FINAL ACTS

of the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 Rio de Janeiro, 1988

INTERNATIONAL TELECOMMUNICATION UNION

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INTERNATIONAL TELECOMMUNICATION UNION
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in the Band 1 605 - 1 705 kHz in Region 2, Rio de Janeiro, 1988**

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Cuba (8)
Suriname (Republic of) (2)
United Kingdom of Great Britain and Northern Ireland (9)
United States of America (4, 10)
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RESOLUTIONS

RECOMMENDATIONS

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FINAL ACTS

of the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (BC-R2(2)), Rio de Janeiro, 1988

PREAMBLE

The World Administrative Radio Conference, Geneva, 1979, in its Recommendation No. 504, considering that, in accordance with provision No. 480 of the Radio Regulations, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service shall be subject to a broadcasting plan, recommended that a regional administrative radio conference be convened to establish a plan for the broadcasting service in the band 1 605 - 1 705 kHz in the whole of Region 2.

The Plenipotentiary Conference (Nairobi, 1982), in its Resolution No. 1, decided that this Conference should be held in two sessions.

The Administrative Council at its 39th Session considered the matter on the basis of the recommendation and the decision referred to above and, after consultation of the Members of the Union belonging to Region 2, took by adopting Resolution No. 913, the necessary steps to convene the First Session of the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2.

The First Session, which took place in Geneva from 14 April to 1 May 1986, 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 frequency band 1 605 - 1 705 kHz allocated to the broadcasting service on a primary basis.

Having adopted the planning method based on standardized parameters, the First Session also requested the International Frequency Registration Board (IFRB) to develop the computer programmes and procedures for the preparation of a draft allotment plan to be considered by the Second Session. It furthermore requested the International Radio Consultative Committee (CCIR) to continue and complete the complementary studies on interservice and interregional sharing criteria with services other than the broadcasting service.

At its 42nd Session in 1987, the Administrative Council established the agenda for the Second Session by its Resolution No. 952. Following consultation of the Members of the Union belonging to Region 2, it resolved that the Second Session be convened in Rio de Janeiro for two weeks and four days, commencing on Monday, 23 May 1988, and placed on the agenda of that session the establishment of a date (or dates) on which the new allocations in the Table of Frequency Allocations would enter into force for Region 2 as stipulated in No. 48l of the Radio Regulations.

Consequently, the Second Session of the Regional Administrative Radio Conference to Establish a Plan for Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 was held in Rio de Janeiro from 23 May to 8 June 1988 and adopted its Final Acts, which comprise the Regional Agreement for the Use of the Band 1 605 - 1 705 kHz in Region 2 and the Plan for Broadcasting Service with associated provisions as well as the Resolutions and Recommendations relating to the application of the Plan and the continued operation of services other than broadcasting services in the band 1 625 - 1 705 kHz.

The Agreement and the Plan referred to above shall enter into force **on 1 July 1990 at 0001 hours UTC**.

The delegates of the Members of the International Telecommunication Union, in signing the present Final Acts, declare that, should an Administration of a Member of the Union make reservations concerning the application of one or more of the provisions of this Regional Agreement, including its Plan, no other Administration shall be obliged to observe that provision or those provisions in its relations with that particular Administration.

The Members of the Union belonging to Region 2 shall inform the Secretary-General of their approval or ratification of the Regional Agreement and its Plan as adopted by the Regional Administrative Radio Conference to Establish a Plan for Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988). The Secretary-General shall inform the Members of the Union promptly of the receipt of any such notification of approval or ratification.

IN WITNESS WHEREOF, the delegates of the Members of the International Telecommunication Union belonging to Region 2 mentioned below have, on behalf of their respective competent authorities, signed one copy of the present Final Acts in the English, French 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 belonging to Region 2.

Done at Rio de Janeiro, on 8 June 1988

For the Argentine Republic:

RICARDO SAIDMAN
OSVALDO M. BEUNZA
TOMÁS ANADON
MARIA DONNA RABALLO

For Antigua and Barbuda:

CAMPBELL MICKEY MATTHEW

For Barbados

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For the Federative Republic of Brazil:

ARTHUR ITUASSU
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For Chile:

MIGUEL PIZARRO ARAGONÉS

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For France:

PIERRE DÉCAMPS
PAUL LORIQUET
ANNE-MARIE NEBÈS

For the Republic of Haiti:

SAMUEL DUBOIS

For the Republic of Honduras:

MARIO ALFREDO LOBO FLORES

For Mexico:

MELESIO FERNÁNDEZ QUIRÓZ

For the Republic of Paraguay:

ANGEL BARBOZA GUTIÉRREZ
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For the United Kingdom of Great Britain and Northern Ireland:

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WIM A. A. RAJCOMAR

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SURUJRATTAN RAMBACHAN
MALA GUINNESS

For the Oriental Republic of Uruguay:

JULIO N. NEME
ROSENDO F. HERNÁNDEZ

For the Republic of Venezuela:

FREDDY JOSÉ FRANCO MAMBEL
RAFAEL AUGUSTO DELIMA A.
NELSON E. BELFORT YIBIRIN
CAROLINA MARQUINA DE ROSAS
JUAN BAUTISTA ROMERO

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REGIONAL AGREEMENT

for the use of the band 1 605 - 1 705 kHz
in Region 2
(Rio 88 Agreement)

PREAMBLE

Considering that No. 480 of the Radio Regulations, as adopted by the World Administrative Radio Conference (WARC-79), provides that: "In Region 2, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service shall be subject to a plan to be established by a regional administrative radio conference . . .";

considering the relevant provisions of the International Telecommunication Convention (Nairobi, 1982) and the Radio Regulations in force, and fully respecting the sovereign right of each country to regulate within its territory the use of the frequency band 1 605 - 1 705 kHz by the services to which this band is allocated in Article 8 of the Radio Regulations and to reach special arrangements regarding these services with such countries as it may consider appropriate, without causing any prejudice to other countries;

seeking to facilitate mutual understanding and cooperation among countries Members of Region 2 in achieving a satisfactory broadcasting service in the band 1 605 - 1 705 kHz and, to the extent consistent with the Plan established for the broadcasting service in this band, to make provision for the fixed and mobile services in the band 1 625 - 1 705 kHz;

recognizing that all countries have equal rights and that, in the application of the Plan and the provisions of this Agreement, the needs of each country, and in particular those of developing countries, shall be met as far as possible;

acknowledging that the mutual protection of their broadcasting service is a major objective of all countries, in order to ensure better coordination and the more efficient use of facilities;

the delegates of the Members of the International Telecommunication Union, assembled in Rio de Janeiro from 23 May to 8 June 1988 at a regional administrative conference convened pursuant to the International Telecommunication Convention (Nairobi, 1982), have adopted, subject to approval by the competent authorities of their respective countries, the following provisions relating to the broadcasting service in Region 2 for the frequency band between 1 605 and 1 705 kHz.

ARTICLE 1

Definitions

1. For the purpose of this Agreement, the following terms shall have the meanings defined below:

1.1 *Union:* The International Telecommunication Union.

1.2 *Secretary-General:* The Secretary-General of the Union.

1.3 *IFRB:* The International Frequency Registration Board.

1.4 *CCIR:* The International Radio Consultative Committee.

1.5 *Convention:* The International Telecommunication Convention.

1.6 *Radio Regulations:* The Radio Regulations supplementing the provisions of the *Convention*.

1.7 *Region 2:* The geographical area defined in No. **394** of the Radio Regulations (Geneva, 1979).

1.8 *Master Register:* The Master International Frequency Register (MIFR).

1.9 *Agreement:* This Instrument and its Annexes.

1.10 *Plan:* The Allotment Plan in Annex 4 to the *Agreement* and the associated provisions.

1.11 *Administration:* Any governmental department or service responsible for discharging the obligations undertaken in the *Convention* and the *Radio Regulations.*

1.12 *Contracting Member:* Any Member of the Union which has approved the *Agreement* or acceded to it.

1.13 *Allotment:* Entry in the *Plan* of a broadcasting channel designated for use by an administration for the (sound) broadcasting service in an allotment area under the conditions specified in the *Plan*. Each allotment included in the *Plan* may be used for one or more assignments using the technical criteria specified in Annex 2 to the *Agreement*.

1.14 *Allotment area:* Specifically defined geographical area within a country, to which one or more channels are allotted, as indicated in Part B of the *Plan*.

1.15 *Assignment:* (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.

1.16 *Conference:* The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988).

ARTICLE 2

Frequency Band and Services

The provisions of the Agreement shall be applied, by the countries parties to the Agreement, to the broadcasting service in the frequency band 1 605 - 1 705 kHz and to the fixed and mobile services in the frequency band 1 625 - 1 705 kHz as allocated to Region 2 under Article **8** of the Radio Regulations.

ARTICLE 3

Execution of the Agreement

3.1 In the frequency band which is the subject of the Agreement, the Contracting Members shall adopt for their broadcasting stations in Region 2 the technical characteristics and standards and, for the fixed and mobile services, the regulatory provisions which are in conformity with the Agreement.

3.2 The Contracting Members may bring into use frequency assignments of the services referred to in Article 2 only under the conditions set out in Articles 5 and 6 of the Agreement.

ARTICLE 4

Procedures for Modification of the Plan and the Coordination of a Station which may be involved in an Adjacent Channel Interference Situation

Section 1. Procedure for Modification of the Plan

1. An administration may at any time modify the Plan by:

- adding an allotment
- deleting an allotment
- changing a channel
- modifying an allotment area,

subject to the agreement of administrations having an allotment in the Plan or a frequency assignment recorded in the Master Register which may be affected.

Modifications to the Plan shall be based on the standardized parameters contained in Section 1.2 of Annex 2; however, a group of administrations may, if they wish, use a lower power or a shorter distance.

1.1 An allotment of an administration is considered to be affected as determined in Section 1.3.1 or 1.3.2 of Annex 2.

1.2 A frequency assignment to a broadcasting station recorded in the Master Register with a favourable finding is considered to be affected as determined in Section 1.3.3 of Annex 2.

1.3 A frequency assignment to a station of the fixed or mobile services recorded in the Master Register with a favourable finding is considered to be affected as determined in Section 1.3.4 of Annex 2.

2. An administration proposing to modify the Plan shall inform the IFRB, communicating the details of the modification of the Plan together with a map of an appropriate scale indicating the modification of the allotment area required, and the name of the administrations whose agreement was obtained.

3. Upon receipt of this information, the IFRB, using the criteria in Section 1 of Annex 2, shall verify it to ensure that no other administration is affected. If the IFRB concludes that another administration is affected, it shall communicate all the data to the administration which has proposed the modification and to the affected administration.

4. When the agreement of all the administrations affected is notified to the IFRB, it shall publish the information received in a special section of its weekly circular indicating that it will modify the Plan accordingly.

5. When the IFRB is not informed of the agreement of the affected administration, it shall return the proposed modification, together with the results of its calculations; the administration shall not bring into use its proposed modification until the agreement of the affected administration has been obtained. The IFRB shall communicate all the data to the affected administration.

Section 2. Procedure for the coordination of broadcasting stations which do not meet the adjacent channel criteria of Section 2, Annex 2

6. An administration proposing to bring into use an assignment which does not meet the criteria in Section 2 of Annex 2, relative to an adjacent channel allotment of another administration, shall seek the latter's agreement.

7. In seeking the agreement of the administration concerned, the administration proposing to bring the assignment into use shall send it a request, together with the information listed in Annex 3 of the Agreement, with a copy to the IFRB.

8. The date on which the IFRB receives the copy of the request for agreement shall be considered as the date of commencement of this procedure.

9. Upon receipt of this information, the IFRB shall examine it with a view to ensuring that no other administration is affected. If the IFRB finds that the agreement of another administration is required, it shall so inform the administration proposing to bring the assignment into use and the affected administration.

10. Upon receipt of a request for agreement, the administration that receives the request shall examine the matter and shall, within 90 days:

- either give its agreement to the proposed use, or
- communicate the characteristics of its existing or planned assignments that may affect the proposed assignment or be affected by it.

11. In seeking an agreement, administrations may, *inter alia*, consider:

- subdividing the border allotment area;
- proposing one or more preferred channels;
- agreeing which channels may be used in the subdivided areas without further coordination.

12. If the administration receiving the request fails to communicate the characteristics of its station within the period prescribed in paragraph 10, and if the proposing administration wishes to pursue the matter, it may request the assistance of the IFRB.

13. Upon receipt of a request of assistance from an administration in application of paragraph 12, the IFRB shall request the administration which has received the request to give its agreement or to communicate the characteristics of its assignments.

14. If, 60 days following a request sent in application of paragraph 13, the IFRB has received no reply despite its reminders, the administration which has received the request will be deemed to have given its agreement for the use of this station, either with standardized parameters, or with non-standardized parameters, provided that the proposed station does not cause any more interference than a station operating on the frontier with standardized parameters.

15. In the event of continuing disagreement, all the stations concerned, except those which were previously agreed to, shall be operated only with characteristics not exceeding the standardized parameters, and the administrations involved shall be deemed to accept any interference that may result from the simultaneous operation of their stations.

16. In the application of this Article, any administration may request the assistance of the IFRB in any step of this procedure.

ARTICLE 5

Implementation of the Plan and Procedures for the Notification of Frequency Assignments to Stations of the Broadcasting Service

Section 1. Implementation of the Plan

1. An administration may at any time:

1.1 Make assignments corresponding to any of its allotments, at one or more locations within the respective allotment area, with characteristics which do not exceed the standardized parameters given in Section 1 of Part C of Annex 4;

1.2 make assignments corresponding to any of its allotments, at one or more locations within the respective allotment area, with non-standardized parameters, provided that the limits specified in Section 3 of Annex 2 are not exceeded. If they are exceeded, the agreement of any affected administration shall be obtained;

1.3 make assignments corresponding to any of its allotments at one or more locations which do not meet the adjacent channel criteria of Section 2 of Annex 2, relative to an adjacent channel allotment of another administration, subject to the application of the procedure contained in Section 2 of Article 4;

1.4 make an assignment to a station located anywhere in its territory on any channel not allotted to it in the area concerned, provided that the limits specified in Section 4 of Annex 2 are not exceeded. If they are exceeded, the agreement of any affected administration shall be obtained.

1.5 When, in two adjacent areas, a given channel is not allotted, each of the two administrations concerned may use it as a non-allotted channel provided that E_{nom} is not exceeded at the limit of each territory separating the two allotment areas, unless the other administration has previously given its agreement.

Section 2. Notification of Assignments to Stations of the Broadcasting Service

1. Whenever an administration intends to bring into use an assignment to a station of the broadcasting service in conformity with this Agreement, it shall notify it to the IFRB in accordance with Article **12** of the Radio Regulations.

2. Complete notices which are in conformity with the Convention and the provisions of the Radio Regulations (except those relating to the probability of harmful interference) shall be examined by the IFRB in application of No. **1245** of the Radio Regulations to determine whether the following conditions are satisfied:

2.1 *Assignments corresponding to allotted channels*

2.1.1 for a station using non-standardized parameters, the field strength at any location of an allotment area in which the same channel is allotted to another administration does not exceed the limits specified in Section 3 of Annex 2;

2.1.2 when the station does not meet the criteria of Section 2 of Annex 2 relative to an adjacent channel allotment of another administration, the coordination procedure contained in Section 2 of Article 4 has been applied.

2.2 *Assignments on non-allotted channels*

2.2.1 the field strength at any location of an allotment area to which the same channel is allotted does not exceed the limits specified in Section 4.1 of Annex 2;

2.2.2 the field strength at any location of an allotment area to which the first or second adjacent channel is allotted does not exceed the limits specified in Section 4.1 of Annex 2;

2.2.3 the field strength does not exceed the limits specified in Section 4.2 of Annex 2 with respect to a broadcasting station recorded in the Master Register on the same channel or on the first or second adjacent channel with a favourable finding;

2.2.4 the conditions specified in Section 4.3 of Annex 2 are met with respect to a station of the fixed or mobile service recorded in the Master Register with a favourable finding on behalf of a Contracting Member.

3. Notices of frequency assignments in conformity with this Agreement shall not be examined by the IFRB under No. **1241** of the Radio Regulations with respect to the assignments recorded in the Master Register on behalf of Contracting Members.

4. If the IFRB's finding resulting from the examination with respect either to paragraphs 2.1.1 or 2.1.2 or to paragraphs 2.2.1 to 2.2.4 is favourable, or if it is unfavourable and the agreement of the affected administration has been communicated to the IFRB, the assignment shall be recorded in the Master Register with a favourable finding.

5. If the IFRB's examination results in an unfavourable finding and the agreement of the affected administration has not been indicated, the notice shall be returned to the notifying administration together with any recommendation that the IFRB may offer for the resolution of the problem.

6. If the administration resubmits the notice and the finding remains unfavourable, and if the agreement with the affected administrations has not been communicated, the notice shall be returned to the administration.

7. In relations between Contracting Members, all assignments to broadcasting stations on allotted channels brought into service in conformity with this Agreement and recorded in the Master Register shall be considered as having the same status, irrespective of the date or dates entered in Column 2 for such assignments.

ARTICLE 6

Notification of Assignments to Stations of the Fixed and Mobile Services in the Band 1 625 - 1 705 kHz

1. Whenever an administration intends to bring into use an assignment to a station of the fixed or mobile service in the band 1 625 - 1 705 kHz, it shall notify it to the IFRB in accordance with Article **12** of the Radio Regulations.

2. Complete notices which are in conformity with the Convention and the provisions of the Radio Regulations (except those relating to the probability of harmful interference) shall be examined by the IFRB in application of No. **1245** of the Radio Regulations to determine if the following conditions are satisfied:

2.1 the field strength does not exceed the limits specified in Section 5.1 of Annex 2; however, when the station of the fixed or mobile service is operating pursuant to the provisions of paragraph 8 of this Article, the field strength shall not exceed E_{nom}, reduced by the appropriate protection ratio, at any point in another allotment area to which the same channel is allotted;

2.2 the limits specified in Section 5.2 of Annex 2 are not exceeded at the edge of the service area of a broadcasting station recorded in the Master Register with a favourable finding on a channel that encompasses totally or partly the assigned band of the notified assignment;

2.3 using the criteria contained in Section 5.3 of Annex 2, no harmful interference is caused to a station of the fixed or mobile service which is recorded in the Master Register on behalf of a Contracting Member and:

a) which bears a date in column 2a, or which

b) is in conformity with No. **1240** of the Radio Regulations and bears a date in column 2b but has not, in fact, caused harmful interference to any frequency assignment with a date in column 2a or to any assignment in conformity with No. **1240** of the Radio Regulations, with an earlier date in column 2b.

3. Notices of frequency assignments of the fixed or mobile service shall not be examined by the IFRB under No. **1241** of the Radio Regulations with respect to assignments recorded in the Master Register on behalf of Contracting Members.

4. If the IFRB's finding resulting from the examination with respect to paragraphs 2.1 to 2.3 is favourable, or whenever it is unfavourable and the agreement of the affected administration(s) has been communicated to the IFRB, the assignment shall be recorded in the Master Register with a favourable finding.

5. If the IFRB's examination results in an unfavourable finding and the agreement of the affected administration was not communicated to the IFRB, the notice shall be returned to the notifying administration, together with any recommendation that the IFRB may offer for the resolution of the problem.

6. If the administration resubmits the notice and the finding remains unfavourable, and if the agreement with the affected administrations has not been communicated, the notice shall be returned to the administration.

7. If the administration resubmits the notification and insists that it be reconsidered, stating that the assignment has been brought into use, the IFRB shall apply the procedure of No. **1255** of the Radio Regulations, and the two-month period provided for that purpose shall start from the date on which a station in the corresponding allotment area is brought into service.

8. An administration may use a channel allotted to it in a given area by assigning frequencies to stations of its fixed or mobile services on conditions that:

– the assigned bandwidth of the station of the fixed or mobile service is totally within the allotted channel or channels;

– the station of the fixed or mobile service shall not cause, to a broadcasting station operated in accordance with the Plan with standardized parameters, interference greater than that obtained from Tables 5.I and 5.II in Chapter 5 of Annex 1;

– the service rendered by the station of the fixed or mobile service does not claim protection greater than that of a broadcasting station with standardized parameters in the same allotment area.

ARTICLE 7

Special Arrangements

In order to supplement the procedures laid down in these provisions, or to facilitate application of the procedures provided for in Articles 4, 5 and 6, administrations may conclude or continue special arrangements in conformity with the applicable provisions of the Convention and the Radio Regulations.

ARTICLE 8

Plan

The Plan appears in Annex 4 to the Agreement and consists of:

Part A: List of allotments

Part B: Maps showing the allotment areas as defined in Article 1

Part C: Technical criteria.

The IFRB shall maintain an up-to-date master copy of the Plan. It shall include all allotments derived from the planning at this Conference plus all modifications made as a result of the successful application of the modification procedure described in Section 1 of Article 4. The IFRB will periodically publish the list of assignments to broadcasting stations in the planned band.

The Secretary-General shall be informed by the IFRB of any modifications made to the Plan and shall publish an up-to-date version of the Plan in an appropriate form when justified by circumstances.

ARTICLE 9

Scope of Application of the Agreement

9.1 The Agreement is binding upon the Contracting Members in their mutual relations, but not in their relations with non-contracting countries.

9.2 Should a Contracting Member formulate reservations on the application of any provision of the Agreement, the other Contracting Members shall be free to disregard that provision in their relations with the Member that has made the reservations.

ARTICLE 10

Approval or Ratification of the Agreement

The signatory Members shall notify the Secretary-General of their approval or ratification of this Agreement as soon as possible by depositing an instrument of approval or ratification; the Secretary-General shall immediately inform the other Members of the Union.

ARTICLE 11

Accession to the Agreement

11.1 Any Member of the Union in Region 2 which has not signed the Agreement may accede to it at any time by depositing an instrument of accession with the Secretary-General, who shall immediately inform the other Members of the Union. Accession shall apply to the Plan as it stands at the time of accession and shall be made without reservation.

11.2 Accession to the Agreement shall become effective on the date on which the instrument of accession is received by the Secretary-General.

ARTICLE 12

Denunciation of the Agreement

12.1 Any Contracting Member may denounce the Agreement at any time by a notification sent to the Secretary-General, who shall inform the other Members of the Union.

12.2 Denunciation shall become effective one year after the date on which the Secretary-General receives the notification of denunciation.

ARTICLE 13

Entry into Force of the Agreement

This Agreement shall enter into force on 1 July 1990 at 0001 hours UTC.

ARTICLE 14

Duration of the Agreement

The Agreement shall remain in force until revised by a competent administrative radio conference for Region 2.

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ANNEX 1

**to the Regional Agreement for the use of
the band 1 605 -1 705 kHz in Region 2
(Rio 88 Agreement)**

TECHNICAL DATA

to be used in the application of the Agreement

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CHAPTER 1

Definitions, symbols and units

1.1 *Definitions*

In addition to the definitions given in the Radio Regulations, the following definitions and symbols apply:

1.1.1 *Broadcasting channel (AM)*

A part of the frequency spectrum, equal to the necessary bandwidth of AM sound broadcasting stations, and characterized by the nominal value of the carrier frequency located at its centre.

1.1.2 *Nominal usable field strength (E_{nom})*

Agreed minimum value of the field strength required to provide satisfactory reception, under specified conditions, in the presence of atmospheric noise, man-made noise and interference from other transmitters. The value of nominal usable field strength has been employed as the reference for planning.

1.1.3 *Service area*

The area limited by the contour within which the calculated level of the groundwave field strength is protected from objectionable interference in accordance with the provisions of Chapter 3.

1.1.4 *Audio-frequency (AF) signal-to-interference ratio*

The ratio (expressed in decibels) between the values of the voltage of the wanted signal and the voltage of the interfering signal, measured under specified conditions, at the audio-frequency output of the receiver. These specified conditions include various parameters such as the frequency separation between the wanted carrier and the interfering carrier, the emission characteristics (type and percentage of modulation, etc.), levels of input and output of the receiver and its characteristics (selectivity, sensitivity to intermodulation, etc.).

1.1.5 *Audio-frequency (AF) protection ratio*

Agreed minimum value of the audio-frequency signal-to-interference ratio corresponding to a subjectively defined reception quality.

1.1.6 *Radio-frequency (RF) signal-to-interference ratio*

The ratio (expressed in decibels) between the values of the radio-frequency voltage of the wanted signal and of the interfering signal, measured at the input of the receiver under specified conditions. These specified conditions include various parameters such as the frequency separation between the assigned frequency of the wanted signal and the assigned frequency of the interfering signal, the emission characteristics (type and percentage of modulation, etc.), levels of input and output of the receiver and its characteristics (selectivity, sensitivity to intermodulation, etc.).

1.1.7 *Radio-frequency (RF) protection ratio*

The radio-frequency signal-to-interference ratio which, in well-defined conditions, makes it possible to obtain the audio-frequency protection ratio at the output of a receiver. These specified conditions include various parameters such as the frequency separation between the assigned frequency of the wanted signal and the assigned frequency of the interfering signal, the emission characteristics (type and percentage of modulation, etc.), levels of input and output of the receiver and its characteristics (selectivity, sensitivity to intermodulation, etc.).

1.1.8 *Relative radio-frequency (RF) protection ratio*

This ratio is the difference (expressed in decibels) between the protection ratio when the assigned frequencies of the wanted and interfering signals have a difference of Δf_a (kHz) and the protection ratio when the Δf_a of these signals is equal to zero.

1.1.9 *Daytime operation*

Operation between the times of sunrise and sunset at the transmitter site.

1.1.10 *Night-time operation*

Operation between the times of sunset and sunrise at the transmitter site.

1.1.11 *Station power*

Unmodulated carrier power supplied to the antenna.

1.1.12 *Groundwave*

Electromagnetic wave which is propagated along or near the surface of the Earth and which has not been reflected by the ionosphere.

1.1.13 *Skywave*

Electromagnetic wave which has been reflected by the ionosphere.

1.1.14 *Skywave field strength, 50% of the time*

The skywave field strength during the reference hour which is exceeded for 50% of the nights of the year. The reference hour is the period of one hour beginning one and a half hours after sunset and ending two and a half hours after sunset at the midpoint of the short great-circle path.

1.1.15 *Characteristic field strength (E_c)*

The field strength, at a reference distance of 1 km in a horizontal direction, of the groundwave propagated along perfectly conducting ground for a 1 kW station power, taking into account losses in a real antenna.

Note 1 – The gain *(G)* of the transmitting antenna relative to an ideal short vertical antenna is given in dB, by the following equation:

$$G = 20 \log \frac{E_c}{300} \quad (1)$$

where

E_c is expressed in mV/m.

Note 2 – The effective monopole radiated power (e.m.r.p.) is given in dB(kW) by the following equation:

$$\text{e.m.r.p.} = 10 \log P_t + G \quad (2)$$

where

P_t is the station power (kW).

1.2 *Symbols and units*

Hz :	hertz
kHz :	kilohertz
W :	watt
kW :	kilowatt
mV/m :	millivolt/metre
μV/m :	microvolt/metre
dB :	decibel
dB(μV/m) :	decibels with respect to 1 μV/m
dBW :	decibels with respect to 1 W
dB(kW) :	decibels with respect to 1 kW
mS/m :	millisiemens/metre
σ :	ground conductivity

CHAPTER 2

Propagation

2.1 *Groundwave propagation*

2.1.1 *Ground conductivity*

When required in the application of Annex 2 for groundwave propagation calculations in the band 1 605 - 1 705 kHz, use shall be made of the edition of the Atlas of Ground Conductivity contained in the IFRB Technical Standards which is valid on the date of receipt of the notice by the IFRB (see Recommendation 3).

2.1.2 *Field strengh curves for groundwave propagation*

The curves shown in Figure 2.1 shall be used for determining groundwave propagation in the frequency range 1 605 - 1 705 kHz. These curves are computed for 1 655 kHz.

The curves are labelled with ground conductivities in millisiemens/metre. All curves, except the 5 000 mS/m (sea water) curve, are derived for a relative dielectric constant of 15. The sea water curve is derived for a relative dielectric constant of 80.

2.1.3 *Calculation of groundwave field strength*

When necessary, using the Atlas of Ground Conductivity, the relevant conductivity or conductivities for the chosen path are determined. If only one conductivity is representative, the method for homogeneous paths is used. If several conductivities are involved, the method for non-homogeneous paths is used.

2.1.3.1 *Homogeneous paths*

The vertical component of the field strength for a homogeneous path is represented in Figure 2.1 as a function of distance, for various values of ground conductivity.

The distance in kilometres is shown on a logarithmic scale on the abscissa. The field strength is shown on a linear scale on the ordinate in decibels above 1 μV/m. The graph is standardized for a characteristic field strength of 100 mV/m corresponding to an effective monopole radiated power (e.m.r.p.) of –9.5 dB relative to 1 kW. The straight line marked “100 mV/m at 1 km” is the field strength on the assumption that the antenna is erected on a surface of perfect conductivity.

For omnidirectional antenna systems having a different characteristic field strength, correction must be made according to either of the following equations:

$$E = E_0 \times \frac{E_c}{100} \times \sqrt{P}$$

if field strengths are expressed in mV/m, or

$$E = E_0 + E_c - 100 + 10 \log P$$

if field strengths are expressed in dB(μV/m).

For directional antenna systems, correction must be made according to either of the following equations:

$$E = E_0 \times \frac{E_R}{100}$$

if field strengths are expressed in mV/m, or

$$E = E_0 + E_R - 100$$

if field strengths are expressed in dB(μV/m),

where

E : resulting field strength

E_0 : field strength read from Figure 2.1

E_R : actual field strength at a particular azimuth at 1 km

E_c: characteristic field strength

P : station power in kW.

Figure 2.2 consists of three pairs of scales to be used with Figure 2.1. Each pair contains one scale labelled in decibels and another in millivolts per metre. Each pair can be cut out and trimmed as a unit to be used as sliding ordinate scales. The scales allow graphical conversion between decibels and millivolts per metre, and are used to make graphical determinations of field strengths. Other methods of making calculations on Figure 2.1 may be used, including the use of dividers to adjust for values of E_R that differ from 100 mV/m at 1 km. However, any method used will follow steps similar to those described below.

For both omnidirectional and directional antenna systems the value of E_R must be found. For omnidirectional systems, E_R can be determined by using either of the following equations:

$$E_R = E_c \sqrt{P}$$

if field strengths are expressed in mV/m, or

$$E_R = E_c + 10 \log P$$

if field strengths are expressed in dB(μV/m).

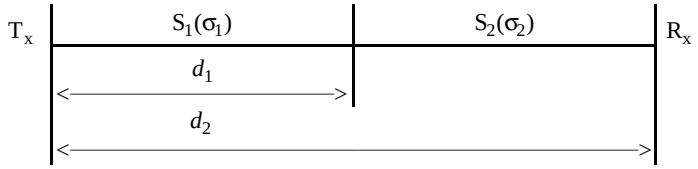
To determine the field strength at a given distance, the scale is placed at that distance with the 100 dB(μV/m) point of the scale resting on the appropriate conductivity curve. The value of E_R is then found on the scale and the point on the underlying graph (which lies underneath the E_R point of the scale) yields the field strength at the given distance.

To determine the distance at a given field strength, the E_R value is found on the sliding scale and that point is placed directly at the level of the given field strength on the appropriate graph. The scale is then moved horizontally until the 100 dB(μV/m) point of the scale coincides with the applicable conductivity curve. The distance may then be read from the abscissa of the graph.

2.1.3.2 *Non-homogeneous paths*

In this case, the equivalent distance or Kirke method shall be used. To apply this method, Figure 2.1 can also be used.

Consider a path whose sections S_1 and S_2 have lengths d_1 and $(d_2 - d_1)$, and conductivities σ_1 and σ_2 respectively, as shown in the following figure:



The method is applied as follows:

a) taking section S_1 first, we read the field strength corresponding to conductivity σ_1 at distance d_1 on Figure 2.1;

b) as the field strength remains constant at the point of discontinuity, the value immediately after the discontinuity must be equal to that obtained in *a)* above. As the conductivity of the second section is σ_2, the curve corresponding to conductivity σ_2 gives the equivalent distance to that which would be obtained at the same field strength arrived at in *a)*. This equivalent distance is d. Distance d is larger than d_1 when σ_2 is larger than σ_1. Otherwise d is less than d_1;

c) the field strength at the real distance d_2 is determined by taking the corresponding curve for conductivity σ_2 and reading off the field strength obtained at the equivalent distance $d + (d_2 - d_1)$;

d) for successive sections with different conductivities, procedures *b)* and *c)* are repeated.

2.2 *Skywave propagation*

The calculation of skywave field strength shall be conducted in accordance with the procedure given below. Skywave propagation is considered to be significant at night only.

2.2.1 *List of symbols*

d : short great-circle path distance (km);

E_c: characteristic field strength (mV/m at 1 km for 1 kW);

$f(\theta)$: ratio of vertical to horizontal plane field strength at elevation angle θ;

f: frequency (kHz);

F : unadjusted annual median skywave field strength, (in dB (μV/m);

F_c : field strength read from Figure 2.8 or Table 2.III for a characteristic field strength of 100 mV/m;

$F(50)$: skywave field strength, 50% of the time, in dB (μV/m);

P : station power (kW);

θ : elevation angle from the horizontal (degrees).

