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INTERNATIONAL TELECOMMUNICATION UNION

# 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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## **NOTE**

The following symbols have been used to indicate the nature of the revision in each case:

- ADD** = addition of a new provision
- MOD** = modification of an existing provision
- (MOD)** = editorial modification of an existing provision
- NOC** = provision unchanged
- SUP** = deletion of an existing provision

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**for the Planning of the HF Bands**  
**Allocated to the Broadcasting Service**  
Geneva, 1987

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

**Preamble**

The World Administrative Radio Conference (Geneva, 1979), considering in its Resolution 508, *inter alia*, that the existing situation in the HF bands allocated exclusively to the broadcasting service is not satisfactory, resolved that the use of the HF bands allocated to the broadcasting service should be subject to planning by a world administrative radio conference to be held in two sessions.

The Plenipotentiary Conference (Nairobi, 1982), in its Resolution 1, decided that this Conference should be held in two sessions and made the necessary arrangements.

The Administrative Council, at the opening meeting of its 38th session, considered Resolution 508 of the WARC-79 and took the necessary steps to convene the First Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, by adopting Resolution 874.

The First Session, which took place in Geneva from 10 January to 11 February 1984, established, in its Report to the Second Session, the technical parameters to be used for planning as well as the principles governing the use of the HF bands allocated exclusively to the broadcasting service. Having adopted an associated method of planning, the First Session requested the IFRB to develop computer programs and test procedures for the preparation of application of the planning method. It also requested the CCIR to continue and complete the complementary studies on certain technical elements.

At its 39th session the Administrative Council established the agenda for the Second Session by its Resolution 912; at its 41st session, considering the results of foregoing consultations, it amended that Resolution and resolved that the Second Session be convened in Geneva for five weeks commencing on Monday, 2 February 1987.

Consequently, the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service was held at Geneva from 2 February to 8 March 1987 and adopted *a partial revision of the Radio Regulations*, which comprises the following elements:

- |                    |  |
|--------------------|--|
| <b>MOD Art. 8</b>  | Frequency Allocations;   |
| <b>MOD Art. 12</b> | Notification and Recording in the Master International Frequency Register of Frequency Assignments to Terrestrial Radiocommunication Stations; |
| <b>MOD Art. 17</b> | Planning and Procedures for the Bands Allocated Exclusively to the Broadcasting Service Between 5 950 kHz and 26 100 kHz;                      |
| <b>MOD Art. 30</b> | Broadcasting Service and Broadcasting Satellite Service;   |
| <b>MOD App. 2</b>  | Submission of Information to the IFRB for High Frequency Broadcasting Requirements;  |
| <b>MOD App. 7</b>  | Table of Transmitter Frequency Tolerances;   |
| <b>ADD App. 45</b> | Technical Parameters Relating to the Use of the HF Bands Exclusively Allocated to the Broadcasting Service.                                    |

The partial revision of the Radio Regulations, as outlined above, shall form an integral part of the latter and shall enter into force on **1 September 1988 at 0001 hours UTC**, unless a different date of entry into force is stipulated therein with regard to any element or to a part of any element referred to in the preceding paragraph.

The Conference also adopted Resolutions and Recommendations relating to the short- and medium-term programmes of action to be followed to improve the use of the HF bands allocated exclusively to the broadcasting service.

The delegates signing this partial revision of the Radio Regulations hereby declare that, should an administration make reservations concerning the application of one or more of the revised provisions of the Radio Regulations, no other administration shall be obliged to observe that provision or those provisions in its relations with that particular administration.

Members of the Union shall inform the Secretary-General of their approval of the partial revision of the Radio Regulations by the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987). The Secretary-General shall inform Members promptly of the receipt of such notifications of approval.

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IN WITNESS WHEREOF, the delegates of the Members of the International Telecommunication Union mentioned below have, on behalf of their respective competent authorities, signed one copy of the present Final Acts in the Arabic, Chinese, English, French, Russian and Spanish languages. In case of dispute, the French text shall prevail. This copy shall remain deposited in the archives of the Union. The Secretary-General shall forward one certified true copy to each Member of the International Telecommunication Union.

Done at Geneva, 8 March 1987

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## ANNEX

### **Partial Revision of the Radio Regulations and of the Appendices of these Regulations**

#### ARTICLE 8

MOD 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 broad-  
casting service shall be subject to provisions to be established by the World  
Administrative Radio Conference for the Planning of HF Bands Allocated to  
the Broadcasting Service (see Resolution 508). The provisions of Resolu-  
tion 512 (HFBC-87) also apply. Within these bands, the date of commence-  
ment 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.

#### ARTICLE 12

MOD 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.

## ARTICLE 17

MOD HFBC-87 **Planning and Procedures for the Bands  
Allocated Exclusively to the Broadcasting Service  
Between 5 950 kHz and 26 100 kHz**

*The 3 following sections (Sections I, II and III) have been added.*

ADD HFBC-87 **Section I. Introduction**

ADD 1736 § 0. When applying the procedure in Section IV of this  
HFBC-87 Article, all administrations are urged to comply with the principles  
laid down in Section II of this Article to the maximum extent  
possible.

ADD HFBC-87 **Section II. Planning Principles**

ADD 1737 § 0A.(1) The planning of the high frequency bands allocated to  
HFBC-87 the broadcasting service shall be based on the principle of equal  
rights of all countries, large or small, to equitable access to these  
bands. In planning, an attempt shall also be made to achieve  
efficient use of these frequency bands, account being taken of the  
technical and economic constraints that may exist in certain cases.  
On the basis of the foregoing, the following planning principles  
shall be applied.

ADD 1738 (2) All the broadcasting requirements, current or future,  
HFBC-87 formulated by the administrations, shall be taken into account and  
be treated on an equitable basis, so as to guarantee the equality of  
rights referred to in No. 1737, and to enable each administration to  
provide a satisfactory service.



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

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**ADD 1739.1** <sup>1</sup> 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**

ADD 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.

ADD 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.

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

ADD 1747 § 0B. 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.

*The present Section I becomes Section IV with the following new title:*

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

NOC 1748

MOD 1749 § 2. The closing dates for the receipt of schedules are set by  
HFBC-87 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.

NOC 1750 to 1752

MOD 1753 § 6. The frequencies included in the schedules shall be in HFBC-87 conformity with No. 1240 of these Regulations.

*The present Section II becomes Section V.*

**Section V. Preliminary Examination and Preparation of the  
Tentative High Frequency Broadcasting Schedule**

NOC 1754 to 1760

*The present Section III becomes Section VI.*

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

NOC 1761 to 1765

*The present Section IV becomes Section VII.*

**Section VII. Publication of the High Frequency Broadcasting Schedule**

NOC 1766 and 1767

(MOD) 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.

*The present Section V is deleted.*

SUP      HFBC-87    Section V.    Annual High Frequency Broadcasting Frequency List  
SUP      1769  
            HFBC-87

*The present Section VI becomes Section VIII.*

**Section VIII. Miscellaneous Provisions**

NOC      1770 to 1772

**ARTICLE 30**

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

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

MOD

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 form \***

**1. *Notifying administration*<sup>1</sup>**

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*<sup>1</sup>**

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

**4. *Geographical coordinates of the transmitting station*<sup>1</sup>**

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

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<sup>1</sup> 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*<sup>1</sup>

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

- CIRAF Zones,<sup>2</sup>
- 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*<sup>1</sup>

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.

---

<sup>1</sup> Basic information that must be provided by administrations.

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

7. *Hours of operation (UTC)*<sup>1</sup>

7.1 *Indicate legal clock time changes*<sup>2</sup>

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

9. *Transmitting antenna characteristics*<sup>1</sup>

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.

---

<sup>1</sup> Basic information that must be provided by administrations.

<sup>2</sup> 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)*<sup>1</sup>

- 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.

---

<sup>1</sup> Basic information that must be provided by administrations.

11. *Class of emission*<sup>1</sup>

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).<sup>2</sup>

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);<sup>3</sup>
- alternative frequencies (in kHz);<sup>3</sup>
- 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)**.

---

<sup>1</sup> Basic information that must be provided by administrations.

<sup>2</sup> For information only.

<sup>3</sup> 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)<sup>1</sup>*
- 14. *Preferred frequency (in kHz)<sup>1</sup>*
- 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 (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)**)*

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<sup>1</sup> 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.

