INTERNATIONAL TELECOMMUNICATION UNION

FINAL ACTS

of the Regional Administrative MF Broadcasting Conference (Region 2)

Rio de Janeiro, 1981

Geneva 1982

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FINAL ACTS

of the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981

The delegates of the Members of the International Telecommunication Union listed below represented at the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, convened in accordance with the International Telecommunication Convention (Malaga-Torremolinos, 1973), have adopted the Final Acts of this Conference which contain the Agreement, resolutions and recommendations.

Argentine Republic, Bahamas (Commonwealth of the), Belize, Brazil (Federative Republic of), Canada, Chile, Colombia (Republic of), Costa Rica, Denmark, Ecuador, United States of America, France, Grenada, Guyana, Jamaica, Mexico, Nicaragua, Panama (Republic of), Paraguay (Republic of), Netherlands (Kingdom of the), Peru, United Kingdom of Great Britain and Northern Ireland, Trinidad and Tobago, Uruguay (Oriental Republic of), Venezuela (Republic of).

These Final Acts shall enter into force on 1 January 1982 except where other dates are specified in any particular provision of the above-mentioned Agreement, resolutions and recommendations.

The delegates of the Members of the International Telecommunication Union who sign these Final Acts hereby declare that should any Member of the Union or any other country whose assignments have been included in the Plan fail to observe one or more of the provisions of the Agreement and associated resolutions, no other Member shall be obliged to observe that provision or those provisions in any relations with that particular Member or country concerned.

In witness whereof, the delegates of the Members of the Union mentioned above have, on behalf of their respective competent authorities, signed these Final Acts in a single copy in the English, French and Spanish languages, in which, 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 in Region 2.

Done at Rio de Janeiro, on 19 December, 1981

For the Argentine Republic:

RICARDO SAIDMAN
NORBERTO B. SONETTI
JORGE TABOADA
JUAN A. AUTELLI
GRACIELA MEALLA

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For the Oriental Republic of Uruguay:

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ROSENDO HERNÁNDEZ
Ing. JUAN ZAVATTIERO

For the Republic of Venezuela:

HÉCTOR MIGUEL PALMA NÚÑEZ

REGIONAL AGREEMENT

for the Medium Frequency Broadcasting Service in Region 2

PREAMBLE

Fully respecting the sovereign right of each country to regulate within its territory the broadcasting service in the medium frequency band and to reach special arrangements with such countries as it may consider appropriate, without prejudice to other administrations;

in order to facilitate relations among the Members of Region 2, mutual understanding, and cooperation on broadcasting in the medium frequency band;

in order to improve the utilization of the frequency band allocated to the medium frequency broadcasting service and achieve a satisfactory broadcasting service in all the countries;

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

recognizing that the protection of mutually accepted services is a major objective for all countries, attempting thereby to bring about better coordination and the use of more efficient facilities;

the delegates of the Members of the International Telecommunication Union meeting in Rio de Janeiro at a regional administrative conference convened under the provisions of the International Telecommunication Convention (Malaga-Torremolinos, 1973), 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 medium frequency band between 535 and 1 605 kHz:

ARTICLE 1

Definitions

For the purposes of this Agreement, the following terms shall have the meanings defined below:

Union: The International Telecommunication Union;

Secretary-General: The Secretary-General of the Union;

IFRB: The International Frequency Registration Board;

CCIR: The International Radio Consultative Committee;

Convention: The International Telecommunication Convention;

Radio Regulations: The Radio Regulations supplementing the provisions of the *Convention*;

Region 2: The geographical area defined in No. 394 of the Radio Regulations Geneva, 1979;

Master Register: The Master International Frequency Register;

Agreement: This Agreement and its Annexes;

Plan: The Plan and its appendices forming Annex 1 to the Agreement and the modifications introduced as a result of the application of the procedure of Article 4 of the Agreement;

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

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

Station: Medium frequency broadcasting station;

Assignment in conformity with the Agreement: A frequency assignment appearing in the *Plan*;

Objectionable interference: The interference caused by a signal that exceeds the maximum permissible field strength within the protected contour, in accordance with the values derived from Annex 2 to the Agreement.

Harmful interference: Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with the *Radio Regulations.*

ARTICLE 2

Frequency Band

The provisions of the Agreement shall apply to the frequency band 535 to 1 605 kHz allocated to the broadcasting service under Article 8 of the Radio Regulations, Geneva, 1979.

ARTICLE 3

Execution of the Agreement

3.1 The Contracting Members shall adopt for their stations in Region 2 in the frequency band which is the subject of the Agreement the technical characteristics and standards specified in the Plan.

3.2 The Contracting Members shall not bring into use assignments in conformity with the Agreement, change the technical characteristics of stations specified in the Plan, introduce new assignments in the Plan, or bring new stations into use, except under the conditions set out in Articles 4 and 5 of the Agreement.

3.3 The Contracting Members undertake to study and, in common agreement and to the extent possible, to put into practice the measures necessary to avoid or to reduce any harmful or objectionable interference that might result from the application of the Agreement.

ARTICLE 4

Procedure for Modifications to the Plan

4.1 *Introduction*

When a Contracting Member proposes to make a modification to the Plan, i.e.:

- to change the characteristics of a frequency assignment to a station shown in the Plan, whether or not the station has been brought into use;
- to introduce a new assignment into the Plan, or
- to bring into use a new station, or
- to cancel a frequency assignment to a station,

the following procedure shall be applied before any notification is made under the provisions of Article 12 of the Radio Regulations (see Article 5 of this Agreement).

4.2 *Proposals for changes in the characteristics of an assignment, for the introduction of a new assignment or for the bringing into use of a new station*

4.2.1 Any administration proposing to change the characteristics of an assignment in the Plan, to introduce a new assignment or bring into use a new station shall seek the agreement of any administration that has an assignment in conformity with the Agreement in the same channel or in adjacent channels with a separation up to 30 kHz and that is considered to be adversely affected in accordance with the provisions of 4.2.10 of this Article.

4.2.2 Any administration proposing to change the characteristics of an assignment in the Plan, to introduce a new assignment or bring into use a new station shall communicate to the IFRB the information in the form specified in Annex 3 to the Agreement. This information should not be sent earlier than 3 years prior to the proposed date of implementation of such a change or of entry into use of the station corresponding to the new assignment. At the same time, it may request the agreement of the administrations whose assignments in conformity with the Agreement it considers may be adversely affected, sending a copy of the correspondence to the IFRB.

4.2.3 In cases not specified in 4.2.14, in order to seek the agreement referred to in 4.2.1, the administration shall at the same time inform the IFRB of the names of the administrations whose agreement it considers should be sought or with which it is attempting to reach an agreement.

4.2.4 If the IFRB receives information that is incomplete as regards the characteristics specified in Annex 3 to the Agreement, it shall immediately request the administration by telegram to provide the missing information as soon as possible.

4.2.5 The IFRB, after ensuring that the information required in Annex 3 to the Agreement has been provided, shall determine, as soon as possible, by using Annex 2 to the Agreement, those administrations whose assignments in conformity with the Agreement are considered adversely affected as specified in 4.2.10 and shall, as soon as possible, forward the results of its calculations to the administration proposing the modification to the Plan. At the same time, the IFRB shall publish in a special section of its weekly circular the information sent pursuant to 4.2.2 and 4.2.3 listing the names of the administrations concerned.

4.2.6 The IFRB shall send the administrations listed in the special section of its weekly circular a telegram informing them of the publication and shall forward the result of its calculations to them.

4.2.7 An administration which considers itself entitled to appear on the list of administrations whose frequency assignments have been considered to be adversely affected according to 4.2.10 may, within 60 days from the date of publication, request the IFRB to include it in that list. Also, a copy of the request shall be sent to the administration proposing the modification to the Plan, together with the relevant technical reasons.

4.2.8 The IFRB shall also determine:

- the effect of the proposed modification on pending modifications not yet included in the Plan; and
- the effect of pending modifications on the proposed modification.

For this purpose, the IFRB shall take into account only those pending modifications which have been received by the Board no more than 180 days before the date of receipt of the modification under consideration. The IFRB shall forward the results of its calculations to the administrations concerned.

4.2.9 The administration proposing a modification shall, in addition to the agreement referred to in 4.2.1, seek the agreement of the administrations whose modifications already received by the IFRB and still pending are considered to be adversely affected in accordance with 4.2.10, but have not been pending longer than 180 days from the date of receipt of the proposed modification by the IFRB in accordance with 4.2.8.

4.2.10 Any assignment in conformity with the Agreement shall be considered as adversely affected when appropriate calculations based on Annex 2 indicate that objectionable interference occurs as a result of a proposed modification to the Plan.

4.2.11 On receipt of the special section referred to in 4.2.5, the administration whose assignments in conformity with the Agreement might be adversely affected in accordance with 4.2.10 shall give urgent consideration to the proposed modification. If it considers that the proposed modification to the Plan is acceptable, it shall signify its agreement as soon as possible to the administration seeking agreement and shall inform the IFRB accordingly.

4.2.12 Should an administration listed in the special section consider that a proposed modification to the Plan is unacceptable, it shall communicate its reasons to the administration seeking agreement within 60 days from the date of publication of the relevant IFRB weekly circular. It may also offer any information or suggestions it deems useful for bringing about a satisfactory solution to the problem. The administration seeking agreement shall endeavour to adapt its requirements as far as possible, having regard to any comments received.

4.2.13 Comments from administrations on the information published in accordance with the provisions of 4.2.5 shall be sent either directly to the administration that is proposing the change or through the IFRB. In all cases, the IFRB must be informed.

4.2.14 The agreement referred to in paragraph 4.2.1 is not required for a proposed change in the characteristics of an assignment in conformity with the Agreement provided that it entails no increase in the effective monopole radiated power in any direction and, if a change in the site of the station is involved, this change is limited to 3 km or to 5% of the distance to the nearest point on the border of a neighbouring country up to a maximum of 10 km. The move is referred to the site first registered in the Plan or subsequently registered in the Plan as a result of the application of the provisions of paragraph 4.2.1. In any event the move shall not result in a groundwave contour overlap prohibited under paragraph 4.10.4.2 of Annex 2 to the Agreement. However, no protection will be required beyond the level of protection which was already accepted before the proposed move.

If the IFRB finds that the above conditions are met, it shall enter the proposed modification in the Plan and publish the relevant information in a special section of the weekly circular. Administrations intending to modify the Plan in this way may then put its project into effect subject to application of the provisions of Article 5 of the Agreement.

4.2.15 Thirty days before the date limit referred to in 4.2.16 for comments, the IFRB shall, by telegram, remind the administrations listed in the special section and which have not already commented of the deadline for making comments.

4.2.16 Any administration, whether or not it receives a request under 4.2.2, that has not forwarded its comments to the administration proposing the modification or to the IFRB within a period of 60 days following the date of the weekly circular referred to in 4.2.5, shall be considered as having agreed to the proposed change.

4.2.17 If, in seeking agreement, an administration makes changes in its proposal which result in an increase in the effective monopole radiated power in any direction with respect to the initial proposal, it shall again apply the provisions of 4.2.1 and the consequent procedure.

4.2.18 If no comments have been received on expiry of the period specified in 4.2.16 or if an agreement has been reached with the administrations that submitted comments, the administration proposing the modification shall inform the IFRB of the final characteristics of the assignment and the names of the administrations with which agreement has been reached.

4.2.19 When agreement has been reached with each administration concerned, the assignment shall be entered in the Plan and the status recognized for an assignment in conformity with the Agreement shall apply to the assignment in question. The IFRB shall publish the information received under 4.2.18 in a special section of its weekly circular, indicating the names of the administrations with which the provisions of this Article have been successfully applied.

4.2.20 Should the administrations involved fail to reach agreement, the IFRB shall conduct such studies as those administrations may request; the IFRB shall inform the administrations of the result of its studies and shall submit appropriate recommendations for the solution of the problem.

4.2.21 Any administration may, during application of the procedure for modification of the Plan or before initiating such procedure, request technical assistance from the IFRB, particularly in seeking the agreement of another administration.

4.2.22 When the proposed modification to the Plan involves a developing country, administrations shall seek a solution conducive to the economic development of the broadcasting system of the developing country, giving due consideration to the principles enunciated to this effect in the Preamble to this Agreement.

4.3 *Special procedure for modifying the Plan*

4.3.1 If, after having exhausted all technical possibilities to secure the agreement referred to in 4.2.1 by applying the procedure provided in 4.2.2 to 4.2.21 an administration fails to have its proposed modification entered in the Plan, it may request the IFRB to apply the provisions of the special procedure outlined below.

4.3.2 Application of this special procedure may be requested by administrations, in particular those of developing countries, taking into account the need for special consideration to be given to new broadcasting stations in areas where they constitute the first or possibly the second service.

4.3.3 The IFRB shall examine the proposed modification to the Plan in order to determine the probability of objectionable interference in the channels of the band. If its finding is unfavourable, the IFRB shall select the channel which offers the best solution and accordingly inform the administration proposing the modification and any other administration whose assignments in conformity with the Agreement may be adversely affected.

4.3.4 In order to guarantee the integrity of the technical criteria on which the Plan is based, the IFRB shall make recommendations to the administration proposing the modification for reducing or eliminating the objectionable interference. In any case, these recommendations should cover the following technical solutions:

- modification of an assignment entered in the Plan in the name of the administration proposing the modification but not yet put into service;
- the use of directional antennas, reduction of the power or change in the site of the transmitter.

4.3.5 The administration proposing the modification to the Plan should do all in its power to eliminate any objectionable interference or reduce it to a minimum by adopting the technical solution suggested by the IFRB.