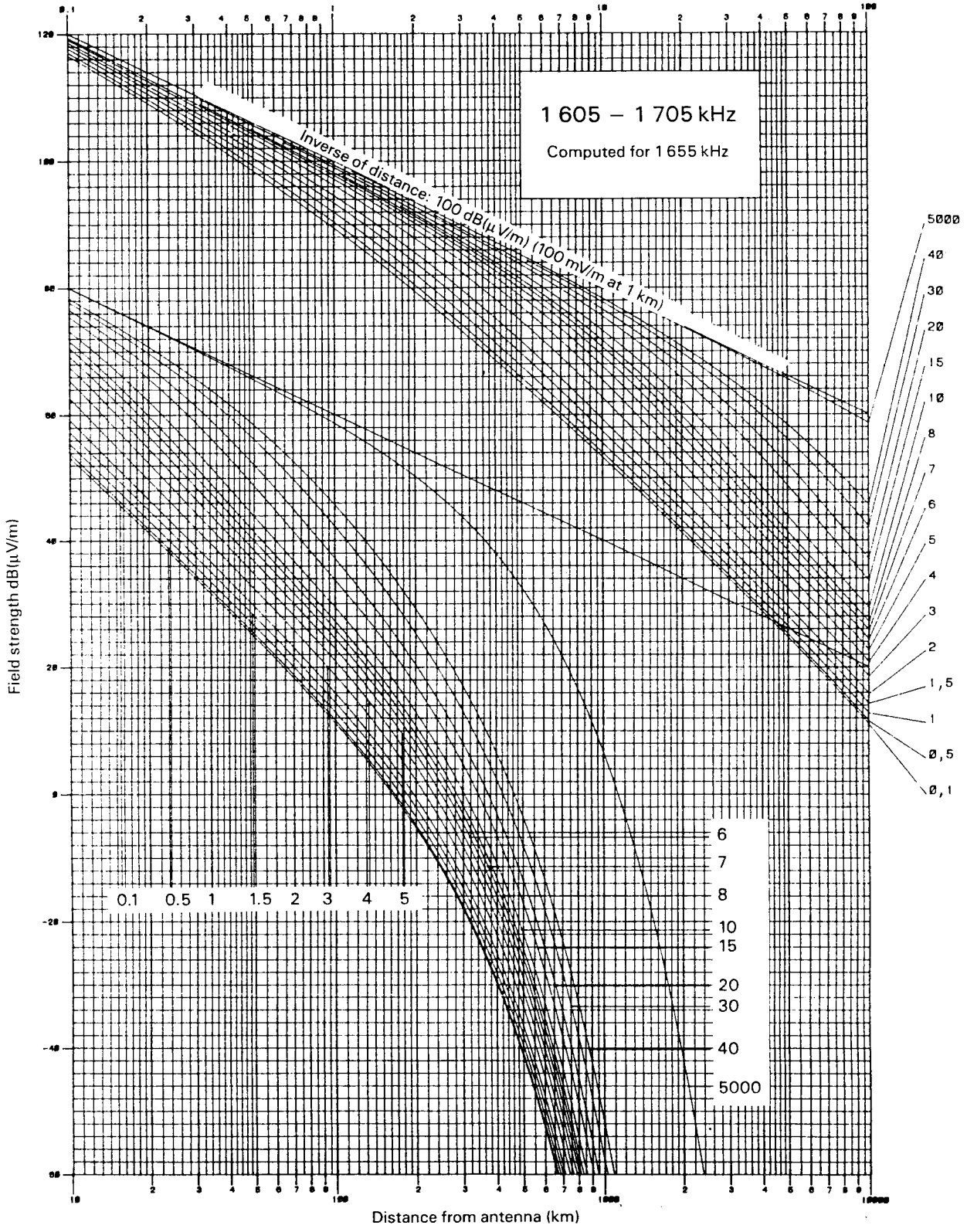


FIGURE 2.1 – *Groundwave field strength versus distance (for a characteristic field strength of 100 mV/m)*

Note : The curves are labelled for various ground conductivities expressed in millisiemens per metre (mS/m).

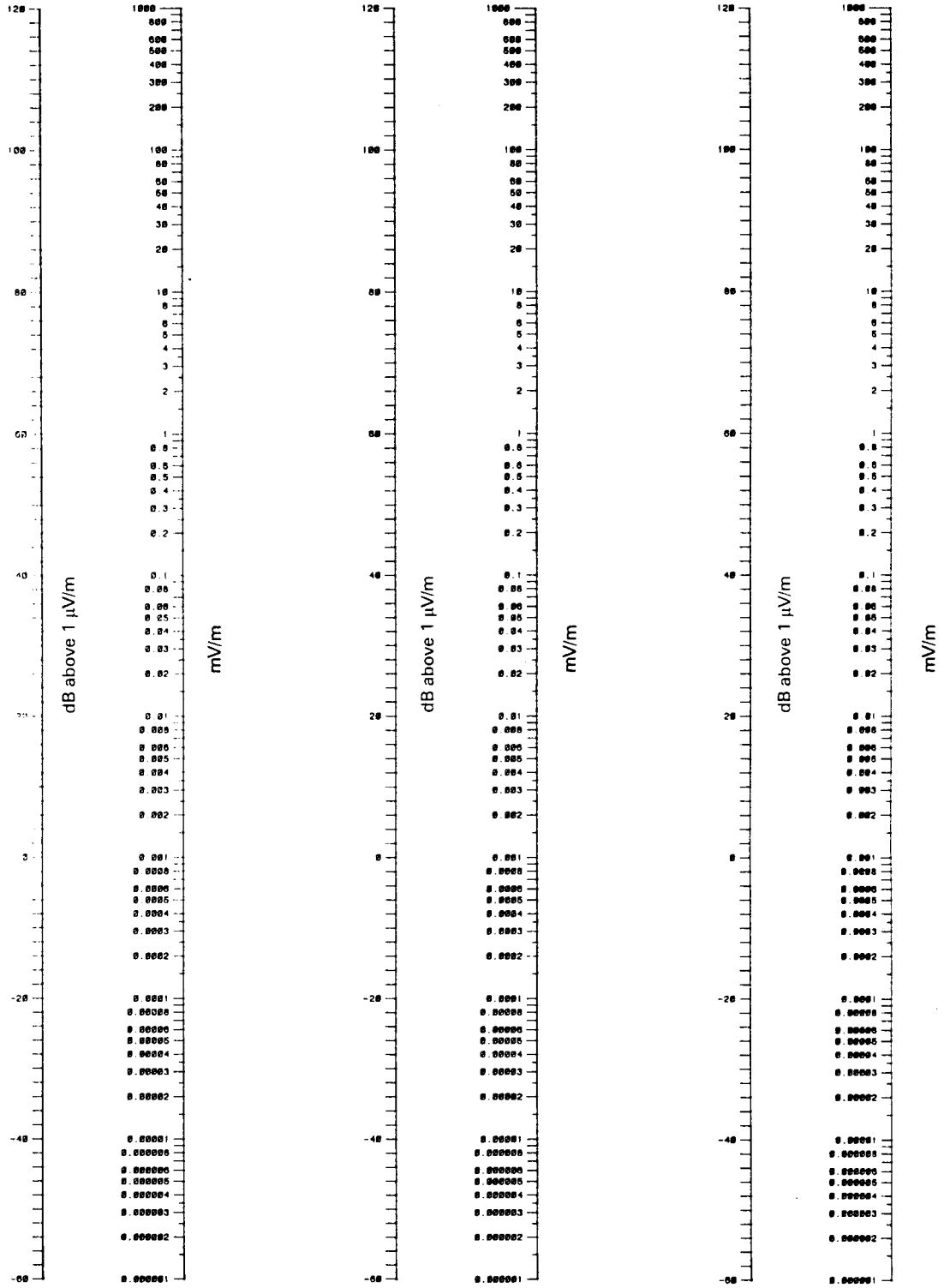


FIGURE 2.2 – *Scales for use with Figure 2.1*

2.2.2 *General procedure*

Radiation in the horizontal plane of an omnidirectional antenna fed with 1 kW (characteristic field strength E_c) is known either from design data or, if the actual design data are not available, from Figure 2.3, which is included for information.

Figure 2.4, which is included for information, illustrates the vertical radiation characteristics for different heights of vertical antennas assuming a transmitter power of 1 kW and a perfectly conducting ground system.

However, Figure 2.5, which shows the characteristic field strength of an antenna based on a 1 ohm resistance loss, shall be used for calculations to determine compliance with the Agreement. The IFRB shall use this curve within the limits of ± 10% for the validation of the E_c submitted by administrations.

Elevation angle θ is given by:

$$\theta = \arctan\left(0.00752 \cot \frac{d}{444.54}\right) - \frac{d}{444.54} \quad \text{degrees} \qquad (1)$$

$$0° \leq \theta \leq 90°$$

Figure 2.6 and Table 2.I respectively give graphical and tabular representations of equation (1). Although the formula shall be used in application of the Agreement, the above figure and table may be used by administrations to estimate the value of the elevation angle.

It is assumed that the Earth is a smooth sphere with an effective radius of 6 367.6 km and that reflections occur from an ionospheric height of 96.5 km.

The ratio $f(\theta)$ for a pertinent elevation angle θ is calculated by means of equation (2) of Appendix 1.

Figure 2.7 and Table 2.II respectively give graphical and tabular representations of $f(\theta)$. Although the formula must be used in application of the Agreement, administrations may use the above figure and tabulation to estimate the value of $f(\theta)$ for simple vertical antennas.

The product $E_c f(\theta)\sqrt{P}$ is thus determined for an omnidirectional antenna. For a directional antenna, $E_c f(\theta)\sqrt{P}$ may be determined from the radiation pattern. $E_c f(\theta)\sqrt{P}$ is the field strength at 1 km at the appropriate elevation angle and azimuth.

The unadjusted annual median skywave field strength F is given by:

$$F = F_c + 20 \log \frac{E_c f(\theta)\sqrt{P}}{100} \quad \text{dB}(\mu\text{V/m}) \qquad (2)$$

where F_c is the direct reading from the field strength curve in Figure 2.8 or Table 2.III.

For the application of the Agreement, the field strength shall be taken from Table 2.III, using, if necessary, linear interpolation of the field strength expressed in μV/m.

Note – The values of F_c in Figure 2.8 and Table 2.III are normalized to 100 mV/m at 1 km, corresponding to an effective monopole radiated power (e.m.r.p.) of –9.5 dB(kW).

For distances greater than 4 250 km, it should be noted that F_c may be expressed by:

$$F_c = \frac{231}{3 + d/1000} - 35.5 \quad \text{dB}(\mu\text{V/m}) \qquad (3)$$

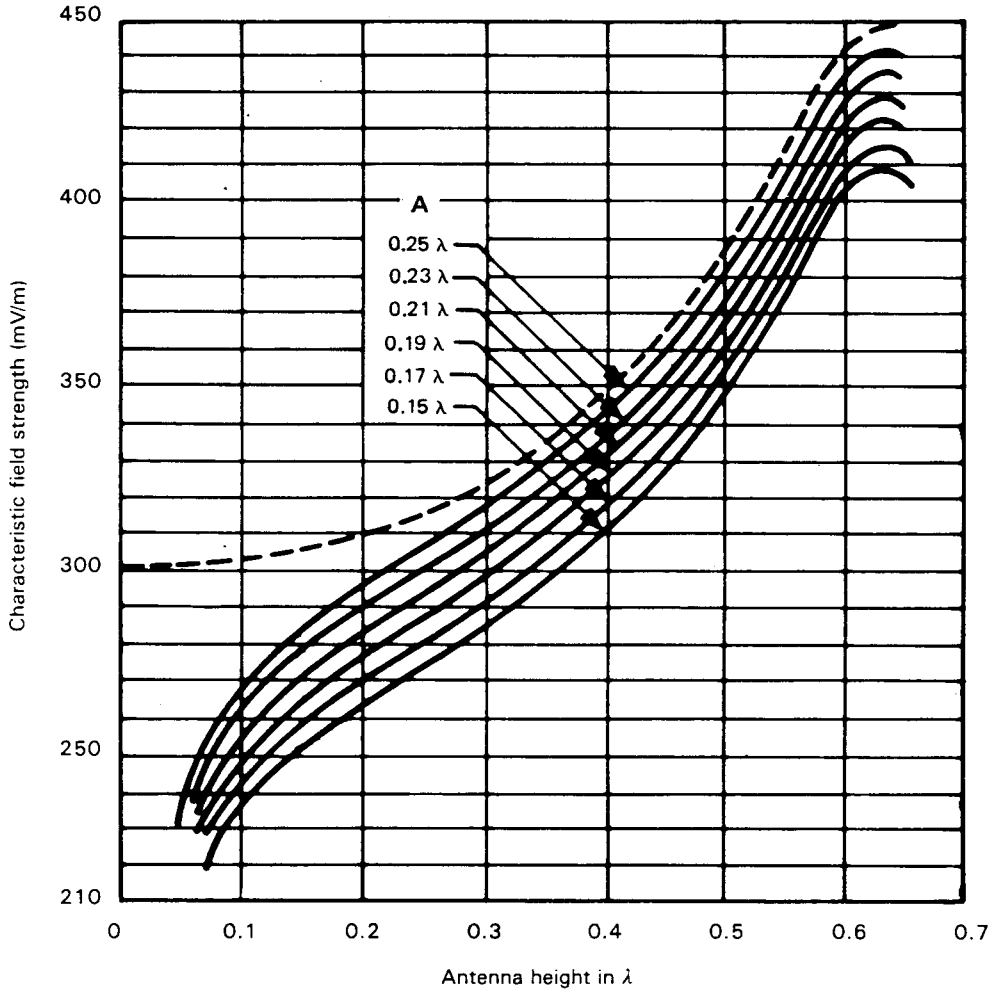
2.2.3 *Skywave field strength, 50% of the time*

This is given by:

$$F(50) = F \text{ dB}(\mu\text{V/m}) \qquad (4)$$

2.2.4 *Sunrise and sunset time*

The local time of sunrise and sunset shall be determined by using Figure 2.9 for various geographical latitudes and for each month of the year. The time is the local meridian time at the point concerned and shall be converted to the appropriate standard time.



A: Radius of ground system
Full lines: Real antenna correctly designed
Dashed line: Ideal antenna on a perfectly conducting ground

FIGURE 2.3 – *Characteristic field strengths for simple vertical antennas, using 120-radial ground systems*

(provided for information purposes)

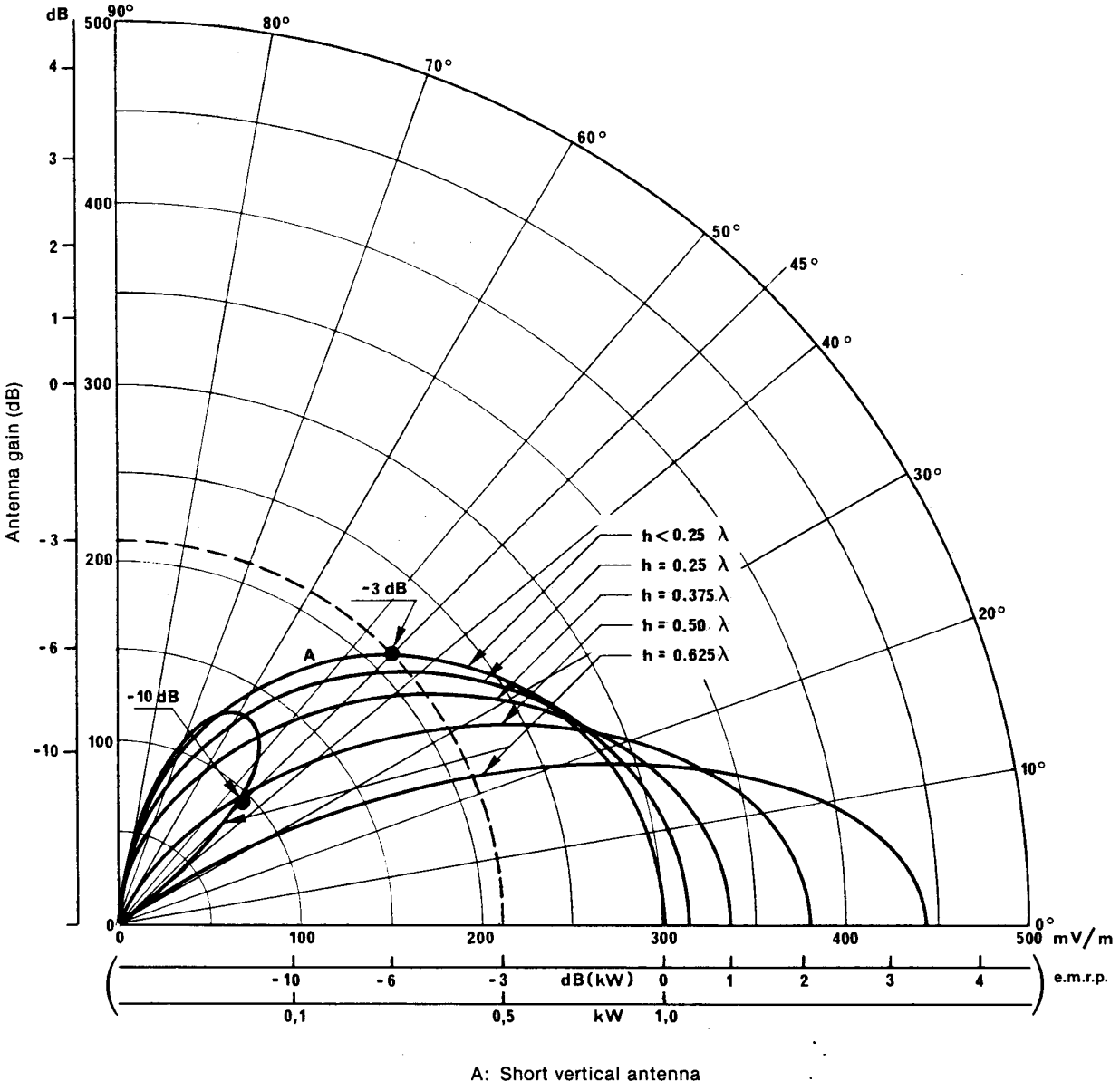


FIGURE 2.4 – *Effective monopole radiated power (e.m.r.p.) and field strength at a distance of 1 km as a function of elevation angle, for different heights of vertical antennas, assuming a transmitter power of 1 kW*

(provided for information purposes)

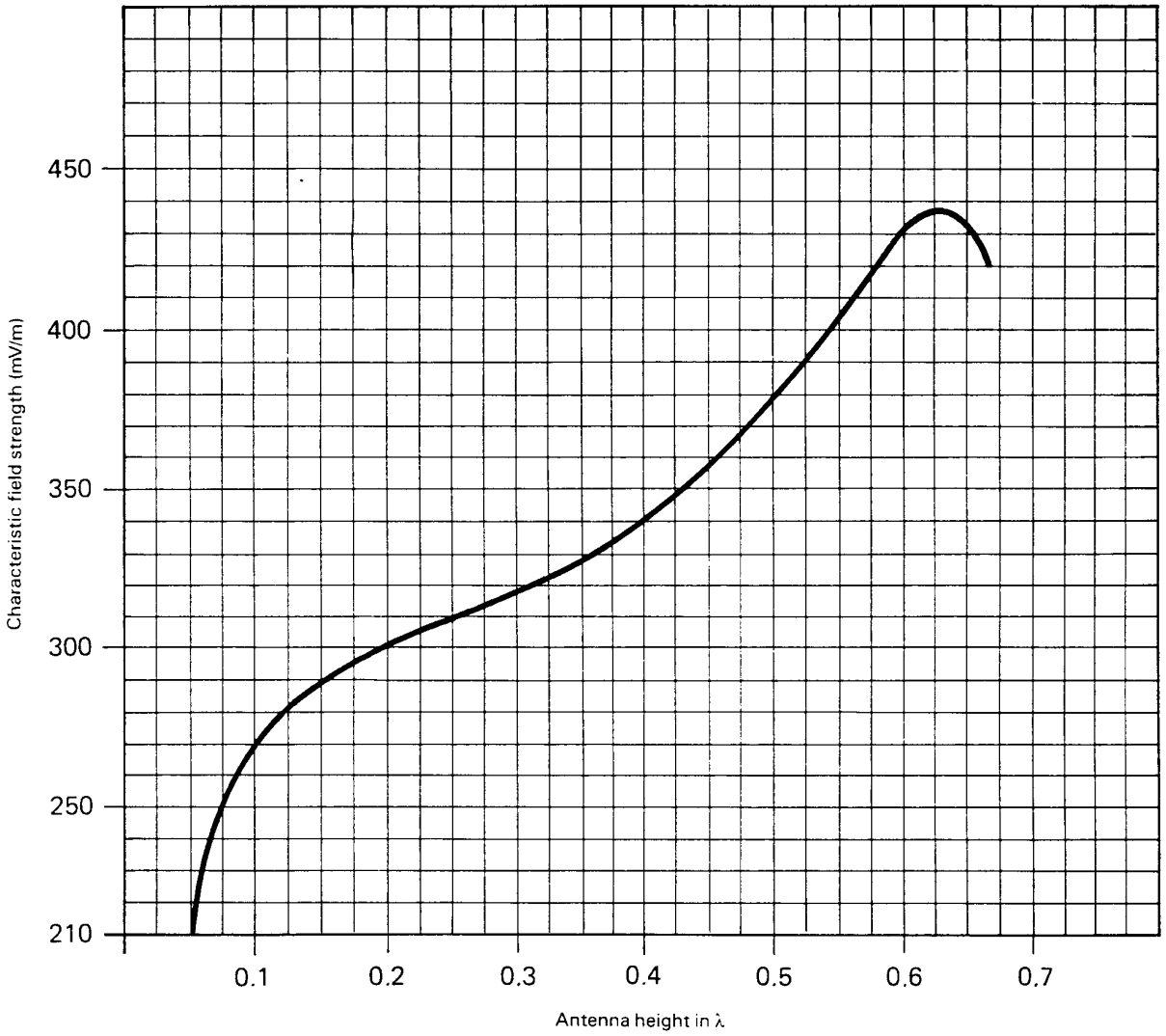


FIGURE 2.5 – *Characteristic field strength of an antenna, based on a 1 ohm resistance loss*

TABLE 2.1 – *Elevation angle versus distance*

(providef for information purposes)

Distance (km)	Elevation angle (degrees)
50	75.3
100	62.2
150	51.6
200	43.3
250	36.9
300	31.9
350	27.9
400	24.7
450	22.0
500	19.8
550	18.0
600	16.3
650	14.9
700	13.7
750	12.6
800	11.7
850	10.8
900	10.0
950	9.3
1000	8.6
1050	8.0
1100	7.4
1150	6.9
1200	6.4
1250	5.9
1300	5.4
1350	5.0
1400	4.6
1450	4.3
1500	3.9
1550	3.5
1600	3.2
1650	2.9
1700	2.6
1750	2.3
1800	2.0
1850	1.7
1900	1.5
1950	1.2
2000	1.0
2050	0.7
2100	0.5
2150	0.2
2200	0.0
2250	0.0
2300	0.0
2350	0.0
2400	0.0

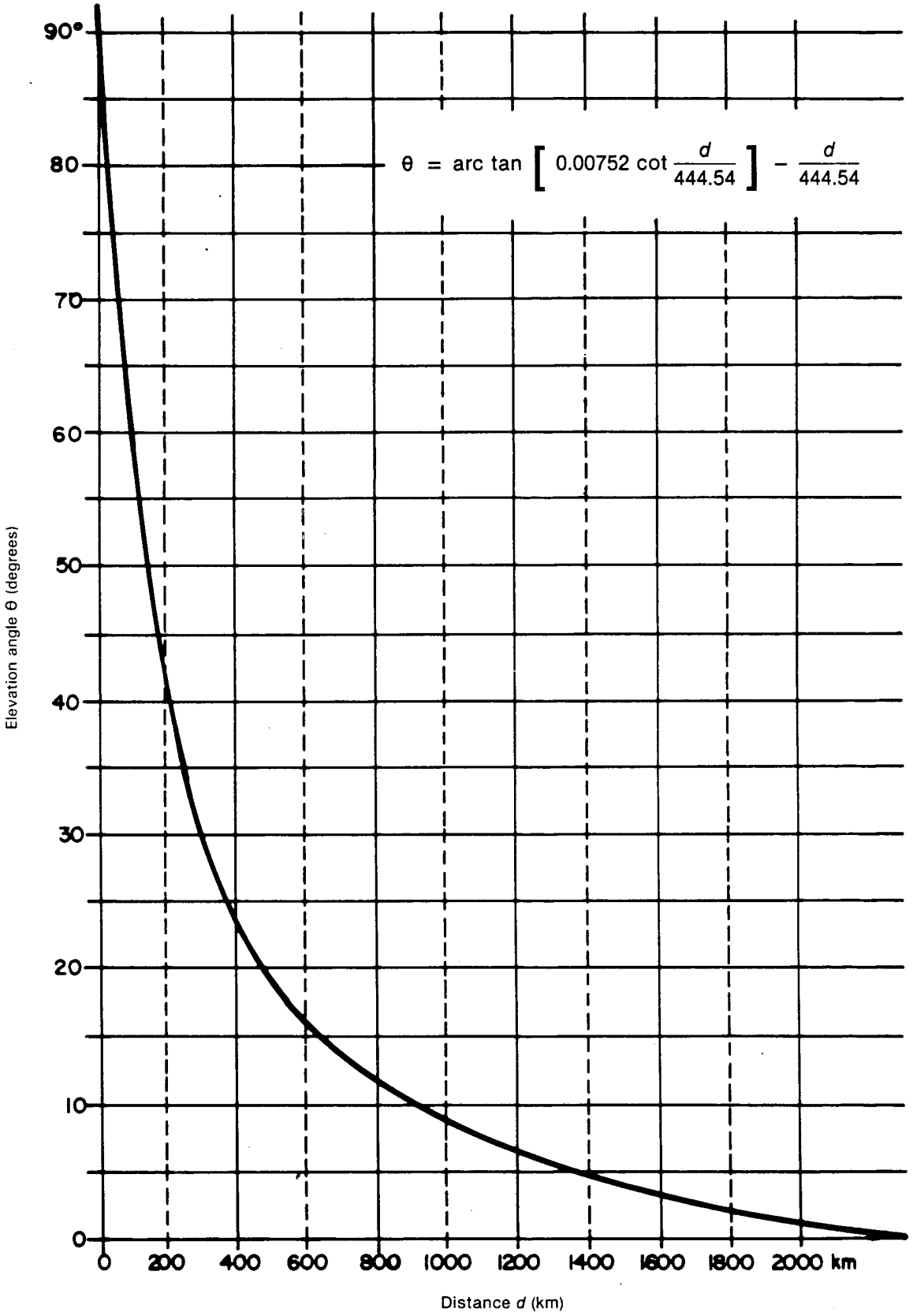


FIGURE 2.6 – *Elevation angle versus distance*
(provided for information purposes)

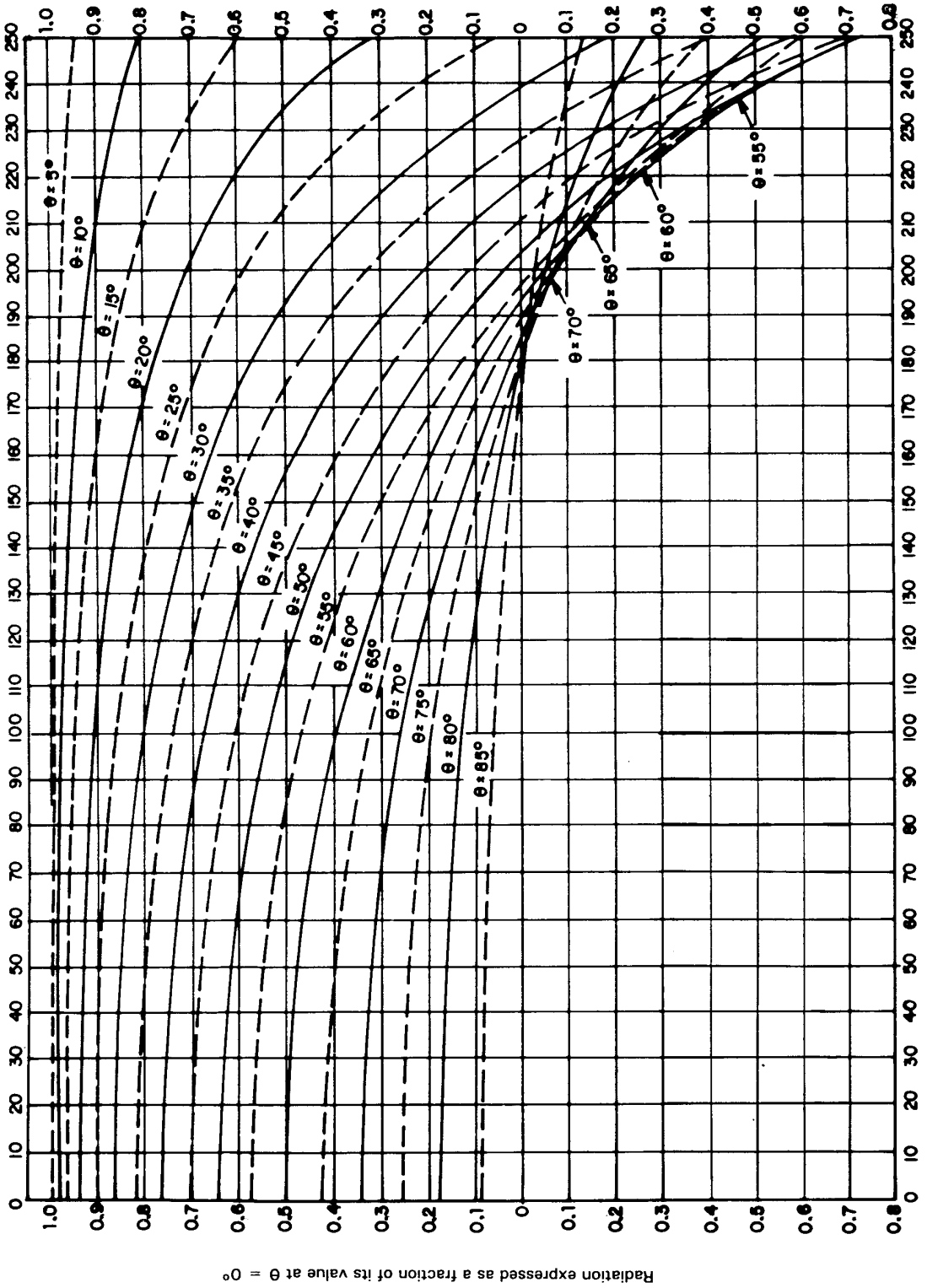


FIGURE 2.7 – *Vertical plane radiation of simple vertical antennas as a function of electrical tower height for various values of elevation angle (θ)*
(provided for information purposes)

TABLE 2.II – *f(θ) values for simple vertical antennas as a function of electrical tower height for different values of elevation angle* θ

(provided for information purposes)

Elevation angle (degrees)	Electrical tower height					
	0.110 λ	0.130 λ	0.150 λ	0.170 λ	0.190 λ	0.210 λ
0	1.000	1.000	1.000	1.000	1.000	1.000
1	1.000	1.000	1.000	1.000	1.000	1.000
2	0.999	0.999	0.999	0.999	0.999	0.999
3	0.999	0.998	0.998	0.998	0.998	0.998
4	0.997	0.997	0.997	0.997	0.997	0.997
5	0.996	0.996	0.996	0.995	0.995	0.995
6	0.994	0.994	0.994	0.993	0.993	0.993
7	0.992	0.992	0.991	0.991	0.991	0.990
8	0.989	0.989	0.989	0.988	0.988	0.987
9	0.987	0.986	0.986	0.985	0.985	0.984
10	0.984	0.983	0.983	0.982	0.981	0.980
11	0.980	0.980	0.979	0.978	0.977	0.976
12	0.976	0.976	0.975	0.974	0.973	0.971
13	0.972	0.972	0.971	0.969	0.968	0.967
14	0.968	0.967	0.966	0.965	0.963	0.961
15	0.963	0.962	0.961	0.959	0.958	0.956
16	0.958	0.957	0.956	0.954	0.952	0.950
17	0.953	0.952	0.950	0.948	0.945	0.943
18	0.947	0.946	0.944	0.942	0.940	0.937
19	0.941	0.940	0.938	0.935	0.933	0.930
20	0.935	0.933	0.931	0.929	0.926	0.922
22	0.922	0.920	0.917	0.914	0.911	0.907
24	0.907	0.905	0.902	0.898	0.894	0.890
26	0.892	0.889	0.885	0.882	0.877	0.872
28	0.875	0.872	0.868	0.864	0.858	0.852
30	0.857	0.854	0.849	0.844	0.839	0.832
32	0.838	0.834	0.830	0.824	0.818	0.811
34	0.819	0.814	0.809	0.803	0.795	0.789
36	0.798	0.793	0.788	0.781	0.774	0.766
38	0.776	0.771	0.765	0.758	0.751	0.742
40	0.753	0.748	0.742	0.735	0.725	0.717
42	0.730	0.724	0.718	0.710	0.702	0.692
44	0.705	0.700	0.693	0.685	0.676	0.666
46	0.680	0.674	0.667	0.659	0.650	0.639
48	0.654	0.648	0.641	0.633	0.623	0.612
50	0.628	0.621	0.614	0.606	0.596	0.585
52	0.600	0.594	0.587	0.578	0.568	0.557
54	0.572	0.566	0.559	0.550	0.540	0.529
56	0.544	0.537	0.530	0.521	0.512	0.501
58	0.515	0.508	0.501	0.493	0.483	0.472
60	0.485	0.479	0.472	0.463	0.454	0.443