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)<sup>1</sup>*
23. *Postal and telegraphic addresses of the administration responsible for the station*
24. *Remarks and supplementary information*

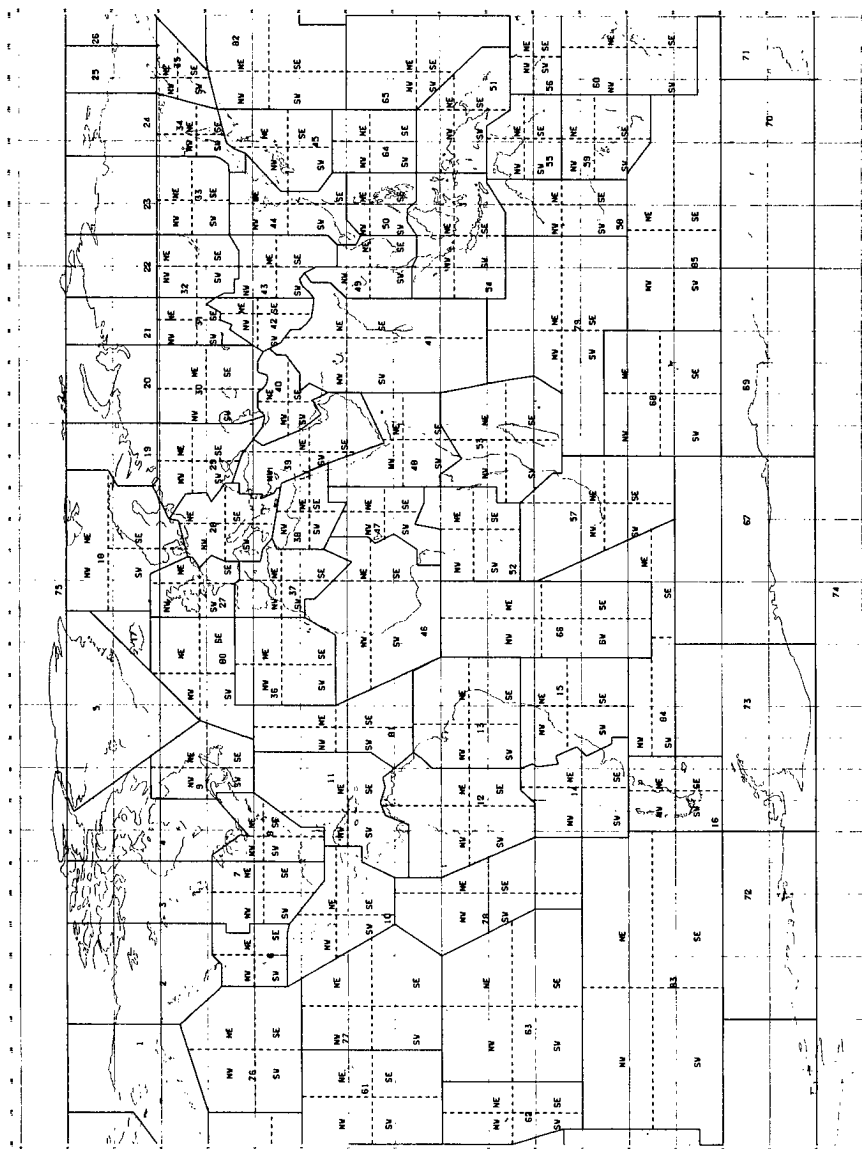
Indicate, after the symbol COORD/, the name of any administration with which coordination has been effected for use of the frequency.

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

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

# SECTION C. Map of CIRAF Zones



ZONAS GEODÉRICAS PARA RADIODIFUSIÓN  
POR ALTAS FRECUENCIAS (ZONAS CIRAF)

GEOGRAPHICAL ZONES FOR HIGH FREQUENCY  
BROADCASTING (CIRAF ZONES)

ZONES GÉOGRAPHIQUES POUR LA RADIODIFFUSION  
À HAUTES FRÉQUENCES (ZONES CIRAF)

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

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## APPENDIX 7

### Notes in the Table of Transmitter Frequency Tolerances

MOD HFBC-87 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.

MOD HFBC-87 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. \*

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ADD HFBC-87 \* *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.

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APPENDIX 45

**HFBC-87**

**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.

### 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. *Planning 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

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.<sup>1</sup>

### 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.

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<sup>1</sup> See Note 21) of Appendix 7.

## 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( $\mu$ /m).

### 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

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## FINAL PROTOCOL\*

At the time of signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the undersigned delegates take note of the following statements made by signatory delegations.

### No. 1

*Original: English*

*For the Republic of Maldives:*

The Delegation of the Republic of Maldives to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), reserves for its Government the right to take such measures as it may consider necessary to safeguard its interests to meet the needs of its broadcasting service.

### No. 2

*Original: English*

*For the Democratic Republic of Afghanistan, the People's Democratic Republic of Algeria, the Kingdom of Saudi Arabia, the United Arab Emirates, the Islamic Republic of Iran, the Republic of Iraq, the Hashemite Kingdom of Jordan, the State of Kuwait, the Socialist People's Libyan Arab Jamahiriya, the Kingdom of Morocco, the Islamic Republic of Mauritania, the Sultanate of Oman, the Islamic Republic of Pakistan, the State of Qatar, the Syrian Arab Republic, the Somali Democratic Republic, Tunisia, the Yemen Arab Republic, the People's Democratic Republic of Yemen:*

The Delegations of the above-mentioned countries to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) declare that the signature and possible approval by their respective Governments or competent authorities of the Final Acts of this Conference are not valid with respect to the Zionist Entity appearing in Annex I of the Convention under the name of the so-called Israel and in no way whatsoever imply its recognition.

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\* *Note by the General Secretariat:* The texts of the Final Protocol are shown in the chronological order of their deposit. In the Table of Contents these texts are grouped in the alphabetical order of country names.

## No. 3

*Original: English**For the Kingdom of Saudi Arabia:*

The Delegation of the Kingdom of Saudi Arabia to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), reserves the right of his Administration to take any action it deems necessary to safeguard its interest in the subjects covered by this Conference, if any administration takes any action whatsoever, in violation of the Final Acts of this Conference, which may have any effect on the broadcasting service of the Kingdom of Saudi Arabia.

## No. 4

*Original: English**For the Republic of Liberia:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service held in Geneva from 2 February to 8 March 1987, the Delegation of the Republic of Liberia reserves for its Government the right to take any action it may deem necessary to safeguard its interests and rights should any Member Administration or State fail in any way to comply with the provisions and annexes contained in the Final Acts as adopted by this Conference.

Should the imposition of the transfer of requirements, or any other restriction in the realization of the broadcasting requirements, national or international, infringe on the sovereign rights of the Republic of Liberia, our Delegation reserves the right to take or adopt any action in pursuit of guarding its sovereignty.

## No. 5

*Original: English**For the Islamic Republic of Pakistan:*

Considering:

a) that the implementation of the planned usage of the HF broadcasting spectrum has been delayed further;

b) that the present, as well as the modified, Article 17 of the Radio Regulations does not ensure an equitable distribution of the HF broadcasting spectrum to all countries;

c) that the 6 and 7 MHz broadcasting bands are highly congested, in particular,

the Delegation of Pakistan reserves its right to take whatever action it considers necessary to protect the HF broadcasting interests of Pakistan. This reservation will be effective till the time an HF broadcasting plan is implemented.



No. 6

*Original: Spanish*

*For the Republic of Honduras:*

The Delegation of the Republic of Honduras to the Second Meeting of the WARC for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) wishes to make the following statement:

1. all countries should exercise their sovereign rights as regards access to the use of the bands allocated to HFBC;
2. the application of the improved Article 17 procedure together with the improved HFBC Planning System will guarantee that the radio spectrum allocated to these bands will be used efficiently and equitably;
3. the overall document submitted to this meeting of the Conference constitutes an adequate and acceptable solution to the problem;
4. it is a matter of considerable concern that a competent WARC could revise the allocation of bands and that the bands allocated to HFBC could as a result be extended to the detriment of the fixed and mobile services, in view of the fact these services operating in the HF bands are an invaluable means of progress for the developing countries;
5. the Honduran Delegation reserves its Government's right to take any action it considers necessary and proper to protect its national interests.

No. 7

*Original: French*

*For Tunisia:*

The Delegation of the Republic of Tunisia to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), deeply concerned at the approach imposed upon the work of the Conference, whereby preference is given to the application of improved Article 17 at the expense of the HFBC Planning System, and disappointed at the results obtained, declares that in signing the Final Acts it reserves for its Government the right to take all appropriate action to ensure the proper operation of its broadcasting services and to satisfy its HF requirements.

No. 8

*Original: English*

*For Antigua and Barbuda:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the Delegation of Antigua and Barbuda reserves the right of its Government to take whatever action may be necessary to ensure the proper functioning of its telecommunication services should any country fail to comply with the provisions adopted by the Conference.

No. 9

*Original: English**For the State of Israel:*

### 1. On the subject of harmful interference

According to the results of the monitoring programmes conducted by the IFRB, about 1,375 stations causing harmful interference have been clearly identified and located and the most probable geographical position of numerous other stations has been confirmed (see paragraph 2.8 of the IFRB Report in Document 9 of the Second Session of this Conference).

The IFRB Report clearly demonstrates the destructive nature and effect of this intentional harmful interference on the reception of short-wave broadcasts of virtually all administrations.