4.3.6 If the administration whose assignments in conformity with the Agreement may be adversely affected finds that it can accept the interference caused to those assignments as a result of the technical solution recommended by the IFRB, it shall so inform the Board within 60 days. This administration may otherwise, within the same period, propose to alter the IFRB's recommendations without it having a significant impact on the proposed assignment. If the IFRB finds this acceptable, it shall reformulate its recommendations accordingly and communicate them to the administration seeking the introduction of its assignment into the Plan.

4.3.7 If the technical solution in the final form adopted by the administration proposing the modification is in accordance with the additional interference margin permitted under 4.11 of Annex 2, the proposed modification shall be entered in the Plan at the request of the administration concerned. The IFRB shall publish this information in a special section of its weekly circular.

4.3.8 A note in the Plan shall indicate that in the examination of proposed modifications to the Plan which may subsequently be submitted, the relevant calculations shall be made with reference to the initial usable field strength value of the other assignments in the same channel, without the assignment in question being considered.

4.4 *Settlement of disputes*

If, after application of the procedure described in this article, the administrations concerned are unable to reach agreement, they may resort to the procedure established in Article 50 of the Convention. The administrations also may apply, by common agreement, the Optional Additional Protocol to the Convention.

4.5 *Cancellation of an assignment*

When an administration decides to cancel an assignment in conformity with the Agreement, it shall immediately notify the IFRB, which shall publish the cancellation in a special section of its weekly circular.

4.6 *Assignments recorded in the Plan but not brought into service*

4.6.1 The IFRB shall consult the administration concerned with regard to the advisability of cancelling assignments recorded in the Plan or introduced into the Plan pursuant to the provisions of this article, but not brought into service within four years of the date of inclusion of the assignment in the Plan. If the administration agrees, the IFRB shall publish the cancellation in a special section of the weekly circular.

4.6.2 On expiry of the period specified in 4.6.1, and if the administration concerned indicates that it needs more time to bring such an assignment into service and has taken the necessary steps to do so, this period may be extended by not more than one year.

4.6.3 On expiry of the period of extension specified in 4.6.2 and should the assignment remain unused, the IFRB shall disregard this assignment in the treatment of future modifications to the Plan and shall enter an appropriate symbol in the Plan. The IFRB shall publish this information in a special section of the weekly circular.

4.6.4 Should the administration concerned decide to bring the assignment into service at a later date, it shall inform the IFRB. Upon receipt of this information, the IFRB shall examine the assignment from the point of view of objectionable interference caused to stations entered in the Plan since the insertion of the symbol referred to in 4.6.3. In cases where the IFRB finds that no objectionable interference will be caused to such stations, it shall delete the symbol. The administration shall notify the assignment in accordance with Article 5 of the Agreement. In cases where the IFRB finds that objectionable interference may be caused, it shall so inform the administration concerned, which shall take appropriate measures to prevent the interference. The symbol shall remain in the Plan until these measures have been taken.

4.7 *Master copy of the Plan*

4.7.1 The IFRB shall keep an up-to-date master copy of the Plan as modified in application of the procedure specified in this article.

4.7.2 The IFRB shall inform the Secretary-General of modifications to the Plan. The Secretary-General shall publish new editions of the Plan at intervals of two years as from the date of entry into force of the Agreement. Modifications to the Plan shall be published by quarterly recapitulative supplements keeping the format of the Plan.

ARTICLE 5

Notification of frequency assignments

5.1 When an administration proposes to bring into use an assignment in conformity with the Agreement, it shall notify it to the IFRB in accordance with the provisions of Article 12 of the Radio Regulations [1]. Any such assignment recorded in the Master Register as a result of application of the provisions of Article 12 of the Radio Regulations shall bear a special symbol under the Remarks Column and a date in Column 2a or in Column 2b.

5.2 When relations between Contracting Members are involved, equal consideration shall be given to all frequency assignments brought into use in conformity with the Agreement and recorded in the Master Register, regardless of the date that appears in Column 2a or Column 2b.

[1] While recording the notified assignments in the Master Register, the IFRB shall enter the appropriate symbols to indicate that:

- the value recorded for power corresponds to the station power;
- the value recorded for antenna height, in the case of omnidirectional antennas, corresponds to height in electrical degrees.

5.3 Whenever the IFRB receives an assignment notice which is not in conformity with the Agreement and for which the procedure of Article 4 was not applied, it shall return the notice to the notifying administration.

5.4 Should an administration resubmit the notice having applied the procedure of this article without reaching agreement with the administrations concerned and insist on reconsideration of its notice, the IFRB shall re-examine the notice. Should the finding remain unchanged, the assignment shall be recorded in the Master Register with an unfavourable finding and a symbol indicating that the entry has been made subject to the reservation that no harmful interference will be caused to assignments in conformity with the Agreement.

ARTICLE 6

Special Arrangements

In order to supplement the procedures provided for under Article 4 of the Agreement and to facilitate application of the procedures to improve utilization of the Plan, Contracting Members may conclude or continue special arrangements in conformity with the pertinent provisions of the Convention and the Radio Regulations.

ARTICLE 7

Scope of Application of the Agreement

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

7.2 Should a Contracting Member make 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 8

Approval of the Agreement

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

ARTICLE 9

Accession to the Agreement

9.1 Any Member of the Union in Region 2 which has not signed the Agreement may at any time deposit 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 reservations.

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

ARTICLE 10

Denunciation of the Agreement

10.1 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.

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

10.3 On the date on which the denunciation becomes effective, the IFRB shall delete from the Plan the assignments appearing in the name of the Member that has denounced the Agreement.

ARTICLE 11

Entry into Force of the Agreement

This Agreement shall enter into force on 1 July 1983 at 0800 hours UTC.

ARTICLE 12

Duration of the Agreement

12.1 The Agreement has been established with a view to meeting the requirements of the medium frequency broadcasting service for a period of about 10 years from the date of entry into force of the Agreement.

12.2 The Agreement shall remain in force until it is revised by a competent administrative radio conference of Region 2.

ANNEX 1

to the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2

PLAN

Part I *Basic characteristics of stations appearing in the Plan* (excluding information on directional antennas).

Part II *Characteristics of antennas*

A Characteristics of directional antennas, including top-loaded or sectionalized antennas, whether directional or not, or description of the radiated field in various sectors in the absence of information on directional antennas

B Supplementary information for directional antenna systems with augmented (modified expanded) patterns

C Supplementary information for top-loaded or sectionalized antennas, whether directional or not

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PART I

Basic characteristics of stations appearing in the Plan (excluding information on directional antennas)

Column No.

1	IFRB Serial Number;
2	Assigned frequency (kHz);
3	Symbol designating the country or the geographical area in which the station is located (see Table 1 of the Preface to the International Frequency List);
4	Name of the Station;
5	Geographical coordinates of the transmitting station in degrees, minutes and, whenever available, seconds;
6	Call sign;
7	Station class (A, B or C);
8	Schedule of operation (D for daytime, N for night-time);
9	Station power (kW);
10	Type of antenna: A – for simple vertical antennas; B – for directional antennas, including top-loaded or sectionalized antennas, whether directional or not; C – for radiated field limitations in the absence of directional antenna information;
11a	For omnidirectional antennas, electrical height (degrees);
11b	For omnidirectional antennas, radiated field strength in the horizontal plane in mV/m at 1 km;
12	The usable field strength site to site shall be recorded as a reference value; for class A stations it is given for information only;
13	Remarks of a permanent nature.

PART II-A

Characteristics of directional antennas, including top-loaded or sectionalized antennas, whether directional or not, or description of the radiated field in various sectors in the absence of information on directional antennas

Section I: *Characteristics of directional antennas, including top-loaded or sectionalized antennas, whether directional or not*

Column No.

1 IFRB Serial Number;

2 Name of station (preceded by the assigned frequency in kHz);

3 Schedule of operation (D for daytime, N for night-time);

4 Total number of towers;

5 Tower number.

This column shows the serial number of towers, as they will be described in columns 6 to 12;

6 Tower field ratio:

Ratio between the theoretical fields of the tower and the reference tower;

7 Phase difference (± degrees).

This column indicates, in degrees, the positive or negative difference in the phase angle of the field due to the tower with respect to the field due to the reference tower, (a minus sign means negative, absence of a sign means positive);

8 Electrical tower spacing (degrees).

This column indicates, in degrees, the electrical spacing of the tower from the reference point shown in column 10;

9 Angular tower orientation (degrees).

This column indicates, in degrees referred to True North, the angular orientation of the tower from the reference point indicated in column 10;

10 Reference point indicator.

This column may contain 0 or 1, with the following significance:

0 : spacing and orientation have been shown in relation to a common reference point which is generally the first tower,

1 : spacing and orientation have been shown in relation to the previous tower;

11 Electrical height of tower (degrees);

Column No.

12 Tower structure.

This column contains a code from 0 to 9 designed to indicate the structure of each tower:

0 : simple vertical antenna
1 : top-loaded antenna
2 :
3 :
4 :
5 : sectionalized antenna
6 :
7 :
8 :
9 :

These codes are used in Part II-C to indicate the characteristics of the various structures. They are also used for the identification of the appropriate formula for vertical radiation in Appendices 4 and 6 to Annex 2.

13 r.m.s. value of radiation: product of the r.m.s. characteristic field strength, calculated in the horizontal plane, and the square root of the power;

14 K_l: multiplying constant in mV/m at 1 km, taking into account a loss resistance of 1 ohm per tower;

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 normal expanded pattern quadrature factor when special precautions are taken to ensure pattern stability);

17 Supplementary information.

Section II: *Radiated field in various sectors in the absence of information on directional antennas*

In the absence of a detailed description of the directional antenna system, an indication of the radiated field limitations in specific sectors is required. In these cases, the radiation pattern (0°-360°) is subdivided in sectors with an indication of the maximum radiated field in the horizontal plane for each sector.

18 Sector (degrees) with reference to True North for which the maximum radiated field is specified;

19 The maximum radiated field strength in the sector described in column 18, in the horizontal plane in mV/m at 1 km;

20 Remarks.

PART II-B

Supplementary information for directional antenna systems with augmented (modified expanded) patterns

Note: This information is supplied for an augmented (modified expanded) antenna radiation pattern as indicated in column 15 of Part II-A.

Column No.

1	IFRB Serial Number;
2	Assigned frequency (kHz);
3	Name of the station;
4	Schedule of operation (D for daytime, N for night-time);
5	Total number of augmentations;
6	Augmentation No. [1];
7	Radiated field strength at central azimuth of augmentation (mV/m at 1 km);
8	Central azimuth of augmentation (degrees);
9	Total span of augmentation (degrees);
10	Supplementary information.

PART II-C

Supplementary information for top-loaded or sectionalized antennas, whether directional or not

When an antenna tower is either top-loaded or sectionalized, the code in column 12 in Part II-A will be in the range from 1 to 9, inclusive. The value in column 12 of Part II-A describes the particular type of top-loaded or sectionalized antenna used, as described below:

Column No.

1	IFRB Serial Number;
2	Assigned Frequency (kHz);
3	Name of the station;
4	Schedule of operation (D for daytime, N for night-time);
5	Tower No.

[1] The order in which the augmentations are numbered is given in paragraph 2.8 of Appendix 3 to Annex 2.

Columns 6 to 9 contain 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:

6	*Code used in Col. 12 (Part II-A)*	*Description of the characteristics for which a value is given in the column. (These values are used in the equations given in Appendices 4 and 6 to Annex 2)*
	1 :	Electrical height of the antenna tower (degrees);
	2 :	Height of lower section (degrees);
	3 :	Height of lower section (degrees);
	4 :	Height of lower section (degrees);
	5 :	Height of lower section (degrees);
	6 :	Total height of tower (degrees);
	7 :	Height of lower section (degrees);
	8 :	Height of lower section (degrees);
	9 :	Centre of bottom dipole (degrees).

7	*Code used in Col. 12 (Part II-A)*	*Description of the characteristics for which a value is given in the column. (These values are used in the equations given in Appendices 4 and 6 to Annex 2)*
	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);
	3 :	Blank;
	4 :	Blank;
	5 :	Height of upper section (degrees);
	6 :	Height of lower section (degrees);
	7 :	Total height of antenna (degrees);
	8 :	Height of upper section (degrees);
	9 :	Centre of top dipole (degrees).

8	*Code used in Col. 12 (Part II-A)*	*Description of the characteristics for which a value is indicated in the column. (These values are used in the equations contained in Appendices 4 and 6 to Annex 2)*
	1 :	Blank;
	2 :	Total height of antenna (degrees);
	3 :	Blank;
	4 :	Blank;
	5 :	Current distribution factor;
	6 :	Blank;
	7 :	Ratio of loop currents in the two elements;
	8 :	Scaling factor so that $f(\theta)$ is 1.0 in the horizontal plane;
	9 :	Blank.

9	*Code used in Col. 12 (Part II-A)*	*Description of the characteristics for which a value is indicated in the column. (These values are used in the equations entered in Appendices 4 and 6 to Annex 2)*
	1 :	Blank;
	2 :	Difference between apparent electrical height (based on current distribution) of the total tower and the actual height of the total tower (degrees);
	3 :	Blank;
	4 :	Blank;
	5 :	Ratio of maximum current in the top section to maximum current in the bottom section;
	6 :	Blank;
	7 :	Blank;
	8 :	The absolute value of the ratio of the real component of current to the imaginary component of current at the point of maximum amplitude;
	9 :	Blank.

