadcasting, under the conditions set out in the preamble of this Recommendation.

RECOMMENDATION No. 514 (HFBC-87)

**Improvements to the Propagation Prediction Method
to be Used for the HF Bands Allocated Exclusively
to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that the First Session of this Conference (Geneva, 1984) adopted a method for the prediction of HF field strength which was based upon studies by the CCIR;
- b)* that during the intersessional period the CCIR undertook further studies in accordance with the request of the First Session of the Conference;
- c)* that recent additional studies by administrations have indicated that further improvements in the method are required;
- d)* that the possibility of further improvement will depend, in part, on the collection and analysis of additional data of field strength measurements,

invites the CCIR

to undertake studies of the HF propagation prediction method adopted by the Conference and to recommend both improvements in the method and later, if necessary, an improved method to be used in the future for the HF bands allocated exclusively to the broadcasting service,

REC514-2

recommends administrations

1. to conduct HF field strength measurement programmes;
2. to contribute data, in a form suitable for study, to the CCIR.

RECOMMENDATION No. 515 (HFBC-87)

**Introduction of Transmitters and
Receivers Capable of Both Double-Sideband (DSB)
and Single-Sideband (SSB) Modes of Operation**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* Resolution **517 (HFBC-87)** relating to the introduction of SSB¹ techniques;
- b)* that the First Session of the present Conference (Geneva, 1984), in its Report to the Second Session, dealt with the progressive introduction of SSB emissions;
- c)* that incentives clearly need to be provided to industry to manufacture receivers with synchronous demodulation, and appropriate transmitters;
- d)* Appendix **45** to the Radio Regulations relating to the SSB system specification for the HF bands allocated to the broadcasting service,

considering further

- e)* that the introduction of SSB techniques can be accelerated by the appropriate transmitting equipment being more widely available in good time;
- f)* that lead-time is necessary for manufacturers to produce equipment capable of working either in both modes, SSB¹ and DSB, or in the SSB¹ mode alone,

¹ With the possibility of both a 6 dB and a 12 dB carrier reduction relative to peak envelope power.

recommends to administrations

that new transmitters which are installed after 31 December 1990 should, as far as possible, be capable of working either in both modes, SSB¹ and DSB, or in the SSB¹ mode alone,

invites the CCIR

to complete its studies into receivers for SSB,

invites administrations

to bring to the notice of the receiver manufacturers the most recent results of relevant CCIR studies as well as the information referred to in *considering d)* and to encourage them to start to produce, by 31 December 1990, low-cost receivers having synchronous demodulators capable of receiving both DSB and SSB¹ broadcasting emissions,

instructs the Secretary-General

to transmit this Recommendation to the International Electrotechnical Commission (IEC).

¹ With the possibility of both a 6 dB and a 12 dB carrier reduction relative to peak envelope power.

RECOMMENDATION No. 516 (HFBC-87)

**Use of Synchronized Transmitters in the HF Bands
Allocated Exclusively to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that the use of synchronized transmitters, where technically appropriate, is an efficient means of economizing frequency spectrum;
- b)* Recommendation **503** of the World Administrative Radio Conference (Geneva, 1979), relating to HF broadcasting;
- c)* that, where the path location is unfavourable, a Doppler frequency difference greater than 0.1 Hz may occur at certain hours of the day;
- d)* CCIR Recommendation 205-2 relating to synchronized transmitters in HF broadcasting,

recognizing

that further studies are needed on the use of synchronized transmitters for broadcasting in the HF bands,

REC516-2

invites the CCIR

to accelerate the studies defined in its Study Programme 44L/10
with a view to making comprehensive Recommendations on this subject,

recommends administrations

to participate actively in these studies.

RECOMMENDATION No. 517 (HFBC-87)

**Relative RF Protection Ratio Values for Single-Sideband (SSB)
Emissions in the HF Bands Allocated Exclusively
to the Broadcasting Service**