This type of deliberate interference is a flagrant breach of the letter and spirit, of both the Convention and the Radio Regulations, (e.g. Article 4 of the Convention — concerning the purposes of the Union; Article 35 of the Convention — concerning harmful interference; Article 18 of the Radio Regulations — concerning harmful interference) — apart from the contravention of other common international principles which are the concern of other international bodies.

The IFRB formally declared in Plenary that if only one administration used frequencies other than those allocated by the Planning System, the System would collapse — not to speak of massive deliberate interference.

Unfortunately, this unbiased professional advice from the ITU, as well as other publicly voiced warnings from short-wave broadcasting experts, have been practically, totally ignored and remain but voices crying in the wilderness.

In these circumstances, Israel reserves its right, and duty, to take any action necessary to adequately maintain and protect its short-wave broadcasting services. In so doing, however, Israel will endeavour — as in the past — to respect, as far as practicable, the rights of administrations which operate in conformity with the Convention and the Radio Regulations.

### 2. General

The Delegation of Israel declares that its signature to this Agreement and its eventual approval by its Administration shall be valid and binding only in relation to those administrations which apply the provision of the Convention and the Radio Regulations in their relations with the State of Israel.

No. 10

*Original: French**For the People's Republic of Bulgaria:*

The Delegation of the People's Republic of Bulgaria to the Second Session of the WARC for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, February-March 1987) reserves for its Government the right to take all appropriate action which it might regard as essential, in the event of violation of the principles embodied in the Final Acts.

No. 11

*Original: Spanish*

*For the Republic of Paraguay:*

The Delegation of the Republic of Paraguay to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) reserves for its Government the right to take any measures it may deem necessary to safeguard its interests should the contents of the Final Acts of the Conference, or parts thereof, or declarations by other administrations jeopardize its radio services.

No. 12

*Original: English*

*For Papua New Guinea:*

The Delegation of Papua New Guinea reserves for its Government, the right to take such action as it may consider necessary to safeguard its interests should Members in any way fail to comply with these Final Acts or fail to comply with the requirements of the International Telecommunication Convention (Nairobi, 1982) or its Annexes or the Protocols attached thereto or should reservations by other Members jeopardize the telecommunication services of Papua New Guinea.

No. 13

*Original: French*

*For the Republic of Cameroon:*

The Delegation of Cameroon declares on behalf of its Government as follows:

1. equitable access to scarce natural resources common to all mankind, and especially the radio spectrum in the HF bands reserved for national and international broadcasting, is a present need;

2. in this respect, the process initiated by this Conference aimed at rationalizing the use of HF wavebands, and in particular those reserved for broadcasting, appear, in our opinion, altogether positive and hopeful;

3. following the principle of dialogue and humanism which underlies its policy of international cooperation, the Republic of Cameroon will spare no efforts to comply with the commitments undertaken at the time of the signature of these Final Acts; it reserves the right, nevertheless, to take whatever measures may be appropriate, should the operation of its short-wave broadcasting network be disturbed as a result of the failure by any other countries to comply with the decisions of the Conference.

## No. 14

*Original: Spanish**For the Republic of Colombia:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (WARC-HFBC, Geneva, 1987), the Delegation of Colombia declares that Colombia does not consider itself bound by the acts, agreements, resolutions or provisions of this Conference insofar as they jeopardize the operation of its broadcasting stations within its territory in the HF bands and other telecommunication services, while it reserves the right of its Government to adopt such measures as it considers appropriate to safeguard the country's interests in these matters or in the event that the application or interpretation of any of the provisions of the Conference make it necessary to do so.

The Delegation of Colombia also reserves the right of its Government to adopt such measures as it considers necessary in accordance with its internal legal system and international law to safeguard its national interests in the event that reservations entered by representatives of other countries may affect its telecommunication services or encroach upon its full sovereign rights.

## No. 15

*Original: English**For the Kingdom of Swaziland:*

In view of the deliberations and the outcome of the HFBC Conference (Geneva, 1987), the Administration of the Kingdom of Swaziland notes with deep concern that the Conference has not lived to its expectations particularly with regard to the non-treatment of national and international requirements.

Furthermore, this Administration regrets with dissatisfaction on the results of the HFBC Planning System which failed to accommodate an appreciable number of frequency assignments; and worse still even those which were captured were deprived of frequency continuity.

The Administration of the Kingdom of Swaziland therefore, reserves its sovereign rights to take the decisions it deems necessary in order to protect and maintain continuity of its broadcast services and its interests in the subjects covered by the Second Session of this Conference should any Administration party to the Conference take any action that might have any effect on its broadcasting services.

No. 16

*Original: English*

*For the United Republic of Tanzania:*

In view of the outcome of the Second Session of the HFBC Conference (Geneva, 1987), the United Republic of Tanzania declares:

1. that this Administration is very much dismayed by the failure of this Conference to discuss in detail and take into consideration differences between national and international broadcasting requirements as was stipulated in Chapter 4, paragraph 4.1.2.2 of the Report of the First Session to the Second Session; noting also that it is now 40 years since this issue was raised for the first time (Atlantic City 1947 Conference);

2. that the results of the HFBC Planning System have turned out to be a great disappointment to almost all the administrations;

3. nevertheless, this Administration reserves its sovereign rights to take action it will deem necessary in order to protect its broadcasting requirements against a country which will infringe with its broadcast requirements.

No. 17

*Original: English*

*For the Republic of Indonesia:*

The Delegation of the Republic of Indonesia to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), reserves the right of its Government to take:

1. any action it may deem necessary to safeguard its interests, should Members in any way fail to comply with the requirements in the Final Acts of the Conference or should reservations by other Members tend to jeopardize its HF broadcasting service;

2. further action in accordance with the Constitution and Laws of the Republic of Indonesia.

No. 18

*Original: English*

*For the Hungarian People's Republic:*

The Delegation of the Hungarian People's Republic to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) reserves for its Government the right to take any action it may consider necessary to safeguard its interest should any Member of the Union fail to comply with the provisions of this Conference, or should reservations by other countries jeopardize its HF broadcasting service.

## No. 19

*Original: English**For the Socialist Federal Republic of Yugoslavia:*

In signing the Final Acts, the Delegation of the Socialist Federal Republic of Yugoslavia to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service declares the following:

The Yugoslav Delegation wishes to express its concern and regrets that better results in response to Resolution No. 508 of the WARC-79 and in the organized approach to the orderly use of the HF spectrum could not be reached. At the same time, this Delegation expresses its belief that this will be compensated for in the years ahead.

The Yugoslav Delegation therefore reserves the right of its Administration to take any action it deems necessary to safeguard the interest of its HF broadcasting service. In so doing, the Yugoslav Administration will take account of the interest of other countries to the greatest extent possible.

## No. 20

*Original: English**For the Socialist People's Libyan Arab Jamahiriya:*

The Socialist People's Libyan Arab Jamahiriya considers radio-frequency bands as a natural resource, each country is therefore allowed to have its rightful natural share of them. The principle of Equal Rights of large and small countries alike can only be achieved by guaranteeing a minimum of requirements to each country at a desired level, taking into account their national requirements in the framework of the ideal organized use of an HFBC plan for all bands.

We believe that the Conference has not been able to achieve these objectives because the road to them was purposefully blocked by a small number of administrations which have a large number of HF radio transmitters, and which wanted to delay or even abort any possible success.

While we consider this Conference to be of a technical nature, it was very clear that those administrations were moved by other motives in order to achieve political and cultural objectives, so that the present anarchy that reigns over the HFBC bands lasts as long as possible.

Given the fact that the Socialist People's Libyan Arab Jamahiriya believes in the principle of Equal Rights between countries, our Administration will reserve the right to continue working for the achievement of that goal on future occasions, namely at the future WARC-1992. We would also like to stress that it is the duty of the IFRB to improve the two systems (HFBC Planning System and the coordination procedures) and to find positive solutions for all countries by WARC-1992.

No. 21

*Original: English*

*For the Republic of Iraq:*

The Delegation of the Republic of Iraq in signing the Final Acts of the Conference declares that:

1. consideration by the Board in the post-conference period of requirements from administrations in accordance with Resolution No. 515 should adhere to the principle of equality of treatment of all requirements on equal footing and to the definition appearing in footnote (1) to the planning principle, Article 17, No. 1744; and hence improvements to the HFBC System should not in any way introduce any preferential treatment of requirements, with respect to their nature, at any stage of its forthcoming development;

2. the principle of satisfying a guaranteed equal minimum of requirements to all administrations was not properly responded to in the Final Acts in spite of the fact that this principle is widely accepted, and regret that a decision on this regard was not appropriately taken;

3. it reserves the right of its Government to take appropriate action it deems necessary to safeguard its national interests with regard to the use of the HF broadcasting bands in case of any interpretation contrary to the above, and of the use of these bands in a manner contrary to the Radio Regulations and the Final Acts.