A NOTE FROM THE ITU LIBRARY & ARCHIVES SERVICE

Annex I (The Plan) is available in three separate PDF files:

- Part I: List A
- Part I: List B
- Part II-A, Part II-B, and Part II-C

ANNEX 2

to the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2

TECHNICAL DATA

to be used in the application of the Agreement

CHAPTER 1

Definitions and symbols

1. *Definitions*

In addition to the definitions given in the Radio Regulations, the following definitions and symbols apply to this Agreement.

1.1 *Broadcasting channel* (in 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.

1.2 *Objectionable interference*

Interference caused by a signal exceeding the maximum permissible field strength within the protected contour, in accordance with the values derived from this Annex.

1.3 *Protected contour*

Continuous line that delimits the area of primary or secondary service which is protected from objectionable interference.

1.4 *Primary service area*

Service area delimited 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 4.

1.5 *Secondary service area*

Service area delimited by the contour within which the calculated level of the field strength due to the skywave field strength 50% of the time is protected from objectionable interference in accordance with the provisions of Chapter 4.

1.6 *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 the nominal usable field strength has been employed as the reference for planning.

1.7 *Usable field strength* (E_u)

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 in a real situation (or resulting from a frequency assignment plan).

1.8 *Audio-frequency (AF) protection ratio*

Agreed minimum value of the audio-frequency signal-to-interference ratio corresponding to a subjectively defined reception quality. This ratio may have different values according to the type of service desired.

1.9 *Radio-frequency protection ratio*

The desired 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 desired carrier and the interfering carrier, the emission characteristics (type and percent modulation, etc.), levels of input and output of the receiver and its characteristics (selectivity, sensitivity to intermodulation, etc.).

1.10 *Class A station*

(See Note 4 to Section 4.6.)

A station intended to provide coverage over extensive primary and secondary service areas, and which is protected against interference accordingly.

1.11 *Class B station*

A station intended to provide coverage over one or more population centres and the contiguous rural areas located in its primary service areas, and which is protected against interference accordingly.

1.12 *Class C station*

A station intended to provide coverage over a city or town and the contiguous suburban areas located in its primary service area, and which is protected against interference accordingly.

1.13 *Daytime operation*

Operation between the times of local sunrise and local sunset.

1.14 *Night-time operation*

Operation between the times of local sunset and local sunrise.

1.15 *Synchronized network*

Two or more broadcasting stations whose carrier frequencies are identical and which broadcast the same programme simultaneously.

In a synchronized network the difference in carrier frequency between any two transmitters in the network shall not exceed 0.1 Hz. The modulation delay between any two transmitters in the network shall not exceed 100 μs, when measured at either transmitter site.

1.16 *Station power*

Unmodulated carrier power supplied to the antenna.

1.17 *Groundwave*

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

1.18 *Skywave*

Electromagnetic wave which has been reflected by the ionosphere.

1.19 *Skywave field strength, 10% of the time*

The skywave field strength during the reference hour which is exceeded for 10% 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.

1.20 *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.

1.21 *Characteristic field strength* (E_c)

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

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

$$G = 20 \log \frac{E_c}{300}$$

where E_c is in units of mV/m.

b) The effective monopole radiated power (e.m.r.p.) is given in dB(1 kW) by the following equation:

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

Where P_t is the station power in kW.

2. *Symbols*

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
dB(kW) :	decibels with respect to 1 kW
mS/m :	millisiemens/metre

CHAPTER 2

Groundwave propagation

2.1 *Ground conductivity*

2.1.1 The Atlas of Ground Conductivity forms Appendix 1 to this Annex. It contains the information communicated to the IFRB following a decision of the First Session (Buenos Aires, 1980), the modifications introduced during the Second Session (Rio de Janeiro, 1981) and the modifications submitted in accordance with 2.1.3 below.

2.1.2 The Atlas is recorded as follows:

2.1.2.1 Large-scale maps of ground conductivity attached to each signed copy of the Final Acts.

2.1.2.2 A small-scale reproduction of these maps (see Appendix 1).

2.1.2.3 A digitized version maintained in a computer data base by the IFRB.

2.1.3 When an administration notifies to the IFRB data intended to modify the Atlas, the IFRB shall so inform all administrations having assignments in Region 2. After 90 days from the date on which this information is communicated by the IFRB, the IFRB shall modify the Atlas and communicate the modifications to all administrations.

2.1.4 No assignment in the Plan shall at any time be required to be modified as a result of the incorporation of these data.

2.1.5 A proposal to modify the Plan shall be evaluated on the basis of the values in the Atlas on the date the proposal was received by the IFRB.

2.2 *Field strength curves for groundwave propagation*

The curves shown in Appendix 2 are to be used for determining groundwave propagation in the following frequency ranges:

Graph No.	kHz
1	540 – 560
2	570 – 590
3	600 – 620
4	630 – 650
5	660 – 680
6	690 – 710
7	720 – 760
8	770 – 810
9	820 – 860
10	870 – 910
11	920 – 960
12	970 – 1 030
13	1 040 – 1 100
14	1 110 – 1 170
15	1 180 – 1 240
16	1 250 – 1 330
17	1 340 – 1 420
18	1 430 – 1 510
19	1 520 – 1 610

2.3 *Calculation of groundwave field strength*

2.3.1 *Homogeneous paths*

The vertical component of the field strength for a homogeneous path is represented in these graphs 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. Graphs 1 to 19 are 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 the following equations:

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

if field strengths are expressed in mV/m, and

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

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

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

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

if field strengths are expressed in mV/m, and

$$E = E_0 + E_R - 100$$

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

Where E: resulting field strength

E_0: field strength read from graphs 1 to 19

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

E_c: characteristic field strength

P: station power in kW.

Graph 20 consists of three pairs of scales to be used with the other graphs of Appendix 2. 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 graphs 1 to 19 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 discussed 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 the following equations:

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

if field strengths are expressed in mV/m, and

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

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

To determine the field strength at a given distance, the scale is placed at the given 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; the point on the underlying graph (which lies underneath the E_R point of the scale) yields the field strength at the given distance.

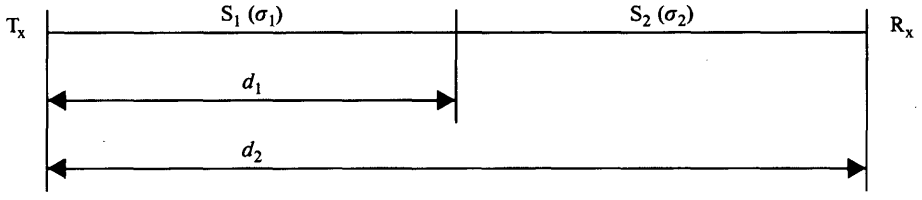
To determine the distance at a given field strength, the E_R value is found on the sliding scale and that point is placed directly at the level of the given field strength on the appropriate graph. The scale is then moved horizontally until the 100 dB(μV/m) point of the scale coincides with the applicable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

Note: Annex E to the Report by the First Session of the Conference, Buenos Aires, 1980 contains a mathematical discussion relating to the calculation of the groundwave curves. The corresponding computer program is available in the IFRB.

2.3.2 *Non-homogeneous paths*

In this case, the equivalent distance or Kirke method is to be used. To apply this method, graphs 1 to 20 can also be used.

Consider a path whose sections S_1 and S_2 have endpoint lengths corresponding to d_1 and $d_2 - d_1$, and conductivities σ_1 and σ_2 respectively, as shown on 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 the graph corresponding to the operational frequency.

b) As the field strength remains constant at the soil discontinuity, the value immediately after the point of 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 note of the corresponding curve for conductivity σ_2 similar to that obtained at equivalent distance $d + (d_2 - d_1)$.

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

CHAPTER 3

Skywave propagation

The calculation of skywave field strength shall be conducted in accordance with the provisions which follow. (No account is taken in the Agreement of sea gain or of excess polarization coupling loss.)

3.1 *List of symbols*

d: short great-circle path distance (km)

E_c: characteristic field strength, mV/m at 1 km for 1 kW

$f(\theta)$: radiation as a fraction of the value $\theta = 0$ (when $\theta = 0$, $f(\theta) = 1$)

f: frequency (kHz)

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

F_c: field strength read from Fig. 4 or Table III for a characteristic field strength of 100 mV/m

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

$F(10)$: skywave field strength, 10% of the time, in dB(μV/m)

P: station power (kW)

θ: elevation angle from the horizontal (degrees)

3.2 *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 Fig. 1.

Elevation angle θ is given by

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

$$0° \leqslant \theta \leqslant 90°$$

Alternatively, Table 1 or Fig. 2 may be used.

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 radiation $f(\theta)$ expressed as a fraction of the value at $\theta = 0$ at a pertinent elevation angle θ can be determined from Fig. 3 or Table II.

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

The unadjusted 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 Fig. 4 or Table III.

Note: Values of F_c in Fig. 4 and Table III are normalized to 100 mV/m at 1 km corresponding to an effective monopole radiated power (e.m.r.p.) or −9.5 dB(kW).

For distances greater than 4250 km, it should be noted that F_c can be expressed by:

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

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

This is given by:

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

3.4 *Skywave field strength, 10% of the time*

The skywave field strength exceeded 10% of the time is given by:

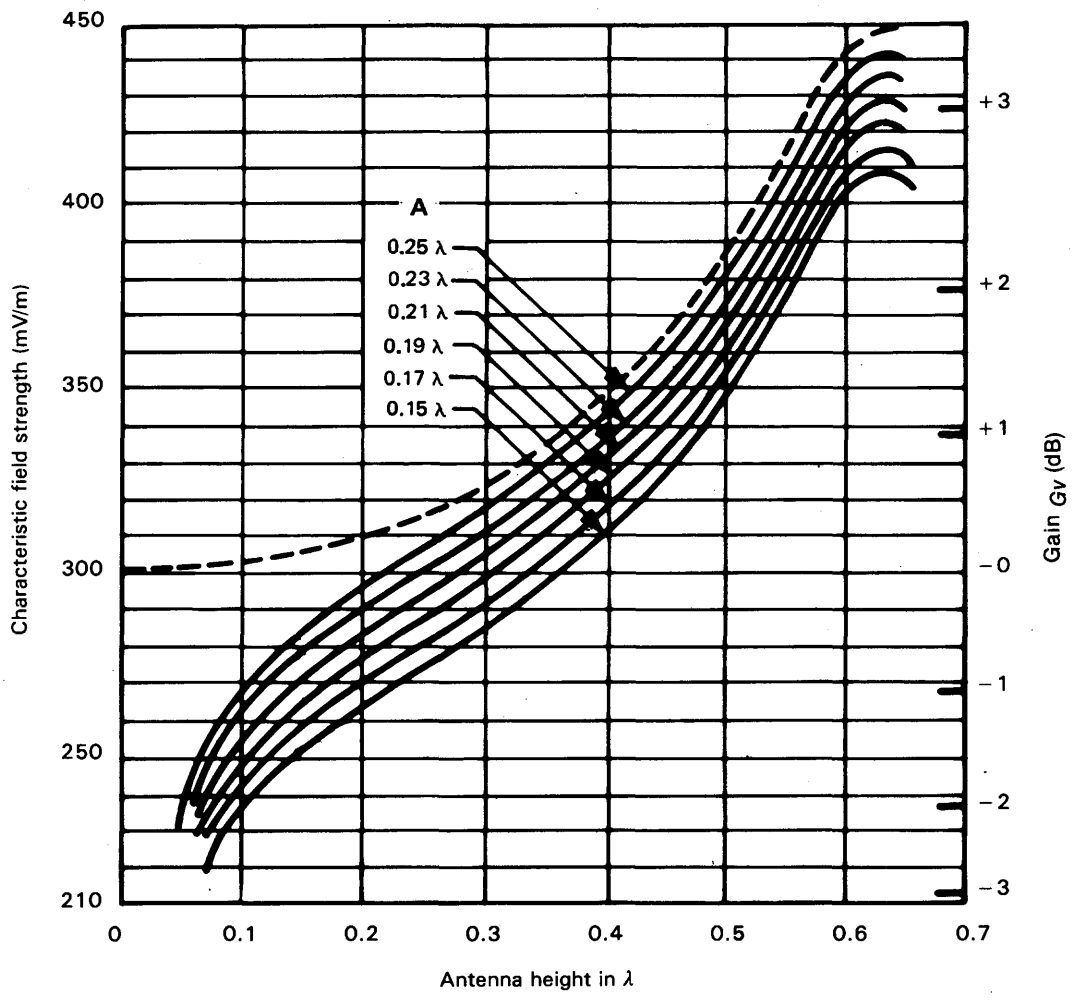
$$F(10) = F(50) + 8 \quad \text{dB}(\mu\text{V/m}) \qquad (5)$$

3.5 *Nocturnal variation of skywave field strength*

Hourly median skywave field strengths vary during the night and at sunrise and sunset. Figure 5 shows the average variation referred to the value at 2 hours after sunset at the path midpoint. This variation applies to field strengths occurring for both 50% and 10% of the nights.