TABLE 2.II *(continued)*

Elevation angle (degrees)	Electrical tower height					
	0.230 λ	0.250 λ	0.270 λ	0.290 λ	0.311 λ	0.350 λ
0	1.000	1.000	1.000	1.000	1.000	1.000
1	1.000	1.000	1.000	1.000	1.000	1.000
2	0.999	0.999	0.999	0.999	0.999	0.999
3	0.998	0.998	0.998	0.998	0.998	0.997
4	0.997	0.996	0.996	0.996	0.996	0.995
5	0.995	0.994	0.994	0.994	0.993	0.992
6	0.992	0.992	0.991	0.991	0.990	0.989
7	0.990	0.989	0.988	0.988	0.987	0.985
8	0.987	0.986	0.985	0.984	0.983	0.980
9	0.983	0.982	0.981	0.980	0.978	0.975
10	0.979	0.978	0.977	0.975	0.973	0.969
11	0.975	0.973	0.972	0.970	0.968	0.963
12	0.970	0.968	0.966	0.964	0.962	0.955
13	0.965	0.963	0.961	0.958	0.955	0.949
14	0.959	0.957	0.955	0.952	0.948	0.941
15	0.953	0.951	0.948	0.945	0.941	0.932
16	0.947	0.944	0.941	0.937	0.933	0.924
17	0.941	0.937	0.934	0.930	0.925	0.914
18	0.934	0.930	0.926	0.921	0.916	0.904
19	0.926	0.922	0.918	0.913	0.907	0.894
20	0.919	0.914	0.909	0.904	0.898	0.883
22	0.902	0.897	0.891	0.885	0.877	0.861
24	0.885	0.879	0.872	0.865	0.856	0.837
26	0.866	0.859	0.852	0.843	0.833	0.811
28	0.846	0.838	0.830	0.820	0.809	0.795
30	0.825	0.816	0.807	0.797	0.784	0.758
32	0.803	0.794	0.784	0.772	0.759	0.729
34	0.780	0.770	0.759	0.747	0.732	0.701
36	0.756	0.746	0.734	0.721	0.705	0.671
38	0.732	0.720	0.708	0.694	0.677	0.642
40	0.706	0.695	0.681	0.667	0.649	0.612
42	0.681	0.668	0.654	0.639	0.621	0.582
44	0.654	0.641	0.627	0.611	0.593	0.552
46	0.628	0.614	0.600	0.583	0.564	0.523
48	0.600	0.587	0.572	0.555	0.536	0.494
50	0.573	0.559	0.544	0.527	0.507	0.465
52	0.545	0.531	0.515	0.498	0.479	0.436
54	0.517	0.503	0.487	0.470	0.451	0.408
56	0.488	0.474	0.459	0.442	0.423	0.381
58	0.460	0.446	0.431	0.414	0.395	0.353
60	0.431	0.418	0.403	0.387	0.368	0.328

TABLE 2.II *(end)*

Elevation angle (degrees)	Electrical tower height					
	0.400 λ	0.450 λ	0.500 λ	0.528 λ	0.550 λ	0.625 λ
0	1.000	1.000	1.000	1.000	1.000	1.000
1	1.000	1.000	0.999	0.999	0.999	0.999
2	0.998	0.998	0.998	0.997	0.997	0.995
3	0.997	0.996	0.995	0.994	0.993	0.989
4	0.994	0.992	0.990	0.989	0.988	0.981
5	0.991	0.988	0.985	0.983	0.981	0.970
6	0.986	0.983	0.979	0.975	0.972	0.957
7	0.982	0.977	0.971	0.967	0.962	0.941
8	0.976	0.970	0.962	0.957	0.951	0.924
9	0.970	0.963	0.953	0.945	0.938	0.904
10	0.963	0.954	0.942	0.933	0.924	0.882
11	0.955	0.945	0.930	0.919	0.909	0.859
12	0.947	0.934	0.917	0.905	0.893	0.834
13	0.938	0.923	0.903	0.889	0.875	0.807
14	0.929	0.912	0.889	0.872	0.857	0.773
15	0.918	0.899	0.873	0.855	0.837	0.748
16	0.908	0.886	0.857	0.836	0.815	0.717
17	0.897	0.873	0.840	0.817	0.795	0.684
18	0.885	0.859	0.823	0.797	0.772	0.651
19	0.873	0.844	0.804	0.776	0.749	0.617
20	0.860	0.828	0.785	0.755	0.726	0.582
22	0.833	0.796	0.746	0.710	0.677	0.510
24	0.805	0.763	0.705	0.665	0.625	0.436
26	0.776	0.728	0.663	0.618	0.574	0.363
28	0.745	0.692	0.621	0.570	0.522	0.290
30	0.714	0.655	0.577	0.522	0.470	0.219
32	0.682	0.619	0.534	0.475	0.419	0.151
34	0.649	0.582	0.492	0.428	0.368	0.085
36	0.617	0.545	0.450	0.383	0.321	0.025
38	0.584	0.509	0.409	0.340	0.275	–0.031
40	0.552	0.473	0.370	0.298	0.231	–0.083
42	0.519	0.438	0.332	0.258	0.190	–0.129
44	0.488	0.405	0.296	0.221	0.152	–0.170
46	0.457	0.372	0.262	0.187	0.117	–0.205
48	0.427	0.341	0.230	0.155	0.085	–0.235
50	0.397	0.311	0.201	0.126	0.056	–0.259
52	0.369	0.283	0.174	0.099	0.031	–0.278
54	0.341	0.257	0.149	0.076	0.009	–0.291
56	0.315	0.232	0.126	0.055	–0.010	–0.300
58	0.289	0.208	0.105	0.037	–0.026	–0.304
60	0.265	0.186	0.087	0.021	–0.039	–0.304
62				0.003	–0.049	–0.300
64				–0.003	–0.056	–0.292
66				–0.011	–0.062	–0.281
68				–0.017	–0.064	–0.267
70				–0.022	–0.065	–0.250
72				–0.025	–0.064	–0.231
74				–0.026	–0.061	–0.210
76				–0.026	–0.056	–0.138
78				–0.024	–0.051	–0.163
80				–0.022	–0.044	–0.138

Note – When the negative sign (–) appears in the Table, it signifies only the existence of a secondary lobe having a phase opposite to that of the main lobe in the vertical radiation pattern. For calculation purposes, ignore the negative sign and use only the absolute value of $f(\theta)$.

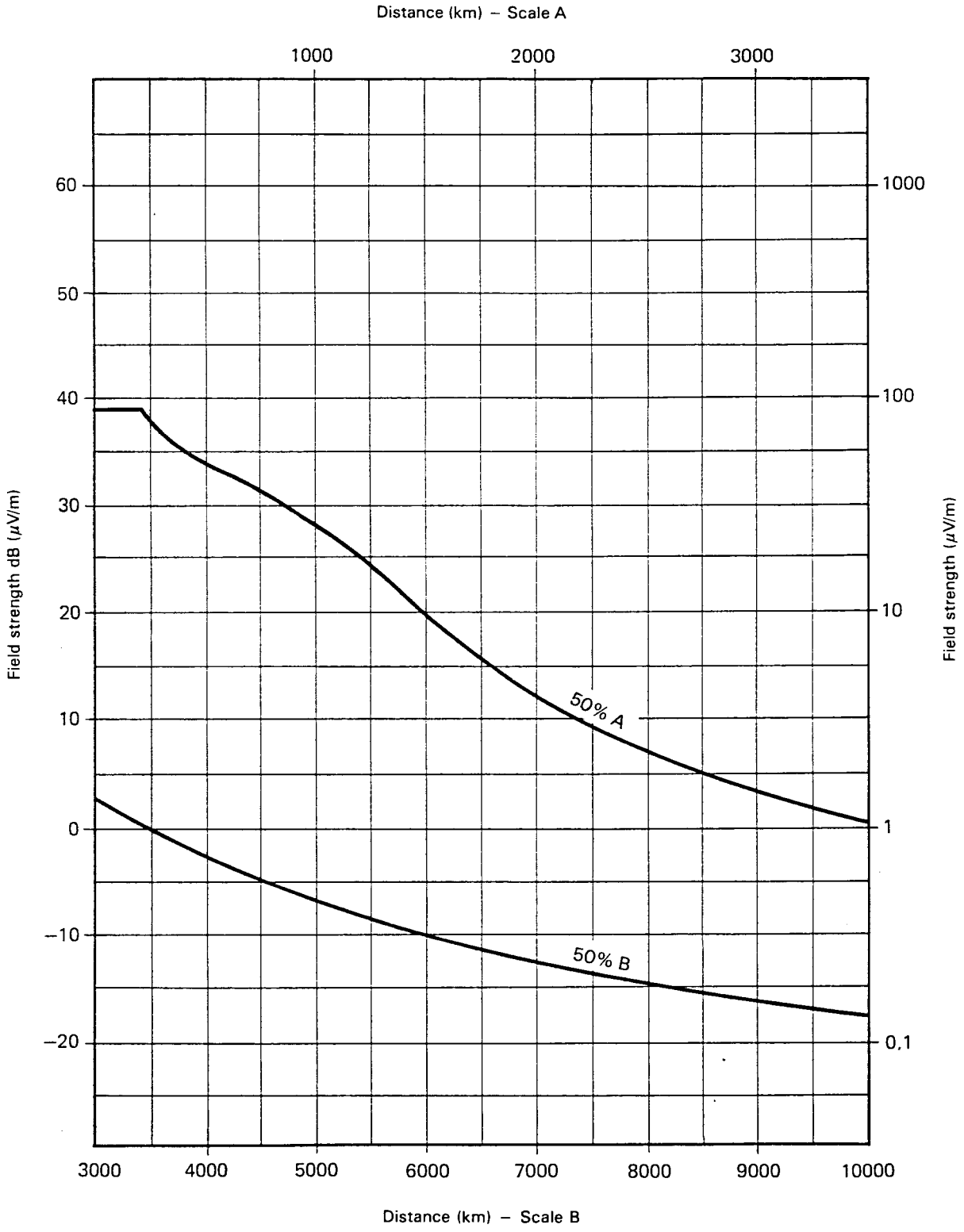


FIGURE 2.8 – *Skywave field strength versus distance for a characteristic field strength of 100 mV/m*

TABLE 2.III – *Skywave field strength versus distance (0 to 10 000 km) for a characteristc field strength of 100 mV/m*

d (km)	F_c (dB(μV/m)) 50%	F_c (μV/m) 50%
0-200	39.28	92.06
250	37.79	77.54
300	36.75	68.82
350	35.86	62.06
400	35.13	57.08
450	34.46	52.86
500	33.92	49.65
550	33.40	46.78
600	32.94	44.36
650	32.45	41.95
700	31.94	39.54
750	31.32	36.81
800	30.73	34.40
850	30.18	32.30
900	29.51	29.89
950	28.83	27.63
1000	28.14	25.54
1050	27.44	23.56
1100	26.79	21.84
1150	25.98	19.91
1200	25.25	18.30
1250	24.50	16.78
1300	23.71	15.32
1350	22.90	13.97
1400	22.08	12.71
1450	21.25	11.55
1500	20.42	10.50
1550	19.59	9.53
1600	18.66	8.57
1650	17.75	7.72
1700	16.87	6.98
1750	16.04	6.34
1800	15.28	5.80
1850	14.52	5.32
1900	13.78	4.89
1950	13.05	4.49
2000	12.34	4.14
2100	11.15	3.61
2200	10.05	3.18
2300	8.92	2.79
2400	8.13	2.55
2500	7.09	2.26
2600	6.16	2.03
2700	5.32	1.85
2800	4.58	1.69
2900	3.81	1.55

TABLE 2.III *(end)*

d (km)	F_c (dB(μV/m)) 50%	F_c (μV/m) 50%
3000	3.11	1.43
3100	2.45	1.33
3200	1.78	1.23
3300	1.18	1.15
3400	0.57	1.07
3500	0.02	1.00
3600	–0.53	0.94
3700	–1.08	0.88
3800	–1.59	0.83
3900	–2.08	0.79
4000	–2.52	0.75
4100	–3.01	0.71
4200	–3.46	0.67
4300	–3.90	0.64
4400	–4.33	0.61
4500	–4.74	0.58
4600	–5.15	0.55
4700	–5.54	0.53
4800	–5.93	0.51
4900	–6.30	0.48
5000	–6.67	0.46
5100	–7.02	0.45
5200	–7.37	0.43
5300	–7.71	0.41
5400	–8.04	0.40
5500	–8.37	0.38
5600	–8.68	0.37
5700	–8.99	0.36
5800	–9.29	0.34
5900	–9.59	0.33
6000	–9.88	0.32
6200	–10.43	0.30
6400	–10.97	0.28
6600	–11.48	0.27
6800	–11.97	0.25
7000	–12.44	0.24
7200	–12.90	0.23
7400	–13.33	0.22
7600	–13.75	0.21
7800	–14.15	0.20
8000	–14.54	0.19
8200	–14.92	0.18
8400	–15.28	0.17
8600	–15.63	0.17
8800	–15.97	0.16
9000	–16.29	0.15
9200	–16.61	0.15
9400	–16.91	0.14
9600	–17.21	0.14
9800	–17.50	0.13
10000	–17.77	0.13

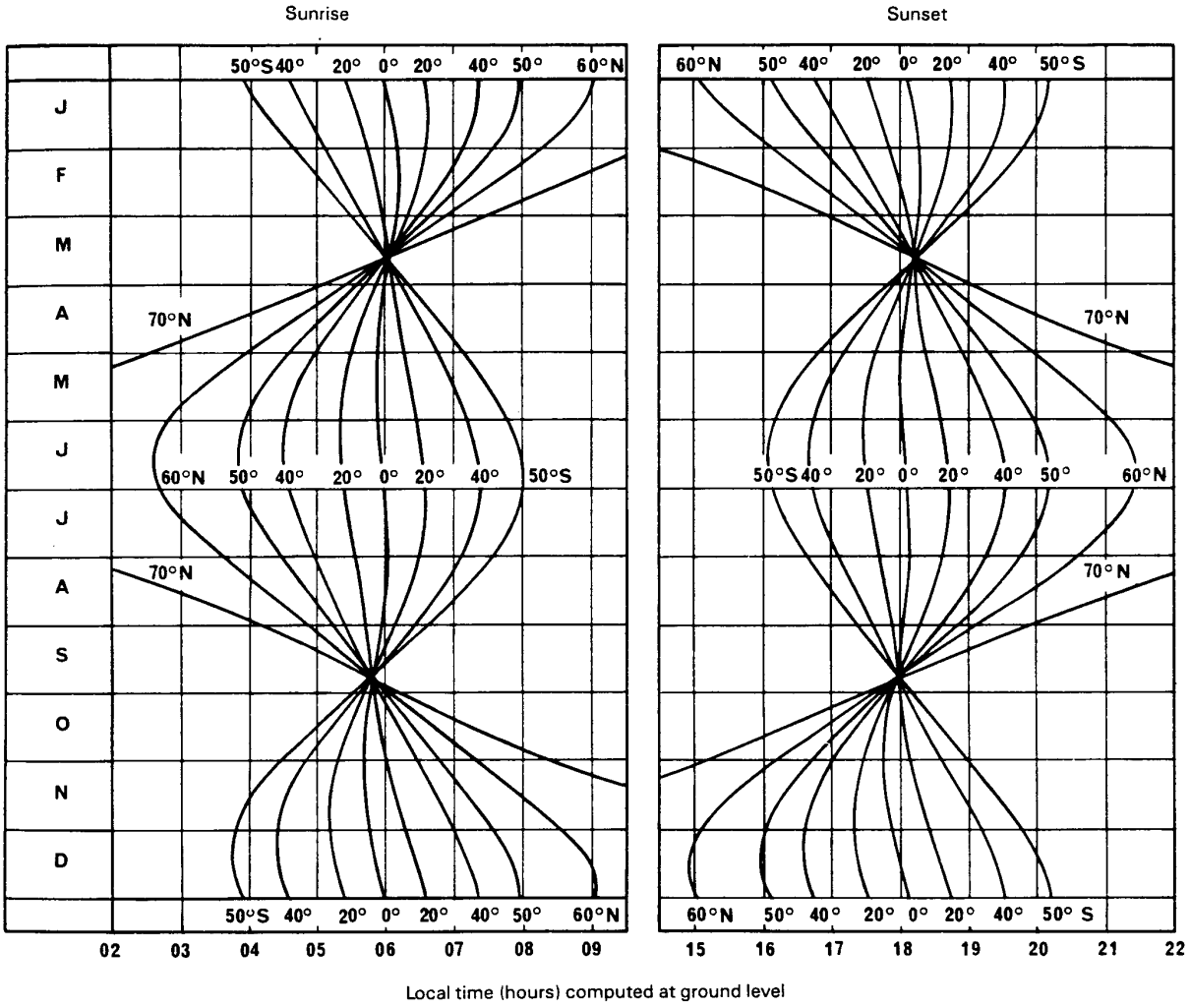


FIGURE 2.9 – *Times of sunrise and sunset for various months and geographical latitudes*

CHAPTER 3

Broadcasting standards and transmission characteristics

3.1 *Channel spacing*

The Plan is based on a channel spacing of 10 kHz and carrier frequencies which are integral multiples of 10 kHz, beginning at 1 610 kHz.

3.2 *Class of emission*

The Plan is based on double-sideband amplitude modulation with full carrier A3E.

Classes of emission other than A3E may also be used, for instance, to accommodate stereophonic systems, on condition that the energy level outside the necessary bandwidth does not exceed that normally expected in A3E emission.

3.3 *Bandwidth of emission*

The Plan is based on a necessary bandwidth of 10 kHz for which only 5 kHz audio bandwidth can be obtained. While this may be an appropriate value for some administrations, others may wish to employ wider bandwidth systems with necessary bandwidths of the order of 20 kHz. However, the protection ratios selected allow operation with 20 kHz occupied bandwidth without an appreciable increase in interference. Stations operating on the frequencies 1 610 and 1 700 kHz shall take into account No. **343** of the Radio Regulations.

3.4 *Frequency tolerance*

The frequency tolerance shall be 10 Hz.

3.5 *Nominal usable field strength (E_{nom})*

Table of nominal usable field strength

	Noise Zone 1	Noise Zone 2
Daytime	0.5 mV/m	1.25 mV/m
Night-time	3.3 mV/m	6 mV/m

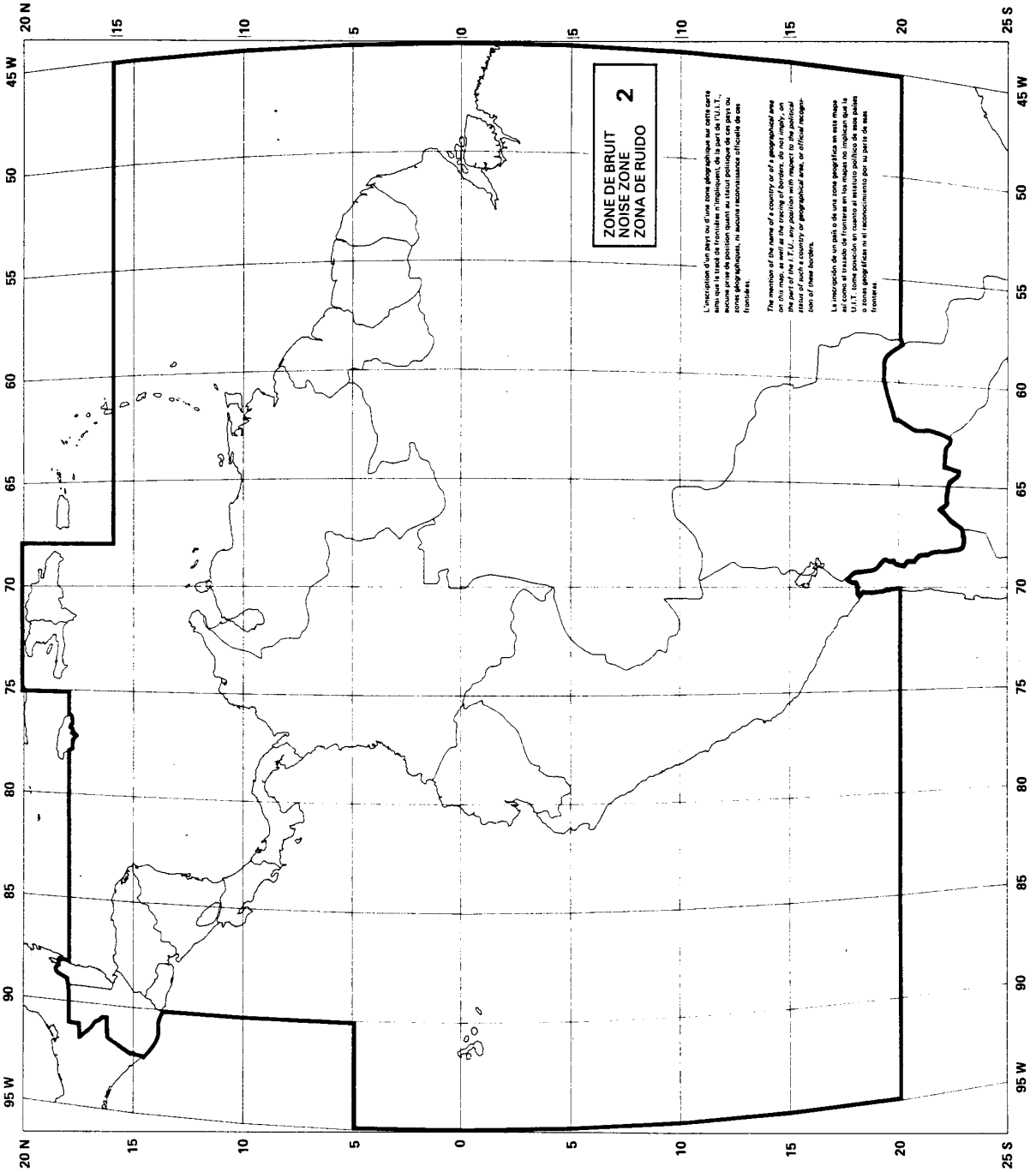
3.6 *Definition of noise zones*

Noise Zone 1

Comprises the whole of Region 2 with the exception of Noise Zone 2.

Noise Zone 2

Comprises the area within the line defined by the coordinates 20º S/45º W, the meridian 45º W to the coordinates 16º N/45º W, the parallel 16º N to the coordinates 16º N/68º W, the meridian 68º W to the coordinates 20º N/68º W, the parallel 20º N to the coordinates 20º N/75º W, the meridian 75º W to the coordinates 18º N/75º W, EXCEPT JAMAICA, the parallel 18º N to the coast of BELIZE, the northeast coast of BELIZE, and the frontier between MEXICO and BELIZE, the frontier between MEXICO and GUATEMALA, the south coast of GUATEMALA and EL SALVADOR until the meridian 90º W, the meridian 90º W to coordinates 5º N/90º W, the parallel 5º N to coordinates 5º N/95º W, the meridian 95º W to the parallel 20º S, the parallel 20º S to the coast of CHILE, the north coast of CHILE, the frontier between CHILE and PERU, the frontier between BOLIVIA and CHILE, the frontier between BOLIVIA and ARGENTINA, the frontier between PARAGUAY and BOLIVIA, the frontier between PARAGUAY and BRAZIL, to the parallel 20º S, the parallel 20º S to coordinates 20º S/45º W.


ZONE DE BRUIT
NOISE ZONE
ZONA DE RUIDO
2
L'inscription d'un pays ou d'une zone géographique sur cette carte ne signifie pas que l'U.I.T. reconnaît ou admet le tracé de ces frontières, aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with respect to the political status of such country or geographical area, or official recognition of these borders.
La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras en los mapas no implican que la U.I.T. tome posición en cuanto al estatuto político de esos países o zonas geográficas ni el reconocimiento por su parte de sus fronteras
20 N
15
10
5
0
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10
15
20
25 S
45 W
50
55
60
65
70
75
80
85
90
95 W

3.7 *Protection ratios*

3.7.1 *Co-channel protection ratio*

The co-channel protection ratio is 26 dB.

3.7.2 *Adjacent channel protection ratio*

– the protection ratio for the first adjacent channel is 0 dB;

– the protection ratio for the second adjacent channel is – 29.5 dB.

CHAPTER 4

Radiation characteristics of transmitting antennas

In carrying out the calculations indicated in Chapter 2, the following shall be taken into account:

4.1 *Omnidirectional antennas*

The characteristic field strength of a simple vertical antenna as a function of its height in wavelength and of the radius of the ground system shall be taken from Figure 2.5.

It is clear from Figure 2.3 that the characteristic field strength increases as the loss in the ground system is reduced to zero and as the antenna height is increased up to 0.625 wavelengths.

The increased characteristic field strength for antenna heights up to 0.625 wavelengths is obtained at the expense of radiation at high angles, as shown in Figures 2.4 and 2.7 and Table 2.II.

4.2 *Considerations relating to the radiation patterns of directional antennas*

The procedures for calculating theoretical, expanded and augmented (modified expanded) directional antenna patterns are given in Appendix 1.

4.3 *Top-loaded or sectionalized antennas*

4.3.1 Calculation procedures are given in Appendix 2.

4.3.2 Stations may employ top-loaded or sectionalized antennas, either because of space limitations or to vary the radiation characteristics from those of a simple vertical antenna. This may be done to achieve the desired coverage or to reduce interference.

4.3.3 An administration using top-loaded or sectionalized antennas shall supply information concerning the tower structure of the antennas. One of the equations in Appendix 2 should be employed to determine the vertical radiation characteristics of the antennas. Other equations may also be proposed by an administration for determining the vertical radiation characteristics of the antennas of that administration, subject to the agreement of the other administration(s) concerned.

CHAPTER 5

Technical criteria for interservice sharing

In accordance with No. **481** of Article **8** of the Radio Regulations, the allocations to the fixed and mobile services in the band 1 625 - 1 705 kHz change from primary to permitted on 1 July 1990. The sharing criteria developed in this chapter are intended to apply to the permitted services in order to protect the broadcasting service in the Plan and provide protection for these permitted services. Protection ratio values are given for the cases where the assigned frequencies of the wanted and interfering signals are the same; for other frequency relationships, relative protection ratio values are given.

5.1 *Protection of the broadcasting service*

The broadcasting service in Region 2 may be subject to interservice interference from the fixed and mobile services of Region 2 to which the sub-band 1 625 - 1 705 kHz is allocated.

Co-channel and first and second adjacent channel protection ratios are given in Section 3.7 of Annex 1 in the case of interference within the broadcasting service. To allow for a similar quality of service, the same quality criteria have been applied to derive the values given for interfering services other than the broadcasting service.

5.1.1 *Protection ratio criteria*

The protection ratio values to protect the broadcasting service from the permitted services are given in Table 5.I. Table 5.II gives the relative protection ratio values to be added to those given in Table 5.I to take into account the different frequency separations.

5.2 *Protection of the permitted services from the broadcasting service*

5.2.1 *Protection ratio criteria*

Table 5.I gives the protection ratios used to protect the permitted services from the broadcasting service in the application of the Agreement.

Table 5.III gives the relative protection ratio values to be added to those given in Table 5.I to take into account the different frequency separations.

5.2.2 *Nominal usable field strength to be protected*

Table 5.IV gives the values of the nominal usable field strength, E_{nom} for the permitted services. These are the values to be taken into account in calculating the permissible interference field strength.

5.3 *Protection between stations of the permitted services*

The provisions and criteria governing the sharing of the 1 625 - 1 705 kHz band by the permitted services shall be based, respectively, on Article **12** of the Radio Regulations and the relevant IFRB Technical Standards.

5.4 *Recommended technical criteria for interregional sharing* (see Recommendation 2)

5.4.1 *Application of No.* **346** *of the Radio Regulations*

In the application of the interregional sharing criteria, the basic principle is the equality of rights between the regions, as provided in No. **346** of the Radio Regulations.

5.4.2 *Application of the IFRB Technical Standards*

The relevant IFRB Technical Standards govern interregional sharing.

TABLE 5.1

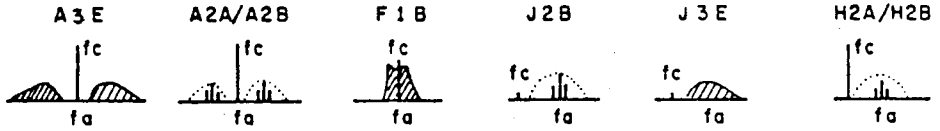
*Steady-state protection ratios (dB) * at $\Delta f_a = 0$*

Wanted signal \ Interfering signal		Class of emission					
		A3E (BC)	A3E (fixed)	A2A/A2B	F1B/J2B	J3E	H2A/H2B
A3E (BC)	Grade 4 (CCIR Rec. 562)	26	26	31	45	38	20
A3E (fixed)[1]	Between MC-GC	26					
A2A/A2B	PE < 10^{-6}	5					
F1B/J2B	PE < 10^{-6}	–3					
J3E		14					
H2A/H2B	PE < 10^{-6}	3					
Class of emission according to Nos. **270** to **273** of the Radio Regulations	Quality of Service						

* Ratio of wanted-to-interfering signals whose powers are expressed in terms of p.e.p. (PX) (See CCIR Recommendation 240-4)

Δf_a = the difference between the assigned frequency of the wanted signal and the assigned frequency of the interfering signal

*The assigned frequency (f_a) for each type of emission is as follows (see Nos. **141** to **144** of the Radio Regulations) :*



[1] Administrations are urged to discontinue the use of double-sideband radiotelephone (class A3E) transmissions in the fixed service (see No. **2700** of the Radio Regulations).

TABLE 5.II – *Steady-state relative protection ratio values (dB) as a function of assigned frequency separation. A3E (BC) is the wanted signal.*

Δf_a (kHz)	Class of interfering emission			
	A3E (fixed)	A2A/A2B H2A/H2B	F1B/J2B	J3E
0	0	0	0	0
1	16	15	– 1	0
2	17	20	– 2	0
3	14	20	– 2	– 1
4	9	15	– 3	– 3
5	3	7	– 4	– 5
6	– 4	– 4	– 5	– 8
7	–10	–11	– 7	–11
8	–15	–16	–10	–16
9	–20	–21	–15	–24
10	–24	–26	–25	–41
15	–47	–48		
20	–55	–55		

TABLE 5.III – *Steady-state relative protection ratio values (dB) as a function of assigned frequency separation. A3E (BC) is the interfering signal.*

Δf_a (kHz)	Class of wanted emission			
	A3E (fixed)	A2A/A2B H2A/H2B	F1B/J2B	J3E
0	0	0	0	0
1	0	0	1	0
2	0	– 8	2	0
3	0	–13	– 3	0
4	0	–17	– 4	0
5	0	–21	– 5	0
6	0	–23	– 8	– 3
7	0	–29	–11	–26
8	0	–31	–15	–30
9	0	–37	–21	–33
10	–27	–41	–29	–37
15	–46	–58		–46
20	–54	–62		–50

TABLE 5.IV – *Values of E_{nom} for the permitted services*

Class of Emission	E_{nom} (mV/m)	
	Noise Zone 1	Noise Zone 2
A3E	3.5	11
J3E	2	6
A2A/A2B	0.2	0.5
F1B/J2B	0.2	0.5
H2A/H2B	0.2	0.5

APPENDIX 1

(to Annex 1)

Calculation of directional antenna patterns

Introduction

This Appendix describes methods to be employed in calculating the field strength produced by a directional antenna at a given point.

1. *General equations*

The theoretical directional antenna radiation pattern is calculated by means of the following equation, which sums the field strength from each element (tower) in the array:

$$E_T(\varphi, \theta) = \left| K_L \sum_{i=1}^{n} F_i f_i(\theta) \angle \psi_i + S_i \cos\theta \cos(\varphi_i - \varphi) \right| \quad (1)$$

where:

$$f_i(\theta) = \frac{\cos(G_i \sin\theta) - \cos G_i}{(1 - \cos G_i)\cos\theta} \quad (2)$$

where:

$E_T(\varphi, \theta)$: theoretical inverse distance field strength at 1 km in mV/m for the given azimuth and elevation;

K_L : multiplying constant in mV/m which determines the pattern size (see Section 2.5 below for derivation of K_L);

n : number of elements in the directional array;

i : denotes the ith element in the array;

F_i : ratio of the theoretical field strength due to the ith element in the array relative to the theoretical field strength due to the reference element;

θ : vertical elevation angle, in degrees, measured from the horizontal plane;

$f_i(\theta)$: ratio of vertical to horizontal plane field strength radiated by the ith element at elevation angle θ;

G_i : electrical height of the ith element, in degrees;

S_i : electrical spacing of the ith element from the reference point in degrees;

φ_i : orientation of the ith element from the reference element (with respect to True North), in degrees;

φ : azimuth with respect to True North, in degrees;

ψ_i : electrical phase angle of field strength due to the ith element (with respect to the reference element), in degrees.

Equations (1) and (2) assume that:

– the current distribution in the elements is sinusoidal,

– there are no losses in the elements or in the ground,

– the antenna elements are base-fed, and

– the distance to the computation point is large in relation to the size of the array.

2. *Determination of values and constants*

2.1 *Determination of the multiplying constant K for an array*

The multiplying constant *K* for the loss-free case may be computed by integrating the power flow over the hemisphere, deriving an r.m.s. field strength and comparing the result with the case where the power is radiated uniformly in all directions over the hemisphere.