No. 22

*Original: French*

*For the Republic of Côte d'Ivoire:*

The Delegation of Côte d'Ivoire to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) (HFBC(2)) agrees in a spirit of compromise to sign the Final Acts of this Conference.

It reserves its Government's right to take any measures required to safeguard its interests in the field of HF broadcasting should any administration represented at this Conference fail to apply the decisions which have been adopted as a compromise.

No. 23

*(Number not used.)*

No. 24

*Original: Spanish**For the Republic of Venezuela:*

Upon signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, the Delegation of the Republic of Venezuela reserves the right for its Government to ratify or not to ratify the contents of these Final Acts, or any part thereof, as well as the right to adopt whatever measures it may consider appropriate to safeguard its interests in the event that any present or future Member fails to comply with the provisions of the said Acts or undertakes any action in breach of Venezuela's sovereignty or its internal legislation.

The Venezuelan Delegation also reserves the right for its Government not to be bound as a result of any act or reservations of other administrations giving rise to an increase in Venezuela's contribution towards defraying the expenses of the International Telecommunication Union.

No. 25

*Original: French**For the Socialist Republic of Viet Nam:*

The Delegation of the Socialist Republic of Viet Nam to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, held at Geneva in 1987 (WARC HFBC-87), taking note of the principles and methods of the planning of HF bands allocated to the broadcasting service, declares as follows:

1. in the application of SSB frequencies to the broadcasting service, the Vietnamese Delegation would like the ITU and its Member States to further strengthen their cooperation with and technical assistance to developing countries, particularly those whose broadcasting infrastructure is not yet developed;

2. on the basis of the principles of equality, sovereignty and territorial integrity, and with a view to meeting broadcasting requirements as fully as possible and using frequencies without jeopardizing that national and international broadcasting services of other Members of the ITU, the Vietnamese Delegation reaffirms the position of its Government, already stated in its declaration to the First Session of the WARC HFBC-84 (Document HFBC(1)/245-E) and also declares that the Government of the Socialist Republic of Viet Nam reserves the right to take whatever measures it considers necessary to oppose any abusive use of the principles adopted by this Conference to the detriment of its country's broadcasting service.



No. 26

*Original: French*

*For the Republic of Senegal:*

Upon signing the Final Acts of the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, the Delegation of the Republic of Senegal reserves the right for its Government to take whatever measures it may consider necessary to protect its interests in the event that any Member should fail in any way to comply with the provisions of these Final Acts or that any reservations entered by other Members should jeopardize the proper operation of its telecommunication services.

No. 27

*Original: French*

*For Burkina Faso:*

Upon signing the Final Acts of the WARC HFBC(2), Geneva, 1987, the Delegation of Burkina Faso reserves the right for its Government to take whatever measures it may consider necessary to safeguard its interests in the event that the provisions of this Conference are not respected or that any reservations entered by other Members should jeopardize its broadcasting services.

Our country or death — we shall prevail!

No. 28

*Original: English*

*For the People's Democratic Republic of Algeria, the Kingdom of Saudi Arabia, the United Arab Emirates, the Republic of Iraq, the Hashemite Kingdom of Jordan, the State of Kuwait, the Socialist People's Libyan Arab Jamahiriya, the Kingdom of Morocco, the Islamic Republic of Mauritania, the Sultanate of Oman, the State of Qatar, the Syrian Arab Republic, the Somali Democratic Republic, Tunisia, the Yemen Arab Republic, the People's Democratic Republic of Yemen:*

The Delegations of the above-mentioned countries to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987):

1. reserve their rights on the unsatisfactory outputs of this Conference which could not achieve its objectives;
2. declare their dissatisfaction that the results of this Conference could not even provide them with a guarantee for satisfying minimum requirements of their HF broadcasting services;
3. express their regret on the way this Conference proceedings were ruled.

No. 29

*Original: English**For the Republic of Kenya:*

The Delegation of the Republic of Kenya, on behalf of the Government of the Republic of Kenya and in accordance with the powers conferred on it by the Government of the Republic of Kenya, herewith declares:

1. that it fully supports and endorses the planning method for the HFBC developed by the First Session of the HFBC Conference and as modified by the Second Session of the Conference;
2. its commitment to the holding of the 1992 World Administrative Radio Conference that shall provide for the adoption and the implementation of the said planning method to all the HF bands exclusively allocated to the broadcasting service not later than 1994;
3. that it reserves the right of its Government to take any action it may consider necessary to safeguard and protect its interests should any Member fail to comply, as required, with the provisions of the International Telecommunication Convention (Nairobi, 1982) and in particular with Resolution No. 9 of the Nairobi Convention;
4. that the Government of the Republic of Kenya does not accept responsibility for consequences arising out of reservations made by Members of the Union to these Final Acts.

No. 30

*Original: English**For Malaysia:*

The Delegation of Malaysia, on behalf of the Government and her Administration hereby:

1. associates herself with the Guiding Principles of Planning of HF Bands Allocated Exclusively for Broadcasting as laid out in the Report to the Second Session of this Conference, and reiterates the principles of equal right and equal access of the frequency spectrum for broadcasting of all countries;
2. notes that the questions of national and international requirements are different and they should be given serious considerations in subsequent competent conference;
3. and reserves her right in all cases at any point in time to safeguard her interest in accessing to the spectrum for HF Broadcasting until such time that the Union rectifies any shortcomings that jeopardize her broadcasting needs.

No. 31

*Original: English*

*In the name of the Federal Republic of Germany:*

In signing the Final Acts of the WARC-HFBC 1987, the Delegation of the Federal Republic of Germany declares that the Final Acts and the Resolutions and Recommendations of this Conference do not prejudice in any way the position of its Government on the improved HFBC Planning System and the improved Consultation Procedure under Article 17 of the Radio Regulations to be taken at a competent WARC.

The Delegation expressly reserves for its Government the right, *inter alia*:

- to make the decisions it will take at a competent WARC dependent on whether the test results are acceptable;
- to decide at a competent WARC in what parts of the bands allocated exclusively to the broadcasting service the Planning System and the Consultation Procedure shall be applied respectively in order to keep the increase of congestion as low as possible in those parts of the spectrum which are governed by the Consultation Procedure; furthermore, the Delegation maintains the Reservation No. 35 made by the Federal Republic of Germany when signing the Final Acts of WARC-1979;
- to make its decision dependent on the appropriate treatment of national and international broadcasting services with respect to RR 954;
- to make its decision on the HFBC Planning System dependent on the inclusion of appropriate provisions for the case of harmful interference.

No. 32

*Original: English*

*For Thailand:*

The Delegation of Thailand reserves for its Government the right to take any action that it deems necessary to safeguard its interests should any country fail, in any way, to comply with the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (HFBC-87) or should reservations by other countries affect its full sovereignty and jeopardize the radiocommunication services of Thailand.

## No. 33

*Original: English**For the Republic of Singapore:*

The Delegation of the Republic of Singapore reserves for its Government the right to take such action as it may consider necessary to safeguard its HF broadcasting service should any Member fail in any way to comply with the Final Acts of the 1987 World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (HFBC-87), or should reservations by any country jeopardize its HF broadcasting service.

## No. 34

*Original: English**For the Socialist People's Republic of Albania:*

Since the Second Session of the HFBC Conference has not succeeded in drawing up a plan in accordance with the principles adopted at the First Session, and since the existing Article 17 does not guarantee a satisfactory HF broadcasting service for many countries, including my own, our Delegation reserves the right for its Government to take the necessary measures to defend its interests in the field of HF broadcasting.

## No. 35

*Original: Spanish**For the Argentine Republic:*

In accordance with the reservation which appears in the minutes of the seventeenth Plenary Meeting of this Conference, the Delegation of the Argentine Republic reserves for its Government the right to take such steps as it may consider appropriate to ensure the continued smooth functioning of the fixed and mobile stations which operate on its territory and are protected by virtue of assignments recorded with a favourable finding in the International Frequency Register, in those portions of the bands allocated to the fixed service which WARC-79 set aside for the extension of the HF broadcasting bands (RR No. 531), having regard to the fact that most of the substitute channels to which the fixed and mobile assignments are supposed to be transferred are unsuitable owing to the high density of such stations in operation.

No. 36

*Original: English*

*For the Republic of Malta:*

The Maltese Delegation to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), declares that its Administration reserves the right to take whatever action it considers necessary to safeguard its interests should any Member fail in any way to comply with the provisions of the Final Acts or should reservations by other countries jeopardize Malta's broadcasting service or its telecommunication services.

The Delegation further reserves its Government's right to take any action required, whether by technical or other measures, to ensure by whatever means the integrity of its national territory in the face of any external interference and to protect its broadcasting service.