3.6 *Sunrise and sunset time*

To facilitate the determination of the local time of sunrise and sunset, Fig. 6 gives the times for various geographical latitudes and for each month of the year. The time is the local meridian time at the point concerned and should 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 1 – *Characteristic field strengths for simple vertical antennas, using 120-radial ground systems*

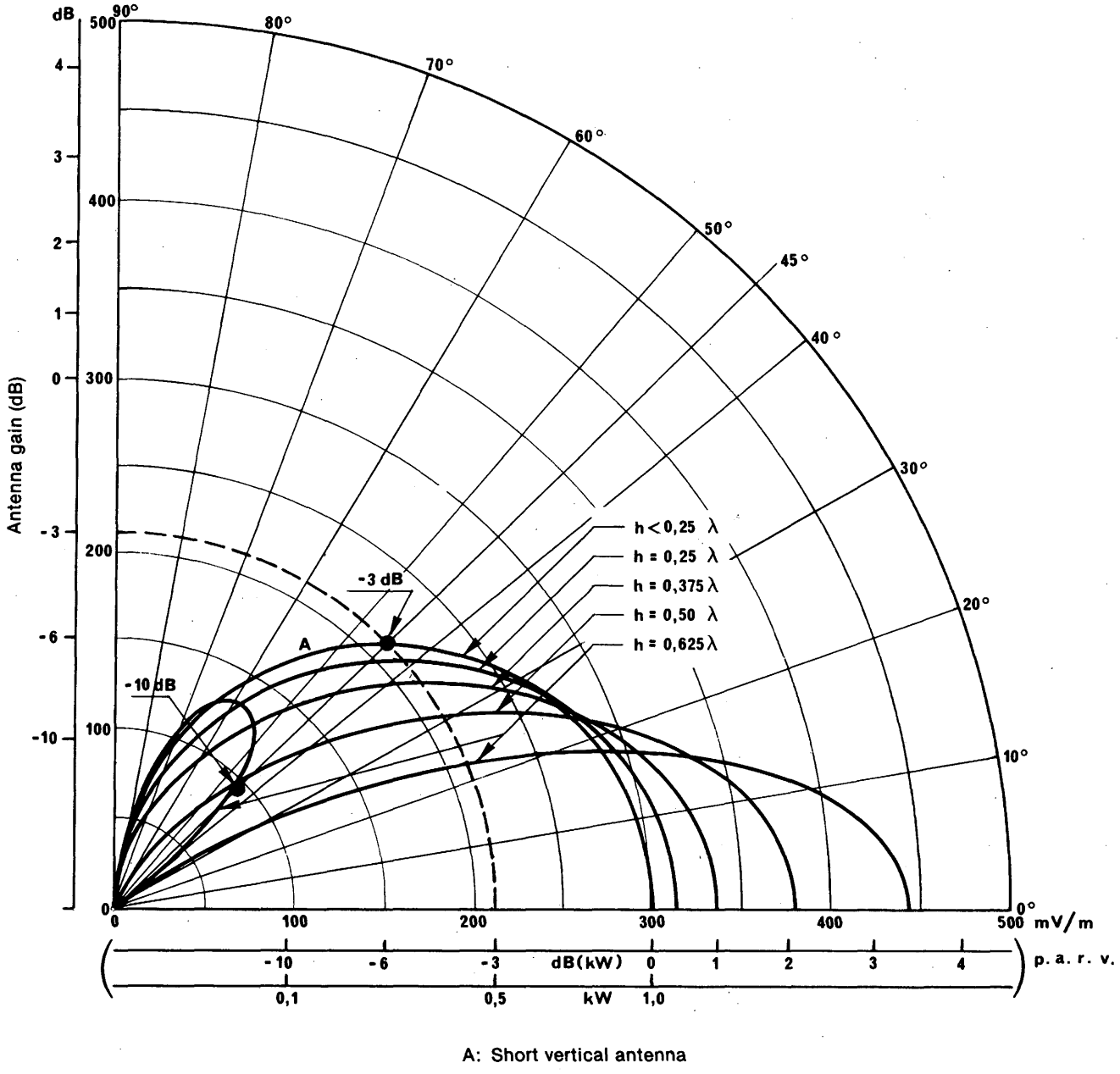


FIGURE 1*a* – *Effective monopole radiated power (e.m.r.p.) and field strength at a distance of 1 km as a function of elevation angle, for different heights of vertical antennas assuming a transmitter power of 1 kW*

TABLE I – *Elevation angle vs distance*

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

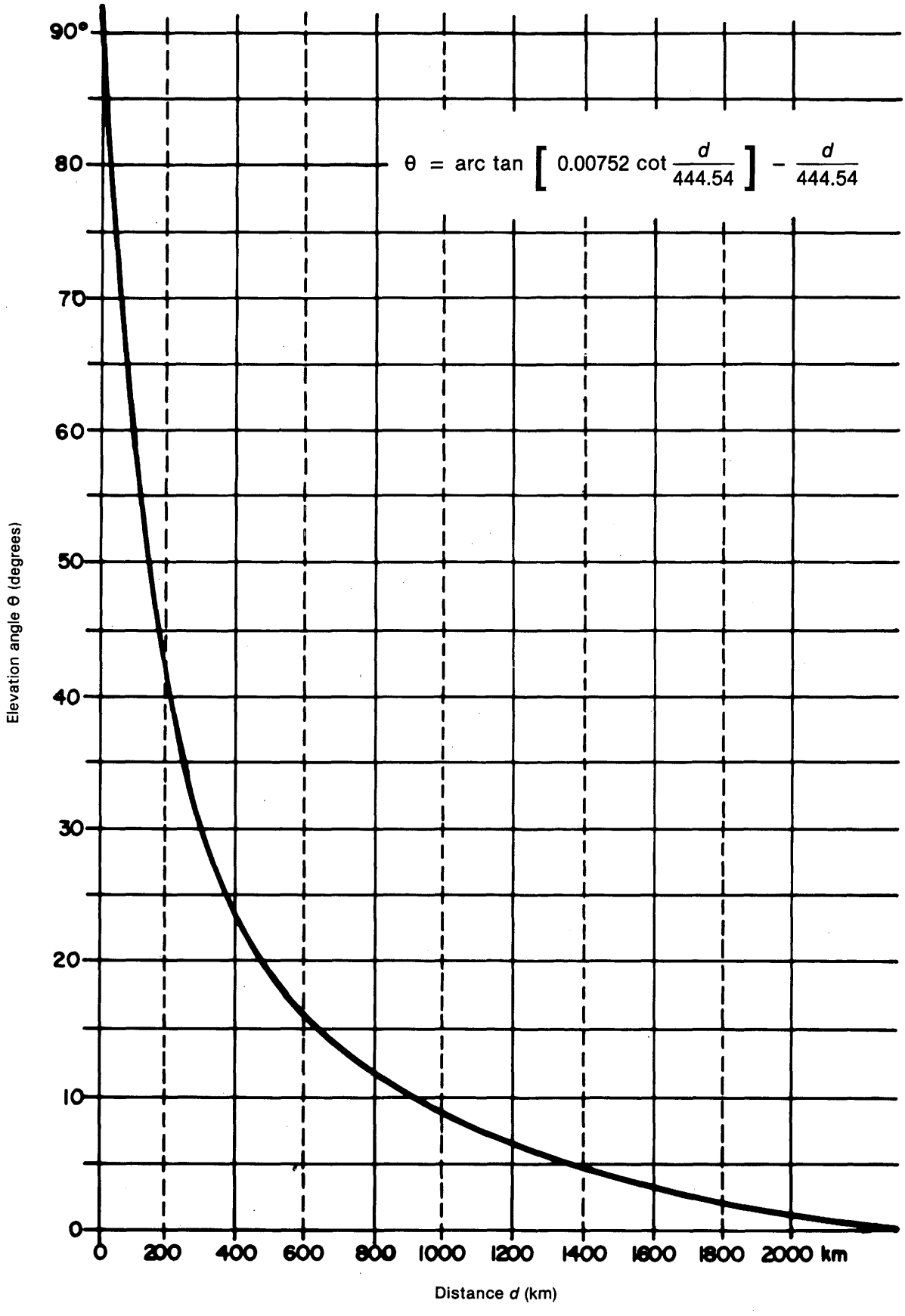


FIGURE 2 – *Elevation angle vs distance*

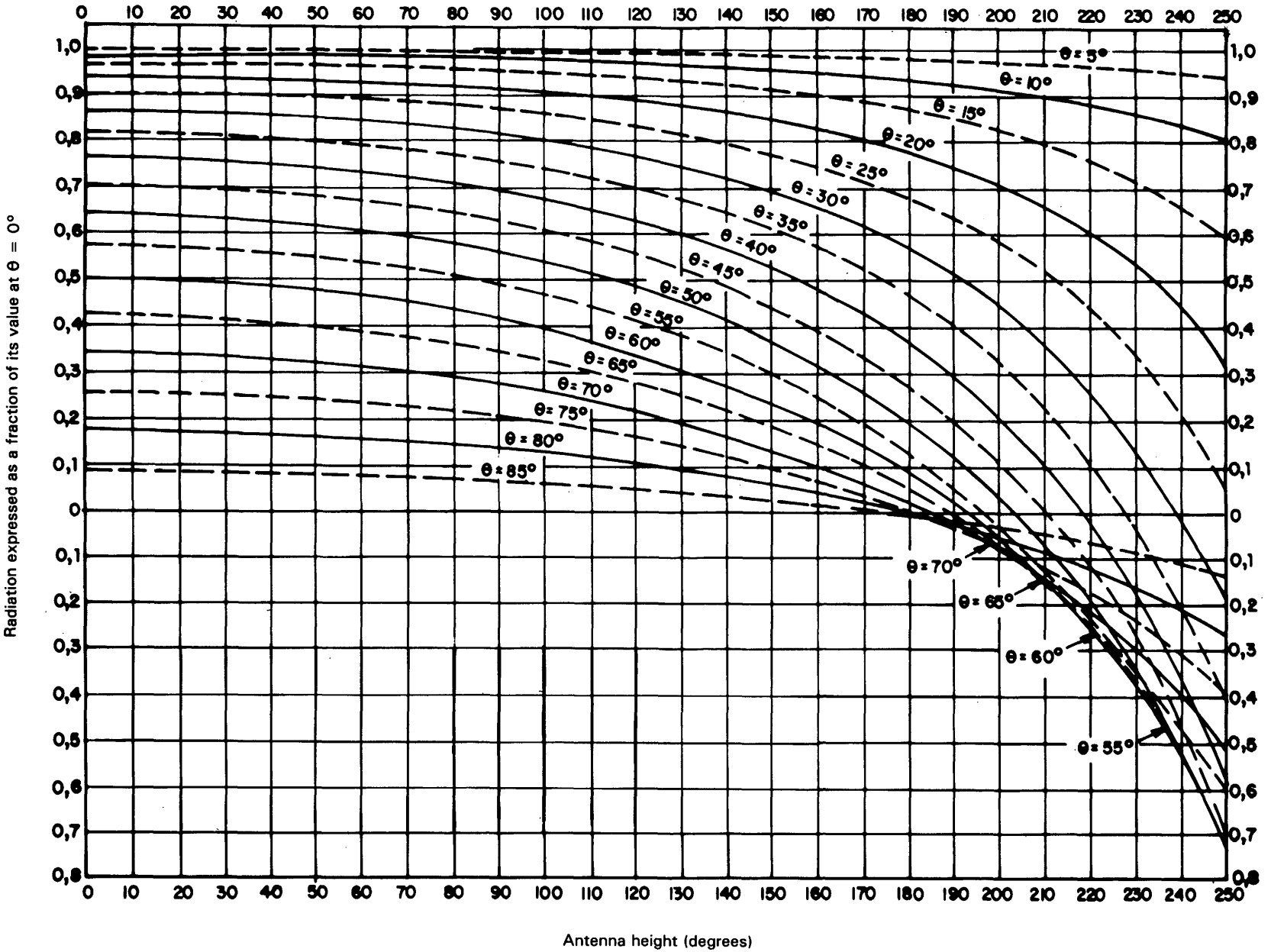


FIGURE 3 – *Vertical plane radiation of simple vertical antennas as a function of electrical tower height for various values of elevation angle (θ)*

TABLE II – *$f(\theta)$ values for simple vertical antennas*

Elevation angle (degrees)	$f(\theta)$					
	0.11 λ	0.13 λ	0.15 λ	0.17 λ	0.19 λ	0.21 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 II *(continued)*

Elevation angle (degrees)	$f(\theta)$					
	0.23 λ	0.25 λ	0.27 λ	0.29 λ	0.311 λ	0.35 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	0.833	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	0.354
60	0.431	0.418	0.403	0.387	0.368	0.328

TABLE II *(end)*

Elevation angle (degrees)	$f(\theta)$					
	0.40 λ	0.45 λ	0.50 λ	0.528 λ	0.55 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 the opposite phase from the main lobe in the vertical radiation pattern. In order to perform the calculation, ignore the negative (−) and use only the absolute value $f(\theta)$ from the Table.