Thus:

$$K = \frac{E_s \sqrt{P}}{e_h} \quad \text{mV/m}$$

where:

K : no-loss multiplying constant (mV/m at 1 km);

E_s : reference level for uniform radiation over a hemisphere, equal to 244.95 mV/m at 1 km for 1 kW;

P : antenna input power (kW);

e_h : root mean square radiation pattern over the hemisphere which may be obtained by integrating $e(\theta)$ at each elevation angle over the hemisphere. The integration can be made using the trapezoidal method of approximation, as follows:

$$e_h = \left[\frac{\pi \Delta}{180} \left\{ \frac{1}{2} [e(\theta)]^2 + \sum_{m=1}^{N} [e(m\Delta)]^2 \cos m\Delta \right\} \right]^{\frac{1}{2}} \tag{3}$$

where:

Δ : interval, in degrees, between equally-spaced sampling points at different elevation angles θ;

m : an integer from 1 to N, which gives the elevation angle θ in degrees when multiplied by Δ, i.e. $\theta = m\Delta$;

N : one less than the number of intervals $\left(N = \frac{90}{\Delta} - 1 \right)$;

$e(\theta)$: root mean square radiation pattern given by equation (1) with K equal to 1 at the specified elevation angle θ (the value of θ is 0 in the first term of equation (3) and $m\Delta$ in the second term); $e(\theta)$ is computed using equation (4).

$$e(\theta) = \left[\sum_{i=1}^{n} \sum_{j=1}^{n} F_i f_i(\theta) F_j f_j(\theta) \cos \psi_{ij} J_0(S_{ij} \cos \theta) \right]^{\frac{1}{2}} \tag{4}$$

where:

i : denotes the ith element;

j : denotes the jth element;

n : number of elements in the array;

ψ_{ij} : difference in phase angles of the field strengths from the ith and jth elements in the array;

S_{ij} : angular spacing between the ith and jth elements in the array;

$J_0 (S_{ij} \cos \theta)$: the Bessel function of the first kind and zero order of the apparent spacing between the ith and jth elements. In equation (4), S_{ij} is in radians. However, when special tables of Bessel functions giving the argument in degrees are used, the values of S_{ij} should then be in degrees.

2.2 *Relationship between field strength and tower current*

The field strength resulting from a current flowing in a vertical antenna element is:

$$E = \frac{R_c I[\cos(G \sin \theta) - \cos G]}{2\pi r \cos\theta} \times 10^3 \quad \text{mV/m} \tag{5}$$

where:

E : field strength in mV/m;

R_c : resistivity of free space ($R_c = 120\pi$ ohms);

I : current at the current maximum, in amperes [1)];

G : electrical height of the element, in degrees;

r : distance from the element, in metres;

θ : vertical elevation angle, in degrees.

At one kilometre and in the horizontal plane ($\theta = 0^o$):

$$E = \frac{120\pi I(1 - \cos G) \times 10^3}{2\pi(1000)} \quad \text{mV/m} \tag{6}$$

hence:

$$E = 60I(1 - \cos G) \quad \text{mV/m} \tag{7}$$

2.3 *Determination of no-loss current at current maximum*

For a tower of uniform cross-section or for a similar type of directional array element, the no-loss current at the current maximum is:

$$I_i = \frac{KF_i}{60(1 - \cos G_i)} \tag{8}$$

where:

I_i : current at current maximum in amperes in the *i*th element;

K : no-loss multiplying constant computed as shown in Section 2.1 above.

The base current is given by $I_i \sin G_i$.

2.4 *Array power loss*

Power losses in a directional antenna system are of various types, including ground losses, antenna coupling losses, etc. The loss resistance for each antenna element may be assumed to be inserted at the current maximum to allow for all losses. The power loss is:

$$P_L = \frac{1}{1000} \sum_{i=1}^{n} R_i I_i^{\,2} \tag{9}$$

where:

P_L : total power loss, in kW;

R_i : assumed loss resistance, in ohms (one ohm, unless otherwise indicated) for the *i*th tower[2)];

I_i : current at current maximum (or base current if the element is less than 90 degrees in electrical height) for the *i*th tower.

---

1) I is the current at the maximum of the sinusoidal distribution. If the electrical height of the element is less than 90º, the base current will be less than I.

2) The loss resistance shall in no way exceed a value such that the value of K_L (see Section 2.5) differs by more than ten percent from that calculated for a resistance of one ohm.

2.5 *Determination of a corrected multiplying constant*

To allow for power loss in the antenna system, the multiplying constant K can be modified, as follows:

$$K_L = K \left(\frac{P}{P + P_L} \right)^{\frac{1}{2}} \tag{10}$$

where:

K_L : multiplying constant after correction for the assumed loss resistance;

K : no-loss multiplying constant computed in Section 2.1 above;

P : array input power (kW);

P_L : total power loss (kW).

2.6 *r.m.s. value of radiation to be notified for directional antennas*

The radiation E_r for directional antennas is determined as follows:

$$E_r = K_L \, e(\theta) \qquad \text{mV/m at 1 km}$$

2.7 *Determination of expanded pattern values*

The expanded pattern is determined as follows:

$$E_{EXP}(\varphi, \theta) = 1.05 \left\{ [E_T(\varphi, \theta)]^2 + Q^2 \right\}^{\frac{1}{2}} \tag{11}$$

where:

$E_{EXP}(\varphi, \theta)$: expanded pattern radiation at a particular azimuth, φ, and a particular elevation angle θ;

$E_T(\varphi, \theta)$: theoretical pattern radiation at a particular azimuth, φ, and a particular elevation angle θ;

Q : quadrature factor, computed as:

$$Q = Q_0 \, g(\theta)$$

where:

Q_0 is the Q on the horizontal plane, and is normally the greatest of the following three quantities:

$$10.0 \quad ; \quad 10\sqrt{P} \quad \text{or} \quad 0.025 \, K_L \left[\sum_{i=1}^{n} F_i^2 \right]^{\frac{1}{2}}$$

$g(\theta)$ is computed as follows:

If the electrical height of the shortest tower is less than or equal to 180 degrees, then:

$$g(\theta) = f(\theta) \text{ for the shortest tower.}$$

If the electrical height of the shortest tower is greater than 180 degrees, then:

$$g(\theta) = \frac{\{[f(\theta)]^2 + 0.0625\}^{\frac{1}{2}}}{1.030776}$$

where $f(\theta)$ for the shortest tower is used.

Note – In comparing the electrical heights of the antenna towers to determine the shortest tower, the total apparent height (as determined by current distribution) is used for top-loaded and sectionalized towers.

2.8 *Determination of augmented (modified expanded) pattern values*

The purpose of the augmented (modified expanded) pattern is to put one or more “patches” on an expanded pattern. Each “patch” is referred to as an “augmentation”. The augmentation may be positive (resulting in more radiation than that of the expanded pattern) or negative (resulting in less radiation than that of the expanded pattern). In no case shall the augmentation be so negative that the augmented (modified expanded) pattern radiation is below the theoretical radiation pattern.

Spans of augmentation may overlap. That is, an augmentation may itself be augmented by a subsequent augmentation. To ensure that the calculations are properly made, the augmentations are handled in increasing order of central azimuth of augmentation, starting at True North. If several augmentations have the same central azimuth, then they are considered in order of decreasing span (i.e. the one with the largest span is handled first). If more than one augmentation has the same central azimuth and the same span, then they are considered in ascending order of their effect.

$$E_{MOD}(\varphi, \theta) = \left\{ [E_{EXP}(\varphi, \theta)]^2 + g^2(\theta) \sum_{i=1}^{a} A_i \cos^2 \left(180\, \Delta_i / \alpha_i\right) \right\}^{\frac{1}{2}} \quad (12)$$

where:

$E_{MOD}(\varphi, \theta)$: augmented (modified expanded) pattern radiation at a particular azimuth, φ, and a particular elevation angle, θ;

$E_{EXP}(\varphi, \theta)$: expanded pattern radiation at a particular azimuth, φ, and a particular elevation angle, θ;

$g(\theta)$: same parameter as described for the expanded pattern (see Section 2.7);

a : number of augmentations;

Δ_i : difference between the azimuth at which the radiation is desired φ, and the central azimuth of augmentation of the ith augmentation. It will be noted that Δ_i must be less than or equal to one-half of α_i;

α_i : total span of the ith augmentation;

A_i : is the value of the augmentation given by the expression[1] :

$$A_{ei} = [E_{MOD}(\varphi_i, \theta)]^2 - [E_{INT}(\varphi_i, \theta)]^2 \quad (13)$$

where:

φ_i : central azimuth of the ith augmentation;

$E_{MOD}(\varphi_i, \theta)$: augmented (modified expanded) horizontal plane radiation at the central azimuth of the ith augmentation, after applying the ith augmentation, but before applying subsequent augmentations;

$E_{INT}(\varphi_i, \theta)$: an interim value of radiation in the horizontal plane at the central azimuth of the ith augmentation. The interim value is the radiation obtained from applying previous augmentations (if any) to the expanded pattern, but before applying the ith augmentation.

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1) When A_i is negative, there is negative augmentation; when A_i is positive, there is positive augmentation. A_i must not be so negative that $E_{MOD}(\varphi, \theta)$ falls below $E_T(\varphi, \theta)$ of any azimuth, φ, or elevation angle, θ.

APPENDIX 2

(to Annex 1)

Equations for calculation of the ratio of vertical to horizontal plane field strength radiated at elevation angle q for top-loaded and typical sectionalized towers

The basic equation is:

$$f(\theta) = \frac{E_\theta}{E_0}$$

where:

E_θ : radiation at a desired elevation angle, θ;

E_0 : radiation in the horizontal plane.

Specific equations for top-loaded and typical sectionalized antennas are given below.

These equations use one or more of four variables A, B, C and D, which are defined after each equation.

1. *Top-loaded antennas* (Type 1 antennas)

$$f(\theta) = \frac{\cos B \cos(A \sin\theta) - \sin\theta \sin B \sin(A \sin\theta) - \cos(A + B)}{\cos\theta[\cos B - \cos(A + B)]}$$

where:

A : electrical height of the antenna tower;

B : difference between the apparent electrical height (based on current distribution) and the actual electrical height (A);

θ : the elevation angle with respect to the horizontal plane.

Note – When B is zero (i.e., when there is no top-loading), the equation reduces to that of a simple vertical antenna.

2. *Sectionalized tower* (Type 2 antennas)

$$f(\theta) = \frac{[\cos B \cos(A \sin\theta) - \cos(A + B)] \sin(C + D - A) + \sin B[\cos D \cos(C \sin\theta) - \sin\theta \sin D \sin(C \sin\theta) - \cos(C + D - A) \cos(A \sin\theta)]}{\cos\theta([\cos B - \cos(A + B)]\sin(C + D - A) + \sin B[\cos D - \cos(C + D - A)])}$$

where:

A : actual height of the lower section;

B : difference between the apparent electrical height (based on current distribution) of the lower section and the actual electrical height of the lower section (A);

C : total actual electrical height of the tower;

D : difference between the apparent electrical height (based on current distribution) of the total tower and the total actual electrical height of the tower (C);

θ : angle of elevation with respect to the horizontal plane.

3. Administrations proposing to use other types of antenna should furnish details of their characteristics, together with a radiation pattern.

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ANNEX 2

to the Regional Agreement for the use of the band 1 605 - 1 705 kHz in Region 2 (Rio 88 Agreement)

LIMITS

to determine when the services of another administration are affected

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1. *Modification of the Plan*

1.1 *Allotment areas*

Any modification of an allotment area shall be defined by national borders and sea coasts and by meridians of longitude and parallels of latitude in integral multiples of 15 minutes.

1.2 *Standardized parameters*

Any modification of the Plan shall be based on the following reference values:

– a standardized distance, contained in Sections 1.3.1 and 1.3.2 below;

– a 1 kW station power;

– a non-directional antenna with an electrical height of 90 degrees;

– a characteristic field strength of 310 mV/m at 1 km.

1.3 *Determination of an affected administration*

In the application of Section 1 of Article 4 of the Agreement, an administration is affected:

1.3.1 *Standardized co-channel separation distance*

If the separation distance between the edge of the allotment area of the proposed modification and any co-channel allotment area in the Plan is less than the following standardized distances:

– land path in Noise Zone 1: 330 km

– land path in Noise Zone 2: 120 km

– sea or mixed path in both noise zones: 500 km.

In the case of mixed paths, the standadized distances are limited to the sea portion of the path plus the total portion of 120 km or 330 km of land path in Noise Zones 2 and 1 respectively.

1.3.2 *Standardized adjacent channel separation distance*

If the separation distance between the edge of the allotment area of the proposed modification and any adjacent channel allotment area in the Plan is less than the following standardized distances:

– land path in Noise Zone 1: 53 km

– land path in Noise Zone 2: 35 km

– sea or mixed path in both noise zones: 95 km.

1.3.3 *Broadcasting stations recorded in the Master International Frequency Register (MIFR)*

If the separation distance between the edge of the allotment area of the proposed modification and the E_{nom} contour of a co-channel or first adjacent channel is less than the standardized distances in Sections 1.3.1 or 1.3.2, as appropriate. When the E_{nom} contour extends beyond the border of a country, the separation distance shall be established from the border or the coastline(s) of that country.

1.3.4 *Stations of the fixed and mobile services recorded in the MIFR*

If the appropriate protection ratios contained in Section 5.2.1 of Annex 1 for a station of the fixed or mobile service recorded in the Master International Frequency Register are not met.

The following approach shall be used in evaluating the protection:

– the nominal usable field strength indicated in Section 5.2.2 of Annex 1 is the value to be protected;

– protection is to be provided at the location of the receiving station for the fixed service;

– protection is to be provided at the location of the land station for the mobile service;

– the interfering field strength value used shall be based on the skywave or groundwave field strength determined in accordance with Sections 2.2 and 2.1 of Annex 1 respectively, whichever is greater. Groundwave calculations shall be based on 10 mS/m uniform conductivity for land paths and 5 000 mS/m uniform conductivity for sea or mixed paths;

– the most critical location in the allotment area is to be used for a potentially interfering broadcasting station, using the standardized parameters described in Section 1.2 of this Annex.

2. *Adjacent channel criteria*

In the application of Section 2 of Article 4 and paragraph 2.1.2 of Section 2 of Article 5, an administration proposing to bring into use an assignment on an allotted channel in a border area shall seek the agreement of another administration if the field strength produced by the proposed assignment within the neighbouring adjacent channel allotment area of that other administration, using a 10 mS/m conductivity value for the land path and a 5 000 mS/m conductivity value for sea or mixed paths, exceeds the daytime nominal usable field strength reduced by the applicable protection ratio expressed in dB, as prescribed in Sections 3.5 and 3.7 of Annex 1, respectively. If the above calculations indicate that another administration might be affected, they shall be repeated using the actual ground conductivity (see Section 2.1.1 of Annex 1), and if the appropriate protection is still not afforded, that administration shall be considered as affected.

In no case, however, shall the other administrations be considered as affected if the proposed assignment is to use the standardized parameters described in Section 1.2 of this Annex and is located at a distance from the neighbouring adjacent channel allotment area greater than the following:

– land path in Noise Zone 1: 53 km

– land path in Noise Zone 2: 35 km

– sea or mixed path in both noise zones: 95 km.

3. *Use of non-standardized parameters on allotted channels*

In the application of paragraphs 1.2 and 2.1.1 of Article 5, an administration is affected if the skywave or groundwave field strength in any part of its allotment area on the same channel, calculated using notified characteristics, exceeds the field strength that would result from a station using standardized parameters located at the standardized distance from the allotment area being considered for protection. For groundwave interference, the calculation shall be made using a uniform ground conductivity of 10 mS/m for ground paths and 5 000 mS/m for sea or mixed paths. However, in recognition of the special problems caused by the low ground conductivity of the Eastern Caribbean islands situated in Noise Zone 2, the Atlas of Ground Conductivity (see Section 2.1.1 of Annex 1) shall be used for the groundwave calculation.

4. *Use of non-allotted channels*

4.1 *Protection of allotment areas*

In the application of paragraphs 2.2.1 and 2.2.2 of Article 5 of the Agreement, another administration is considered to be affected if the skywave or groundwave field strength in any part of its allotment area on the co-channel or first or second adjacent channel, calculated using notified characteristics, exceeds the E_{nom} reduced by the appropriate protection ratio. For groundwave interference, the calculation shall be made using the Atlas of Ground Conductivity. However, in the case of sea or mixed paths, the groundwave field strength produced at the boundary of the allotment area shall not exceed the field strength that would be produced by a station with standardized parameters located at the standardized distance, using the uniform conductivity value of 5 000 mS/m.

4.2 *Protection of broadcasting assignments recorded in the MIFR*

In the application of paragraph 2.2.3 of Article 5 of the Agreement, another administration with a broadcasting assignment recorded in the MIFR on either a co-channel or a first or second adjacent channel is affected if the skywave field strength (in the case of co-channel) or the groundwave field strength (in the case of co-channel, first and second adjacent channel) at the limits of the E_{nom} contour, calculated using notified characteristics, exceeds the E_{nom} reduced by the appropriate protection ratio.

However, where the contour corresponding to the nominal usable field strength extends beyond the border of the country in which the station is located, the maximum permissible field strength of the interfering signal at the border shall be the field strength of the station to be protected, calculated along the border and reduced by the protection ratio. For protection purposes, the border of a country shall be deemed to encompass only its land area, which includes its islands.

In the case of broadcasting stations recorded in the MIFR on non-allotted channels, the skywave protection criteria shall be based on the evaluation of the protection level at the broadcasting station location.

4.3 *Protection of stations of the fixed and mobile services recorded in the MIFR*

In the application of Section 2, paragraph 2.2.4 of Article 5, an administration with a station of the fixed or mobile service recorded in the MIFR is affected if the appropriate protection criteria contained in Section 5.2.1 of Annex 1 are not met.

The following approach shall be used in evaluating the protection:

– the nominal usable field strength indicated in Section 5.2.2 of Annex 1 is the value to be protected;

– protection is to be provided at the location of the receiving station for the fixed service;

– protection is to be provided at the location of the land station for the mobile service;

– the interfering field strength value used shall be based on the skywave or groundwave field strength determined in accordance with Sections 2.2 and 2.1 of Annex 1 respectively, whichever is greater. Groundwave calculations shall be based on the Atlas of Ground Conductivity.

4.4 *Use of non-standardized parameters for assignments on non-allotted channels*

Assignments of non-allotted channels in non-adjacent areas may use a higher radiated power than that produced by a standardized parameter station, provided that the field strength within a neighbouring country without a co-channel, first or second adjacent channel allotment does not exceed the field strength produced by a standardized parameter station situated at the most critical point on the border of the originating country.

However, an administration shall not be required to reduce the power of its station if the field strength at all points in the territory of another country concerned does not exceed the E_{nom} reduced by the co-channel protection ratio.

5. *Use of the fixed and mobile services*

5.1 *Protection of the Allotment Plan*

In the application of paragraph 2.1 of Article 6 of the Agreement, another administration is considered to be affected if the skywave or groundwave field strength in any part of its allotment area on the co-channel or other frequency offset in relation to the wanted emission, calculated using notified characteristics, exceeds the E_{nom} reduced by the appropriate protection ratio given in Chapter 5 of Annex 1.

5.2 *Protection of broadcasting assignments recorded in the MIFR*

In the application of paragraph 2.2 of Article 6 of the Agreement, another administration having a broadcasting assignment recorded in the MIFR is considered to be affected if, at the limit of the E_{nom} contour, the skywave or the groundwave field strength on the co-channel or other frequency offset in relation to the wanted broadcasting emission, calculated using notified characteristics, exceeds the E_{nom} reduced by the appropriate protection ratio as given in Section 5.1.1 of Annex 1.

However, where the contour corresponding to the nominal usable field strength extends beyond the border of the country in which the station is located, the maximum permissible field strength of the interfering signal at the border shall be the field strength of the station to be protected, calculated along the border and reduced by the protection ratio. For protection purposes, the border of a country shall be deemed to encompass only its land area, which includes its islands.

In the case of broadcasting stations recorded in the MIFR on non-allotted channels, the skywave protection criteria shall be based on the evaluation of the protection level at the broadcasting station location.

5.3 *Protection of stations of the fixed and mobile services recorded in the Master Register from other stations of the same services*

In the application of paragraph 2.3 of Article 6, in examining notices of stations of the fixed or mobile services with respect to other assignments of the fixed and mobile services recorded in the Master Register, the IFRB shall use its Technical Standards for the band and service concerned, applying its criteria for determining a favourable finding under No. **1241** of the Radio Regulations.

6. *General considerations*

The following conditions shall apply:

– in no case shall the station power of a broadcasting station exceed 10 kW;

– the effect of each interfering transmitter shall be evaluated separately, and interference from other transmitters shall not be taken into account in determining the maximum permitted signal strength from each transmitter;

– when the E_{nom} contour of a broadcasting station extends beyond the border of the country, the actual field strength calculated at the border shall be used to evaluate the permitted interference levels, using the appropriate protection ratios;

– land areas, which include islands of the same country within the contour of the nominal usable field strength (E_{nom}) of broadcasting assignments recorded in the MIFR, shall be protected.

ANNEX 3

to the Regional Agreement for the use of the band
1 605 - 1 705 kHz in Region 2
(Rio 88 Agreement)

DATA

for the notification of broadcasting assignments
in the application of Article 12 of the Radio Regulations *)

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*) *Note by the General Secretariat:* The forms to be used in the application of this Annex will be developed and published by the IFRB.

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PART I

General information on the transmitting station

Item No.

01 *Administration*

Indicate the name of the administration;

02 *Assigned frequency (kHz)*

03 *Name of transmitting station*

Indicate the name of the locality or the name by which the station is known;

04 *Call sign*

05 *Country*

Indicate the name of the country or geographical area in which the station is located. Use the symbols in Table B1 of the Preface to the International Frequency List;

06 *Geographical coordinates of the transmitting station*

Indicate the geographical coordinates (longitude and latitude) of the transmitting antenna site in degrees, minutes and seconds. Seconds need to be entered only if available;

07 *Indicate the reason for the notification:*

a) New assignment;

b) Modification of the characteristics of an existing assignment;

c) Cancellation of an assignment;

08 Indicate the date of bringing into service or the date of cessation of operation;

DAYTIME OPERATION

09 *Station power (dBW)*

Indicate the carrier power supplied to the antenna for daytime operation;

10 *r.m.s. value of radiation (mV/m at 1 km) for daytime station power*

11 *Antenna type*

Indicate here the type of antenna used for daytime operation. Use the symbols as follows:

A – Simple omnidirectional antenna;

B – Directional antenna or non-simple omnidirectional antenna;

12 *Simple vertical antenna electrical height*

Indicate here the electrical height, in degrees, for a simple vertical antenna in use for daytime operation;

NIGHT-TIME OPERATION

13 *Station power (dBW)*

Indicate the carrier power supplied to the antenna for night-time operation;

14 *r.m.s. value of radiation (mV/m at 1 km) for night-time station power*

15 *Antenna type*

Indicate the type of antenna used for night-time operation (use the symbols in item No. 11 above);

16 *Simple vertical antenna electrical height*

Indicate here the electrical height, in degrees, for a simple vertical antenna in use for night-time operation;

17 *Remarks*

Indicate here any necessary additional information, such as the identification of the synchronized network to which the station belongs. If shared time operation is intended, indicate in this box and identify the other assignment involved;

18 *Coordination*

Indicate the name of the countries which may be affected and with which coordination has been effected;

PART II

Description of a directional antenna consisting of vertical conductors

Item No.

01 Indicate the name of the transmitting station;

02 *Country*

Indicate the country or geographical area in which the station is located. Use the symbols in Table B1 of the Preface to the International Frequency List;

03 Indicate the hours of operation for which the given characteristics of the antenna are applicable. The symbols "D" or "N" shall be used to indicate that the station operates for the daytime or night-time period respectively. When the same operation is used for both daytime and night-time, enter the two symbols "D" and "N";

04 Indicate the total number of towers constituting the array;

05 This column shows the serial number of towers, as they will be described in columns 06 to 12;

06 Indicate here the ratio of the tower field to the field from the reference tower;

07 Indicate here, in degrees, the positive or negative difference in the phase angle of the field from the tower with respect to the field from the reference tower;

08 Indicate, in degrees, the electrical spacing of the tower from the reference point, defined in column 10;

09 Indicate, in degrees from True North, the angular orientation of the tower from the reference point indicated in column 10;

10 Define the reference point as follows:

0 : where the spacing and angular orientation are shown with respect to a common reference point which is generally the first tower;

1 : where the spacing and angular orientation are shown with respect to the previous tower;

11 Indicate the electrical height (degrees) of the tower under consideration;

12 *Tower structure*

This column should contain a code from 0 to 2 to indicate the structure of each tower:

0 = simple vertical antenna
1 = top-loaded antenna
2 = sectionalized antenna

Codes 1 and 2 are used in Part IV to indicate the characteristics of the various structures. They are also used for the identification of the appropriate formula for vertical radiation in Appendices 1 and 2 to Annex 1.

13 Not used;

14 r.m.s. value of radiation (mV/m at 1 km) (see Section 2.6 of Appendix 1 to Annex 1);

15 Type of pattern:

T = theoretical

E = expanded

M = augmented (modified expanded);

16 Special quadrature factor for expanded and augmented (modified expanded) patterns in mV/m at 1 km (to replace the normally used expanded pattern quadrature factor when special precautions are taken to ensure pattern stability);

17 Supplementary information.

PART III

Description of the parameters of directional antennas with augmented (modified expanded) patterns

1. Part II of this Annex contains the information for directional antenna systems operating with theoretical and expanded patterns. However, some stations may operate with augmented (modified expanded) directional antenna patterns. In these cases, additional calculations are performed, once the expanded radiation is calculated, to determine the radiation from the augmented (modified expanded) directional antenna pattern. This Part contains the additional parameters required for augmented (modified expanded) patterns.

2. If Part III is submitted, a corresponding Part II must also be submitted.

3. Part III should be submitted only if item 15 of Part II contains the symbol M for “augmented (modified expanded)”.

Item No.

01 Indicate the name of the transmitting station;

02 *Country*

Indicate the country or geographical area in which the station is located, using the symbols in Table B1 of the Preface to the International Frequency List;

03 Indicate the hours of operation for which the antenna characteristics given are applicable. The symbols “D” or “N” shall be used to indicate that the station operates for the daytime and night-time. When the antenna characteristics are the same for both daytime and night-time, enter the two symbols “D” and “N”;

04 Indicate the total number of augmentations which are used. It must be 1 or greater than 1;

05 Indicate the serial number of the augmentations;

06 Indicate the radiation at the central azimuth of augmentation. This value should always be equal to or greater than the value from the theoretical pattern;

07 Indicate the central azimuth of augmentation. This is the centre of the span;

08 Indicate the total span of the augmentation. Half of the span will be on each side of the central azimuth of augmentation. Spans may overlap; if so, augmentations are processed clockwise according to the central azimuth of augmentations;

09 Supplementary information. Indicate any supplementary information concerning augmented (modified expanded) patterns.

PART IV

Supplementary information for top-loaded or sectionalized towers used for omnidirectional and directional antennas

When an antenna tower of a directional antenna is either top-loaded or sectionalized, Column 12, Part II will contain either a figure 1 or a figure 2. These numerals describe the particular type of top-loaded or sectionalized antenna used, as described below:

Item No.

01 *Name of the station*

02 *Country*

Indicate the country or geographical area in which the station is located, using the symbols in Table B1 of the Preface to the International Frequency List;

03 Indicate the hours of operation for which the given characteristics of the antenna are applicable. The symbols “D” or “N” shall be used to indicate that the station operates for the daytime or night-time period respectively. When the same operation is used for both daytime and night-time, enter the two symbols “D” and “N”;

04 *Tower number*

Columns 5 to 8 show the values of four characteristics of the elements constituting a top-loaded or sectionalized antenna. Each of these columns may contain a figure representing the value of a given characteristic as described below:

05	*Code used in Col. 12* (Part II)	*Description of the characteristic the value of which is given in the column (these values are used in the equations given in Appendix 2 to Annex 1)*
	1	Electrical height of the antenna tower (degrees);
	2	Height of lower section (degrees);

06	*Code used in Col. 12* (Part II)	*Description of the characteristic the value of which is given in the column (these values are used in the equations given in Appendix 2 to Annex 1)*
	1	Difference between apparent electrical height (based on current distribution) and actual height (degrees);
	2	Difference between apparent electrical height of lower section (based on current distribution) and actual height of lower section (degrees);

07	*Code used in Col. 12* (Part II)	*Description of the characteristic the value of which is indicated in the column (these values are used in the equations contained in Appendix 2 to Annex 1)*
	1	Blank;
	2	Total height of antenna (degrees);

08	*Code used in Col. 12* (Part II)	*Description of the characteristic the value of which is indicated in the column (these values are used in the equations entered in Appendix 2 to Annex 1)*
	1	Blank;
	2	Difference be tween apparent electrical height (based on current distribution) of the total tower and the actual height of the total tower (degrees).

ANNEX 4

ALLOTMENT PLAN

for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio 88 Plan)

PART A *List of Allotments*

PART B *Maps showing the allotment areas as defined in Article 1*

PART C *Technical criteria*

Part A – List of Allotments

1. COLUMN HEADINGS OF THE PLAN

Col. No. 1: *Allotment Area :* This column contains the symbol designating the country or the geographical area using symbols indicated in Table B1 of the Preface to the International Frequency List followed by the symbol number designating the allotment area given in Part B.

Col. No. 2: *Allotment(s) :* This column contains the channel number(s) (see Table 1 showing channel number and corresponding frequencies to be assigned), which may be used for one or more assignments in the allotment area.

Col. No. 3: *Remarks.*

TABLE 1

Channel number	Corresponding frequency to be assigned (kHz)
1	1 610
2	1 620
3	1 630
4	1 640
5	1 650
6	1 660
7	1 670
8	1 680
9	1 690
10	1 700

2. TEXT FOR SYMBOLS IN REMARKS COLUMN OF THE PLAN

1/: The use of this allotment is subject to the agreement of the administrations listed in this remark. However, such agreement is not required when the allotment is used with lower radiated power in the direction of the allotment area concerned, in such a way that the limits specified in Section 3 of Annex 2 are met.

2/: The use of this allotment beyond 17.5 km from the border concerned with the administration listed in the Remarks column does not require the agreement of the listed administration.

3/: The use of this allotment is not subject to first adjacent channel coordination with the administration listed in the Remarks column.