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a) that the Conference has adopted a method for the planning of the HF bands allocated exclusively to the broadcasting service;
- b) that this method is based on the use of double-sideband (DSB) emissions;
- c) that the RF co-channel protection ratio is one of the fundamental planning parameters;
- d) that the Conference has adopted Resolution **517 (HFBC-87)** relating to the transition from DSB to SSB emissions in the HF bands allocated exclusively to the broadcasting service and Recommendation **515 (HFBC-87)** relating to the introduction of transmitters and receivers capable of both DSB and SSB modes of operation;
- e) that the SSB system characteristics for HF broadcasting are contained in Appendix **45** to the Radio Regulations;
- f) that, however, due to their provisional nature, the values of the relative RF protection ratio to be applied for all relevant combinations of wanted and unwanted DSB and SSB emissions have not been included in the Appendix mentioned in e) above;
- g) that preliminary studies have shown that SSB emissions may require a lower RF co-channel protection ratio for the same reception quality;

h) Resolution **514 (HFBC-87)** relating to the procedure to be applied by the IFRB in the revision of relevant parts of its Technical Standards used for HF broadcasting,

recommends

that, subject to the procedure to be applied by the IFRB in the revision of relevant parts of its Technical Standards used for HF broadcasting given in Resolution **514 (HFBC-87)**, the values of relative RF protection ratio given in the Annex to this Recommendation be used by the IFRB in its Technical Standards relating to SSB emissions in the HF bands allocated exclusively to the broadcasting service,

invites the CCIR

to continue to study the values of relative RF protection ratio for the different cases and frequency separations covered in the Annex to this Recommendation,

and recommends administrations

to participate actively in these studies.

ANNEX TO RECOMMENDATION No. 517 (HFBC-87)

Relative RF Protection Ratio Values

1. The values of relative RF protection ratio given in the table should be used whenever SSB emissions in conformity with the specification in Appendix 45 to the Radio Regulations are involved in the use of the HF bands allocated exclusively to the broadcasting service.

2. The values given refer to the case of co-channel DSB wanted and unwanted signals for the same reception quality.
3. For the reception of DSB and SSB (6 dB carrier reduction relative to peak envelope power) wanted signals, a conventional DSB receiver with envelope detection designed for a channel spacing of 10 kHz is assumed.
4. For the reception of an SSB wanted signal (12 dB carrier reduction relative to peak envelope power), the reference receiver as specified in Appendix 45, part B, section 3, to the Radio Regulations is assumed.
5. SSB signals with 6 dB carrier reduction relative to peak envelope power assume equivalent sideband power as specified in Appendix 45, part B, paragraph 1.2, to the Radio Regulations.
6. The figures for case 2 in the following table relate to a situation where the centre frequency of the intermediate frequency pass-band of the DSB receiver is tuned to the carrier frequency of the wanted SSB signal. If this is not the case, the value for a difference of +5 kHz may increase to -1 dB.

Relative RF protection ratio values with reference to the co-channel RF protection ratio for DSB wanted and unwanted signals (dB)¹ for use in the HF bands allocated exclusively to the broadcasting service

	Wanted signal	Unwanted signal	Carrier frequency separation $f_{\text{unwanted}} - f_{\text{wanted}}, \Delta f(\text{kHz})$								
			-20	-15	-10	-5	0	+5	+10	+15	+20
1	DSB	SSB (6 dB carrier reduction relative to p.e.p.)	-51	-46	-32	+1	3	-2	-32	-46	-51
2	SSB (6 dB carrier reduction relative to p.e.p.)	DSB	-54	-49	-35	-3	0	-3	-35	-49	-54
3	SSB (6 dB carrier reduction relative to p.e.p.)	SSB (6 dB carrier reduction relative to p.e.p.)	-51	-46	-32	+1	0	-2	-32	-46	-51
4	SSB (12 dB carrier reduction relative to p.e.p.)	SSB (12 dB carrier reduction relative to p.e.p.)	-57	-57	-57	-45	0	-20	-47	-52	-57

¹ Frequency separations Δf less than -20 kHz, as well as Δf greater than 20 kHz, need not be considered.

RECOMMENDATION No. 518 (HFBC-87)

HF Broadcast Receivers

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987),

considering

- a)* that a large number of receivers fail to tune over all the HF bands allocated exclusively to the broadcasting service or have imprecise analogue displays for broadcasting frequencies (a subject of complaint by numerous HF broadcasters);
- b)* that to reduce congestion in certain bands and to improve spectrum utilization, the appropriate HF bands, including the highest bands (21 and 26 MHz), should be used;
- c)* that a precise frequency display facilitates the tuning of receivers and so encourages the public to listen to HF broadcasts,

recommends administrations

to draw the attention of manufacturers to this matter, to ensure that future low-cost broadcast receivers are equipped to cover all HF broadcasting bands and, if possible, to provide digital frequency display,

instructs the Secretary-General

to communicate this Recommendation to the International Electrotechnical Commission (IEC).