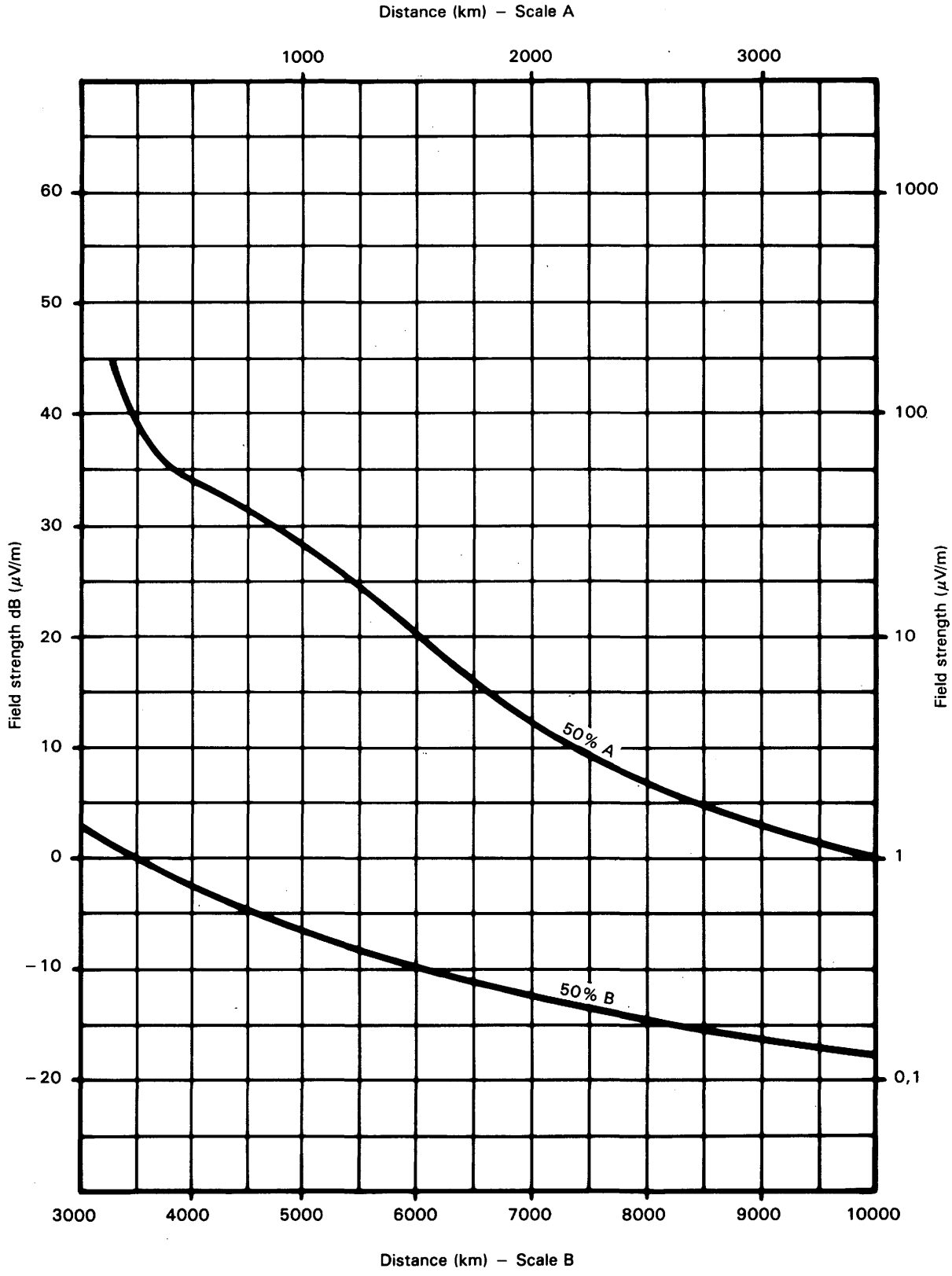


FIGURE 4 – *Skywave field strength vs distance for a characteristic field strength of 100 mV/m*

TABLE III – *Skywave field strength vs distance (100 to 10 000 km) for a characteristic field strength of 100 mV/m*

d (km)	F_c (dB (μV/m)) 50%	F_c (μV/m) 50%
100	45.06	179.11
150	41.38	117.18
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	49.45
550	33.40	46.78
600	32.94	41.36
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 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

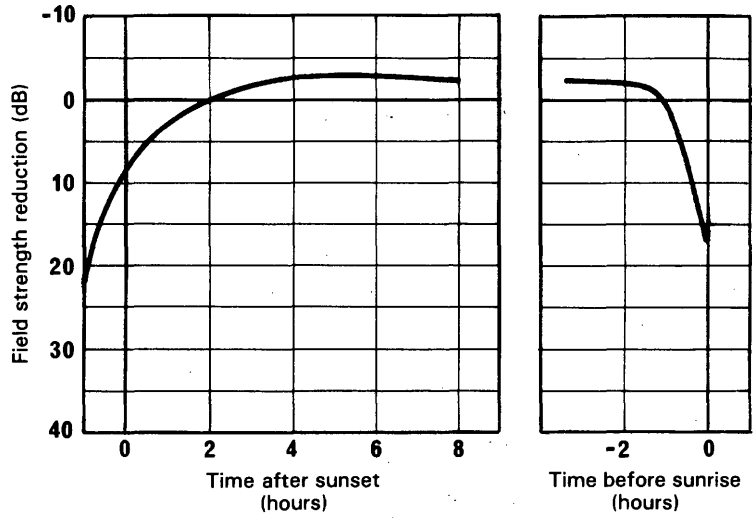


FIGURE 5 – *Field strength variation during the night*

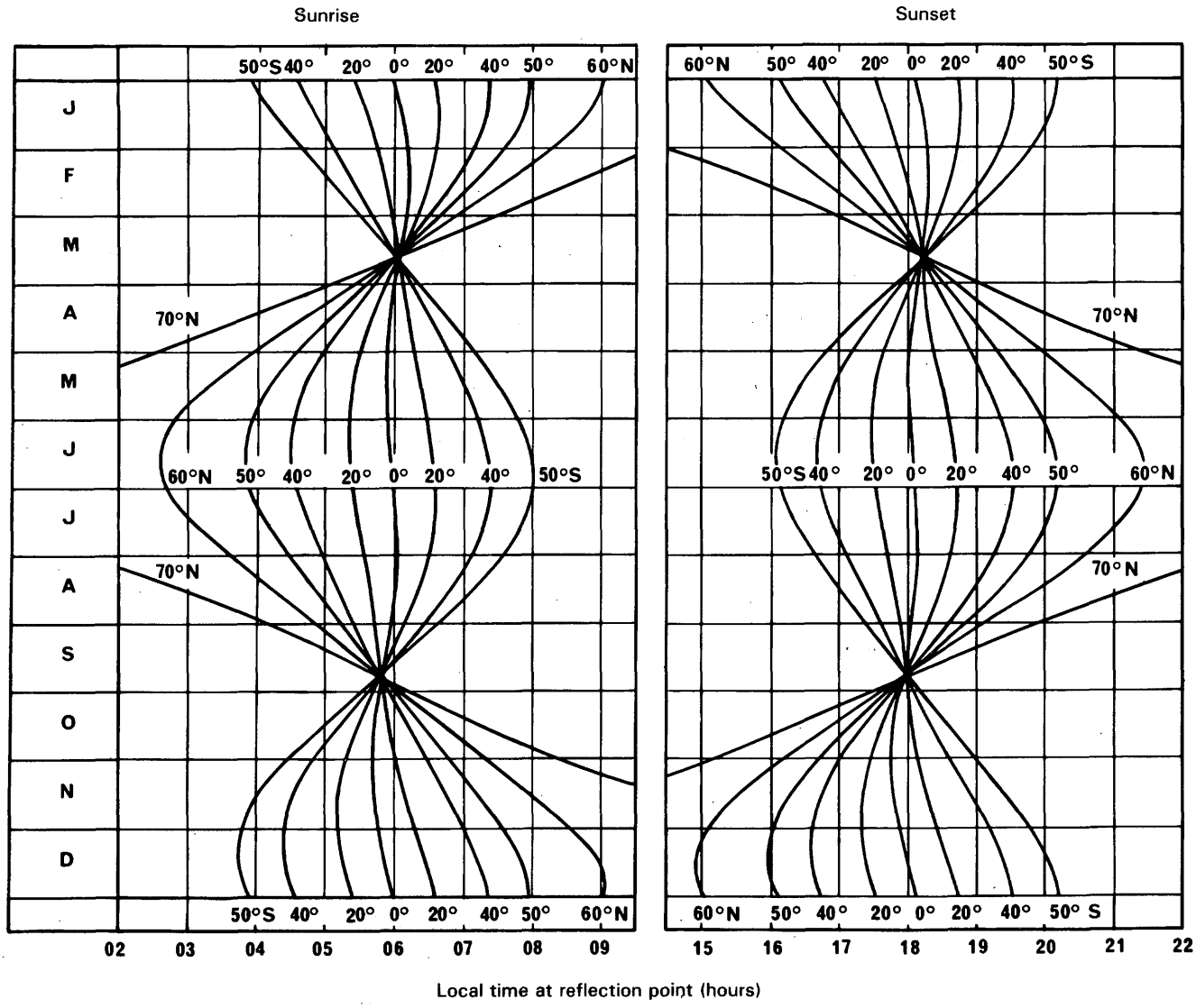


FIGURE 6 – *Times of sunrise and sunset for various months and geographical latitudes*

CHAPTER 4

Broadcasting Standards

4.1 *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 540 kHz.

4.2 *Class of emission*

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

Classes of emission other than A3E, for instance to accommodate stereophonic systems, could also be used on condition that the energy level outside the necessary bandwidth does not exceed that normally expected in A3E emission and that the emission is receivable by receivers employing envelope detectors without increasing appreciably the level of distortion.

4.3 *Bandwidth of emission*

The Plan assumes a necessary bandwidth of 10 kHz, for which only a 5 kHz audio bandwidth can be obtained. While this might be an appropriate value for some administrations, others have successfully employed wider bandwidth systems having occupied bandwidths of the order of 20 kHz without adverse effects.

4.4 *Station power*

4.4.1 *Class A*

- The power of any class A station exceeding 100 kW day/50 kW night shall not be increased;
- The power of any class A station not exceeding 100 kW day/50 kW night may be increased but shall not exceed those values;
- Any new class A station shall have a power not exceeding 100 kW day/50 kW night.

4.4.2 *Class B*

The maximum station power shall be 50 kW.

4.4.3 *Class C*

During night-time, the maximum station power shall be 1 kW.

During daytime, the maximum station power shall be:

- 1 kW in noise zone 1
- 5 kW in noise zone 2

provided that the protection criteria given in paragraph 4.9 of this Chapter are met.

4.5 *Special procedures governing skywave interference calculations*

4.5.1 Canada, Denmark (for Greenland), the French Department of Saint Pierre and Miquelon, Mexico and the United States of America will calculate the value of interfering skywave signals that each receives from Canada, Greenland, Saint Pierre and Miquelon, Mexico and the United States of America for class A, B and C stations on the basis of 10% of the time.

4.5.2 In circumstances involving one or more of the Administrations named in 4.5.1 and one or more administrations that use the criterion of 50% of the time to determine the field strength of skywave interfering signals, the following procedures shall apply:

4.5.2.1 If an administration using the criterion of 50% of the time to determine the field strength of skywave interfering signals proposes to enter a station in the Plan or modify the operating characteristics of a station already admitted into the Plan, then all calculations of the field strength of skywave interfering signals shall be made on the basis of 50% of the time.

4.5.2.2 If an administration using the criterion of 10% of the time to determine the field strength of skywave interfering signals proposes to enter a station in the Plan or modify the operating characteristics of a station already admitted into the Plan, then:

- if the administration whose station is receiving interference is one that uses the criterion of 50% of the time to determine the field strength of skywave interfering signals, calculations of the field strength of skywave interfering signals shall be made on the basis of 50% of the time.
- if the administration whose station is receiving interference is one that uses the criterion of 10% of the time to determine the field strength of skywave interfering signals, calculations of the field strength of skywave interfering signals shall be made on the basis of 10% of the time.

4.5.3 Except as envisaged in 4.5.1 and 4.5.2, the field strength of skywave interfering signals shall be calculated on the basis of 50% of the time.

4.6 TABLE IV – *Nominal usable field strength* (1) (2)

	Noise zone 1	Noise zone 2
4.6.1	*Class A station* (3) (4) *Groundwave* Daytime: co-channel: 100 μV/m adjacent channel: 500 μV/m Night-time: 500 μV/m *Skywave* 500 μV/m, 50% of time	*Class A station* (4) *Groundwave* Daytime: co-channel: 250 μV/m adjacent channel: 500 μV/m Night-time: 1250 μV/m *Skywave* 1250 μV/m, 50% of time
4.6.2	*Class B station* (5) *Groundwave* Daytime: 500 μV/m Night-time: 2500 μV/m	*Class B station* (5) *Groundwave* Daytime: 1250 μV/m Night-time: 6500 μV/m
4.6.3	*Class C station* (5) *Groundwave* Daytime: 500 μV/m Night-time: 4000 μV/m	*Class C station* (5) *Groundwave* Daytime: 1250 μV/m Night-time: 10,000 μV/m

(1) The nominal usable field strength values shown in the Table were used as the reference for planning (see definition in Chapter 1, paragraph 1.6 of this Annex).

(2) Higher values than those shown in the Table may be employed in order to satisfy noise limitations or special arrangements between two or more administrations.

(3) The following nominal usable field strength values are employed between the countries of Central America for class A stations:

Groundwave:
Daytime: co-channel 500 μV/m
adjacent channel 500 μV/m
Night-time: 1000 μV/m
Skywave: 1000 μV/m for 50% of the time

(4) The night-time contour, groundwave or skywave, whichever is the more distant, is to be protected in the case of class A stations.

(5) The protected contour during night-time operation for class B and C stations shall be the higher of the groundwave contour in 4.6.2 and 4.6.3 respectively, or the groundwave contour corresponding to the usable field strength of the station as defined in 4.7 and resulting from the Plan.

4.7 *Use of the root sum square (RSS) method to determine the usable field strength resulting from the weighted interfering signals*

4.7.1 *General*

The overall usable field strength E_u due to two or more individual interference contributions is calculated on an RSS basis, using the expression:

$$E_u = \sqrt{(a_1E_1)^2 + (a_2E_2)^2 + \ldots (a_iE_i)^2 \ldots}$$

where:

E_i is the field strength of the ith interfering transmitter (in μV/m);

a_i is the radio-frequency protection ratio associated with the ith interfering transmitter, expressed as a numerical ratio of field strengths.