No. 37

*Original: Russian*

*For the Byelorussian Soviet Socialist Republic, the Ukrainian Soviet Socialist Republic and the Union of Soviet Socialist Republics:*

In signing the Final Acts of the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the Delegations of the Byelorussian Soviet Socialist Republic, the Ukrainian Soviet Socialist Republic and the Union of Soviet Socialist Republics state that the partial revision of the Radio Regulations adopted by the Conference, the planning method developed, the improvements to the automated Planning System and the amendments to Article 17 of the Radio Regulations should be tried out, using test seasonal plans and frequency schedules to be developed, and analyzed before they are submitted for consideration by a future competent conference.

Should the test plans drawn up on the basis of the decisions of this Conference fail to satisfy the HF broadcasting requirements of the Byelorussian Soviet Socialist Republic, the Ukrainian Soviet Socialist Republic and the Union of Soviet Socialist Republics, these Administrations will hold consultations with the countries concerned and the IFRB and, if necessary, take any measures they may deem appropriate to safeguard their interests.

No. 38

*Original: Spanish*

*For Mexico:*

The Delegation of Mexico, noting that the decisions of the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) include a Recommendation to the effect that the need should be considered of convening a WARC with a view to studying the possible extension of the HF bands allocated on an exclusive basis to the broadcasting service, reserves for its Government the right to take such steps as it may consider appropriate to protect its radio services in these bands.

No. 39

*Original: English**For the United Kingdom of Great Britain and Northern Ireland:*

## I

Recalling Statement No. 36, in the Final Protocol to the Final Acts of the WARC-79, the United Kingdom notes that the inadequacy of the high frequency bands allocated to the broadcasting service has been proved by the unacceptable results of the IFRB tests on the HFBC Planning System and therefore reserves the right to take such action as may be necessary, consistent with the Radio Regulations, to ensure the continued operation of its HF broadcasting services.

## II

Recalling the results of the monitoring programmes established by the IFRB in accordance with Resolution COM5/1 of the First Session of the WARC HFBC and the positive identification of many stations causing extensive harmful interference to broadcasting services, the United Kingdom urges the administrations concerned to take prompt action to cease the operation of such stations and thereby to avoid prejudicing the prospects of successfully implementing any decisions that may be taken by a competent WARC.

## III

Recalling the unacceptable performance of the HFBC Planning System developed in accordance with the instructions of the First Session of the WARC HFBC, as evidenced in Document 120 of the Second Session, the United Kingdom reserves its position on the future acceptability of the System until it has been improved by the IFRB, until the improved System has been thoroughly tested together with its interactions with the revised Article 17, and until the results have been considered and found acceptable by a competent WARC.

## IV

Recalling Article 80 of the Convention and Resolution No. 48 of the Plenipotentiary Conference, Nairobi 1982, the United Kingdom reserves its position on all financial implications of the decisions of the WARC HFBC 1987 including the costs of the post-conference work on the improved HFBC System and the improved Article 17 as well as the potential costs to the ITU of implementing either or both developments.

No. 40

*Original: Spanish*

*For Cuba:*

The Delegation of the Republic of Cuba, in signing the Final Acts of the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, states that:

1. It denounces the aggressive nature of transmissions broadcast from the territory of the United States of America in various bands allocated or not allocated to the broadcasting services.

As it stated on previous occasions, these transmissions are clearly intended to disseminate fallacious and misleading information in daily infringement of Cuba's national sovereignty and political and economic stability and in flagrant violation of the International Telecommunication Convention (Nairobi, 1982); furthermore they cause serious interference to the various radio services operating in Cuba in accordance with the Radio Regulations.

Consequently, it reserves for its Government the right to adopt such measures as it deems necessary to safeguard its national interests in the various bands concerned, particularly those allocated to the broadcasting service.

2. It also reserves for its Government the right to take whatever action it may deem necessary to safeguard its interests if:

- a) the effects of applying any HF broadcasting planning method or provision, adopted by this Conference, should adversely affect the existing and planned broadcasting services of the Republic of Cuba;
- b) the reservations and statements made by other administrations should be prejudicial to those services;
- c) other Members of the Union should fail to comply with any of the provisions laid down by this Conference.

No. 41

*Original: English*

*For Australia:*

Recalling Article 80 of the Convention and Resolution No. 48 of the Plenipotentiary Conference, Nairobi 1982, Australia reserves its position on all financial implications of the decisions of the WARC HFBC-1987, including the costs of any post-conference work on the development of systems and the potential costs of implementing such systems.

No. 42

*Original: Spanish**For the Eastern Republic of Uruguay:*

In signing the Final Acts of the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the Delegation of the Eastern Republic of Uruguay reserves for its Government the right to take such action as it may deem necessary to ensure the proper development and operation of its HF broadcasting service, should its interests be affected by the application of any of the Resolutions, Recommendations, annexes or provisions adopted by this Conference.

It also reserves the right to adopt any measures it sees fit to protect its HF radio services from the harmful effects of reservations made by other administrations or of the failure of any other Member of the Union to comply with those provisions.

No. 43

*Original: French**For the Gabonese Republic:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, the Delegation of the Gabonese Republic reserves for its Government the right to take whatever action it may deem necessary to protect its HF broadcasting interests if:

1. other Members should fail in any way to comply with the provisions adopted by this Conference;
2. the reservations made by other Members should jeopardize the proper operation of its broadcasting services.

No. 44

*Original: French**For the People's Republic of Angola:*

The Delegation of the People's Republic of Angola, having regard to the declarations made by several delegations in respect of the results of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), reserves for its Government the right to take whatever action it may deem necessary to protect its interests should other Members of the Union fail to comply with the Final Acts of the Conference.



No. 45

*Original: English*

*For the United States of America:*

# I

The Delegation of the United States of America, recalling its reservations in Nos. 36 and 38 of the Final Protocol of WARC-79 regarding the failure to provide adequate allocations to the HF broadcasting service, reaffirms its view that without such adequate allocations it will not be possible to plan all frequency bands to enable countries to sustain their broadcasting services in the face of varying conditions throughout the solar cycle. In the absence of adequate spectrum, the Administration of the United States of America reserves its right to take the necessary steps to meet the needs of its HF broadcasting services.

# II

The Administration of the United States of America, calling attention to the fact that some of its broadcasting in the high frequency bands allocated to the broadcasting service are subject to harmful interference in contravention of Article 35 of the Convention, and that the continuation of such harmful interference would make it impossible to implement effectively the proposed new planning procedures discussed at this Conference, reserves its right with respect to such interference to take necessary and appropriate actions to protect its broadcasting interests. In so doing, however, it intends to respect, to the extent practicable, the rights of administrations operating in accordance with the Convention and the Radio Regulations.

# III

The Administration of the United States of America declares that it does not, by signature of these Final Acts authorizing the development of software to test the adequacy of proposed new planning procedures for the HF bands allocated exclusively to the broadcasting service, accept any obligations in respect to the implementation of such procedures pending the completion and evaluation of adequate tests and the subsequent decisions of a competent Administrative Radio Conference.

# IV

The Administration of the United States of America reserves its position on the financial costs of the decisions made at the WARC-HFBC(2) Conference, including any costs for the post-conference activities as well as the future costs to the ITU of implementing any of these decisions.

No. 46

*Original: English*

*For the People's Democratic Republic of Algeria, the Kingdom of Saudi Arabia, the United Arab Emirates, the Republic of Iraq, the Hashemite Kingdom of Jordan, the State of Kuwait, the Socialist People's Libyan Arab Jamahiriya, the Kingdom of Morocco, the Islamic Republic of Mauritania, the Sultanate of Oman, the State of Qatar, the Syrian Arab Republic, Tunisia, the Yemen Arab Republic, the People's Democratic Republic of Yemen:*

The Delegations of the above-mentioned countries to the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (HFBC WARC-1987, Geneva) reserve their Governments' or competent authorities' rights to take such action as they may consider necessary to protect their interests, should any decision of this Conference fail in any way to observe Resolution No. 9 amongst other provisions of the International Telecommunication Convention (Nairobi, 1982).

These Governments or competent authorities make the same reservation should any Member fail to observe such provisions.

No. 47

*Original: English*

*For the Republic of India:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the Delegation of the Republic of India reserves the right of its Administration to take appropriate steps, if necessary, to ensure proper functioning of its radio services, should any country make reservations and/or fail to apply any provision or provisions of the Radio Regulations or the Convention.

No. 48

*Original: English*

*For the Islamic Republic of Iran:*

The Delegation of the Islamic Republic of Iran reserves for its Government the right to take any action as it may consider necessary to safeguard its interests should they be affected by decisions taken at this Conference, or by failure on the part of any other country or administration in any way to comply with the requirements of the International Telecommunication Convention (Nairobi, 1982) or its Annexes or the Protocols or the Regulations attached thereto, or these Final Acts, or should Reservations or Declarations by other countries or administrations jeopardize the proper and efficient operation of its telecommunication services, or infringe the full exercise of the sovereign rights of the Islamic Republic of Iran.