(1)	(2)	(3)
ABW 1	1	
ABW 1	6	1/ ATN CLM
ABW 1	7	
AIA 1	1	
AIA 1	2	1/ ATG VIR VRG
ALS 1	1	
ALS 1	2	
ALS 1	3	
ALS 1	4	
ALS 1	5	
ALS 1	6	
ALS 1	7	
ALS 1	8	
ALS 1	9	
ALS 1	10	
ALS 2	2	
ALS 2	4	
ALS 2	6	
ALS 2	8	
ALS 2	10	
ARG 1	1	
ARG 1	2	
ARG 1	3	
ARG 1	4	
ARG 1	5	
ARG 1	6	
ARG 1	7	
ARG 1	8	
ARG 1	9	
ARG 1	10	
ARG 2	2	
ARG 2	3	
ARG 2	4	
ARG 2	5	
ARG 2	6	
ARG 3	3	
ARG 3	4	
ARG 3	6	
ARG 3A	3	
ARG 3A	4	
ARG 3A	5	
ARG 3A	6	
ARG 4	3	
ARG 4	6	
ARG 4	8	
ARG 4A	3	
ARG 4A	8	
ARG 4B	3	
ARG 4B	6	1/ B
ARG 4B	8	
ARG 5	3	
ARG 5	8	
ARG 5	10	
ARG 6	3	
ARG 6	6	
ARG 6	7	
ARG 6	8	
ARG 6	10	
ARG 7	3	
ARG 7	6	
ARG 7	7	
ARG 7	8	
ARG 7	10	
ARG 7A	3	
ARG 7A	6	
ARG 7A	8	
ARG 7A	10	
ARG 8	3	
ARG 8	6	
ARG 8	8	1/ B
ARG 8	10	
ARG 9	3	
ARG 9	6	
ARG 9	7	
ARG 10	3	
ARG 10	6	
ARG 10	7	
ARG 11	3	
ARG 11	4	
ARG 11	6	
ARG 12	3	
ARG 12	4	
ARG 12	6	
ARG 12	8	
ARG 12	10	
ARG 13	2	
ARG 13	3	
ARG 13	6	
ARG 14	1	
ARG 14	2	
ARG 14	3	
ARG 14	4	
ARG 14	5	
ARG 14	6	
ARG 14	7	
ARG 14	8	
ARG 14	9	
ARG 14	10	
ARG 15	3	
ARG 15	4	
ARG 15	6	
ARG 15	8	
ARG 15	10	
ARG 16A	3	
ARG 16A	4	
ARG 16A	6	
ARG 16A	8	
ARG 16A	10	
ARG 16B	3	
ARG 16B	4	
ARG 16B	6	
ARG 16B	8	
ARG 16B	10	
ATG 1	2	1/ AIA VIR VRG
ATG 1	3	
ATN 1	5	
ATN 1	6	1/ ABW CLM
ATN 1	9	
ATN 2	7	
B 1	1	
B 1	2	
B 1	3	
B 1	4	
B 1	5	
B 1	6	
B 1	7	
B 1	8	
B 1	9	
B 1	10	
B 2	1	
B 2	2	
B 2	3	
B 2	4	
B 2	5	2/ F
B 3	1	
B 3	2	
B 3	3	3/ SUR
B 4	1	
B 4	2	
B 4	3	3/ SUR
B 4	9	
B 5	1	
B 5	2	
B 5	3	3/ SUR
B 6	1	
B 6	2	
B 6	3	
B 6	4	
B 6	8	
B 7	1	

(1)	(2)	(3)
B 7	2	
B 7	8	
B 8	1	
B 8	2	
B 8	8	
B 8	9	
B 8	10	
B 9	1	
B 9	2	
B 9	8	
B 10	1	
B 10	2	
B 10	3	
B 10	4	
B 10	8	
B 11	1	
B 11	2	
B 11	3	
B 12	1	
B 12	2	
B 12	3	
B 12	9	
B 12	10	
B 13	1	
B 13	2	
B 13	3	
B 14	1	
B 14	2	
B 14	3	
B 14	4	
B 14	5	
B 15	1	
B 15	2	
B 15	6	
B 15	7	1/ BOL
B 16	1	
B 16	2	
B 16	7	
B 16	8	1/ ARG
B 17	1	
B 17	2	
B 17	6	
B 17	7	
B 17	8	
B 18	1	
B 18	2	
B 18	6	
B 18	7	
B 18A	1	
B 18A	2	
B 18A	7	
B 18B	1	
B 18B	2	
B 18B	7	
B 18C	1	
B 18C	2	
B 18C	7	
B 19	1	
B 19	2	
B 19A	1	
B 19A	2	
B 19A	6	1/ ARG
B 20	1	
B 20	2	
B 20	4	
B 20	5	
B 20	6	
B 20	7	
B 20	9	
B 21	1	
B 21	2	
B 21	3	
B 21	4	
B 21	5	
B 21	6	
B 22	1	
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BAH 6	3	1/ CUB HTI
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CUB 8	3	1/ BAH HTI
CUB 8	4	
CUB 9	1	1/ BAH HTI
CUB 9	3	1/ BAH HTI
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CYM 2	8	
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DOM 2	8	
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DOM 4A	5	
DOM 4A	8	
DOM 4B	5	
DOM 4B	8	
DOM 4B	9	
DOM 5	1	

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DOM 5	3		FLK 2B	7		GTM 6	2	
DOM 5	5		FLK 2B	9		GTM 6	8	
DOM 5	7		GDL 1	10		GTM 6	10	
DOM 5	8		GRD 1	1	1/ BRB LCA VCT VEN	GTM 7	1	
DOM 6	2		GRD 1	5		GTM 7	2	
DOM 6	4		GRL 1	1		GTM 7	8	
DOM 6	5		GRL 1	2		GTM 7	10	
DOM 6	8		GRL 1	3		GTM 8	1	
DOM 6	9		GRL 1	4		GTM 8	8	
EQA 1	1		GRL 1	5		GTM 8	10	
EQA 1	2		GRL 1	6		GUF 1	1	
EQA 1	3		GRL 1	7		GUF 1	2	
EQA 1	4		GRL 1	8		GUF 1	3	
EQA 1	5		GRL 1	9		GUF 1	4	
EQA 1	6		GRL 1	10		GUF 1	5	
EQA 1	7		GRL 2A	3		GUF 1	6	
EQA 1	8		GRL 2A	4		GUF 1	7	
EQA 1	9		GRL 2A	5		GUF 1	8	
EQA 1	10		GRL 2A	6		GUF 1	9	
EQA 2	1		GRL 2A	7		GUF 1	10	
EQA 2	2		GRL 2B	3		GUF 2	6	2/ B
EQA 2	3		GRL 2B	4		GUF 2	7	
EQA 2	4		GRL 2B	5		GUF 2	8	
EQA 2	5		GRL 2B	6		GUF 2	9	
EQA 3	1		GRL 2B	7		GUF 2	10	
EQA 3	2		GRL 2C	3		GUF 3	1	3/ SUR
EQA 3	3		GRL 2C	4		GUF 3	7	
EQA 4	1		GRL 2C	5		GUF 3	8	
EQA 4	2		GRL 2C	6		GUF 3	9	
EQA 4	3		GRL 2C	7		GUF 3	10	
EQA 4	9		GRL 3	3		GUF 4	7	
EQA 4	10		GRL 3	4		GUF 4	8	
FLK 1	1		GRL 3	5		GUF 4	10	
FLK 1	2		GRL 3	6		GUY 1	1	
FLK 1	3		GRL 3	7		GUY 1	2	
FLK 1	4		GTM 1	1		GUY 1	3	
FLK 1	5		GTM 1	2		GUY 1	4	
FLK 1	6		GTM 1	3		GUY 1	5	
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FLK 1	8		GTM 1	10		GUY 1	7	
FLK 1	9		GTM 2	1		GUY 1	8	
FLK 1	10		GTM 2	2		GUY 1	9	
FLK 2A	1		GTM 2	8		GUY 1	10	
FLK 2A	2		GTM 3	1		GUY 2	6	
FLK 2A	5		GTM 3	2		GUY 2	7	
FLK 2A	7		GTM 4	1		GUY 2	8	
FLK 2A	9		GTM 4	2		GUY 2	9	
FLK 2B	1		GTM 5	1		GUY 2	10	
FLK 2B	2		GTM 5	2		GUY 3	6	
FLK 2B	5		GTM 6	1		GUY 3	7	

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HTI 1A	1	1/ BAH CUB
HTI 1A	3	1/ BAH CUB
HTI 1A	5	
HTI 1B	1	1/ BAH CUB
HTI 1B	3	1/ BAH CUB
HTI 1B	5	
HTI 1C	1	1/ BAH CUB
HTI 1C	3	1/ BAH CUB
HTI 1C	5	
HTI 2	1	1/ BAH CUB
HTI 2	3	1/ BAH CUB
HTI 2	5	
HTI 3	1	1/ BAH CUB
HTI 3	3	1/ BAH CUB
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SUR 7	6	3/ F
SWN 1	7	
TCA 1	6	
TCA 1	10	
TRD 1	6	

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URG 1	7	
URG 1	9	
URG 1	10	
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URG 4	10	
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USA 1	7	
USA 1	8	
USA 1	9	
USA 1	10	
USA 2	2	
USA 2	4	
USA 2	6	
USA 2	8	
USA 2	10	
USA 3	1	
USA 3	2	
USA 3	4	
USA 3	6	
USA 3	8	
USA 3	10	
USA 4	6	
USA 4	8	
USA 4	10	
USA 5	2	
USA 5	4	
USA 5	6	
USA 5	8	
USA 5	10	
USA 6	2	
USA 6	4	
USA 6	6	
USA 6	8	
USA 6	10	
VCT 1	1	1/ BRB GRD LCA VEN
VCT 1	2	
VEN 1	1	
VEN 1	2	
VEN 1	3	
VEN 1	4	
VEN 1	5	
VEN 1	6	
VEN 1	7	
VEN 1	8	
VEN 1	9	
VEN 1	10	
VEN 2A	1	
VEN 2A	2	
VEN 2A	3	
VEN 2A	4	
VEN 2A	5	
VEN 2B	1	
VEN 2B	2	
VEN 2B	3	
VEN 2B	4	
VEN 2B	5	
VEN 2B	7	
VEN 3A	2	
VEN 3A	3	
VEN 3A	4	
VEN 3A	5	
VEN 3B	2	
VEN 3B	3	
VEN 3B	4	
VEN 3B	5	
VEN 4A	2	
VEN 4A	3	
VEN 4A	4	
VEN 4B	2	
VEN 4B	3	
VEN 4B	4	
VEN 5	1	
VEN 5	2	
VEN 5	3	
VEN 5	4	
VEN 5	7	
VEN 6	1	
VEN 6	2	
VEN 6	3	
VEN 6	4	
VEN 6	7	
VEN 6	8	
VEN 6	10	
VEN 7	1	
VEN 7	2	
VEN 7	3	
VEN 7	4	
VEN 7	7	
VEN 7	8	
VEN 7	10	
VEN 8A	2	
VEN 8A	3	
VEN 8A	4	
VEN 8	8	
VEN 8	10	
VEN 8B	2	
VEN 8B	3	
VEN 8B	4	
VEN 8B	8	
VEN 8B	10	
VEN 9	2	
VEN 9	3	
VEN 9	4	
VEN 9	8	
VEN 9	10	
VEN 10	2	
VEN 10	3	
VEN 10	4	
VEN 10	6	
VEN 10	7	
VEN 10	8	
VEN 10	9	
VEN 10	10	
VEN 11	3	
VEN 11	5	
VEN 11	6	
VEN 11	8	
VEN 11	9	
VEN 11	10	
VEN 12	1	
VEN 12	2	
VEN 12	3	
VEN 12	4	
VEN 12	5	
VEN 13	3	
VEN 13	4	
VEN 13	5	
VEN 14	3	
VEN 14	4	
VEN 14	5	
VEN 14	6	
VEN 14	7	
VEN 15	3	

(1)	(2)	(3)
VEN 15	4	
VEN 15	5	
VEN 16	3	
VEN 16	4	
VEN 16	7	
VEN 16	8	
VEN 16	10	
VEN 17A	3	
VEN 17A	7	
VEN 17A	10	
VEN 17B	3	
VEN 17B	7	
VEN 17B	10	
VEN 18A	3	
VEN 18A	6	
VEN 18A	7	
VEN 18A	8	
VEN 18A	9	
VEN 18A	10	
VEN 18B	3	
VEN 18B	6	
VEN 18B	7	
VEN 18B	8	
VEN 18B	9	
VEN 18B	10	
VEN 19A	3	
VEN 19A	4	
VEN 19B	3	
VEN 19B	4	
VEN 20	1	
VEN 20	2	
VEN 20	3	
VEN 20	4	
VEN 20	5	
VEN 21	1	
VEN 21	2	
VEN 21	3	
VEN 21	4	
VEN 21	5	
VEN 21	6	
VEN 21	7	
VEN 21	8	
VEN 21	9	
VEN 21	10	
VEN 22	2	
VEN 22	3	
VEN 22	4	
VEN 22	7	
VEN 22	9	
VEN 22	10	
VEN 23	1	
VEN 23	2	
VEN 23	3	
VEN 23	4	
VEN 23	5	
VEN 23	7	
VEN 23	9	
VEN 23	10	
VEN 24	3	
VEN 24	4	
VEN 24	7	
VEN 24	9	
VEN 24	10	
VEN 25	3	
VEN 25	4	
VEN 25	7	
VEN 25	9	
VEN 25	10	
VEN 26	2	
VEN 26	3	
VEN 26	4	
VEN 26	7	
VEN 26	9	
VEN 26	10	
VEN 27	1	1/ BRB GRD LCA VCT
VEN 27	3	
VEN 28	3	
VEN 28	4	
VEN 29	3	
VEN 29	4	
VEN 29	9	
VEN 29	10	
VEN 30A	3	
VEN 30A	4	
VEN 30A	5	
VEN 30B	1	
VEN 30B	2	
VEN 30B	3	
VEN 30B	4	
VEN 30B	5	
VEN 31A	2	
VEN 31A	3	
VEN 31A	4	
VEN 31B	2	
VEN 31B	3	
VEN 31B	4	
VEN 31C	2	
VEN 31C	3	
VEN 31C	4	
VIR 1	2	1/ AIA ATG VRG
VIR 1	9	
VRG 1	2	1/ AIA ATG VIR
VRG 1	4	

Part B – Maps showing the allotment areas as defined in Article 1

This part contains a series of 15 maps showing the allotment areas.*

It is noted that Bermuda, Easter Island, Hawaii, Johnston Island and the Midway Islands are listed in Table B1 of the Preface to the International Frequency List. Since these islands are more than 500 km from any other country or geographical area in the Region and from each other, all 10 channels are allotted to each of these areas. Moreover, there are many offshore islands not listed in Table B1 of the Preface to the International Frequency List which are more than 500 km from any other countries or geographical areas. Although these islands are not shown on the maps of the allotment areas, all 10 channnels are allotted to each of these islands.

The allotment areas shall be delimited by:

– frontiers between two (or more) countries;

– boundaries between land and sea;

– meridians whose longitude is an integral multiple of 15 minutes;

– parallels whose latitude is an integral multiple of 15 minutes.

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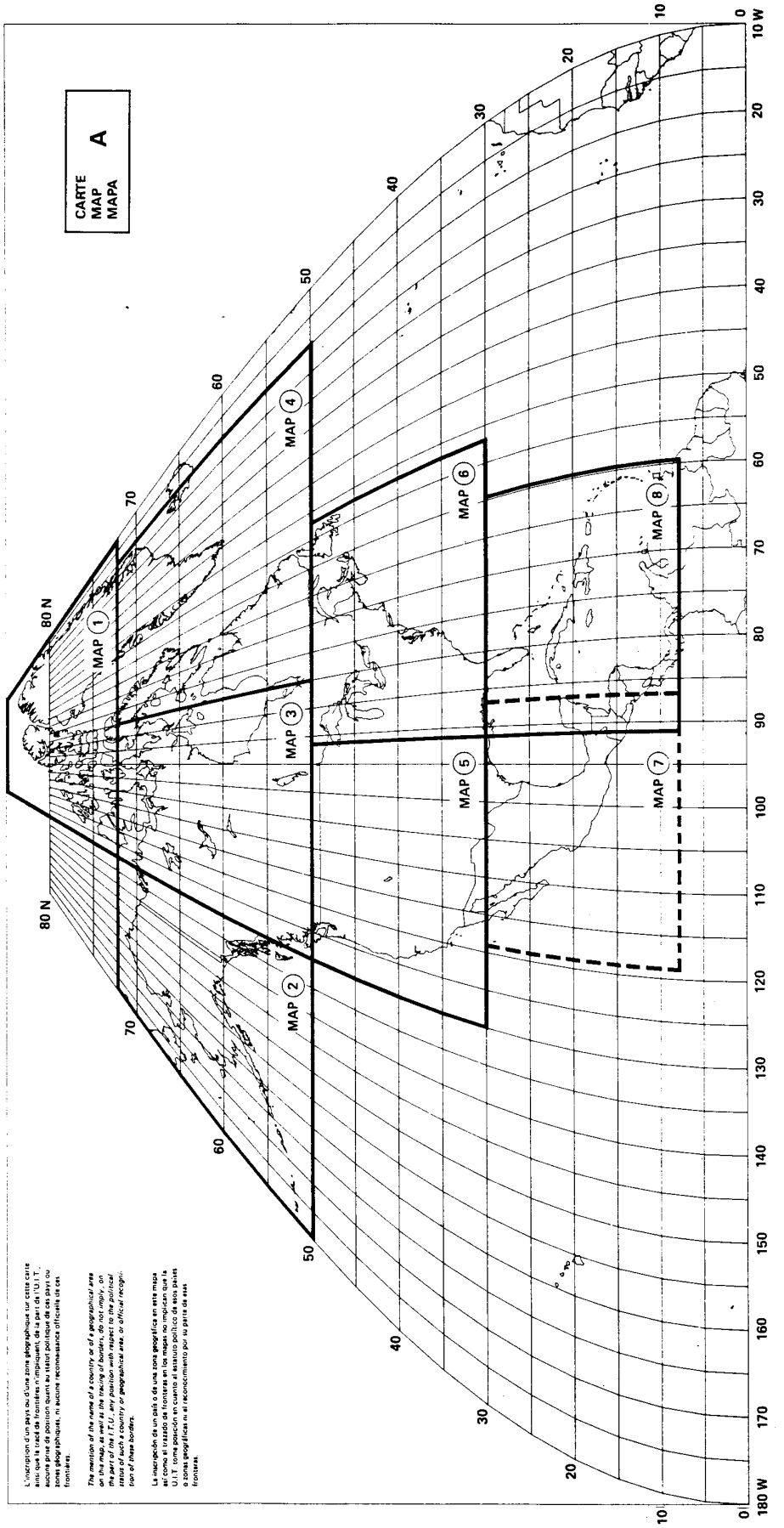
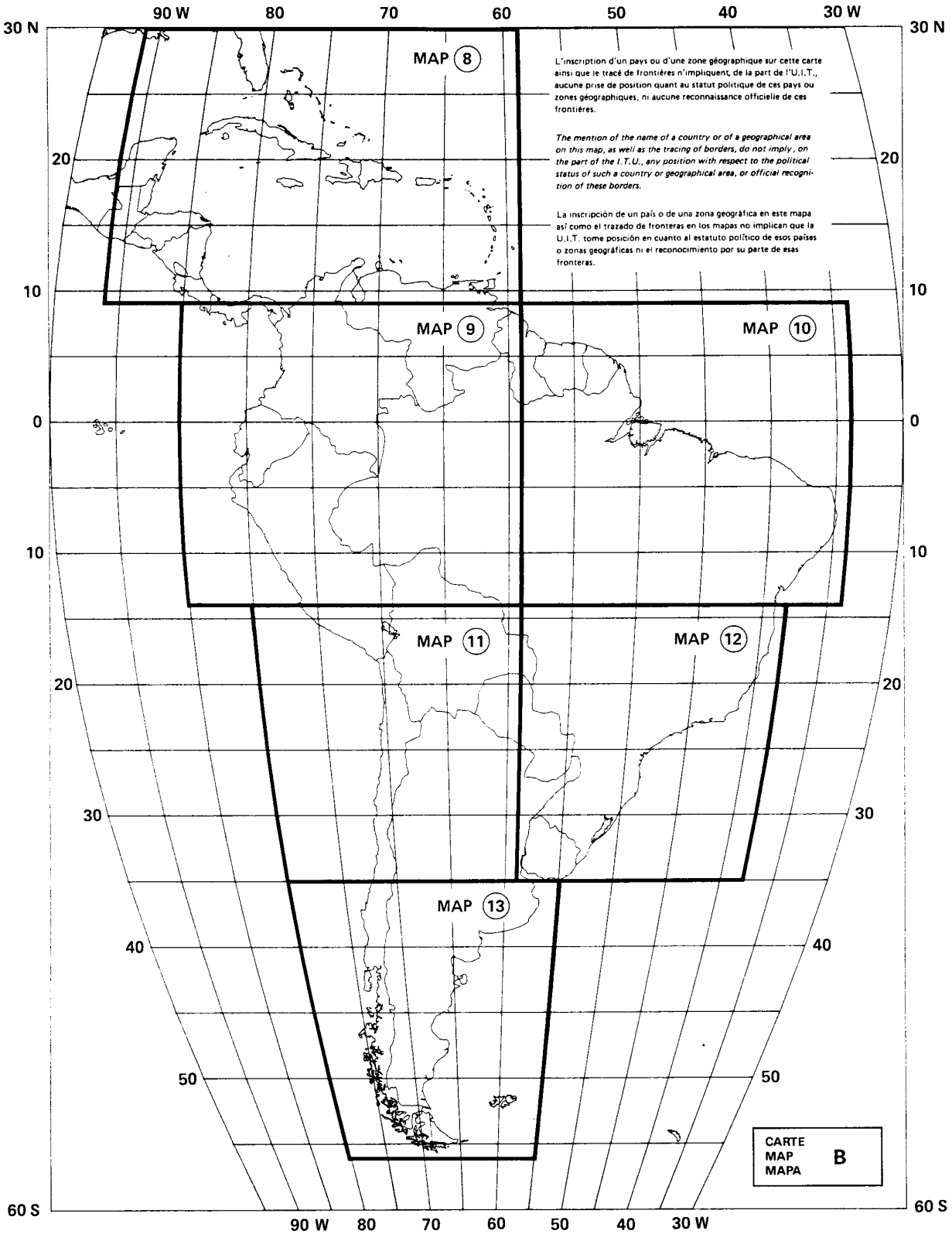
* *Note by the General Secretariat:* Two of these maps, labelled “A” and ”B”, show the relationship between the other 13 maps, numbered 1 to 13, which show the allotment areas.



L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.

The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with regard to the political status of such a country or geographical area, or official recognition of these borders.

La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras en los mapas no implican que la U.I.T. tome posición en cuanto al estatuto político de esos países o zonas geográficas ni al reconocimiento por su parte de esas fronteras.


90 W
80
70
60
50
40
30 W
30 N
20
10
0
10
20
30
40
50
60 S
MAP 8
MAP 9
MAP 10
MAP 11
MAP 12
MAP 13
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
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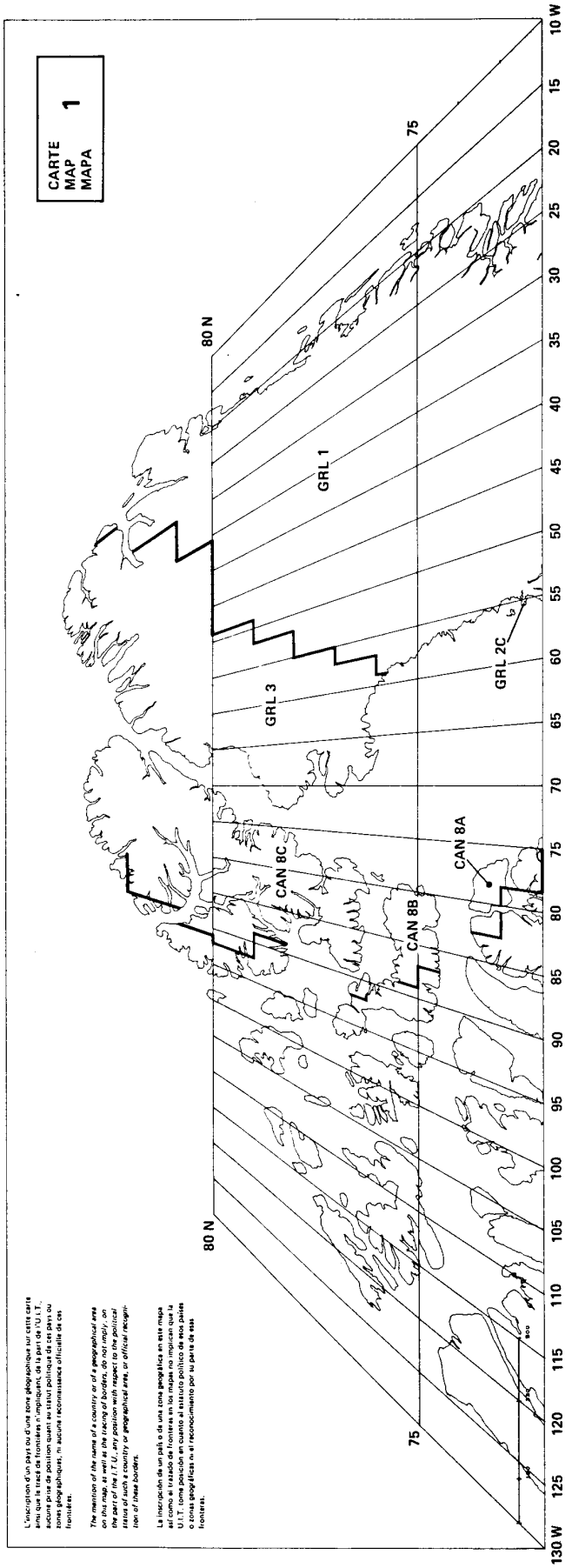
CARTE
MAP
MAPA
B


CARTE 1
MAP
MAPA
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T. aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
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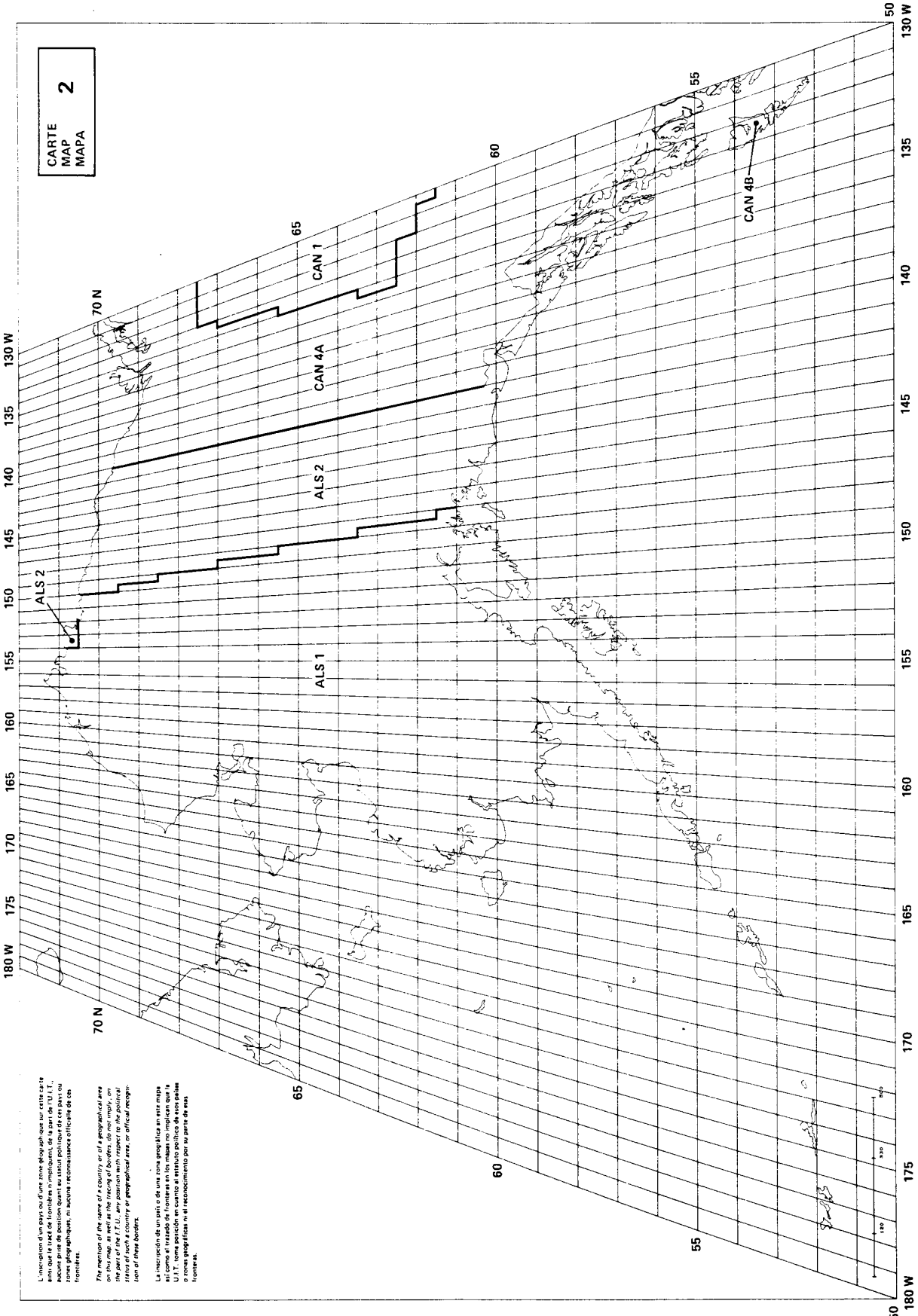
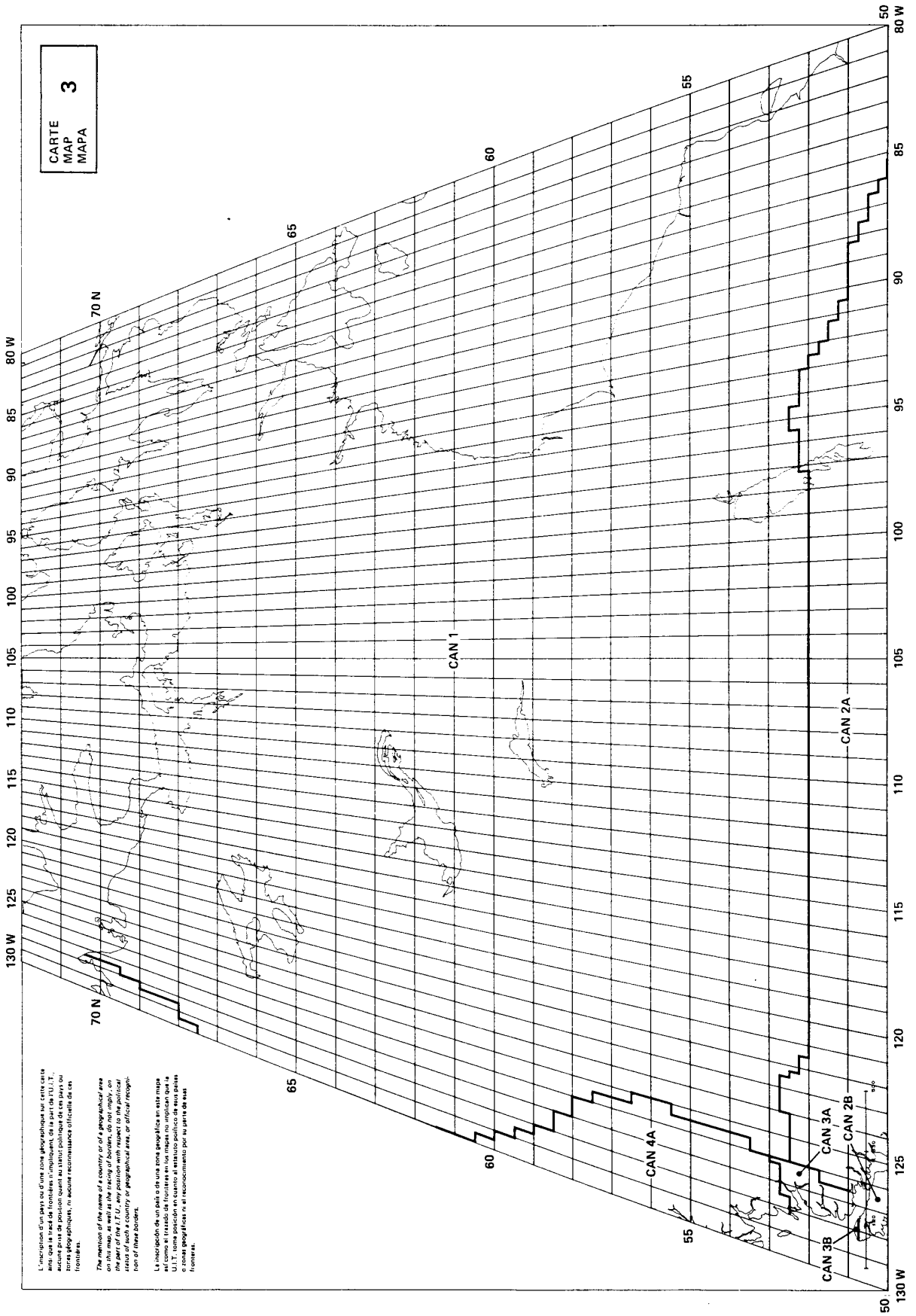
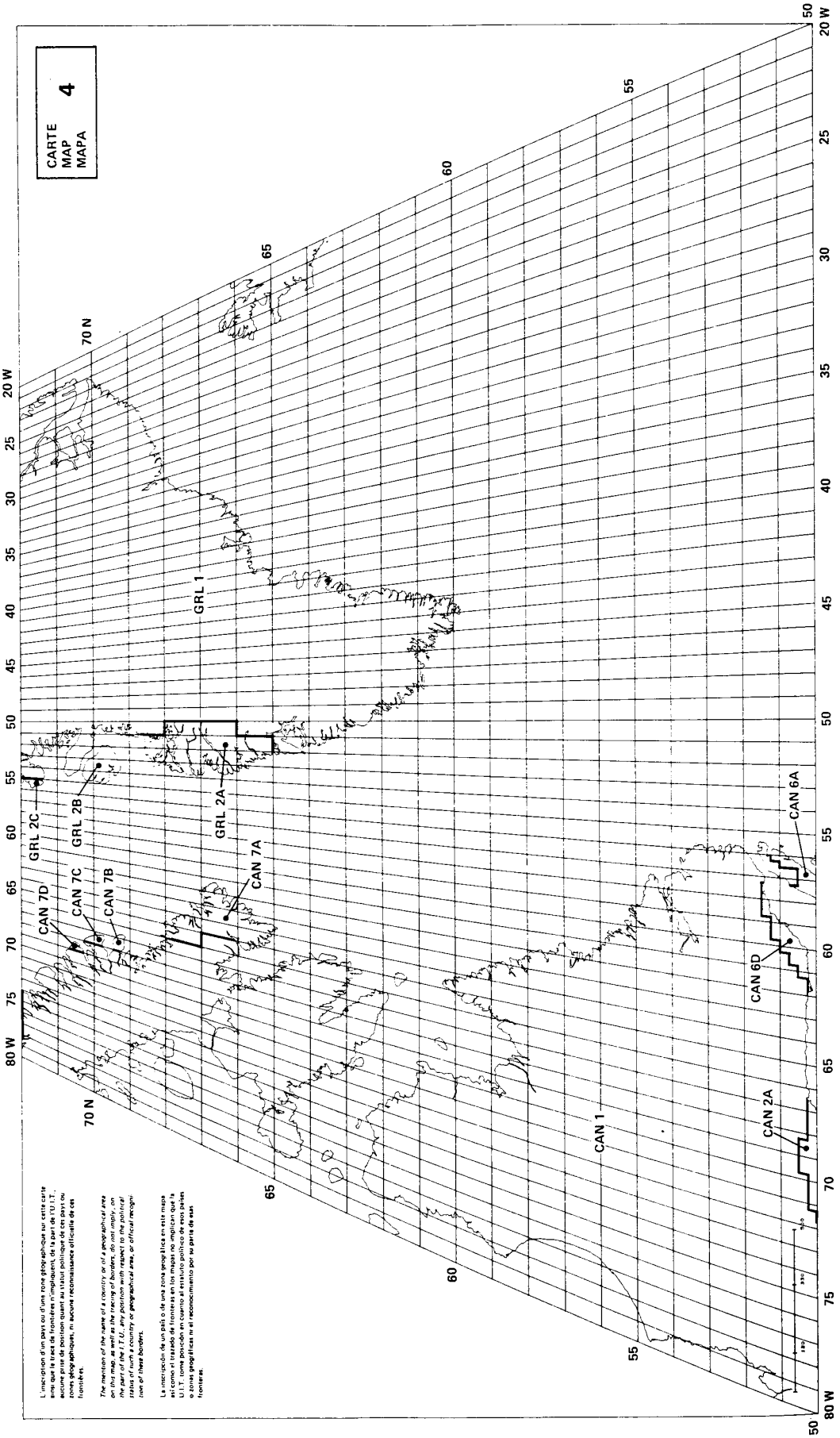
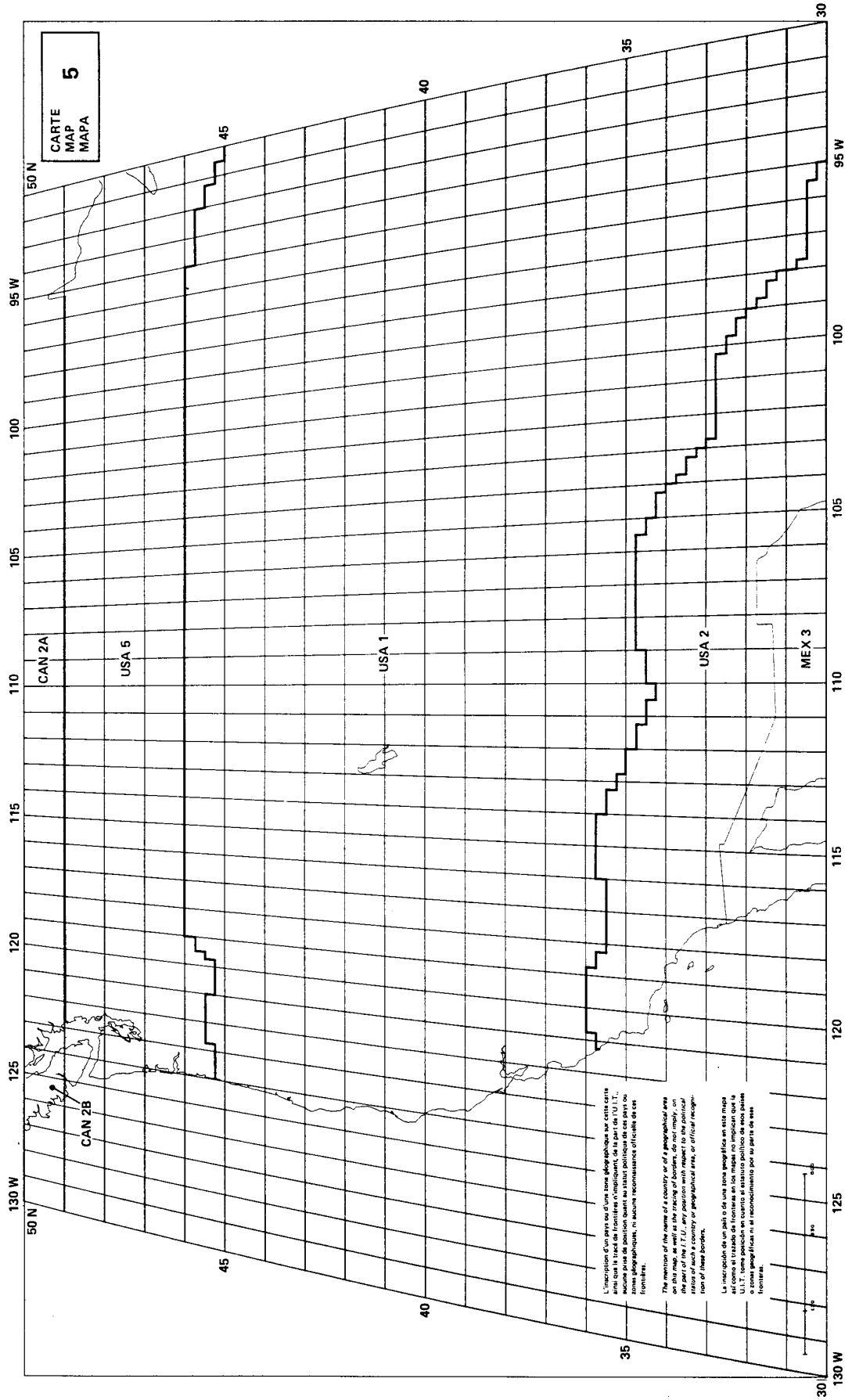
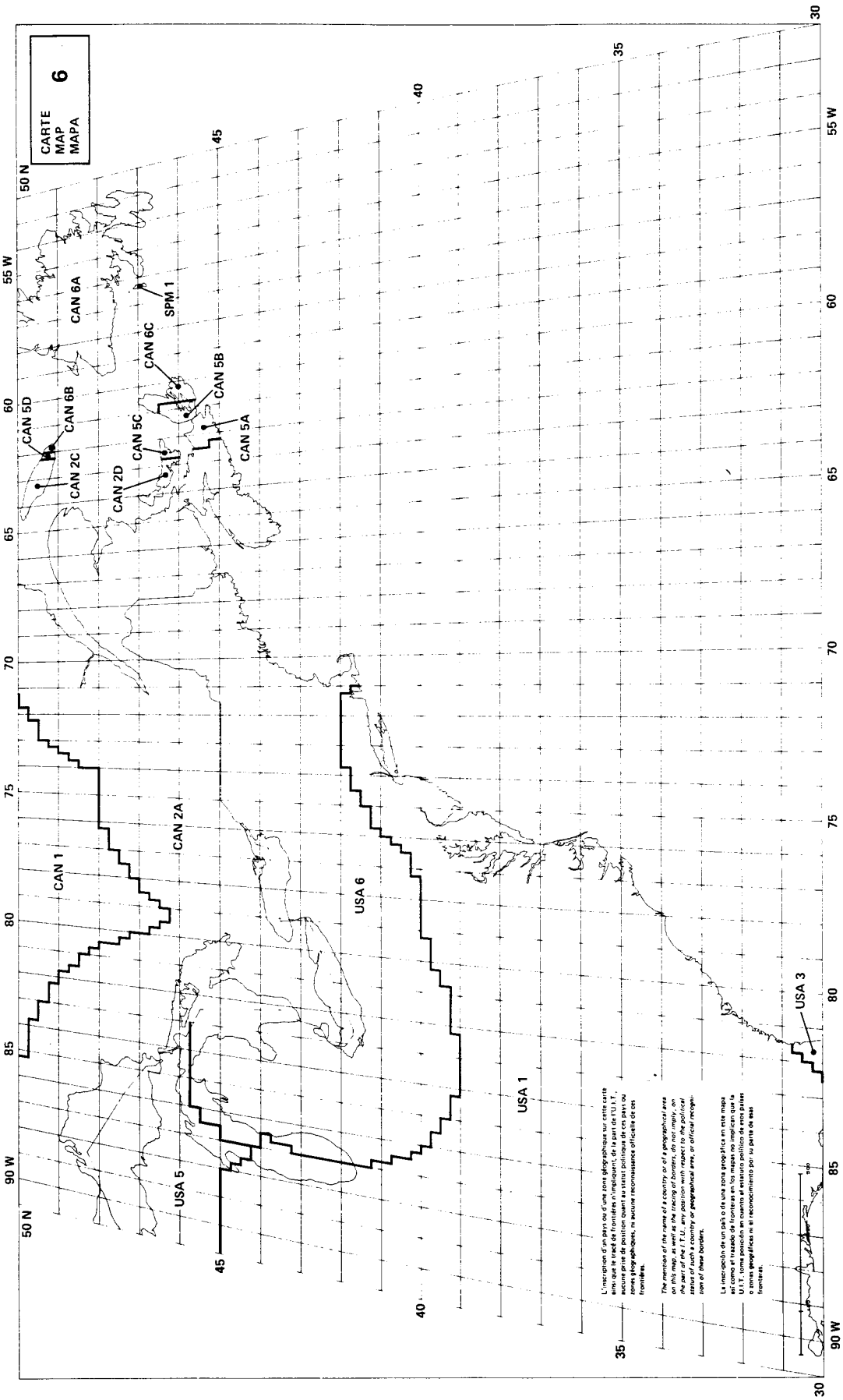
80 N
75
GRL 1
GRL 3
GRL 2C
CAN 8C
CAN 8B
CAN 8A
130 W
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10 W