4.7.2 *50% exclusion principle*

The 50% exclusion principle allows a significant reduction in the number of calculations.

According to this principle, the values of the individual usable field strength contributions are arranged in descending order of magnitude. If the second value is less than 50% of the first value, the second value and all subsequent values are neglected. Otherwise an RSS value is calculated for the first and second values. The calculated RSS value is then compared with the third value in the same manner by which the first value was compared to the second and a new RSS value is calculated if required. The process is continued until the next value to be compared is less than 50% of the last calculated RSS value. At that point the last calculated RSS value is considered to be the usable field strength E_u.

For the purposes of this Agreement, if the contribution of a new station is greater than the smallest value previously considered in calculating the RSS value of assignments in the Plan, the contribution of the new station adversely affects assignments in conformity with this Agreement even if it is less than 50% of the RSS value. However, the new contribution does not adversely affect assignments in conformity with this Agreement if the RSS value determined by inserting the contribution of the new station in the list of contributors is smaller than the nominal usable field strength E_{nom}.

4.8 *Definition of noise zones*

Noise zone 1

Comprises the whole of Region 2 with the exception of noise zone 2.

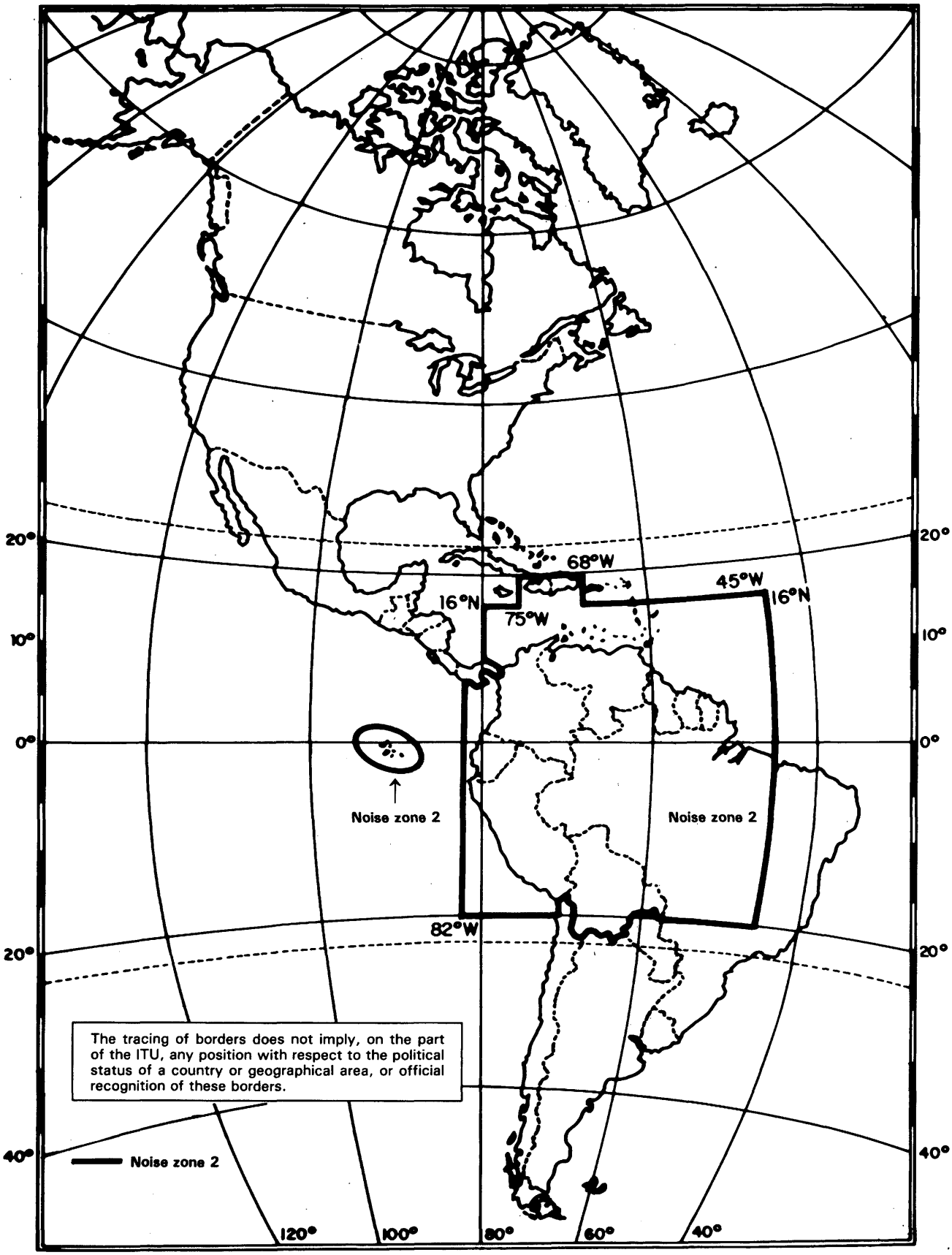
Noise zone 2

Comprises the area within the line defined by the coordinates 20° S-45° W, the meridian 45° W to the coordinates 16° N-45° W, the parallel 16° N to the coordinates 16° N-68° W, the meridian 68° W to the coordinates 20° N-68° W, the parallel 20° N to the coordinates 20° N-75° W, the meridian 75° W to the coordinates 16° N-75° W, the parallel 16° N to the coordinates 16° N-80° W, the meridian 80° W to the northeast coast of Panama, the frontier between Panama and Colombia, the southeast coast of Panama and the meridian 82° W to the parallel 20° S, and the parallel 20° S, with the exception of Chile and Paraguay, until the frontier between Paraguay and Brazil until 45° W. Bolivia is entirely included in noise zone 2 as are the archipelago of San Andrés y Providencia and the islands belonging to Colombia and the Colon archipelago or the Galapagos Islands (Ecuador).

Note 1. – Grenada is included in noise zone 1 night-time and noise zone 2 daytime.

Note 2. – See the maps of noise zones on the following page.

NOISE ZONES


20°
10°
0°
20°
40°
68°W
45°W
16°N
16°N
75°W
Noise zone 2
Noise zone 2
82°W
The tracing of borders does not imply, on the part of the ITU, any position with respect to the political status of a country or geographical area, or official recognition of these borders.
Noise zone 2
120°
100°
80°
60°
40°

4.9 *Channel protection ratios*

4.9.1 *Co-channel protection ratio*

The co-channel protection ratio is 26 dB.

4.9.2 *Adjacent channel protection ratio*

- protection ratio for the first adjacent channel: 0 dB
- protection ratio for the second adjacent channel: −29.5 dB

4.9.3 *Synchronized networks*

In addition to the standards specified in the Agreement, the following additional standards apply to synchronized networks.

For the purpose of determining interference caused by synchronized networks, the following procedure shall be applied. If any two transmitters are less than 400 km apart, the network shall be treated as a single entity, the value of the composite signal being determined by the quadratic addition of the interfering signals from all the individual transmitters in the network. If the distances between all the transmitters are equal to or greater than 400 km, the network shall be treated as a set of individual transmitters.

For the purpose of determining skywave interference received by any one member of a network, the value of the interference caused by the other elements of the network shall be determined by the quadratic addition of the interfering signals from all of those elements. In any case, where groundwave interference is a factor it shall be taken into account.

The co-channel protection ratio between stations belonging to a synchronized network is 8 dB.

4.10 *Application of protection criteria*

4.10.1 *Value of protected contours*

Within the national boundary of a country, the protected contour shall be determined by using the appropriate value of nominal usable field strength, or as otherwise determined in note (5) to paragraph 4.6 for class B and C stations. Instead of protecting normally protected contours for class A stations, countries with specific service requirements beyond the normally protected contours for such stations may establish, through bilateral or multilateral arrangements with concerned or affected countries, additional protection criteria for one or more existing broadcasting stations.

Note: Administrations which need to adopt less restrictive criteria may incorporate the procedure described in Appendix 5 to this Annex, paragraph 6 in bilateral or multilateral arrangements between the administrations concerned.

4.10.2 *Co-channel protection* [1]

4.10.2.1 *Daytime protection of all classes of stations*

During the daytime the groundwave contour of class A, B and C stations shall be protected against groundwave interference. The protected contour is the groundwave contour corresponding to the value of the nominal usable field strength. The maximum permissible interfering field strength at the protected contour is the value of the nominal usable field strength divided by the protection ratio. The effect of each interfering signal shall be evaluated separately, and the presence of interference from other stations in excess of this permissible level shall not reduce the necessity to limit interference which would result from proposed modifications or assignments. Where the protected contour would extend beyond the boundary of the country in which the station is located, the maximum permissible interfering field strength at the boundary is the calculated field strength of the protected station along the boundary divided by the protection ratio.

[1] See the matrix in paragraph 8 of Appendix 5 to this Annex.

4.10.2.2 *Night-time protection of class A stations*

In circumstances where the criterion of 50% of the time is used to determine the field strength of skywave interfering signals, the groundwave contour or the skywave contour 50% of the time, whichever is farther from the site of the protected class A station, shall be protected against skywave interference during the night-time. The protected contour is the groundwave contour or skywave contour 50% of the time, whichever is farther from the station site, corresponding to the value of the nominal usable field strength. The value of the field strength to be protected is the greater of the nominal usable field strength or the usable field strength resulting from the Plan, the usable field strength being determined in accordance with 4.7 at points on the protected contour. The maximum permissible interfering field strength at the protected contour shall be determined in accordance with 4.7. Where the protected contour would extend beyond the boundary of the country in which the station is located, the calculated field strength along the boundary shall be protected as described above, using the value of the groundwave signal wherever the boundary crosses the primary service area and the value of the skywave signal outside the primary service area.

In circumstances where the criterion of 10% of the time is used to determine the field strength of skywave interfering signals, the groundwave contour or the skywave contour 50% of the time, whichever is farther from the site of the protected class A station, shall be protected against skywave interference during the night-time. The protected contour is the groundwave contour or skywave contour 50% of the time, whichever is farther from the station site, corresponding to the value of the nominal usable field strength. The maximum permissible interfering field strength at the protected contour is the value of the nominal usable field strength divided by the protection ratio. The effect of each interfering signal shall be evaluated separately, and the presence of interference from other stations in excess of the level permitted shall not reduce the necessity to limit interference which would result from proposed modifications or assignments. Where the protected contour would extend beyond the boundary of the country in which the station is located, the maximum permissible interfering field strength at the boundary is the calculated field strength of the protected station along the boundary, divided by the protection ratio, using the value of the groundwave signal wherever the boundary crosses the primary service area and the value of the skywave signal outside the primary service area.

4.10.2.3 *Night-time protection of class B and C stations*

During the night-time, the groundwave contour of class B and C stations shall be protected against skywave interference. The protected contour is the groundwave contour corresponding to the value of the greater of the nominal usable field strength or the usable field strength resulting from the Plan as determined at the site of the protected station in accordance with 4.7. The maximum permissible interfering field strength calculated at the site of the protected station in accordance with 4.7 shall not be exceeded at the protected contour. Where the protected contour would extend beyond the boundary of the country in which the station is located, the protected contour shall follow that part of the boundary.

4.10.2.4 *Modification of assignments*

If a station of an administration causes interference to a station of another administration and such interference is permitted in accordance with the terms of the Agreement, then in the event of a modification being proposed to the assignment corresponding to the former station, it will not be necessary to protect the assignment corresponding to the latter station beyond the level provided before the proposed modification.

4.10.3 *Adjacent channel protection* [1]

During the daytime and night-time, the groundwave contour of class A, B and C stations shall be protected against groundwave interference. The protected contour is the groundwave contour corresponding to the value of the nominal usable field strength determined as follows:

- for daytime protection of class A stations, the value specified in 4.6.1 for adjacent channel daytime groundwave;
- for night-time protection of class A stations, the value specified in 4.6.1 for night-time groundwave;
- for daytime and night-time protection of class B stations, the value specified in 4.6.2 for daytime groundwave;
- for daytime and night-time protection of class C stations, the value specified in 4.6.3 for daytime groundwave.

[1] See the matrix in paragraph 8 of Appendix 5 to this Annex.

The maximum permissible interfering field strength at the protected contour is the value of the nominal usable field strength divided by the protection ratio. The effect of each interfering signal shall be evaluated separately, and the presence of interference from other stations in excess of this permissible level shall not reduce the necessity to limit interference which would result from the proposed modifications or assignments.

Where the protected contour would extend beyond the boundary of the country in which the station is located, the maximum permissible interfering field strength at the boundary is the calculated field strength of the protected assignment along the boundary divided by the protection ratio.

If a station of an administration causes interference to a station of another administration and such interference is permitted in accordance with the terms of the Agreement, then in the event of a modification being proposed to the assignment corresponding to the former station, it will not be necessary to protect the assignment corresponding to the latter station beyond the level provided before the proposed modification.

4.10.4 *Protection outside national boundaries*

4.10.4.1 No station has the right to be protected beyond the boundary of the country in which the station is established, except when otherwise specified in a bilateral or multilateral arrangement.

4.10.4.2 No broadcasting station shall be assigned a nominal frequency with a separation of 10 kHz from that of a station in another country if the 2500 μV/m contours overlap.

No broadcasting station shall be assigned a nominal frequency with a separation of 20 kHz from that of a station in another country if the 10 000 μV/m contours overlap.

No broadcasting station shall be assigned a nominal frequency with a separation of 30 kHz from that of a station in another country if the 25 000 μV/m contours overlap.