No. 49

*Original: English*

*For Finland and Sweden:*

The Delegations of Finland and Sweden to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) note with regret that the Conference did not take necessary decisions which in the near future would lead to implementation of provisions called for by the World Administrative Radio Conference (Geneva, 1979) to improve the existing unsatisfactory situation in the HF bands allocated exclusively to the broadcasting service.

Therefore, in signing the Final Acts, the above-mentioned Delegations reserve for their Administrations the right to take necessary measures to meet the requirements of HF broadcasting services of their respective countries. In so doing, the Administrations of Finland and Sweden will take into account, to the greatest extent practicable, the interests of services of other countries operating in accordance with the Radio Regulations and the decisions of this Conference.

No. 50

*Original: English*

*For the People's Republic of China:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987), the Chinese Delegation states the following:

The Chinese Administration has always been of the view that the planning of the HF bands allocated exclusively to the broadcasting service is an effective measure for rational utilization of the frequency spectrum as well as for change of the unsatisfactory existing situation of the HF bands allocated to the broadcasting service. With the joint efforts of the participating delegations, the present Conference has made some progress in this respect, but it has not been able to make the final decision on the implementation of the Plan. Therefore, the Chinese Delegation reiterates that the Chinese Delegation's statement included in the Final Protocol to the Final Acts of WARC-1979 still remains valid.

No. 51

*Original: English*

*For the Democratic Republic of Afghanistan:*

The Delegation of the Democratic Republic of Afghanistan, on behalf of its Government, reserves the right to take any measures it deems necessary to protect its interests if other countries or administrations fail to observe the provisions contained in the Final Acts and the annexes thereto, as adopted by this Conference.

## No. 52

*Original: French**For the Islamic Republic of Mauritania:*

The Delegation of the Islamic Republic of Mauritania, in signing the Final Acts of this Conference, reserves for its Government the right to take whatever action it may deem necessary to protect its interests should any Member whatsoever fail in any way to comply with the said Final Acts or should the reservations made by other administrations jeopardize its telecommunication services or entail an increase in its contribution to defraying Union expenses.

## No. 53

*Original: French**For Belgium, Ireland and Luxembourg:*

Paragraph 10 of new section 2 of Article 17 of the Radio Regulations refers to the concept of minimum requirements to be satisfied for each administration with an acceptable level of quality.

In the view of the above-mentioned Delegations, the consultation procedure and planning system described in Annex 1 to Resolution No. 515 (HFBC-87) cannot ensure the fulfilment of the principle set out in paragraph 10 of new section 2 of Article 17 of the Radio Regulations.

In order to enable the conference scheduled for 1992 to take a final decision at an early stage, the above-mentioned Delegations hold the view that the IFRB should study ways and means of satisfying these minimum requirements for each administration, having particular regard to the software implications. To this end, the Belgian Delegation has submitted Document 205 setting out a number of solutions which the above-mentioned Delegations propose should be *taken into consideration* by the IFRB.

## No. 54

*Original: French**For Italy:*

The report of the Budget Control Committee (Document 261) shows that the implementation of the decisions of WARC HFBC-87 will entail expenditure which substantially exceeds the limits set by the Administrative Council on the basis of Additional Protocol I to the International Telecommunication Convention (Nairobi, 1982).

In signing the Final Acts of the Conference, the Delegation of Italy reserves its Administration's position with regard to future budgetary considerations.

No. 55

*Original: English*

*For Canada:*

The Administration of Canada draws attention to the Report of the IFRB describing the results of the monitoring programme in the high frequency bands allocated to the broadcasting service. This report lists a large number of transmissions which have a class of emission different from the one used for broadcasting, which are not in conformity with Nos. 340 and 341 and with Article 17 of the Radio Regulations, and which are considered to cause harmful interference to other broadcasting stations operating in accordance with the Radio Regulations.

In signing the Final Acts, Canada emphasizes that the successful implementation of an HFBC Planning System would be adversely affected by the presence of harmful interference.

No. 56

*Original: Spanish*

*For Chile:*

The Delegation of Chile to WARC-HFBC(2) reserves for its Government the right to take whatever action it may deem necessary to ensure the proper operation of its telecommunication services and to safeguard its national sovereignty.

No. 57

*Original: English*

*For the Arab Republic of Egypt:*

The Delegation of the Arab Republic of Egypt reserves the right for its Government to take such action as it may deem necessary to safeguard its interests should any administration fail in any way to comply with the provisions of the Final Acts of this Conference and the annexes thereto, or should declarations by other administrations harm in any way its telecommunication or broadcasting services.

No. 58

*Original: French**For France:*

A

The French Delegation reserves for its Government the right to take any action it may deem necessary to safeguard its interests should any Member fail in any way to comply with the provisions of the Convention and the Regulations annexed thereto, or should reservations by other administrations jeopardize the operation of its radiocommunication services.

B

The signature of the Final Acts by the French Delegation is without prejudice to its Government's position when the financial implications of the decisions of the Conference are considered.

No. 59

*Original: Spanish**For Ecuador:*

The delegation of Ecuador, on behalf of its Government, declares that its Administration will endeavour to comply with all the provisions of the partial revision of the Radio Regulations adopted by the present Conference, and reserves the right to:

- a) take such steps as it considers necessary to protect Ecuador's radiocommunication services should they be affected by the provisions of the Final Acts of the present Conference or of the Annexes thereto, or by the failure of other Members of the Union to comply with those provisions;
- b) to begin using the single-sideband (SSB) system when the conditions are favourable for its implementation; and
- c) not to accept the reservations formulated by other countries if they prove detrimental to the national interests of Ecuador.

Finally, it endorses statement No. 66 formulated at the World Administrative Radio Conference (Geneva, 1979) and statement No. 80 formulated at the Plenipotentiary Conference (Nairobi, 1982) in their entirety.

No. 60

*Original: English*

*For the Democratic People's Republic of Korea:*

The Delegation of the Democratic People's Republic of Korea participated in the Second Session of the HFBC with its belief that it could establish the HFBC Planning System to a certain extent on the basis of the principles adopted at the First Session.

However, it wishes to express its concern and regret that the global results of testing are not as satisfactory as they could be, as analyzed and recognized during the Conference.

We have great hopes that the next competent WARC will develop and adopt an improved HFBC Planning System in accordance with the Resolutions and Recommendations adopted at the current Conference and the experiences gained by the IFRB during the intersessional period so that the HF spectrum can be used on an equal basis, in particular in the interests of the developing countries according to the spirit of the Nairobi Plenipotentiary Conference.

No. 61

*Original: English*

*For the United States of America:*

The United States of America, noting the statement (No. 40) entered by the Administration of Cuba rejects the allegations contained therein and recalls its rights to broadcast to Cuba on appropriate frequencies free of jamming or other wrongful interference and reserves its rights with respect to existing interference and any future interference by Cuba with United States broadcasting.

No. 62

*Original: English*

*For the State of Israel:*

The declarations made by certain delegations in No. 2 of the Final Protocol, being in flagrant contradiction with the principles and purposes of the International Telecommunication Union and, therefore, devoid of any legal validity, the Government of Israel wishes to put on record that it rejects these declarations outright and will proceed on the assumption that they can have no validity with respect to the rights and duties of any Member State of the International Telecommunication Union.

In any case, the Government of Israel will avail itself of its rights to safeguard its interests should the Governments of those delegations in any way violate any of the provisions of the Convention, or the Annexes, Protocols or Regulations attached thereto, or the Final Acts of this Conference.

The Delegation of Israel further notes that declaration No. 2 does not refer to the State of Israel by its full and correct name. As such it is totally inadmissible and must be repudiated as a violation of recognized rules of international behaviour.

No. 63

*Original: English**For the Socialist People's Libyan Arab Jamahiriya:*

Having noted the statements made, in signing the Final Acts and Final Protocol, the Socialist People's Libyan Arab Jamahiriya reserves the right to take any appropriate action it deems necessary to safeguard the Libyan national interests of its HF broadcasting service, in case the reservations of other countries jeopardize the proper operation of its broadcasting services, or other Members fail to apply any provision adopted by this Conference, Radio Regulations or the Convention.

No. 64

*Original: French**For the Socialist Republic of Romania:*

A

Noting the reservations made by various delegations to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, the Delegation of the Socialist Republic of Romania reserves for its Government the right to take any action it might deem necessary to protect its interests and to meet the requirements of its broadcasting service should any Members fail in any way to comply with the provisions of the Convention and of the Regulations annexed thereto, or should reservations formulated by other administrations jeopardize proper operation of that service.

B

Signing of the Final Acts by the Delegation of the Socialist Republic of Romania does not prejudice the position which its Government will see fit to adopt when the budgetary implications of the decisions taken by the Conference are examined.

No. 65

*Original: English**For the Kingdom of the Netherlands:*

The Delegation of the Kingdom of the Netherlands, disappointed by the great number of reservations made by a majority of the Delegations present at the Second Session of the WARC HFBC-1987 on the use of the HFBC bands, feels obliged to reserve its right and to take any action it deems necessary to safeguard the interests of its HFBC service. In so doing the Administration of the Kingdom of the Netherlands will take into account, to the greatest extent practicable, the interests of services of other countries operating in accordance with the Radio Regulations and the decisions of this Conference.