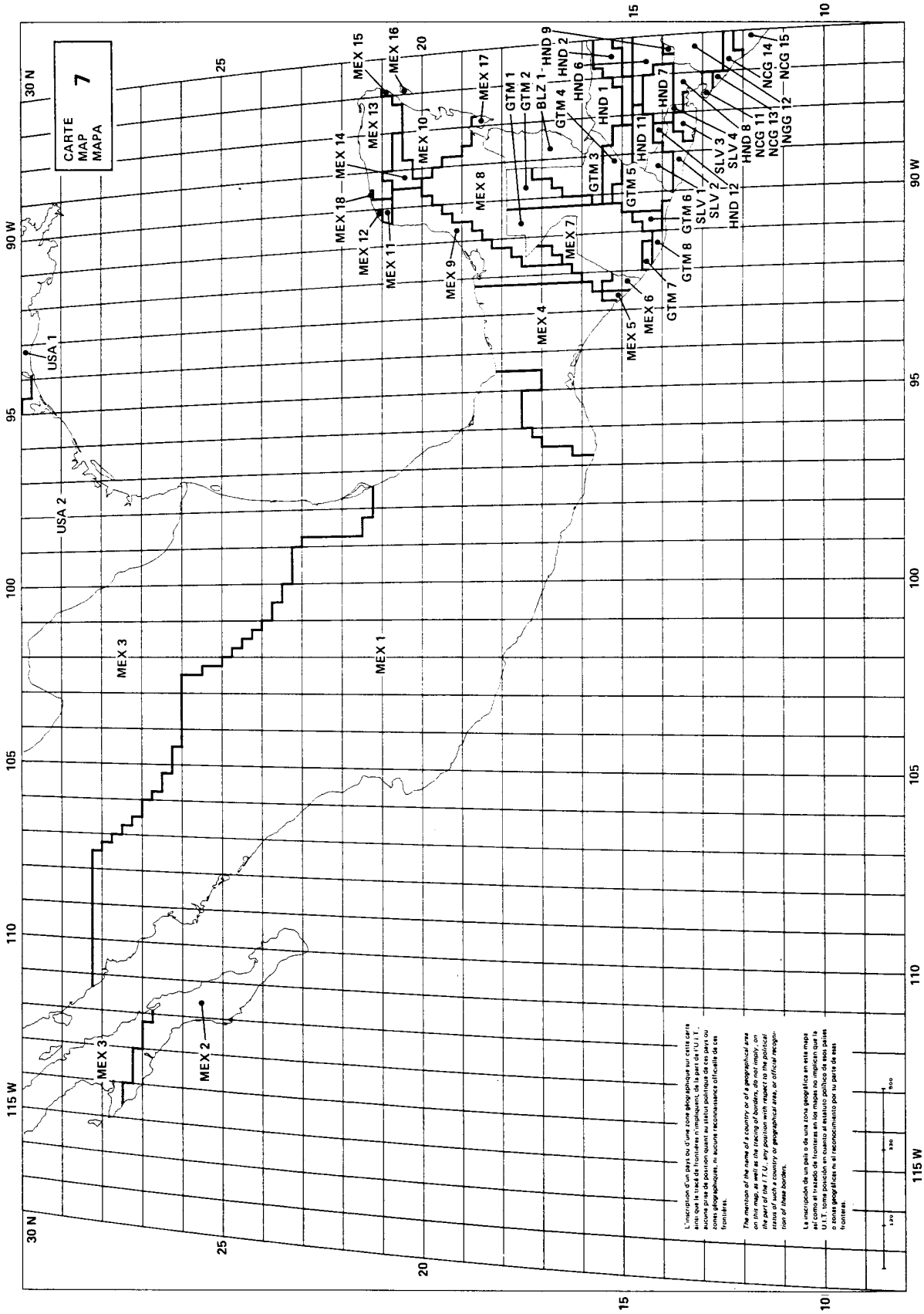

CARTE 2
MAP
MAPA
ALS 1
ALS 2
CAN 1
CAN 4A
CAN 4B
180 W
175
170
165
160
155
150
145
140
135
130 W
70 N
65
60
55
50
L'inscription d'un pays ou d'une zone géographique sur cette carte n'implique de la part de l'U.I.T. aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with respect to the political status of such a country or geographical area, or official recognition of these borders.
La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras en los mapas no implican que la U.I.T. tenga posición alguna con respecto al estatuto político de esas o zonas geográficas ni el reconocimiento por su parte de esas fronteras.

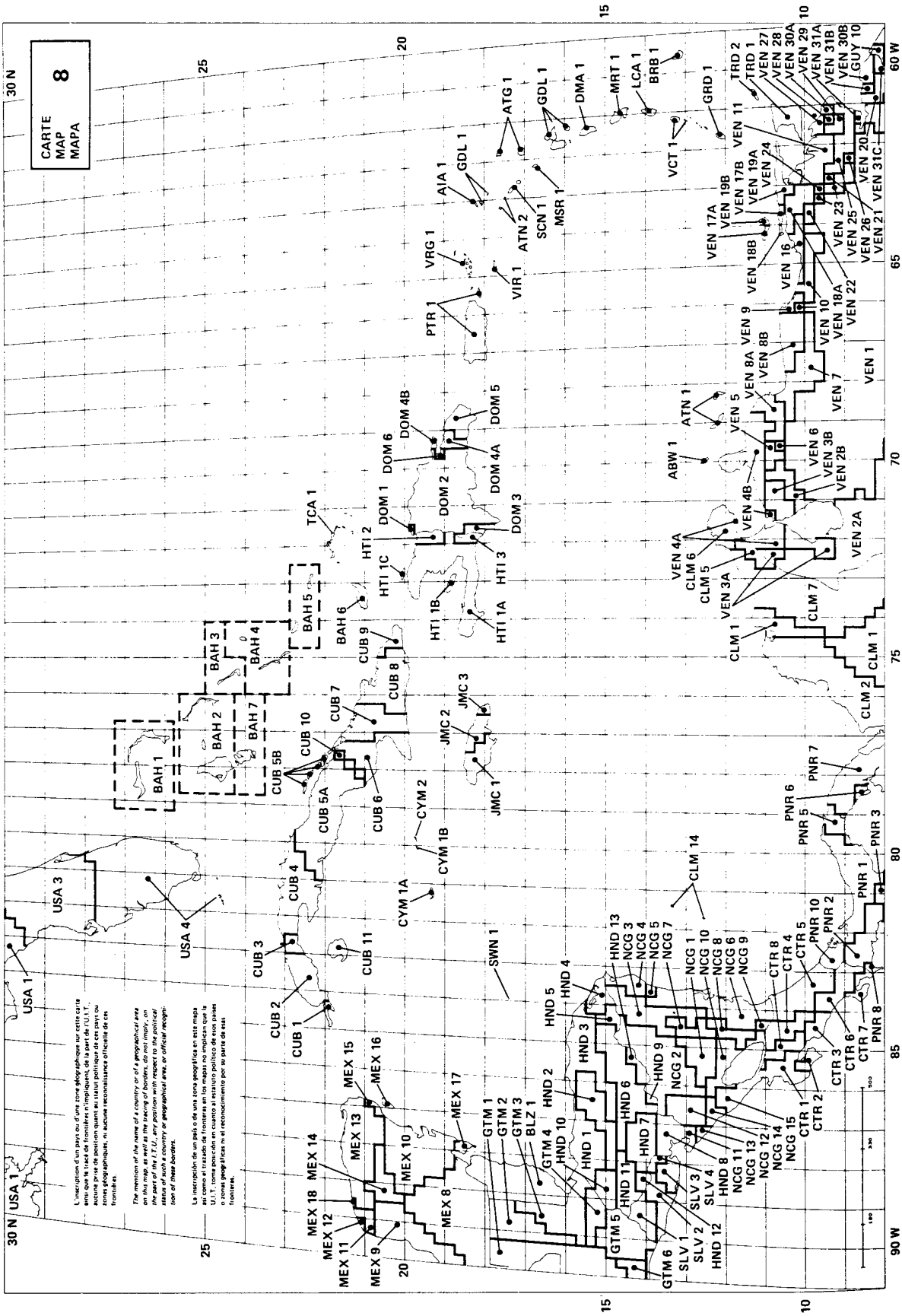

CARTE 3
MAP
MAPA
CAN 1
CAN 2A
CAN 2B
CAN 3A
CAN 3B
CAN 4A
70 N
65
60
55
130 W
125
120
115
110
105
100
95
90
85
80 W
50


CARTE 4
MAP
MAPA
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'implique, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with respect to the political status of such a country or geographical area, or official recognition of these borders.
La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras no implican, por parte de la U.I.T., toma posición en cuanto al estatuto político de esos países o zonas geográficas ni el reconocimiento por su parte de esas fronteras.
GRL 1
GRL 2A
GRL 2B
GRL 2C
CAN 1
CAN 2A
CAN 6A
CAN 6D
CAN 7A
CAN 7B
CAN 7C
CAN 7D
70 N
80 W
20 W


CARTE
MAP
MAPA
5
50 N
45
40
35
30
130 W
125
120
115
110
105
100
95 W
CAN 2A
CAN 2B
USA 5
USA 1
USA 2
MEX 3


CARTE
MAP
MAPA
6
CAN 1
CAN 2A
CAN 2C
CAN 2D
CAN 5A
CAN 5B
CAN 5C
CAN 5D
CAN 6A
CAN 6B
CAN 6C
SPM 1
USA 1
USA 3
USA 5
USA 6
50 N
55 W
60
65
70
75
80
85
90 W
45
40
35
30


CARTE
MAP
MAPA
7
30 N
25
20
15
10
90 W
95
100
105
110
115 W
USA 1
USA 2
MEX 1
MEX 2
MEX 3
MEX 4
MEX 5
MEX 6
MEX 7
MEX 8
MEX 9
MEX 10
MEX 11
MEX 12
MEX 13
MEX 14
MEX 15
MEX 16
MEX 17
MEX 18
GTM 1
GTM 2
GTM 3
GTM 4
GTM 5
GTM 6
GTM 7
GTM 8
BLZ 1
HND 1
HND 2
HND 6
HND 7
HND 8
HND 9
HND 11
HND 12
SLV 1
SLV 2
SLV 3
SLV 4
NCG 11
NCG 131
NCG 14
NGG 12
NCG 15


CARTE
MAP
MAPA
8
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
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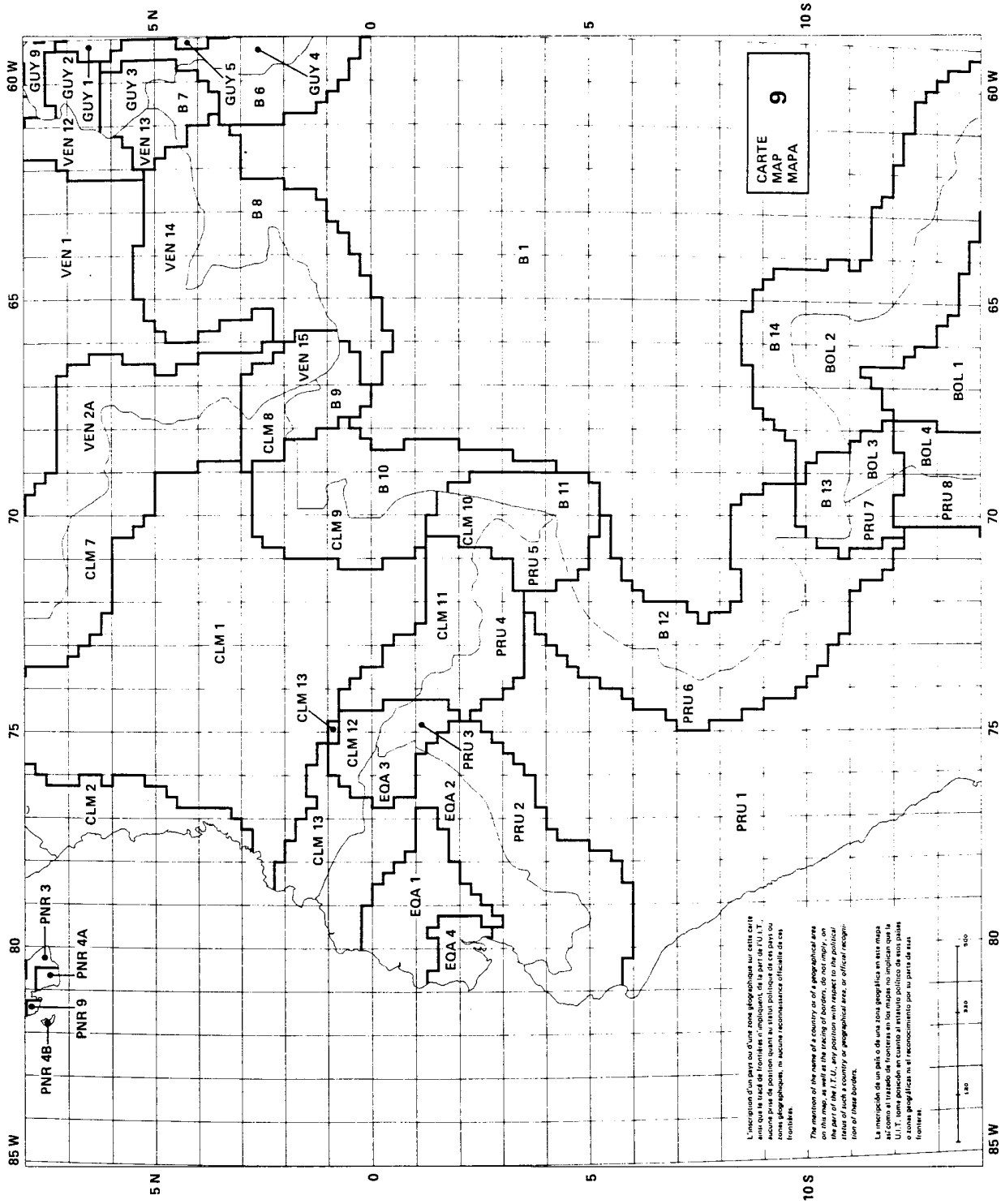
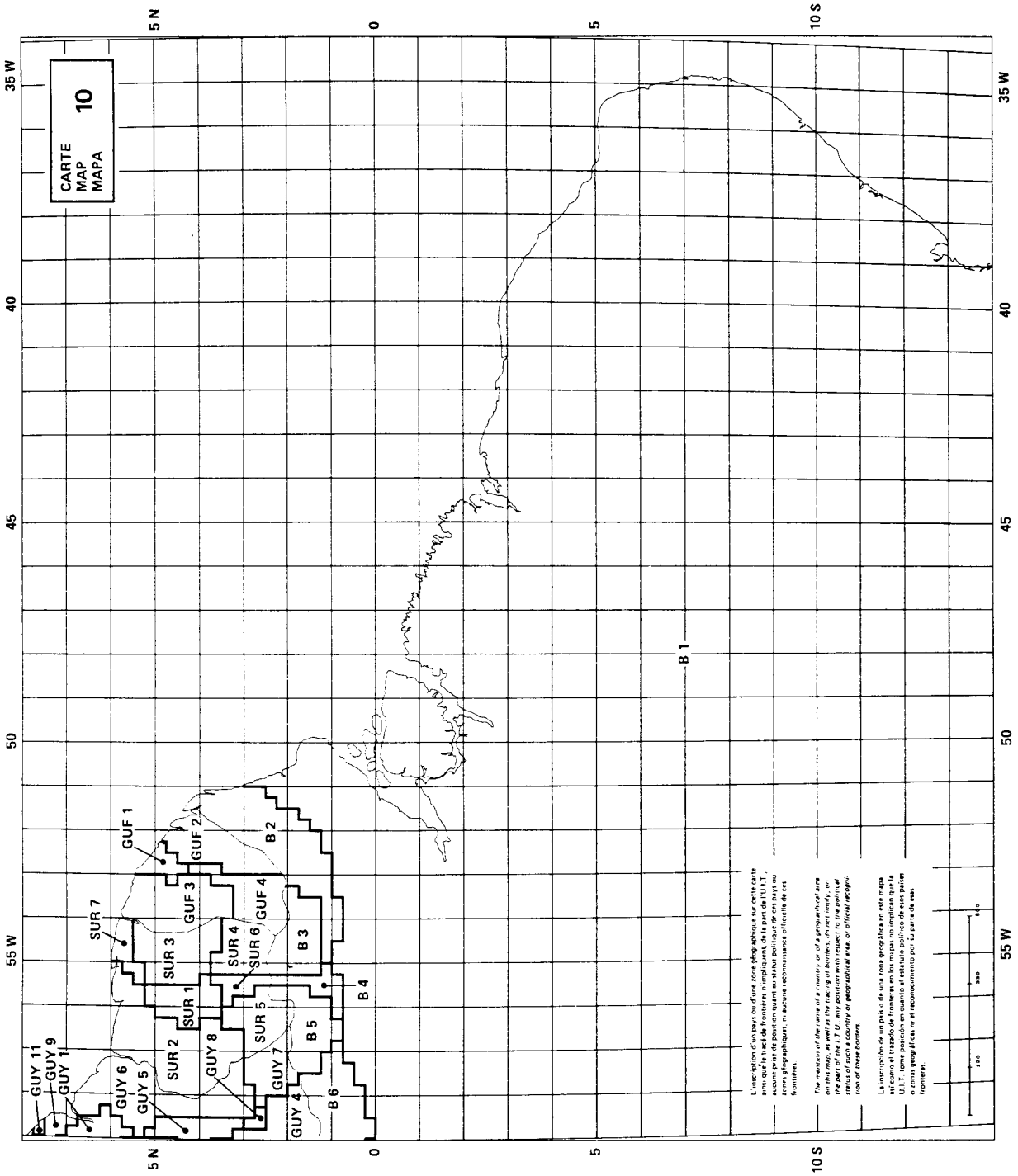
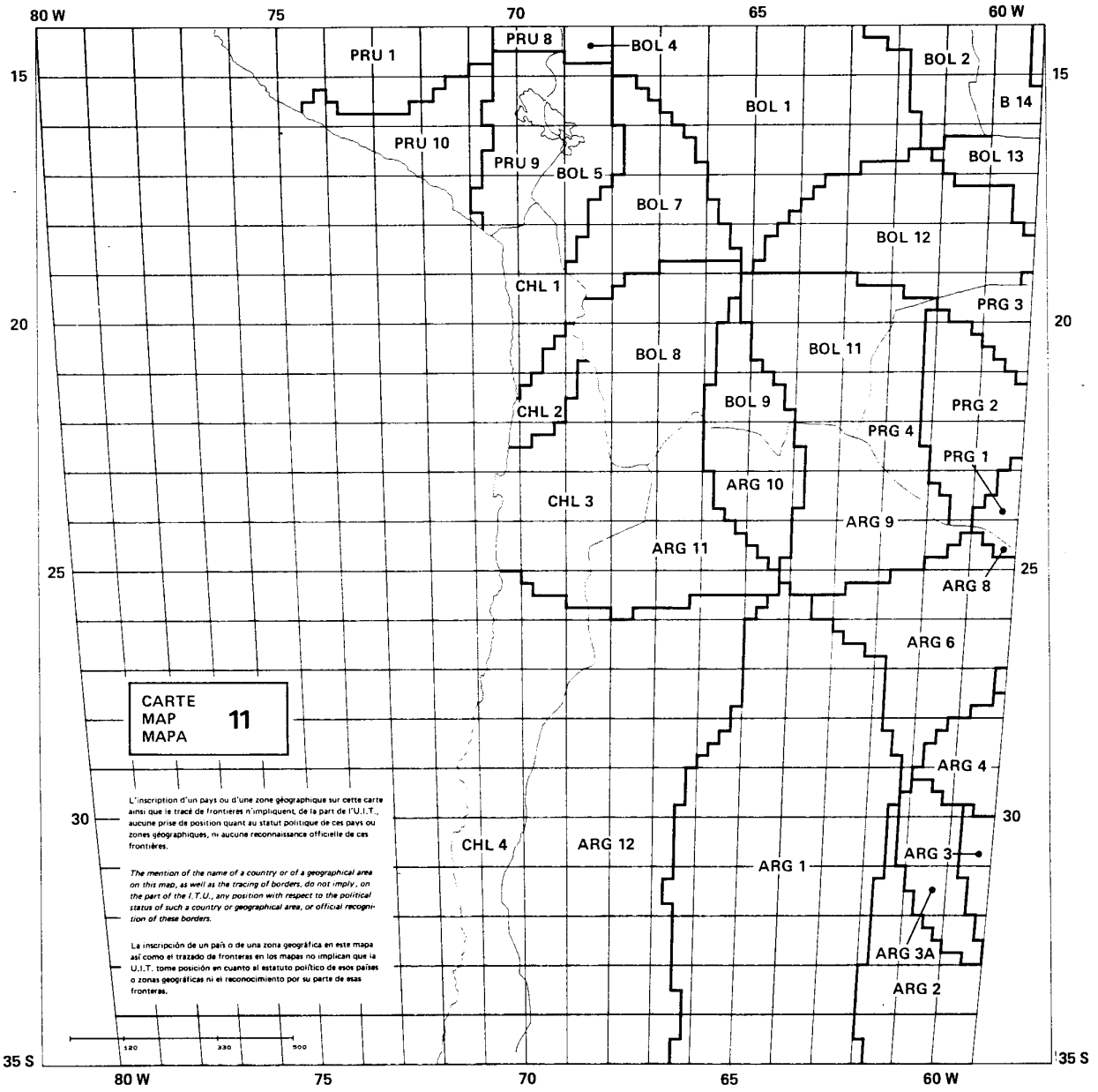
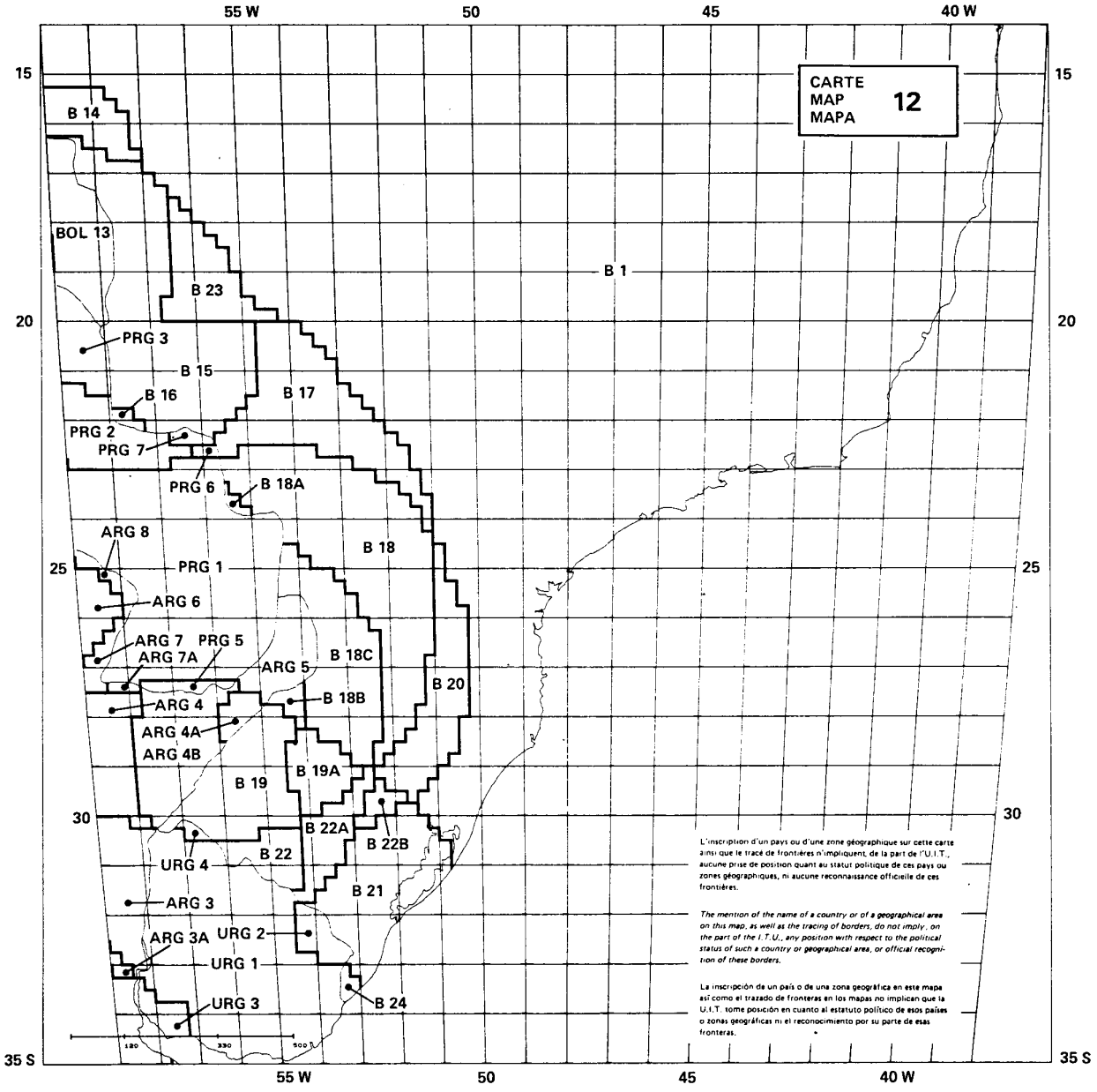
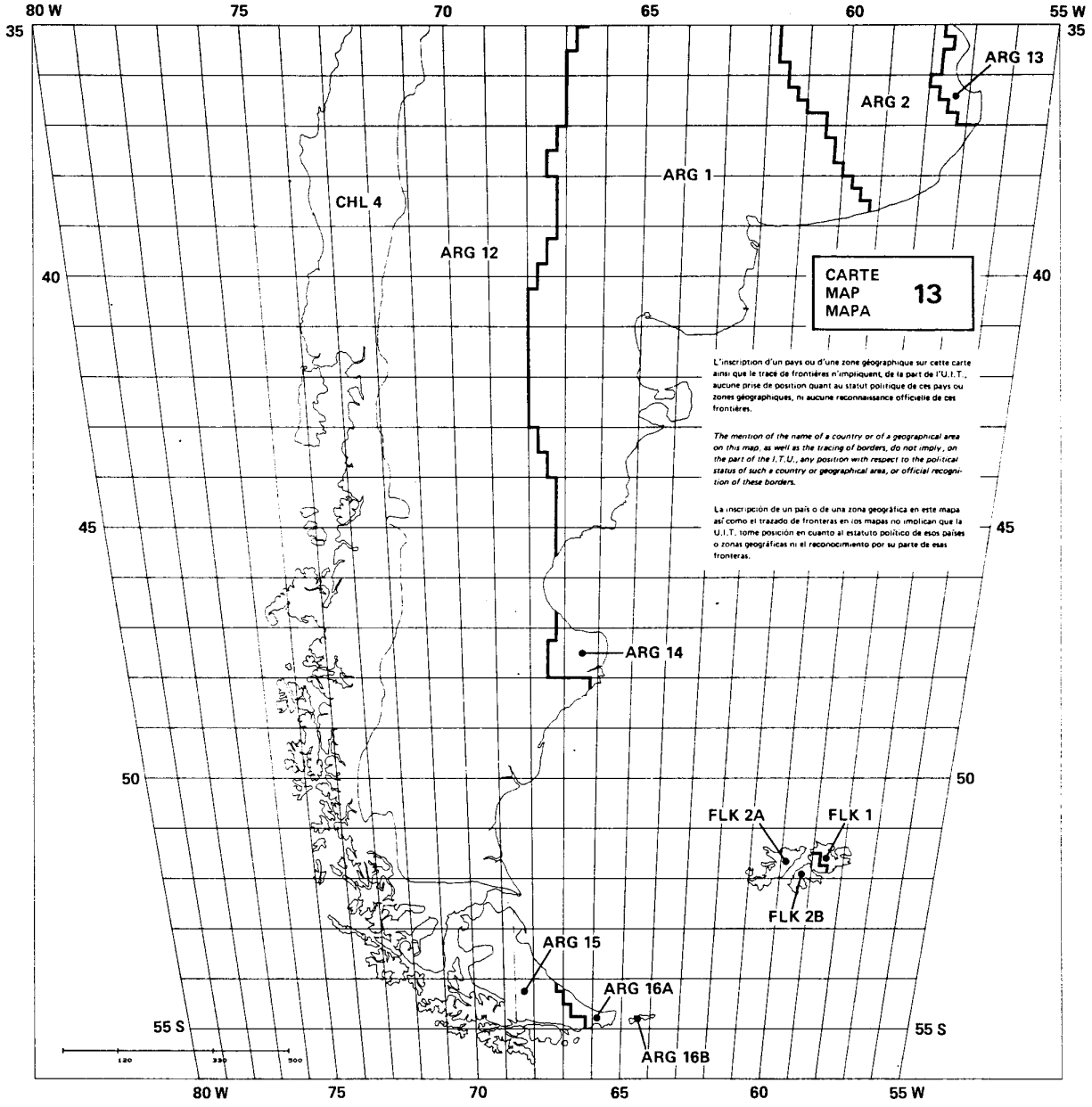
60 W
30 N
90 W