4.10.4.3 In addition to the conditions described in 4.10.4.2, when the protected contour would extend beyond the boundary of the country in which the station is located, its assignment shall be protected in accordance with 4.10.2 and 4.10.3.

4.10.4.4 For protection purposes, the boundary of a country shall be deemed to encompass only its land area, including islands.

4.11 *Additional interference margin*

For assignments to which the special provisions of paragraph 4.3.7 of the Agreement apply, the station may radiate in any direction encompassing the service areas of a station included in the Plan up to $2.0/M$ dB more than would be allowed if such special provisions had not been invoked. The value of M is equal to one plus the number of times an affected station was previously required to accept an additional margin of interference due to the application of paragraph 4.3.7 of the Agreement. The value of $2.0/M$ dB shall be determined separately for each existing assignment that will be affected. A station shall not be required to accept an additional margin of interference resulting from the application of the aforementioned special provisions more than three times.

CHAPTER 5

Radiation characteristics of transmitting antennas

In carrying out the calculations indicated in Chapters 2 and 3, the following shall be taken into account:

5.1 *Omnidirectional antennas*

Fig. 1 of Chapter 3 shows the characteristic field of a simple vertical antenna as a function of its length and of the radius of the ground system. The characteristic field of an antenna with a loss-less ground system is also shown for comparison.

It is clear 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 lengths up to 0.625 wavelengths is obtained at the expense of radiation at high angles as shown graphically in Fig. 1*a* and numerically in Table II of Chapter 3.

5.2 *Considerations of the radiation patterns of directional antennas*

5.2.1 The procedures for calculating theoretical, expanded and augmented (modified expanded) directional antenna patterns are given in Appendix 3 to this Annex.

5.2.2 Other methods may be proposed by an administration and shall be used by the IFRB in determining the directional antenna patterns of that administration, subject to the agreement of the other administrations concerned and provided that the method proposed results in a complete description of the radiation in the horizontal and vertical planes.

5.3 *Top-loaded and sectionalized antennas*

5.3.1 Calculation procedures are given in appendix 4 to this Annex.

5.3.2 Many stations employ top-loaded or sectionalized towers, either because of space limitations or to vary the radiation characteristics from those of a simple vertical antenna. This is done to achieve desired coverage or to reduce interference.

5.3.3 Administrations using top-loaded or sectionalized antennas shall supply information concerning the tower structure of the antennas. Normally, one of the equations in Appendix 4 to this Annex shall be employed to determine the vertical radiation characteristics of the antennas. Other equations may also be proposed by an administration and shall be used by the IFRB in determining the vertical radiation characteristics of the antennas of that administration, subject to the agreement of the other administrations concerned.

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APPENDIX 1

(to Annex 2)

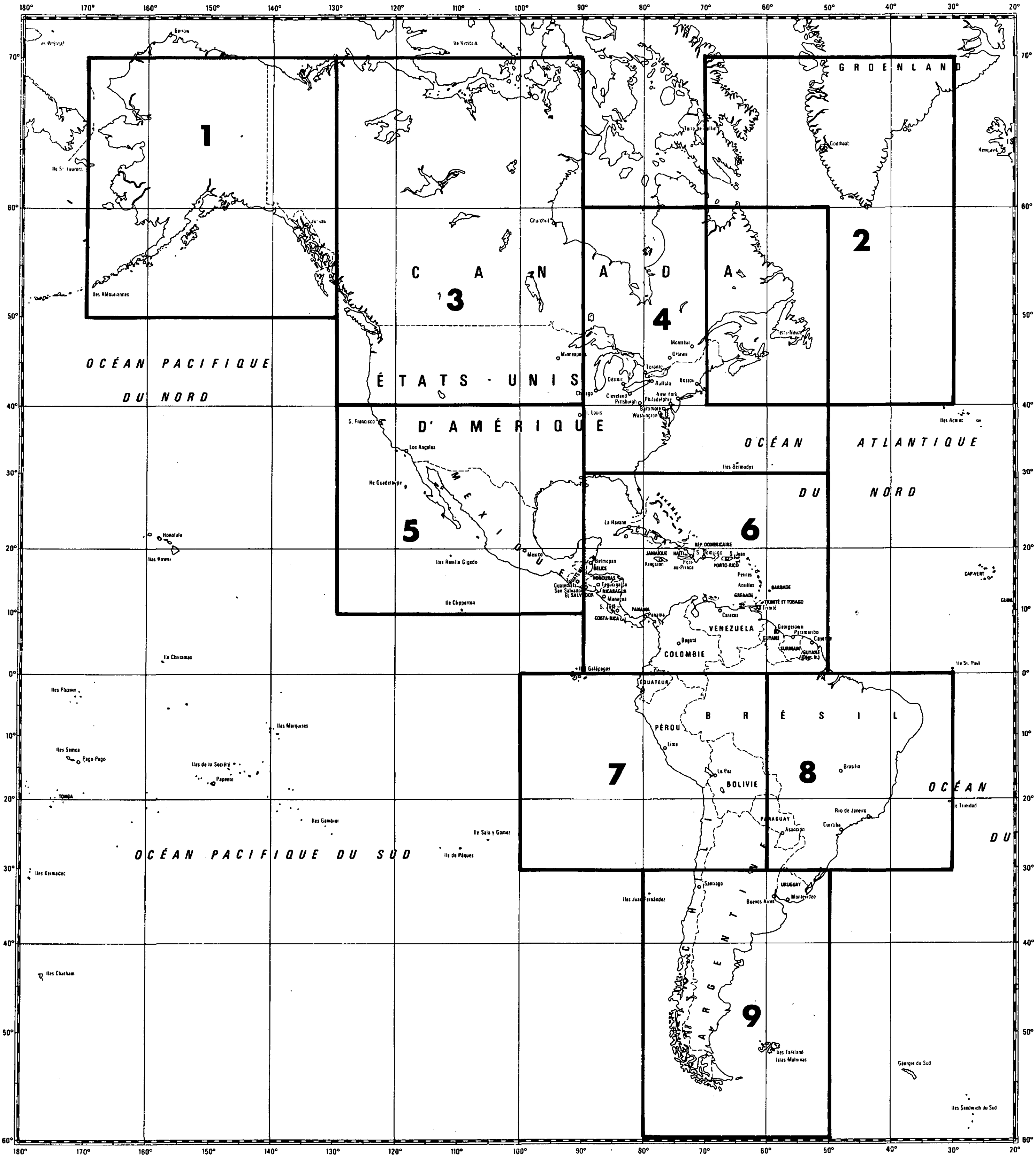
Atlas of ground conductivity *

LE TRACÉ DES FRONTIÈRES N'IMPLIQUE DE LA PART DE L'UIT AUCUNE PRISE DE POSITION QUANT AU STATUT POLITIQUE D'UN PAYS OU D'UNE ZONE GÉOGRAPHIQUE, NI AUCUNE RECONNAISSANCE OFFICIELLE DE CES FRONTIÈRES.

THE TRACING OF BORDERS DOES NOT IMPLY ON THE PART OF THE ITU ANY POSITION WITH RESPECT TO THE STATUS OF A COUNTRY OR GEOGRAPHICAL AREA, OR OFFICIAL RECOGNITION OF THESE BORDERS.

EL TRAZADO DE FRONTERAS EN LOS MAPAS NO IMPLICA QUE LA UIT TOME POSICIÓN EN CUANTO AL ESTATUTO POLÍTICO DE PAÍSES O ZONAS GEOGRÁFICAS NI EL RECONOCIMIENTO POR SU PARTE DE ESAS FRONTERAS.

* Published separately.



L'inscription d'un pays ou d'un territoire 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 territoires, ni aucune reconnaissance officielle de ces frontières.
Cette carte a été préparée afin d'assister les experts en planification de la Conférence.

The mention of the name of a country or of a territory 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 territory, or official recognition of these borders.
The map has been prepared to assist the planning experts of the Conference.

La inscripción de un país o de un territorio 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 territorios ni el reconocimiento por su parte de esas fronteras.
Esta mapa ha sido preparado para asistir a los expertos en planificación de la Conferencia.

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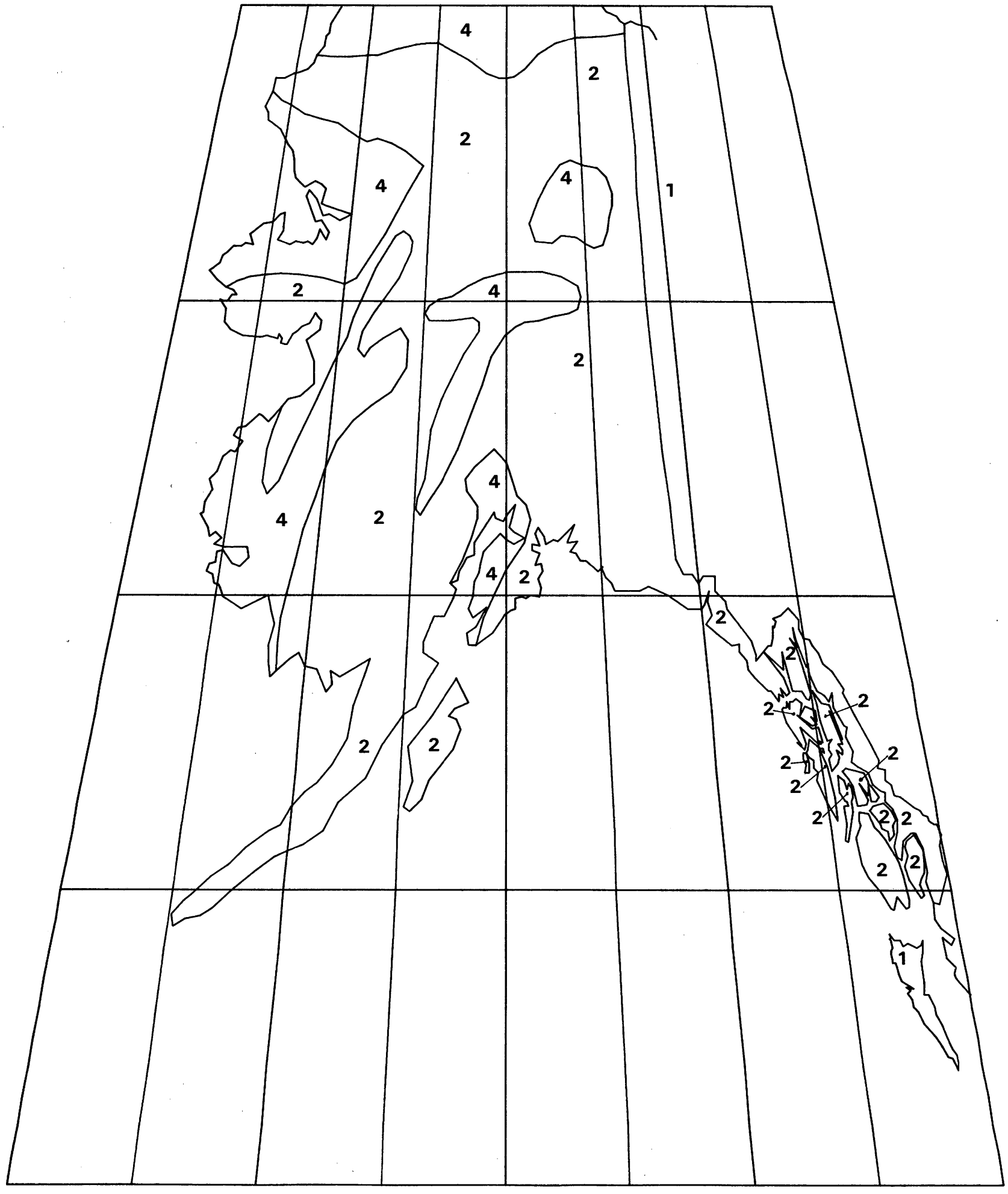