No. 66

*Original: English*

*For Turkey:*

After having noted the declarations already deposited, the Turkish Delegation, to the Second Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) reserves for its Government the right to take such measures as it may consider necessary to safeguard its interests to meet the needs of its broadcasting service.

No. 67

*Original: French*

*For the Republic of Mali:*

Having noted the declarations already deposited, the Delegation of the Republic of Mali, in signing the Final Acts of the Second Session of the HFBC World Administrative Radio Conference, reserves for its Government the right to take whatever action it may deem necessary to protect its interest if:

- a) reservations or statements by other administrations were to jeopardize the proper operation of its radiocommunication installations;
- b) other Members were to fail in any way to comply with the provisions of the Convention and the Radio Regulations.

No. 68

*Original: English*

*For the Democratic Socialist Republic of Sri Lanka:*

The Delegation of the Democratic Socialist Republic of Sri Lanka, disappointed by the great number of reservations made by a majority of the Delegations present at the Second Session of the WARC HFBC-87 on the use of the HFBC bands, feels obliged to reserve the right of its Administration to safeguard the interests of its HFBC service.

In so doing the Administration of the Democratic Socialist Republic of Sri Lanka will take into account to the greatest extent practicable, the interests of services of other countries operating in accordance with the Radio Regulations and the decisions of this Conference.

No. 69

*Original: English**For the People's Republic of China:*

In signing the Final Acts of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (Geneva, 1987) and having noted the statement No. 25, the Chinese Delegation reiterates the position of the Chinese Government, already stated in its declaration (No. 115) included in the Final Protocol to the International Telecommunication Convention (Nairobi, 1982).

*(The signatures follow)*

*(The signatures following the Final Protocol are the same as those shown on pages 4 to 20 with the exception of the signature of the People's Republic of Poland which did not sign it)*

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Addition of a reference to

RESOLUTION No. 8

Under the title of Resolution 8

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

## 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,

**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) shall be abrogated.

## 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 kHz<sup>1</sup>,

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<sup>1</sup> This band cannot be implemented before 1 July 1994 (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,

*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,

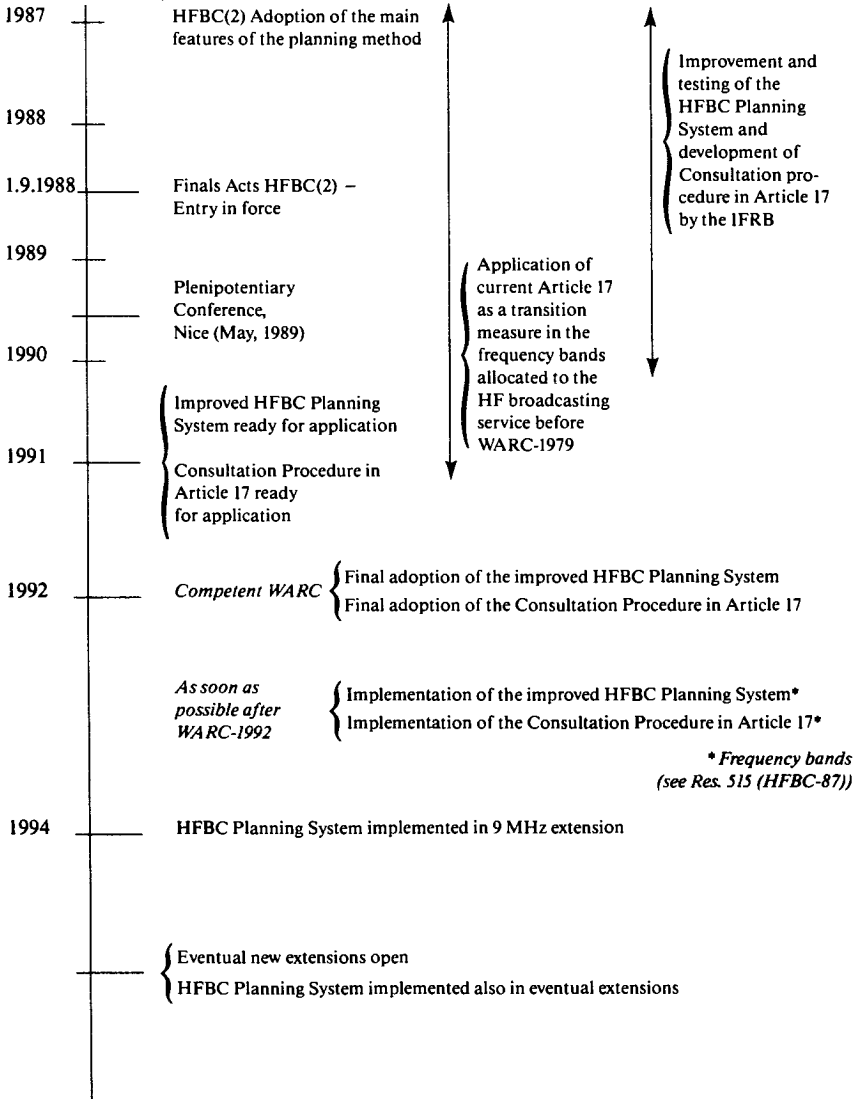
*instructs the Secretary-General*

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



# ANNEX TO RESOLUTION No. 511 (HFBC-87)

## Programme of Action



## 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);

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 (Geneva, 1984),

*noting*

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

- 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 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 Administrative 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,

- 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;



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 1 above and following the action mentioned in 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;

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 6 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)**).

## 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 5 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 (HFBC-87) 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);

- 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 (HFBC-87), 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 (HFBC-87).

6. On receipt of notices pursuant to paragraph 5 above, the Board shall ensure that the basic information listed in Appendix 2 (HFBC-87) 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 (HFBC-87). 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 broadcasting reliability (BBR)<sup>1</sup> 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.

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

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 (**HFBC-87**) 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 (HFBC-87), 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 (HFBC-87) 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 affecting<sup>1</sup> 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 affecting<sup>1</sup> 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.

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<sup>1</sup> 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 and 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 conditions<sup>1</sup>.

## 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  $\Delta F$  (Hz or kHz) and the protection ratio when the carriers of these emissions have the *same frequency*.

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<sup>1</sup> The specified conditions include such diverse parameters as: spacing  $\Delta F$  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 ( $E_{min}$ )<sup>1</sup>*

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 ( $E_u$ )<sup>1</sup>*

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 IFRB<sup>2</sup>. 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 12-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.

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<sup>1</sup> 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.

<sup>2</sup> 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 (**HFBC-87**), does not include a test point, the IFRB shall establish a new test point and include it in the Technical Standards. Such additions to the 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 HF 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 (HFBC-87). 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 incompatible<sup>1</sup> with all other requirements in the set.

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

IV.4.1.4 The *MGIR*<sup>1</sup> (*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”.

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<sup>1</sup> Refer to the Technical Standards of the IFRB.

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 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 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( $\mu$ V/m)	Median field strength of wanted signal <sup>1</sup>	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( $\mu$ V/m)	Wanted signal exceeded 10% of the time	$E_w + D_U(E_w)$
(9)	$E_w(90)$ dB( $\mu$ V/m)	Wanted signal exceeded 90% of the time	$E_w - D_L(E_w)$
(10)	$E_{min}$ dB( $\mu$ V/m)	Minimum usable field strength	IFRB technical standards
(11)	BCR	Basic circuit reliability	Formula (1) or Figure 1

<sup>1</sup> 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 ( $\mu$ 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).