CARTE 9
MAP
MAPA
GUY 1
GUY 2
GUY 3
GUY 4
GUY 5
VEN 1
VEN 2A
VEN 12
VEN 13
VEN 14
VEN 15
B 1
B 6
B 7
B 8
B 9
B 10
B 11
B 12
B 13
B 14
BOL 1
BOL 2
BOL 3
BOL 4
CLM 1
CLM 2
CLM 7
CLM 8
CLM 9
CLM 10
CLM 11
CLM 12
CLM 13
PRU 1
PRU 2
PRU 3
PRU 4
PRU 5
PRU 6
PRU 7
PRU 8
EQA 1
EQA 2
EQA 3
EQA 4
PNR 3
PNR 4A
PNR 4B
PNR 9
60 W
65
70
75
80
85 W
5 N
0
5
10 S


CARTE
MAP
MAPA
10
5 N
0
5
10 S
35 W
40
45
50
55 W
GUY 11
GUY 9
GUY 1
GUY 6
GUY 5
GUY 4
SUR 2
SUR 7
SUR 3
SUR 1
GUY 8
SUR 5
GUY 7
SUR 4
SUR 6
GUF 1
GUF 2
GUF 3
GUF 4
B 1
B 2
B 3
B 4
B 5
B 6


80 W
75
70
65
60 W
15
20
25
30
35 S
PRU 1
PRU 8
BOL 4
BOL 2
B 14
BOL 1
PRU 10
PRU 9
BOL 5
BOL 13
BOL 7
BOL 12
CHL 1
PRG 3
BOL 8
BOL 11
BOL 9
CHL 2
PRG 2
PRG 4
PRG 1
ARG 10
CHL 3
ARG 9
ARG 11
ARG 8
ARG 6
CARTE
MAP
MAPA
11
ARG 4
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
CHL 4
ARG 12
ARG 1
ARG 3
The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with respect to the political status of such a country or geographical area, or official recognition of these borders.
ARG 3A
La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras en los mapas no implican que la U.I.T. tome posición en cuanto al estatuto político de esos países o zonas geográficas ni el reconocimiento por su parte de esas fronteras.
ARG 2
120
330
900


55 W
50
45
40 W
15
20
25
30
35 S
CARTE
MAP
MAPA
12
B 14
BOL 13
B 23
B 1
PRG 3
B 15
B 16
B 17
PRG 2
PRG 7
PRG 6
B 18A
ARG 8
B 18
PRG 1
ARG 6
ARG 7
PRG 5
ARG 7A
ARG 5
B 18C
B 20
ARG 4
B 18B
ARG 4A
ARG 4B
B 19
B 19A
B 22A
B 22B
B 22
URG 4
B 21
ARG 3
ARG 3A
URG 2
URG 1
URG 3
B 24
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
The mention of the name of a country or of a geographical area on this map, as well as the tracing of borders, do not imply, on the part of the I.T.U., any position with respect to the political status of such a country or geographical area, or official recognition of these borders.
La inscripción de un país o de una zona geográfica en este mapa así como el trazado de fronteras en los mapas no implican que la U.I.T. tome posición en cuanto al estatuto político de esos países o zonas geográficas ni el reconocimiento por su parte de esas fronteras.


80 W
75
70
65
60
55 W
35
40
45
50
55 S
ARG 13
ARG 2
ARG 1
CHL 4
ARG 12
CARTE
MAP
MAPA
13
L'inscription d'un pays ou d'une zone géographique sur cette carte ainsi que le tracé de frontières n'impliquent, de la part de l'U.I.T., aucune prise de position quant au statut politique de ces pays ou zones géographiques, ni aucune reconnaissance officielle de ces frontières.
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ARG 14
FLK 2A
FLK 1
FLK 2B
ARG 15
ARG 16A
ARG 16B
120
330
500

Part C – Technical criteria

1. *Standardized parameters*

a) 1 kW station power.

b) Non-directional antenna with an electrical height of 90 degrees.

c) Channel spacing of 10 kHz and carrier frequencies which are integer multiples of 10 kHz, beginning at 1 610 kHz.

2. *Standardized co-channel distances*

– land paths in Noise Zone 1: 330 km
(based on skywave propagation)

– land paths in Noise Zone 2: 120 km
(based on groundwave propagation
with a conductivity of 10 mS/m)

– sea and mixed paths in both noise zones: 500 km

– in the case of mixed paths, the
standardized distances are limited to
the sea portion of the path plus the
total portion of 120 km or 330 km of land
path in Noise Zones 2 and 1 respectively.

3. *Other technical criteria*

a) On the condition of not causing more interference to the Plan than would result from the application of criteria 1 and 2 above, station powers to a maximum of 10 kW and a directional antenna may be used.

b) As an exception, on the condition of not causing interference to the Plan, channels not allotted to the allotment area may be used.

c) An administration may use a channel allotted to it in a given area by assigning frequencies to the stations of the fixed or mobile service on condition that:

– the assigned bandwidth of the station of the fixed or mobile service is totally within the allotted channel;

– the field strength of a station of the fixed or mobile service shall not exceed the E_{nom} of the broadcasting service reduced by the appropriate protection ratio. This condition relates to the field strength of a broadcasting station with standardized parameters, at any location of an allotment area to which the same channel is allotted;

– the service rendered by the station of the fixed or mobile service does not claim protection greater than that of a station of the broadcasting service with the standardized parameters in the same allotment area.

FINAL PROTOCOL *

to the

Regional Agreement for the use of the Band 1 605 - 1 705 kHz in Region 2 (Rio 88 Agreement)

At the time of signing the Final Acts of the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988), the undersigned delegates take note of the following statements made by signatory delegations.

No. 1

Original: Spanish

For the Argentine Republic:

I

The Argentine Delegation declares that its country does not recognize any frequency allotments made directly or indirectly for any service in any part of the radio-frequency spectrum, particularly the frequency band 1 605 - 1 705 kHz allocated to the broadcasting service in accordance with Article **8** of the Radio Regulations, in respect of the Malvinas Islands, if such allotments are made in the name of another State or States.

In all cases, the Argentine Republic reserves its right to use, as its own, any radio frequencies allotted under those conditions.

The Argentine Republic, exercising its sovereign right over the Malvinas Islands, declares that its Government does not recognize the allotments entered, on behalf of the United Kingdom of Great Britain and Northern Ireland, in the plans drawn up by this Conference, in order to provide services in the above-mentioned territory, and reaffirms its sovereignty over the Malvinas Islands, which form an integral part of its national territory.

Resolutions 2065 (XX), 3160 (XXVIII), 31/49, 37/9 and 39/6 adopted by the United Nations General Assembly recognize the existence of a sovereignty dispute with regard to the Malvinas question and call upon the Argentine Republic and the United Kingdom of Great Britain and Northern Ireland to resume negotiations with a view to finding a peaceful and definitive solution to the dispute and the other points of contention regarding the question as soon as possible, through the good offices of the Secretary-General of the United Nations, who was instructed to report to the General Assembly on the progress achieved. On 27 November 1985, the United Nations General Assembly at its 40th session adopted Resolution 40/21 again urging both parties to resume negotiations, and that appeal was repeated in Resolutions 41/40 of 25 November 1986 and 42/19 of 17 November 1987.

II

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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.

The Argentine Delegation declares that its Government reserves the right to make any other declaration or reservation until the appropriate time.

No. 2

Original: English

For the Republic of Suriname:

The Delegation of the Republic of Suriname on behalf of its Government expressly states that the geographical area between the points 1 degree 50 minutes N – 56 degrees 00 minutes W and 1 degree 30 minutes N – 58 degrees 20 minutes W and 3 degrees 20 minutes N – 57 degrees 40 minutes W is and remains an integral and inseparable part of the national area of the Republic of Suriname, over which area that Republic holds inalienable rights and exercises sovereignty.

In the light of the foregoing, the Republic of Suriname cannot accept the channel allotments for any service to any other State than the Republic of Suriname in this particular area.

The Delegation of the Republic of Suriname, on behalf of its Government therefore declares that it does not consider itself bound by any decision taken in this Radio Conference or any provision contained in Final Acts of this Conference which contradicts the contents and intention of this statement.

No. 3

Original: Spanish

For the Eastern Republic of Uruguay:

In signing the Final Acts of the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988), the Delegation of the Eastern Republic of Uruguay reserves for its Government the right to take any steps it considers necessary to ensure the satisfactory operation of its broadcasting stations in the band 1 605 - 1 705 kHz:

a) should other countries fail to comply with the provisions of the Final Acts of the Conference;

b) should reservations entered by the Delegations of other countries jeopardize the normal operation of the broadcasting service in the band concerned.

No. 4

Original: English

For the United States of America:

The Government of the United States of America reserves the right to take any action that it deems necessary to safeguard its interests in the event that another Member jeopardizes the operation of its MF broadcasting service, fails to comply with the provisions of these Final Acts, or violates applicable provisions of the Convention or of the Radio Regulations.

No. 5

Original: Spanish

For the Republic of Venezuela:

The Delegation of the Republic of Venezuela declares that its Government reserves the right to take any steps it may consider necessary to ensure the development and satisfactory operation of its broadcasting service and other services to which the band 1 605 - 1 705 kHz is allocated, should its interests be affected by the decisions taken at this Conference or by the related Final Acts.

It also declares that the signing of the Final Acts does not imply recognition of the limits of the geographical areas as shown in Annex 4.

Furthemore, it reserves the right to take any steps it may consider necessary to protect its MF radiocommunication service from any adverse consequences of the declarations made by other administrations or of the failure on the part of any other Member of the Union belonging to Region 2 to accede to the Agreement or, in general, to comply with the provisions adopted at this Conference.

No. 6

Original: Spanish

For Costa Rica:

The Delegation of the Republic of Costa Rica to the Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988) reserves, for its Government, the right to accept or to reject any decision of this Conference which might in any way affect its sovereignty with regard to the use of the radio spectrum for medium frequency broadcasting in the said band within its national territory.

No. 7

Original: English

For Barbados:

The Delegation of Barbados reserves for its Government the right to take such action as it may consider necessary to safeguard its interests should other countries fail to comply with the Provisions of the Agreement of the Regional Administrative Radio Conference (Rio de Janeiro, 1988) or its Annexes or the Protocols attached thereto, or should reservations by other Members jeopardize the Broadcasting Services of Barbados.

No. 8

Original: Spanish

For Cuba:

In accordance with paragraph number 1 of Cuba's Declaration No. 5 concerning the Report prepared at the First Session (RARC-BC-R2, Geneva, 1986), the Delegation of Cuba to this Second Session declares, on signing the Final Acts of this Conference (Rio de Janeiro, 1988), that in the event of further radio attacks on its national sovereignty in the new broadcasting band 1 605 - 1 705 kHz, the Administration of the Republic of Cuba reserves its right to take any measures it considers necessary to protect its sovereignty and its national interests.

No. 9

Original: English

For the United Kingdom of Great Britain and Northern Ireland:

The Delegation of the United Kingdom of Great Britain and Northern Ireland notes Statement No. 1 by the Delegation of the Argentine Republic concerning the Falkland Islands.

The Delegation of the United Kingdom of Great Britain and Northern Ireland rejects the statement made regarding the Falkland Islands. The Government of the United Kingdom of Great Britain and Northern Ireland have no doubt as to British sovereignty over the Falkland Islands which are, and remain an integral part of the territories for the international relations of which the Government of the United Kingdom of Great Britain and Northern Ireland are responsible.

Further, regarding frequency allotments, the United Kingdom of Great Britain and Northern Ireland has no doubt on its title to speak for allotments and assignments in respect of the Falkland Islands in all frequency bands. It is the sole authority which is recognized by the International Telecommunication Union for so doing.

No. 10

Original: English

For the United States of America:

With regard to Declaration No. 8 by the Government of the Republic of Cuba, the United States of America draws attention to the declaration it made at the First Session of the RARC in Geneva in 1986. Further, the use of the term “agresiones radiales” in a technical forum of the International Telecommunication Union is improper. The United States of America reiterates the points made in its 1986 Declaration as well as its intention to take measures it deems necessary to safeguard its interests.

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RESOLUTIONS AND RECOMMENDATIONS

RESOLUTION No. 1

Continued Operation of Services other than the Broadcasting Service in the Band 1 605 - 1 705 kHz

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

considering

a) that the band 1 605 - 1 705 kHz is allocated in Region 2 on a primary basis to the fixed, mobile and aeronautical radionavigation services until the date adopted by this Conference;

b) that, as of the above date, in Region 2, the band 1 605 - 1 625 kHz is exclusively allocated to the broadcasting service and the band 1 625 - 1 705 kHz is allocated to the broadcasting service on a primary basis, to the fixed and mobile services on a permitted basis, and to the radiolocation service on a secondary basis;

c) that this Conference has adopted the date of 1 July 1990 for the entry into force of the change in the Table of Frequency Allocations, as required by No. **481** of the Radio Regulations (see Resolution 2);

d) that, as of the above date, stations of the fixed and mobile services in the band 1 605 - 1 625 kHz and stations of the aeronautical radionavigation service in the band 1 605 - 1 705 kHz may continue to operate only on the basis of No. **342** of the Radio Regulations;

noting

a) that administrations were requested by the First Session of the Conference to take all necessary steps to ensure that the full implementation of the Plan is not compromised;

b) that some administrations wish to continue the operation of stations of the fixed and mobile services in the band 1 625 - 1 705 kHz;

c) that the IFRB, at the request of the First Session, carried out an enquiry with administrations having assignments recorded in the Master Register for the services concerned;

d) the IFRB Report to the Conference on this matter;

considering further

that there is a need to assess the possible incompatibilities between allotments in the Plan and remaining frequency assignments used by stations of the fixed and mobile services in the band 1 625 - 1 705 kHz in Region 2;

resolves to request the IFRB

1. to prepare for each administration of Region 2, in advance of 1 July 1990, the list of assignments to each station of the fixed and mobile services in the band 1 605 - 1 625 kHz and aeronautical radionavigation service in the band 1 605 - 1 705 kHz and request them to cease the operation of these stations as soon as possible and to notify their cancellation from the Master Register. After 1 July 1990, the IFRB shall review its findings for those assignments remaining in the Master Register and shall include in them a reference to No. **342** of the Radio Regulations;

2. to assess the interference caused to the allotments appearing in the broadcasting Plan by assignments to the fixed and mobile services in the band 1 625 - 1 705 kHz notified before the date of entry into force of the Final Acts of this Conference;

3. to review the finding of any assignment of the fixed and mobile services which is incompatible with the broadcasting Plan and enter a remark in an appropriate column of the Master Register to indicate that this finding will be reviewed again when a broadcasting station of the allotment at the origin of the unfavourable finding is brought into use;

4. to inform the concerned administrations accordingly, noting, in the case of any administration responsible for the non-broadcasting assignment:

a) that the finding for its assignment recorded in the Master Register will be reviewed when a station of the broadcasting service is brought into use in the allotment concerned and, to this effect,

b) that, when the procedure of No. **1255** of the Radio Regulations is applied to a station of the fixed or mobile service, the two-month period specified in this procedure shall start from the date of bringing into use of such a station of the broadcasting service in conformity with the allotment concerned;

urges administrations

to take all appropriate steps to eliminate interference to stations of the broadcasting service brought into use in accordance with the Agreement.

RESOLUTION No. 2

Application of the Plan and Associated Provisions for the Broadcasting Service in Region 2 in the Band 1 605 - 1 705 kHz

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

noting

a) that, in accordance with No. **480** of the Radio Regulations adopted by WARC-1979, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service shall be subject to a plan to be established by a regional administrative radio conference;

b) that, in its Resolution No. 952, the Administrative Council assigned to the Conference the task of preparing a plan together with procedures governing the use of the band 1 625 - 1 705 kHz by other services in Region 2 and procedures to be applied for the implementation of the Plan;

having considered

a) that the planning of the band 1 605 - 1 705 kHz was based on allotting channels to allotment areas derived from the adoption of standardized parameters and distances;

b) that the use of non-standardized parameters can be accommodated when not in conflict with the Plan;

c) that provisions were made for administrations to use non-allotted channels without conflicting with the Plan;

noting further

a) that the Conference adopted an Agreement containing the provisions applicable to the countries of the Region which will be parties to the Agreement;

b) that, in order to ensure that the bringing into service of broadcasting stations in Region 2 in the band 1 605 - 1 705 kHz by countries non-parties to the Agreement is without prejudice to the regional broadcasting Plan, there is a need to revise No. **480** of the Radio Regulations;

c) that, to this effect, the Conference has prepared a revised text of No. **480** of the Radio Regulations for consideration by the World Administrative Radio Conference on the use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It (ORB-88), the agenda of which contains the following text:

> "15. to consider and, if appropriate, revise No. **480** of the Radio Regulations only to the extent necessary to ensure that implementation of broadcasting stations in Region 2 in the band 1 605 - 1 705 kHz is without prejudice to the regional broadcasting plan adopted at the Second Session of RARC BC-R2;";

recognizing

that some of the provisions adopted by the Conference derive from the nature of the Plan and are closely related to it in such a way that they shall be considered as an integral part of the Plan,

resolves

1. that the Plan to be used in accordance with No. **480** of the Radio Regulations is that contained in the Final Acts of this Conference (Parts A, B and C);

2. to recommend to the World Administrative Radio Conference ORB-88 the revised text of No. **480** of the Radio Regulations as contained in the Annex to this Resolution;

3. that, in accordance with the revised text of No. **480** of the Radio Regulations, when examining frequency assignment notices to stations of the fixed and mobile services in the band 1 625 - 1 705 kHz in Region 2 with respect to No. **1241** of the Radio Regulations, the IFRB shall, in addition to the assignments referred to in No. **1241**, take account of the allotments appearing in the Plan specified in *resolves* 1;

further resolves

that the date for the change in the Table of Frequency Allocations, as required by No. **481** of the Radio Regulations, shall be 1 July 1990.

ANNEX

to Resolution No. 2

RR 480 In Region 2, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service is subject to the Plan established by the Regional Administrative Radio Conference (Rio de Janeiro, 1988).

In Region 2, in the band 1 625 - 1 705 kHz, the relationship between the broadcasting, fixed and mobile services is shown in No. **419**. However, frequency assignments to stations of the fixed and mobile services in the band 1 625 - 1 705 kHz, notified under No. **1214**, shall take account of the allotments appearing in the Plan established by the Regional Administrative Radio Conference (Rio de Janeiro, 1988).

RESOLUTION No. 3

**Adjacent Channel Interference to or from
Broadcasting Stations in the Frequency Band below 1 605 kHz**

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

considering

a) that stations of the broadcasting service may experience interference from first and second adjacent channels;

b) that such interference may involve stations operated, on the one hand, on 1 590 and 1 600 kHz and, on the other hand, on 1 610 and 1 620 kHz;

c) that this Conference is not empowered to take any action with respect to any assignment below 1 605 kHz that is recorded in the Master Register or that appears in any regional agreement;

d) that administrations need to know in advance where and when adjacent channel interference may occur in order to take appropriate measures for its avoidance;

resolves to request the IFRB

as a matter of assistance to administrations in application of No. **999** of the Radio Regulations, to evaluate the level of adjacent channel interference that may exist between any existing or projected assignments on the channels 1 590, 1 600, 1 610 and 1 620 kHz, and to communicate the results to the administrations concerned;

urges

the administrations concerned, after receiving the results from the IFRB, to take all possible steps towards a mutual resolution of the situation.

RECOMMENDATION No. 1

**Revision of No. 480 and other Provisions
of the Radio Regulations**

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

considering

a) that, in accordance with No. **480** of the Radio Regulations adopted by WARC-79, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service in Region 2 shall be subject to a plan to be established by a regional administrative radio conference;

b) that, under No. **481** and the Table of Frequency Allocations in Article **8** of the Radio Regulations and until the date adopted by this Conference, the band 1 605 - 1 705 kHz is allocated in Region 2 to the fixed, mobile, and aeronautical radionavigation services on a primary basis and to the radiolocation service on a secondary basis;

c) that, under the Table of Frequency Allocations in Article **8** of the Radio Regulations, including No. **481**, and as of the above date in Region 2, the band 1 605 - 1 625 kHz will be allocated exclusively to the broadcasting service and the band 1 625 - 1 705 kHz will be allocated to the broadcasting service on a primary basis, to the fixed and mobile services on a permitted basis, and to the radiolocation service on a secondary basis;

d) that this Conference adopted the date of 1 July 1990 for the entry into force of the change in the Table of Frequency Allocations, as required by No. **481** of the Radio Regulations;

noting

a) that Recommendation **504** of WARC-79 recommended, *inter alia*, that a regional administrative radio conference be convened to establish a plan for the broadcasting service in the band 1 605 - 1 705 kHz in Region 2;

b) that the First Session of this Conference, in Recommendation No. 3, stated that:

– the Region 2 administrations should henceforth refrain from assigning frequencies in the band 1 625 - 1 705 kHz to their stations in the non-broadcasting service which might inhibit the implementation of the Plan;

– when using frequencies in the band 1 605 - 1 705 kHz for stations in the non-broadcasting services, administrations should take all necessary steps to ensure that the full implementation of the Plan adopted by the Conference is not compromised;

c) that, on the basis of Nos. **480** and **481** of the Radio Regulations, this Conference has been empowered to establish a broadcasting Plan for the entire Region and its date of implementation (see Resolution 2);

d) that the agenda of the World Administrative Radio Conference on the use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It (ORB-88) includes the consideration of No. **480** of the Radio Regulations, and to this effect, this Conference is assigned the task of preparing a revised text of this Regulation;

e) that the Conference has adopted Resolution 2 indicating the Plan to be used by all countries of Region 2 in accordance with No. **480** of the Radio Regulations;

recommends to WARC ORB-88

that No. **480** of the Radio Regulations be modified to read as follows:

RR 480 In Region 2, the use of the band 1 605 - 1 705 kHz by stations of the broadcasting service is subject to the Plan established by the Regional Administrative Radio Conference (Rio de Janeiro, 1988).

In Region 2, in the band 1 625 - 1 705 kHz, the relationship between the broadcasting, fixed and mobile services is shown in No. **419**. However, frequency assignments to stations of the fixed and mobile services in the band 1 625 - 1 705 kHz, notified under No. **1214**, shall take account of the allotments appearing in the Plan established by the Regional Administrative Radio Conference (Rio de Janeiro, 1988);

further recommends

that a future competent world administrative radio conference take the necessary action to delete from the Radio Regulations No. **481** and Recommendation **504** of WARC-79;

requests

the Administrative Council to take the necessary steps to ensure that No. **481** of the Radio Regulations and Recommendation **504** of WARC-79 are placed on the agenda of a future competent world administrative radio conference with a view to their possible deletion from the Radio Regulations;

instructs

the Secretary-General to forward this Recommendation to WARC ORB-88.

RECOMMENDATION No. 2

Technical Criteria for Interregional Sharing

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

considering

a) that, according to the agenda contained in Administrative Council Resolution No. 952, this Conference recommends the technical criteria for the sharing of the band 1 625 - 1 705 kHz between the broadcasting service and other services in Region 2;

b) that, in according with Nos. **1001** and **1454** of the Radio Regulations, the IFRB develops Technical Standards and Rules of Procedure for internal use by the Board in the exercise of its functions, based *inter alia* on the relevant provisions of the Radio Regulations and the Appendices thereto, the decisions of administrative radio conferences, as appropriate, and the Recommendations of the CCIR;

c) No. **480A** of the Radio Regulations relating to the coverage contour of the maritime mobile service in Region 1 which is to be determined by groundwave propagation;

noting

a) that the recording and examination process provided in Article **12** of the Radio Regulations is the only procedure making it possible to avoid harmful interference between stations operating in Region 2, on the one hand, and those operating in Regions 1 and 3, on the other hand, and that the IFRB will therefore adopt appropriate Technical Standards;

b) that, under No. 56 of the Convention, the decisions of a regional administrative conference must in all circumstances be in conformity with the provisions of the Radio Regulations and that such a conference may give instructions to the IFRB, provided that they do not conflict with the interests of the two other Regions;

c) that the Regional Administrative Radio Conference for the maritime mobile service and aeronautical radionavigation service in certain parts of the MF band in Region 1 (RARC MM-R1, Geneva, 1985) adopted technical criteria for the protection of the maritime mobile service in the bands 1 606.5 - 1 625 kHz and 1 635 - 1 800 kHz;

recognizing

a) that the method of calculating skywave field strength set out in the Annex to this Recommendation was proposed for use in the planning of 1 605 - 1 705 kHz band because it was more precise than the method used for the 525 - 1 605 kHz band in Region 2, and that the latter was chosen only because it simplified the planning process;

b) that simplicity is not a major factor in the calculation of field strength over interregional paths for individual assignments;

recommends

1. that the IFRB should take account of the method of calculating the skywave field strength described in the Annex to this Recommendation when adopting its Technical Standards relating to the examination of frequency assignment notices for broadcasting stations of Region 2 operating in the band 1 605 - 1 705 kHz from the standpoint of the probability of harmful interference to stations in Regions 1 and 3, and vice versa. The field strengths thus calculated should be increased by 2.5 dB to take into account the different reference hours in Region 2 and Regions 1 and 3;

2. that in calculating interregional interference, the field strengths should be determined by taking their arithmetic mean, expressed in dB (μV/m) for a specified e.m.r.p., calculated both by the method described in Annex 1 to CCIR Recommendation 435-3 and by that referred to in *recommends 1* above. The value thus calculated should be applied when it is midnight at the mid-point of the interregional path, provided that the entire path is in darkness. Field strengths at other times are unlikely to exceed this value.

ANNEX

to Recommendation No. 2

Calculation of the skywave field strength to evaluate interregional interference

1. *List of symbols* (see also Chapter 2 of Annex 1)

a_T: geographical latitude of the transmitter location (degrees);

a_R: geographical latitude of the receiver location (degrees);

b_T: geographical longitude of the transmitter location (degrees);

b_R: geographical longitude of the receiver location (degrees);

φ_T: geomagnetic latitude of the transmitter location (degrees);

φ_R: geomagnetic latitude of the receiver location (degrees);

φ: average geomagnetic latitude of a path under study (degrees).

Note – North and East are considered positive, South and West negative.

2. *General procedure*

The general procedure for calculation of skywave field strength to evaluate interregional interference is similar to that described in Chapter 2 of Annex 1, with the following exception.

The annual median unadjusted skywave field strength F is given by:

$$F = F_c + 20 \log \frac{E_c f(\theta)\sqrt{P}}{100} \qquad \text{dB}(\mu\text{V/m}) \tag{1}$$

F_c is given by:

$$F_c = (95 - 20 \log d) - (6.28 + 4.95 \tan^2 \varphi)(d/1000)^{1/2} \qquad \text{dB}(\mu\text{V/m}) \tag{2}$$

Figure 1 and Table I show the values of F_c for selected latitudes. If $|\varphi|$ is greater than 60 degrees, equation (2) is evaluated for $|\varphi| = 60$ degrees. If d is less than 200 km, equation (2) is evaluated for $d = 200$ km. However, the actual great-circle distance is to be used in determining the elevation angle (see Section 4 for the calculation of great-circle distance and conversion from geographical latitude to geomagnetic latitude).

Note – Values of F_c are normalized to 100 mV/m at 1 km corresponding to an effective monopole radiated power (e.m.r.p.) of -9.54 dB(kW).

3. *Skywave field strength, 50% of the time*

This is given by:

$$F(50) = F \quad \text{dB } (\mu V/m) \tag{3}$$

4. *Path parameters*

See Section 1. The great-circle distance d (km) is given by:

$$d = 111.18 \text{ arc cos } [\sin a_T \sin a_R + \cos a_T \cos a_R \cos (b_R - b_T)] \tag{4}$$

The geomagnetic latitude of the transmitter location, φ_T, is given by:

$$\varphi_T = \text{arc sin } [\sin a_T \sin 78.5^\circ + \cos a_T \cos 78.5^\circ \cos (69^\circ + b_T)] \tag{5}$$

φ_R can be determined in a similar manner. Then,

$$\varphi = \tfrac{1}{2} (\varphi_T + \varphi_R) \tag{6}$$

Alternatively, Figure 2 may be used.