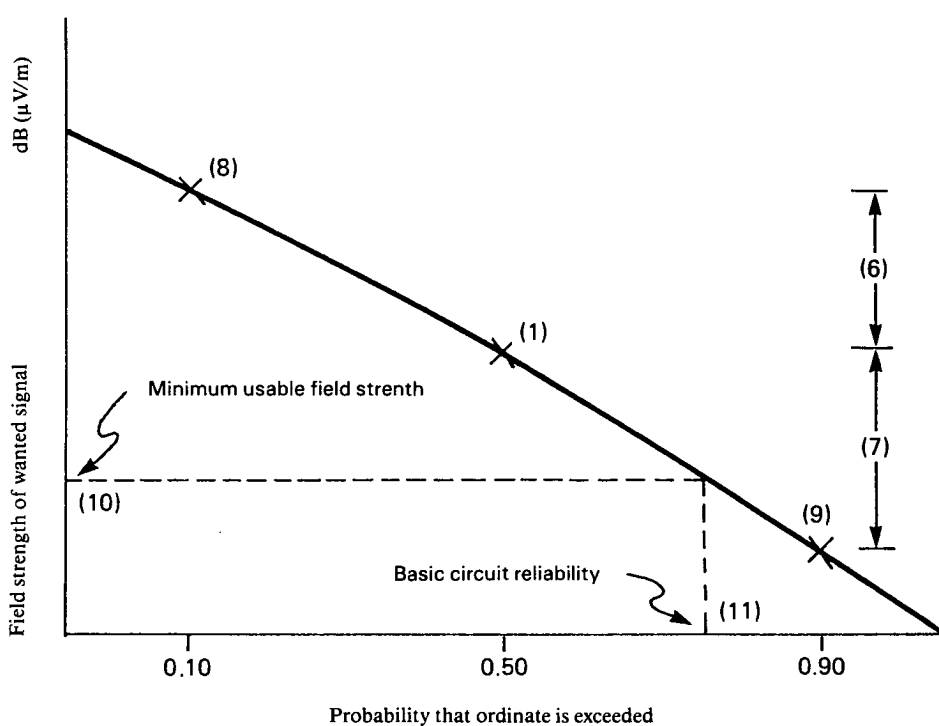


FIGURE 1

*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( $\mu$ V/m)	Median field strength of wanted signal	IFRB technical standards
(2)	$E_i$ dB( $\mu$ V/m)	Median field strength of interfering signals $E_1, E_2, \dots E_n$	IFRB technical standards
(3)	$I$ dB( $\mu$ V/m)	Resultant field strength of interference	$I = 20 \log_{10} \sqrt{\sum_{i=1}^n 10^{\left(\frac{E_i + \alpha_i}{10}\right)}}$ <sup>1</sup>
(4)	$S/I$	Median signal-to-interference ratio	$E_w - I$

<sup>1</sup>  $\alpha_i$  is the appropriate relative protection ratio corresponding to the carrier frequency separation between the wanted and each unwanted signal.

### V.3 Basic reception reliability (BRR)

The method for computing basic reception reliability is given in Table 3. With a single frequency, basic reception reliability (BRR) 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.

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*<sup>1</sup>

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	$1 - \prod_{n=F_1}^{F_2} (1 - \text{BCR}(n))$

<sup>1</sup> The two frequencies  $F_1$  and  $F_2$  shall be situated in different HF bands allocated to the broadcasting service.

*Three-frequency operation*<sup>2</sup>

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	$1 - \prod_{n=F_1}^{F_3} (1 - \text{BCR}(n))$

<sup>2</sup> 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  $E_{min}$  and greater than or equal to  $E_{min} - 10$  dB.

In these conditions,  $M$  is determined as:

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

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 BBR<sup>1</sup> 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.

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

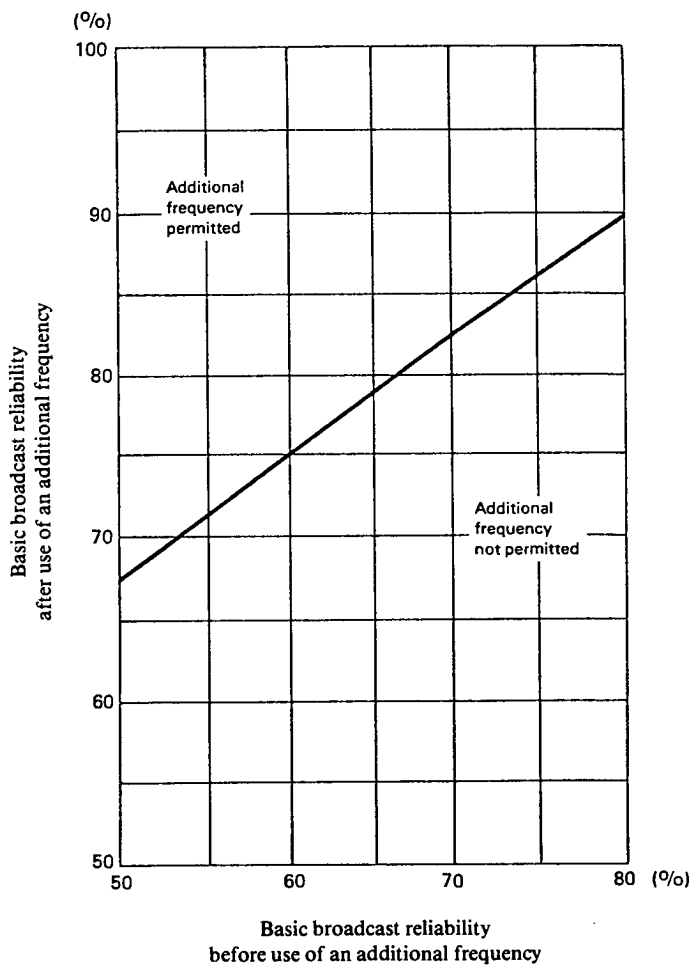


FIGURE 2

*Limits for use of an additional frequency*

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

$BBR(\text{after}) > 30 + 0.75 \times BBR(\text{before})$  additional frequency permitted

$BBR(\text{after}) \leq 30 + 0.75 \times BBR(\text{before})$  additional frequency not permitted.

### VIII. *Performance assessment*<sup>1</sup>

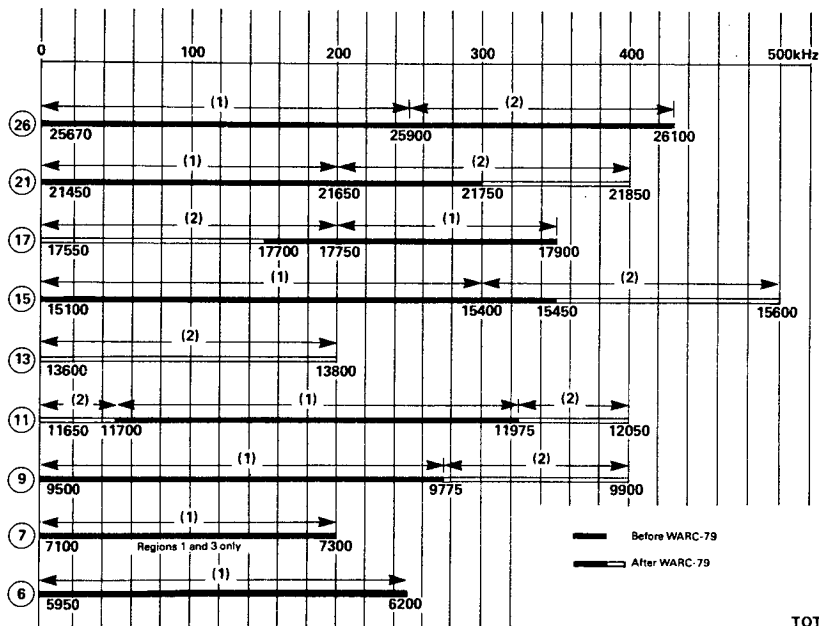
In order to assess the performance of a requirement, the following values should be given for each 15-minute period, each hour, or for the duration of the emission, as appropriate:

- 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.

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<sup>1</sup> The IFRB may develop additional parameters for assessing performance.

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



TOTAL

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	
<b>TOTAL</b>	<b>1880</b>	<b>1250</b>

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,

*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 HF Antenna Diagrams,

*invites the CCIR*

to continue to update the Book of HF 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 (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. 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;

*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.

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 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



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.

### 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 ( $\alpha$ ) for carrier frequency separations<sup>1</sup> ( $\Delta f$ ), with reference to the co-channel protection ratio, should be:

$\Delta f$	$\alpha$
0 kHz	0 dB
$\pm 5$ kHz	–3 dB
$\pm 10$ kHz	–35 dB
$\pm 15$ kHz	–49 dB
$\pm 20$ kHz	–54 dB

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<sup>1</sup> 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( $\mu\text{V/m}$ ), 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  $60^\circ$  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,

*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 Method<sup>1</sup> 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.

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



## 2. *Ionospheric parameters*

Values of the ionospheric parameters foF2, M(3000)F2 and foE 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 MUFs<sup>1</sup> 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.

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

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

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

- $P_t$  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

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

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

- $E_0 = 139.6 - 20 \log P'$  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  $0^\circ$  to  $8^\circ$  at the corresponding azimuth;
- $G_{ap}$  is the antipodal focussing 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  $E_{ts}$  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:

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

where  $D$  is the path length in kilometres.

*Note:* The constant terms in the equations for  $E_{ts}$  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,

*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 SSB<sup>1</sup> 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, SSB<sup>1</sup> and DSB, or in the SSB<sup>1</sup> mode alone,

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<sup>1</sup> 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, SSB<sup>1</sup> and DSB, or in the SSB<sup>1</sup> 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 SSB<sup>1</sup> broadcasting emissions,

*instructs the Secretary-General*

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

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<sup>1</sup> 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,

*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 Values of RF Protection Ratio

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 below 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)<sup>1</sup> 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

<sup>1</sup> Frequency separations  $\Delta f$  less than -20 kHz, as well as  $\Delta f$  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 Electro-technical Commission (IEC).

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