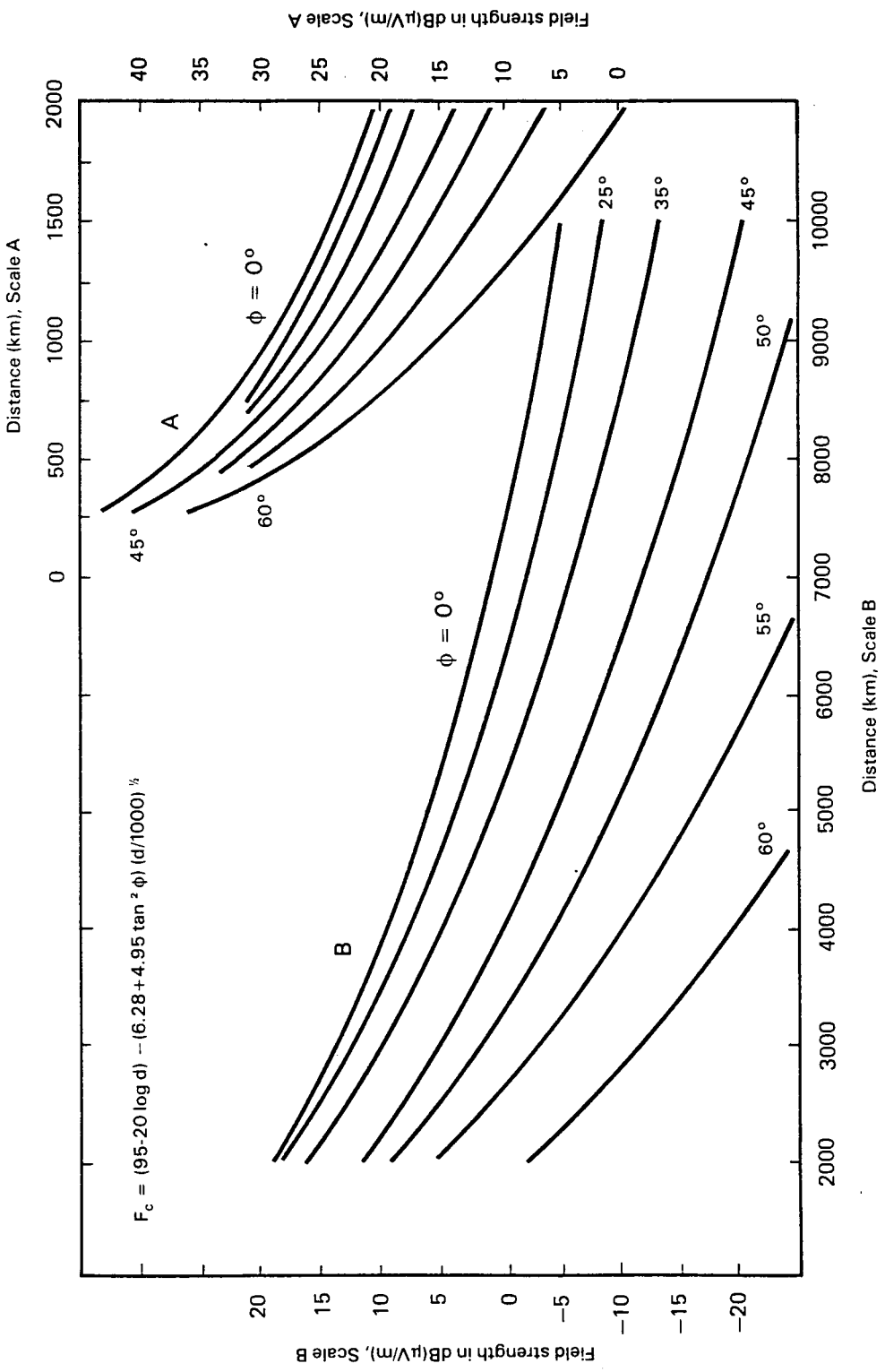

FIGURE 1 – *Skywave field strength versus distance (for a characteristic field strength of 100 mV/m at 1 km, 50% of the time, 2 hours after sunset)*

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
0-200	46.17	203.4574	46.01	199.7683	45.43	186.8867	43.96	157.6842	39.53	94.7147
250	43.90	156.6680	43.72	153.4954	43.07	142.4722	41.42	117.8230	36.47	66.6392
300	42.02	126.1266	41.82	123.3314	41.11	113.6631	39.30	92.3093	33.88	49.4450
350	40.40	104.7304	40.19	102.2257	39.43	93.5977	37.47	74.7566	31.62	38.0894
400	38.98	88.9709	38.76	86.6981	37.94	78.8988	35.85	62.0462	29.59	30.1752
450	37.72	76.9207	37.48	74.8381	36.61	67.7174	34.40	52.4825	27.76	24.4320
500	36.58	67.4351	36.33	65.5120	35.41	58.9589	33.08	45.0689	26.08	20.1307
550	35.53	59.7930	35.27	58.0059	34.31	51.9358	31.86	39.1832	24.52	16.8266
600	34.57	53.5183	34.29	51.8487	33.29	46.1953	30.74	34.4183	23.07	14.2352
650	33.68	48.2840	33.39	46.7172	32.35	41.4276	29.69	30.4974	21.70	12.1669
700	32.84	43.8589	32.54	42.3829	31.46	37.4139	28.70	27.2260	20.42	10.4915
750	32.06	40.0746	31.75	38.6794	30.63	33.9955	27.77	24.4640	19.20	9.1169
800	31.32	36.8059	31.00	35.4833	29.84	31.0547	26.89	22.1079	18.04	7.9764
850	30.62	33.9579	30.29	32.7007	29.10	28.5022	26.06	20.0797	16.93	7.0208
900	29.95	31.4572	29.62	30.2595	28.39	26.2696	25.26	18.3198	15.87	6.2133
950	29.32	29.2464	28.98	28.1030	27.71	24.3030	24.50	16.7818	14.85	5.5255
1000	28.72	27.2798	28.36	26.1861	27.07	22.5601	23.77	15.4291	13.87	4.9356
1050	28.14	25.5207	27.77	24.4729	26.45	21.0066	23.07	14.2325	12.92	4.4265
1100	27.58	23.9394	27.21	22.9339	25.85	19.6150	22.39	13.1684	12.01	3.9845
1150	27.05	22.5115	26.67	21.5451	25.28	18.3625	21.74	12.2177	11.12	3.5988
1200	26.53	21.2165	26.14	20.2866	24.73	17.2306	21.11	11.3645	10.27	3.2607
1250	26.04	20.0378	25.64	19.1418	24.19	16.2036	20.50	10.5958	9.43	2.9628
1300	25.56	18.9609	25.15	18.0967	23.68	15.2685	19.91	9.9007	8.63	2.6995
1350	25.09	17.9741	24.68	17.1396	23.18	14.4142	19.34	9.2699	7.84	2.4657

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
1400	24.64	17.0669	24.22	16.2603	22.69	13.6313	18.79	8.6958	7.07	2.2574
1450	24.21	16.2306	23.78	15.4503	22.22	12.9119	18.25	8.1716	6.32	2.0713
1500	23.78	15.4577	23.35	14.7021	21.76	12.2490	17.72	7.6916	5.60	1.9045
1550	23.37	14.7416	22.93	14.0094	21.32	11.6367	17.21	7.2512	4.88	1.7544
1600	22.97	14.0766	22.52	13.3665	20.88	11.0698	16.71	6.8459	4.19	1.6192
1650	22.58	13.4577	22.12	12.7687	20.46	10.5438	16.22	6.4722	3.50	1.4970
1700	22.20	12.8806	21.74	12.2115	20.05	10.0547	15.74	6.1268	2.84	1.3862
1750	21.83	12.3415	21.36	11.6913	19.64	9.5991	15.28	5.8071	2.18	1.2857
1800	21.46	11.8369	20.99	11.2046	19.25	9.1739	14.82	5.5104	1.54	1.1942
1850	21.11	11.3638	20.63	10.7487	18.87	8.7763	14.38	5.2347	0.91	1.1107
1900	20.76	10.9196	20.27	10.3208	18.49	8.4041	13.94	4.9780	0.29	1.0345
1950	20.43	10.5018	19.93	9.9186	18.12	8.0549	13.51	4.7386	– 0.31	0.9648
2000	20.09	10.1084	19.59	9.5401	17.76	7.7270	13.09	4.5151	– 0.91	0.9008
2050	19.77	9.7373	19.26	9.1832	17.41	7.4185	12.68	4.3060	– 1.49	0.8421
2100	19.45	9.3869	18.94	8.8465	17.06	7.1280	12.28	4.1102	– 2.07	0.7880
2150	19.14	9.0555	18.62	8.5282	16.72	6.8540	11.88	3.9265	– 2.64	0.7382
2200	18.83	8.7419	18.30	8.2271	16.38	6.5953	11.49	3.7541	– 3.19	0.6923
2250	18.53	8.4446	18.00	7.9419	16.06	6.3508	11.11	3.5919	– 3.74	0.6499
2300	18.24	8.1626	17.70	7.6714	15.73	6.1194	10.73	3.4393	– 4.28	0.6106
2350	17.95	7.8947	17.40	7.4147	15.42	5.9002	10.36	3.2955	– 4.82	0.5743
2400	17.66	7.6400	17.11	7.1708	15.11	5.6923	9.99	3.1599	– 5.34	0.5405
2450	17.38	7.3977	16.83	6.9388	14.80	5.4949	9.63	3.0318	– 5.86	0.5092
2500	17.11	7.1669	16.54	6.7179	14.50	5.3075	9.28	2.9107	– 6.37	0.4801
2550	16.84	6.9468	16.27	6.5075	14.20	5.1292	8.93	2.7962	– 6.88	0.4530

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
2600	16.57	6.7369	16.00	6.3068	13.91	4.9594	8.59	2.6877	– 7.38	0.4278
2650	16.31	6.5364	15.73	6.1152	13.62	4.7978	8.25	2.5849	– 7.87	0.4042
2700	16.05	6.3448	15.46	5.9323	13.34	4.6436	7.91	2.4873	– 8.35	0.3823
2750	15.79	6.1616	15.20	5.7574	13.06	4.4966	7.59	2.3948	– 8.83	0.3617
2800	15.54	5.9862	14.95	5.5901	12.78	4.3562	7.26	2.3068	– 9.31	0.3425
2850	15.30	5.8183	14.70	5.4299	12.51	4.2220	6.94	2.2231	– 9.77	0.3246
2900	15.05	5.6573	14.45	5.2765	12.24	4.0937	6.62	2.1435	– 10.24	0.3077
2950	14.81	5.5029	14.20	5.1295	11.98	3.9709	6.31	2.0677	– 10.69	0.2919
3000	14.57	5.3547	13.96	4.9884	11.72	3.8534	6.00	1.9955	– 11.15	0.2771
3050	14.34	5.2125	13.72	4.8530	11.46	3.7408	5.70	1.9267	– 11.59	0.2632
3100	14.11	5.0758	13.48	4.7230	11.20	3.6328	5.39	1.8610	– 12.04	0.2501
3150	13.88	4.9444	13.25	4.5981	10.95	3.5293	5.10	1.7982	– 12.47	0.2379
3200	13.66	4.8180	13.02	4.4779	10.71	3.4299	4.80	1.7383	– 12.91	0.2263
3250	13.44	4.6963	12.79	4.3624	10.46	3.3345	4.51	1.6810	– 13.34	0.2154
3300	13.22	4.5792	12.57	4.2512	10.22	3.2428	4.22	1.6262	– 13.76	0.2051
3350	13.00	4.4663	12.35	4.1441	9.98	3.1546	3.94	1.5738	– 14.18	0.1954
3400	12.78	4.3575	12.13	4.0409	9.74	3.0698	3.66	1.5236	– 14.60	0.1863
3450	12.57	4.2526	11.91	3.9414	9.51	2.9883	3.38	1.4755	– 15.01	0.1776
3500	12.36	4.1514	11.70	3.8455	9.28	2.9097	3.10	1.4294	– 15.42	0.1695
3550	12.16	4.0537	11.49	3.7529	9.05	2.8341	2.83	1.3852	– 15.82	0.1618
3600	11.95	3.9593	11.28	3.6636	8.82	2.7611	2.56	1.3428	– 16.22	0.1545
3650	11.75	3.8682	11.07	3.5773	8.60	2.6909	2.29	1.3021	– 16.62	0.1476
3700	11.55	3.7801	10.87	3.4940	8.38	2.6231	2.03	1.2631	– 17.01	0.1410
3750	11.35	3.6949	10.66	3.4134	8.16	2.5577	1.77	1.2255	– 17.40	0.1348

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
3800	11.16	3.6125	10.46	3.3356	7.94	2.4945	1.51	1.1894	− 17.79	0.1289
3850	10.96	3.5328	10.26	3.2602	7.72	2.4335	1.25	1.1547	− 18.18	0.1234
3900	10.77	3.4556	10.07	3.1873	7.51	2.3746	0.99	1.1214	− 18.56	0.1181
3950	10.58	3.3808	9.87	3.1168	7.30	2.3177	0.74	1.0892	− 18.93	0.1131
4000	10.39	3.3084	9.68	3.0485	7.09	2.2627	0.49	1.0583	− 19.31	0.1083
4050	10.21	3.2383	9.49	2.9823	6.89	2.2094	0.24	1.0286	− 19.68	0.1038
4100	10.02	3.1702	9.30	2.9182	6.68	2.1580	0.00	0.9999	− 20.05	0.0995
4150	9.84	3.1043	9.12	2.8560	6.48	2.1081	− 0.24	0.9722	− 20.41	0.0954
4200	9.66	3.0403	8.93	2.7958	6.28	2.0599	− 0.49	0.9456	− 20.78	0.0915
4250	9.48	2.9782	8.75	2.7373	6.08	2.0132	− 0.73	0.9199	− 21.13	0.0878
4300	9.30	2.9179	8.56	2.6806	5.88	1.9679	− 0.96	0.8951	− 21.49	0.0842
4350	9.13	2.8594	8.38	2.6255	5.68	1.9240	− 1.20	0.8711	− 21.85	0.0808
4400	8.95	2.8026	8.21	2.5721	5.49	1.8815	− 1.43	0.8480	− 22.20	0.0776
4450	8.78	2.7474	8.03	2.5202	5.30	1.8403	− 1.66	0.8257	− 22.55	0.0746
4500	8.61	2.6937	7.85	2.4698	5.11	1.8003	− 1.89	0.8041	− 22.89	0.0717
4550	8.44	2.6416	7.68	2.4208	4.92	1.7615	− 2.12	0.7833	− 23.24	0.0689
4600	8.27	2.5909	7.51	2.3732	4.73	1.7239	− 2.35	0.7632	− 23.58	0.0662
4650	8.10	2.5415	7.34	2.3269	4.54	1.6873	− 2.57	0.7437	− 23.92	0.0637
4700	7.94	2.4936	7.17	2.2819	4.36	1.6518	− 2.79	0.7249	− 24.26	0.0613
4750	7.77	2.4469	7.00	2.2381	4.18	1.6174	− 3.02	0.7066	− 24.59	0.0589
4800	7.61	2.4014	6.83	2.1955	3.99	1.5839	− 3.24	0.6890	− 24.93	0.0567
4850	7.45	2.3572	6.67	2.1541	3.81	1.5513	− 3.45	0.6719	− 25.26	0.0546
4900	7.29	2.3141	6.50	2.1137	3.64	1.5197	− 3.67	0.6554	− 25.58	0.0526
4950	7.13	2.2721	6.34	2.0744	3.46	1.4890	− 3.88	0.6394	− 25.91	0.0506

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
5000	6.97	2.2313	6.18	2.0362	3.28	1.4591	−4.10	0.6239	−26.23	0.0488
5050	6.81	2.1914	6.02	1.9989	3.11	1.4300	−4.31	0.6089	−26.56	0.0470
5100	6.66	2.1526	5.86	1.9626	2.93	1.4017	−4.52	0.5943	−26.88	0.0453
5150	6.51	2.1147	5.70	1.9272	2.76	1.3741	−4.73	0.5802	−27.19	0.0437
5200	6.35	2.0778	5.54	1.8927	2.59	1.3473	−4.94	0.5665	−27.51	0.0421
5250	6.20	2.0418	5.39	1.8591	2.42	1.3212	−5.14	0.5532	−27.83	0.0406
5300	6.05	2.0067	5.23	1.8263	2.25	1.2958	−5.35	0.5404	−28.14	0.0392
5350	5.90	1.9724	5.08	1.7943	2.08	1.2711	−5.55	0.5279	−28.45	0.0378
5400	5.75	1.9389	4.93	1.7631	1.92	1.2470	−5.75	0.5157	−28.76	0.0365
5450	5.60	1.9063	4.77	1.7326	1.75	1.2235	−5.95	0.5040	−29.06	0.0352
5500	5.46	1.8744	4.62	1.7029	1.59	1.2006	−6.15	0.4925	−29.37	0.0340
5550	5.31	1.8433	4.47	1.6739	1.42	1.1783	−6.35	0.4814	−29.67	0.0328
5600	5.17	1.8129	4.33	1.6456	1.26	1.1565	−6.55	0.4706	−29.97	0.0317
5650	5.02	1.7832	4.18	1.6180	1.10	1.1353	−6.74	0.4602	−30.27	0.0306
5700	4.88	1.7542	4.03	1.5909	0.94	1.1146	−6.94	0.4500	−30.57	0.0296
5750	4.74	1.7259	3.89	1.5646	0.78	1.0944	−7.13	0.4401	−30.87	0.0286
5800	4.60	1.6982	3.74	1.5388	0.63	1.0747	−7.32	0.4304	−31.16	0.0277
5850	4.46	1.6711	3.60	1.5136	0.47	1.0555	−7.51	0.4211	−31.46	0.0267
5900	4.32	1.6446	3.46	1.4890	0.31	1.0367	−7.70	0.4120	−31.75	0.0259
5950	4.18	1.6187	3.32	1.4649	0.16	1.0184	−7.89	0.4031	−32.04	0.0250
6000	4.05	1.5934	3.18	1.4414	0.00	1.0005	−8.08	0.3945	−32.33	0.0242
6050	3.91	1.5686	3.04	1.4184	−0.15	0.9831	−8.27	0.3861	−32.62	0.0234
6100	3.78	1.5444	2.90	1.3959	−0.30	0.9660	−8.45	0.3780	−32.90	0.0226
6150	3.64	1.5207	2.76	1.3739	−0.45	0.9494	−8.63	0.3700	−33.19	0.0219

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
6200	3.51	1.4975	2.62	1.3524	– 0.60	0.9331	– 8.82	0.3623	– 33.47	0.0212
6250	3.37	1.4748	2.49	1.3314	– 0.75	0.9172	– 9.00	0.3548	– 33.75	0.0205
6300	3.24	1.4525	2.35	1.3108	– 0.90	0.9017	– 9.18	0.3475	– 34.03	0.0199
6350	3.11	1.4308	2.22	1.2906	– 1.05	0.8865	– 9.36	0.3403	– 34.31	0.0193
6400	2.98	1.4095	2.08	1.2709	– 1.19	0.8717	– 9.54	0.3334	– 34.59	0.0186
6450	2.85	1.3886	1.95	1.2515	– 1.34	0.8571	– 9.72	0.3266	– 34.86	0.0181
6500	2.72	1.3682	1.82	1.2326	– 1.48	0.8429	– 9.90	0.3200	– 35.14	0.0175
6550	2.59	1.3481	1.69	1.2141	– 1.63	0.8291	– 10.07	0.3135	– 35.41	0.0170
6600	2.47	1.3285	1.55	1.1960	– 1.77	0.8155	– 10.25	0.3073	– 35.68	0.0164
6650	2.34	1.3093	1.42	1.1782	– 1.91	0.8022	– 10.42	0.3012	– 35.95	0.0159
6700	2.21	1.2905	1.29	1.1608	– 2.06	0.7892	– 10.60	0.2952	– 36.22	0.0154
6750	2.09	1.2720	1.17	1.1437	– 2.20	0.7765	– 10.77	0.2894	– 36.49	0.0150
6800	1.97	1.2539	1.04	1.1270	– 2.34	0.7641	– 10.94	0.2837	– 36.76	0.0145
6850	1.84	1.2362	0.91	1.1106	– 2.48	0.7519	– 11.11	0.2782	– 37.02	0.0141
6900	1.72	1.2188	0.78	1.0946	– 2.62	0.7400	– 11.28	0.2728	– 37.29	0.0137
6950	1.60	1.2017	0.66	1.0788	– 2.75	0.7283	– 11.45	0.2675	– 37.55	0.0133
7000	1.47	1.1850	0.53	1.0634	– 2.89	0.7169	– 11.62	0.2624	– 37.82	0.0129
7050	1.35	1.1686	0.41	1.0483	– 3.03	0.7057	– 11.79	0.2573	– 38.08	0.0125
7100	1.23	1.1525	0.29	1.0334	– 3.16	0.6947	– 11.96	0.2524	– 38.34	0.0121
7150	1.11	1.1367	0.16	1.0189	– 3.30	0.6840	– 12.12	0.2477	– 38.60	0.0118
7200	0.99	1.1212	0.04	1.0046	– 3.43	0.6735	– 12.29	0.2430	– 38.85	0.0114
7250	0.88	1.1060	– 0.08	0.9906	– 3.57	0.6632	– 12.45	0.2384	– 39.11	0.0111
7300	0.76	1.0911	– 0.20	0.9769	– 3.70	0.6531	– 12.62	0.2340	– 39.37	0.0108
7350	0.64	1.0765	– 0.32	0.9634	– 3.83	0.6432	– 12.78	0.2296	– 39.62	0.0104

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(continued)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
7400	0,52	1,0621	– 0,44	0,9502	– 3,97	0,6335	– 12,94	0,2254	– 39,87	0,0101
7450	0,41	1,0480	– 0,56	0,9372	– 4,10	0,6240	– 13,10	0,2212	– 40,13	0,0099
7500	0,29	1,0341	– 0,68	0,9245	– 4,23	0,6147	– 13,26	0,2172	– 40,38	0,0096
7550	0,18	1,0205	– 0,80	0,9120	– 4,36	0,6055	– 13,42	0,2132	– 40,63	0,0093
7600	0,06	1,0072	– 0,92	0,8997	– 4,49	0,5966	– 13,58	0,2093	– 40,88	0,0090
7650	– 0,05	0,9941	– 1,03	0,8877	– 4,62	0,5878	– 13,74	0,2055	– 41,12	0,0088
7700	– 0,16	0,9812	– 1,15	0,8759	– 4,74	0,5792	– 13,90	0,2018	– 41,37	0,0085
7750	– 0,28	0,9685	– 1,27	0,8643	– 4,87	0,5707	– 14,06	0,1982	– 41,62	0,0083
7800	– 0,39	0,9561	– 1,38	0,8529	– 5,00	0,5625	– 14,21	0,1947	– 41,86	0,0081
7850	– 0,50	0,9439	– 1,50	0,8417	– 5,12	0,5543	– 14,37	0,1912	– 42,11	0,0078
7900	– 0,61	0,9319	– 1,61	0,8307	– 5,25	0,5464	– 14,53	0,1878	– 42,35	0,0076
7950	– 0,72	0,9201	– 1,73	0,8198	– 5,38	0,5385	– 14,68	0,1845	– 42,59	0,0074
8000	– 0,83	0,9085	– 1,84	0,8092	– 5,50	0,5309	– 14,83	0,1813	– 42,84	0,0072
8050	– 0,94	0,8971	– 1,95	0,7988	– 5,62	0,5233	– 14,99	0,1781	– 43,08	0,0070
8100	– 1,05	0,8859	– 2,06	0,7885	– 5,75	0,5159	– 15,14	0,1750	– 43,32	0,0068
8150	– 1,16	0,8749	– 2,18	0,7785	– 5,87	0,5087	– 15,29	0,1720	– 43,55	0,0066
8200	– 1,27	0,8641	– 2,29	0,7686	– 5,99	0,5016	– 15,44	0,1690	– 43,79	0,0065
8250	– 1,38	0,8535	– 2,40	0,7588	– 6,12	0,4946	– 15,59	0,1661	– 44,03	0,0063
8300	– 1,48	0,8430	– 2,51	0,7493	– 6,24	0,4877	– 15,74	0,1632	– 44,27	0,0061
8350	– 1,59	0,8327	– 2,62	0,7399	– 6,36	0,4810	– 15,89	0,1604	– 44,50	0,0060
8400	– 1,70	0,8226	– 2,73	0,7306	– 6,48	0,4743	– 16,04	0,1577	– 44,74	0,0058
8450	– 1,80	0,8127	– 2,83	0,7215	– 6,60	0,4678	– 16,19	0,1550	– 44,97	0,0056
8500	– 1,91	0,8029	– 2,94	0,7126	– 6,72	0,4615	– 16,34	0,1524	– 45,20	0,0055
8550	– 2,01	0,7933	– 3,05	0,7038	– 6,84	0,4552	– 16,49	0,1499	– 45,43	0,0053

continued . . .

TABLE I

Skywave field strength versus distance (0 to 10,000 km) for a characteristic field strength of 100 mV/m

(end)

DISTANCE (km)	FIELD STRENGTH FOR INDICATED MEAN GEOMAGNETIC LATITUDE									
	0 degree		15 degrees		30 degrees		45 degrees		60 degrees	
	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m	dB(μV/m)	μV/m
8600	−2.12	0.7838	−3.16	0.6952	−6.95	0.4490	−16.63	0.1474	−45.66	0.0052
8650	−2.22	0.7745	−3.26	0.6867	−7.07	0.4430	−16.78	0.1449	−45.89	0.0051
8700	−2.32	0.7653	−3.37	0.6783	−7.19	0.4370	−16.92	0.1425	−46.12	0.0049
8750	−2.43	0.7563	−3.48	0.6701	−7.31	0.4312	−17.07	0.1401	−46.35	0.0048
8800	−2.53	0.7474	−3.58	0.6620	−7.42	0.4254	−17.21	0.1378	−46.58	0.0047
8850	−2.63	0.7387	−3.69	0.6540	−7.54	0.4198	−17.36	0.1356	−46.81	0.0046
8900	−2.73	0.7301	−3.79	0.6462	−7.65	0.4142	−17.50	0.1334	−47.03	0.0044
8950	−2.83	0.7216	−3.90	0.6385	−7.77	0.4088	−17.64	0.1312	−47.26	0.0043
9000	−2.93	0.7133	−4.00	0.6309	−7.88	0.4034	−17.78	0.1291	−47.48	0.0042
9050	−3.03	0.7051	−4.10	0.6235	−8.00	0.3982	−17.93	0.1270	−47.71	0.0041
9100	−3.13	0.6970	−4.21	0.6161	−8.11	0.3930	−18.07	0.1249	−47.93	0.0040
9150	−3.23	0.6891	−4.31	0.6089	−8.23	0.3879	−18.21	0.1229	−48.15	0.0039
9200	−3.33	0.6813	−4.41	0.6018	−8.34	0.3829	−18.35	0.1210	−48.38	0.0038
9250	−3.43	0.6736	−4.51	0.5948	−8.45	0.3780	−18.49	0.1190	−48.60	0.0037
9300	−3.53	0.6660	−4.61	0.5879	−8.56	0.3731	−18.63	0.1171	−48.82	0.0036
9350	−3.63	0.6585	−4.72	0.5811	−8.67	0.3684	−18.76	0.1153	−49.04	0.0035
9400	−3.73	0.6511	−4.82	0.5744	−8.79	0.3637	−18.90	0.1135	−49.26	0.0034
9450	−3.82	0.6439	−4.92	0.5678	−8.90	0.3591	−19.04	0.1117	−49.47	0.0034
9500	−3.92	0.6368	−5.02	0.5613	−9.01	0.3546	−19.18	0.1099	−49.69	0.0033
9550	−4.02	0.6297	−5.12	0.5549	−9.12	0.3501	−19.31	0.1082	−49.91	0.0032
9600	−4.11	0.6228	−5.21	0.5486	−9.23	0.3457	−19.45	0.1065	−50.12	0.0031
9650	−4.21	0.6160	−5.31	0.5424	−9.33	0.3414	−19.59	0.1049	−50.34	0.0030
9700	−4.30	0.6092	−5.41	0.5363	−9.44	0.3372	−19.72	0.1033	−50.55	0.0030
9750	−4.40	0.6026	−5.51	0.5303	−9.55	0.3330	−19.86	0.1017	−50.77	0.0029
9800	−4.49	0.5961	−5.61	0.5244	−9.66	0.3289	−19.99	0.1001	−50.98	0.0028
9850	−4.59	0.5896	−5.70	0.5186	−9.77	0.3248	−20.12	0.0986	−51.19	0.0028
9900	−4.68	0.5833	−5.80	0.5128	−9.87	0.3209	−20.26	0.0971	−51.41	0.0027
9950	−4.78	0.5770	−5.90	0.5072	−9.98	0.3169	−20.39	0.0956	−51.62	0.0026
10000	−4.87	0.5709	−5.99	0.5016	−10.09	0.3131	−20.52	0.0942	−51.83	0.0026

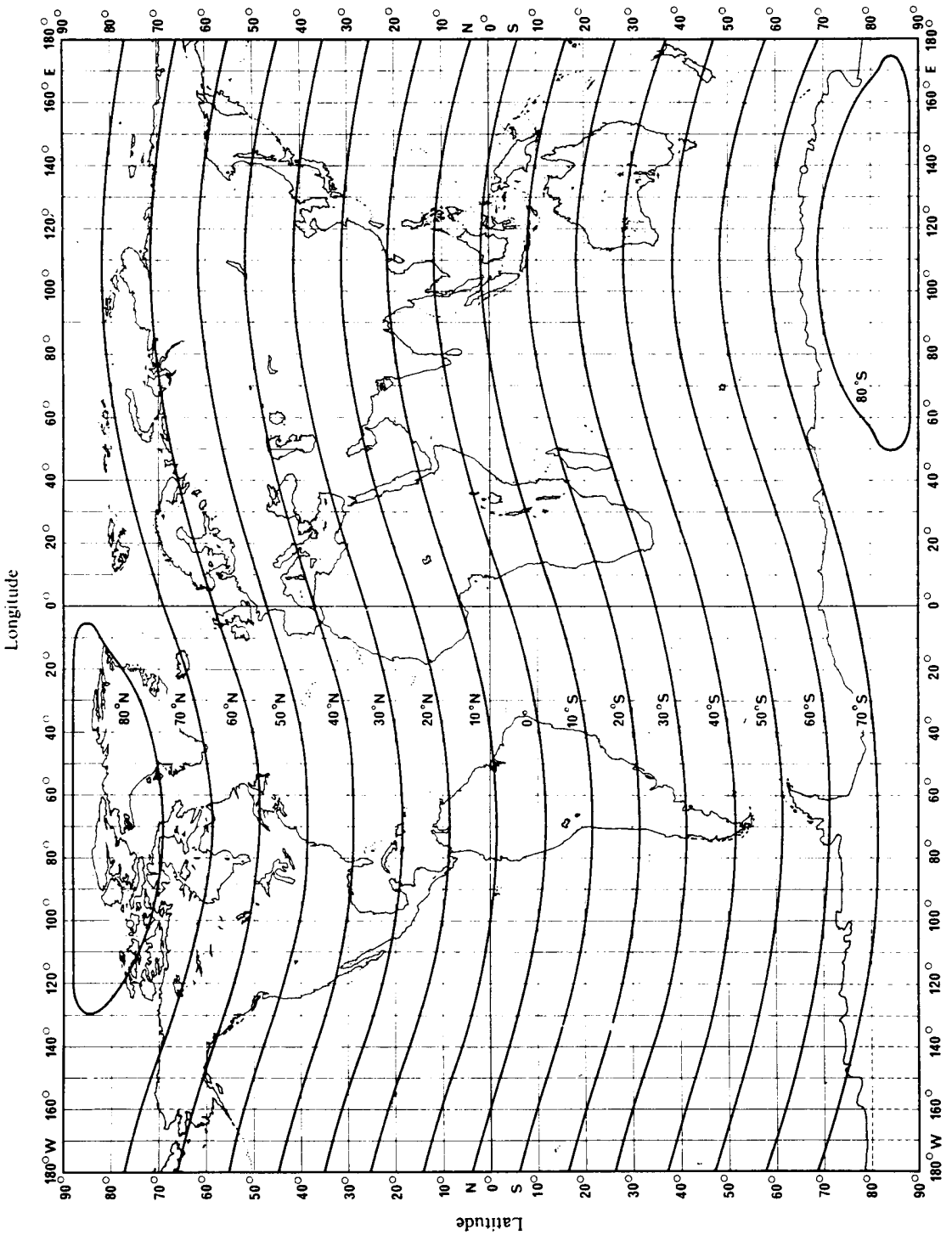

FIGURE 2

Geomagnetic latitudes

RECOMMENDATION No. 3

Technical Standards of the IFRB Relating to the Use of the Band 1 605 - 1 705 kHz in Region 2

The Regional Administrative Radio Conference to Establish a Plan for the Broadcasting Service in the Band 1 605 - 1 705 kHz in Region 2 (Rio de Janeiro, 1988),

considering

a) that the application of the Agreement calls for reference to the Atlas of Ground Conductivity;

b) that administrations may wish to have this Atlas updated;

c) that this Conference has adopted technical criteria to be used in the application of the Agreement concerning the sharing between the broadcasting service and the fixed and mobile services;

d) No. **1454** of the Radio Regulations relating to the development of the IFRB Technical Standards;

e) that No. **1001.1** of the Radio Regulations states that the IFRB Technical Standards shall be published and open for comment by administrations;

f) that, for the application of its Technical Standards, the IFRB has developed an Atlas of Ground Conductivity for Region 2 which reflects the relevant data notified by administrations;

recommends

1. that any administration intending to correct or modify the Atlas of Ground Conductivity relating to its area communicate the relevant data to the IFRB;

2. that the IFRB should modify the Atlas and communicate this change to all Region 2 administrations within 90 days of the receipt of the request for modification;

3. that, in developing its Technical Standards for use in the application of Article **12** for all administrations of Region 2, the IFRB shall take into consideration those criteria contained in Annexes 1 and 2;

4. that, when deciding on the protection to be used in evaluating harmful interference, the protection criteria adopted by the Conference be taken into consideration.