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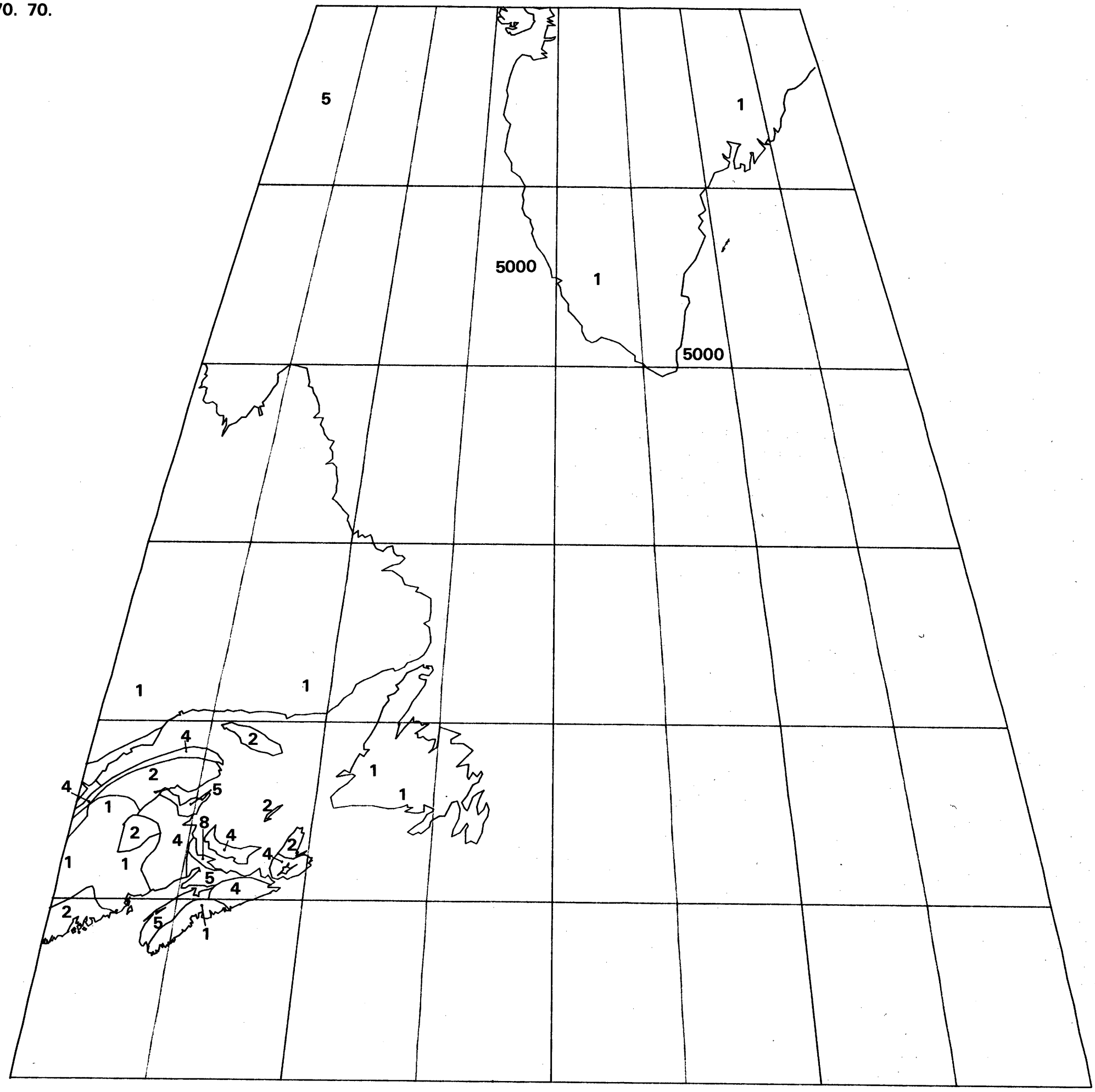

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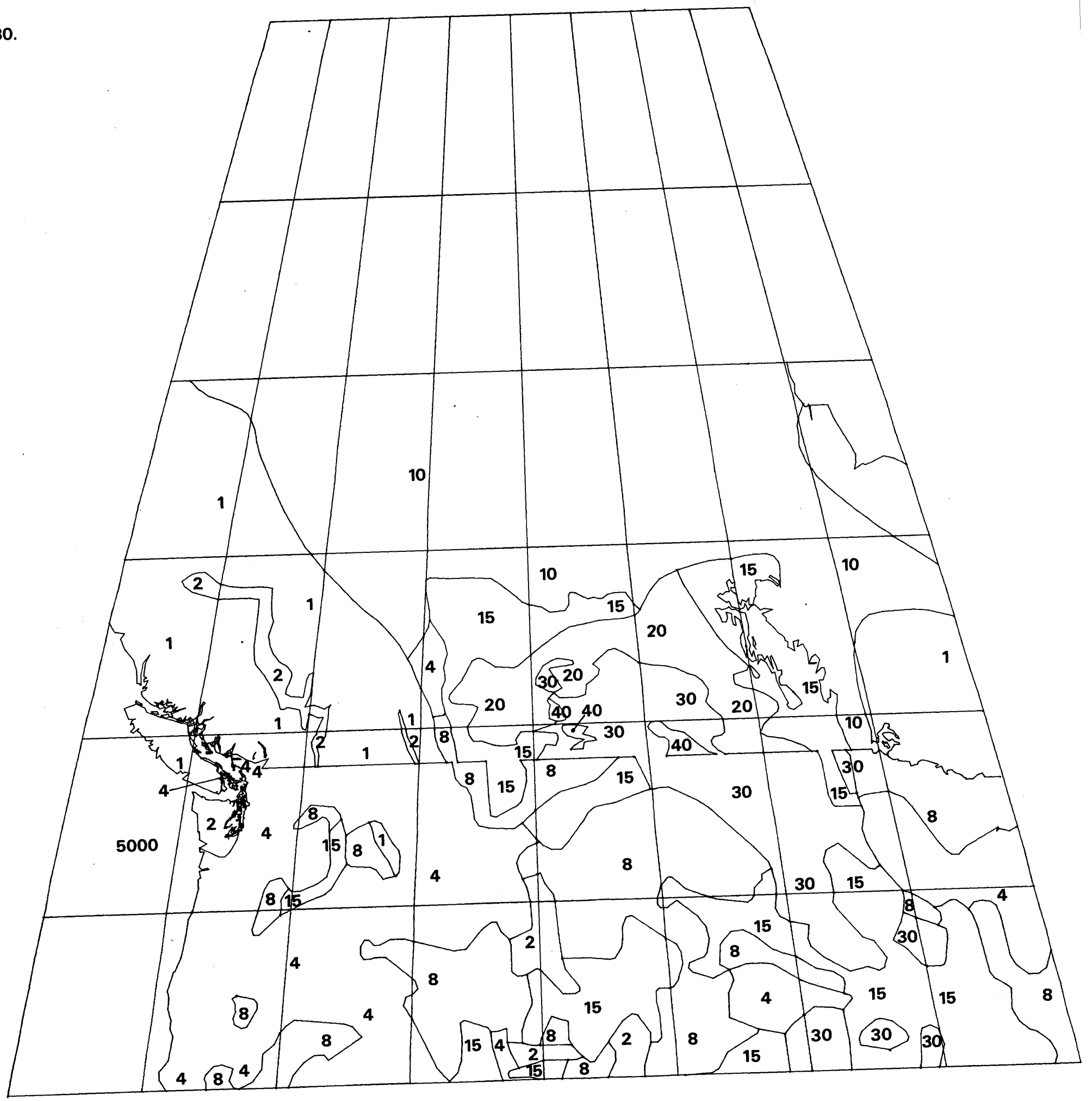

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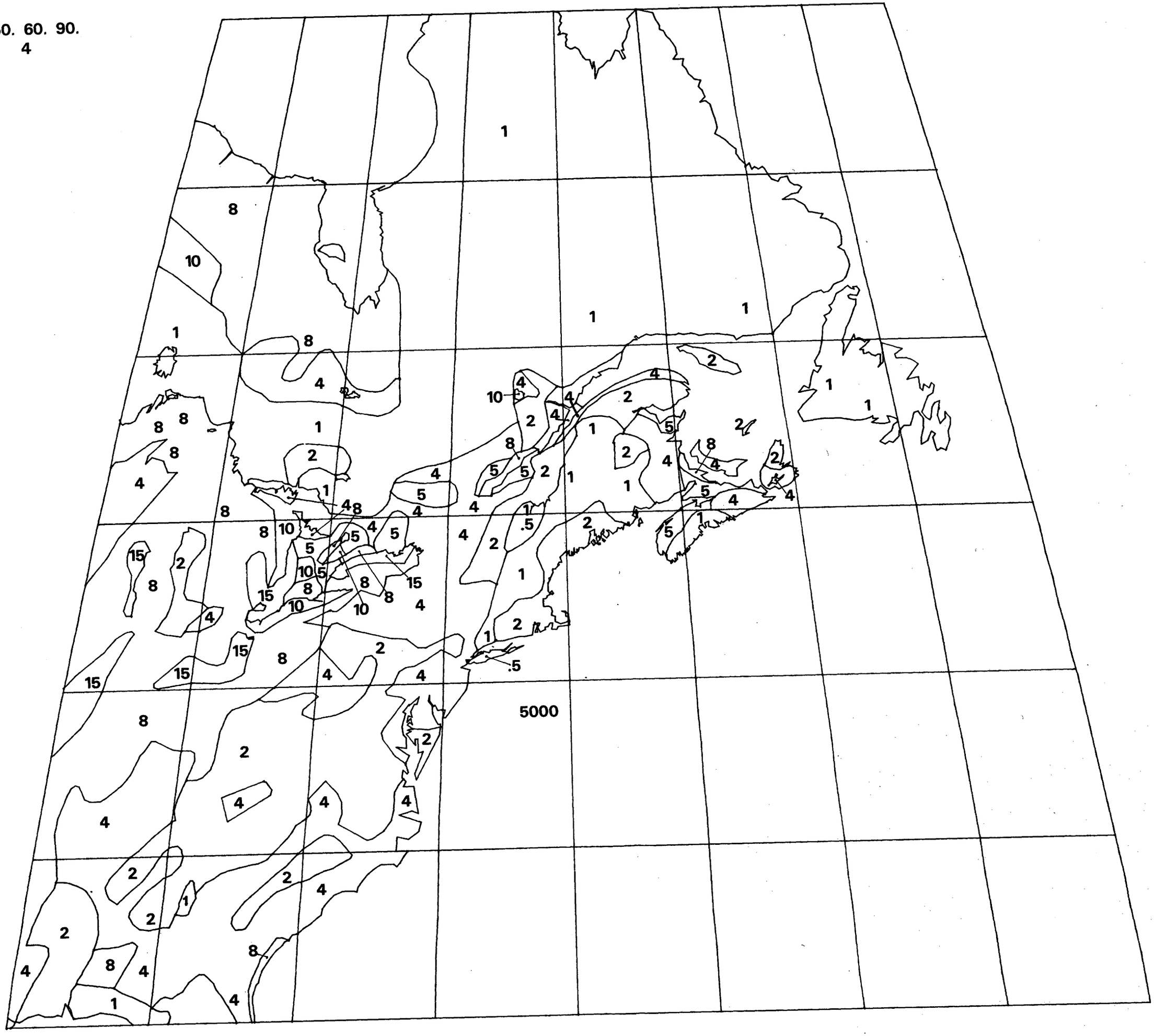

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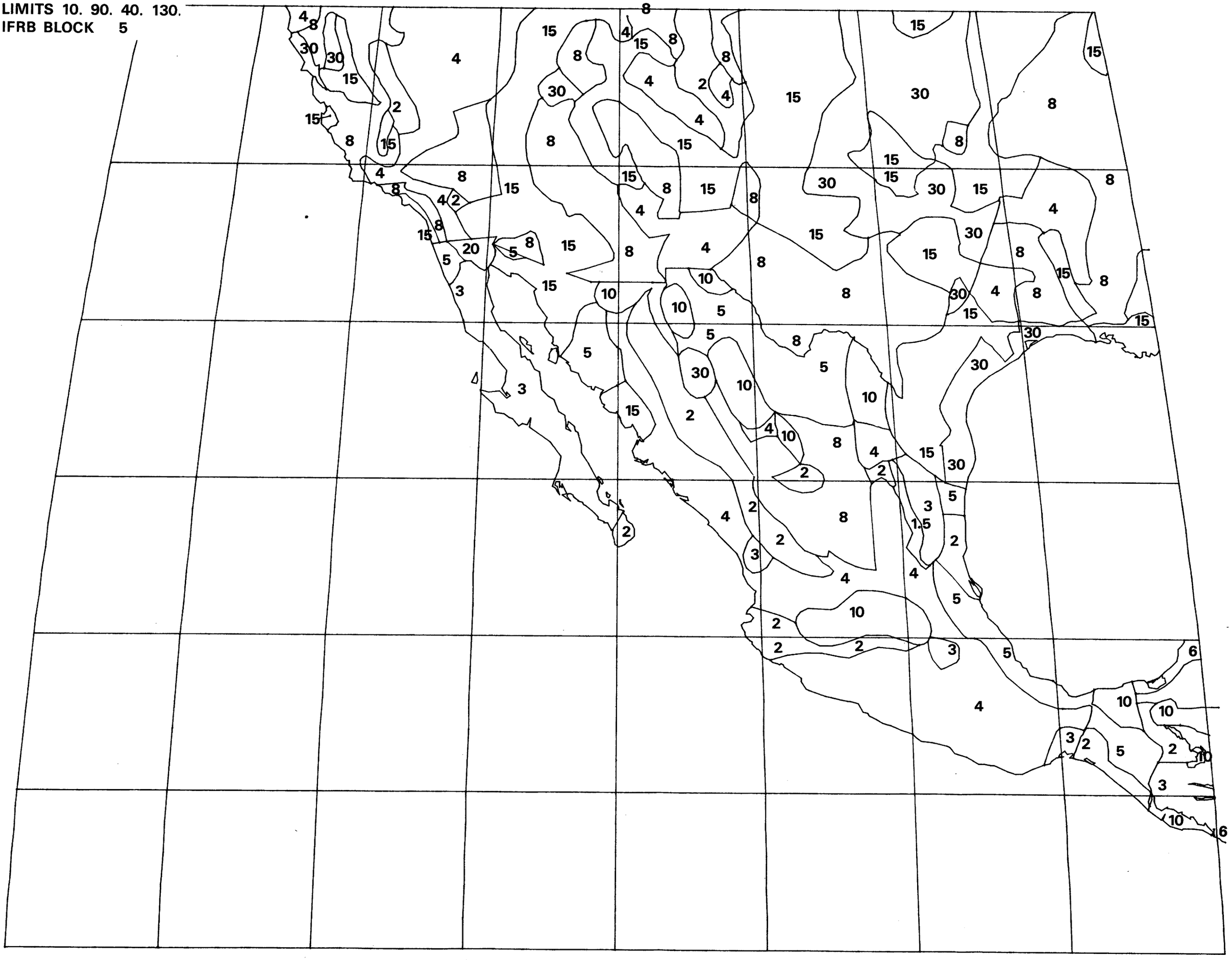

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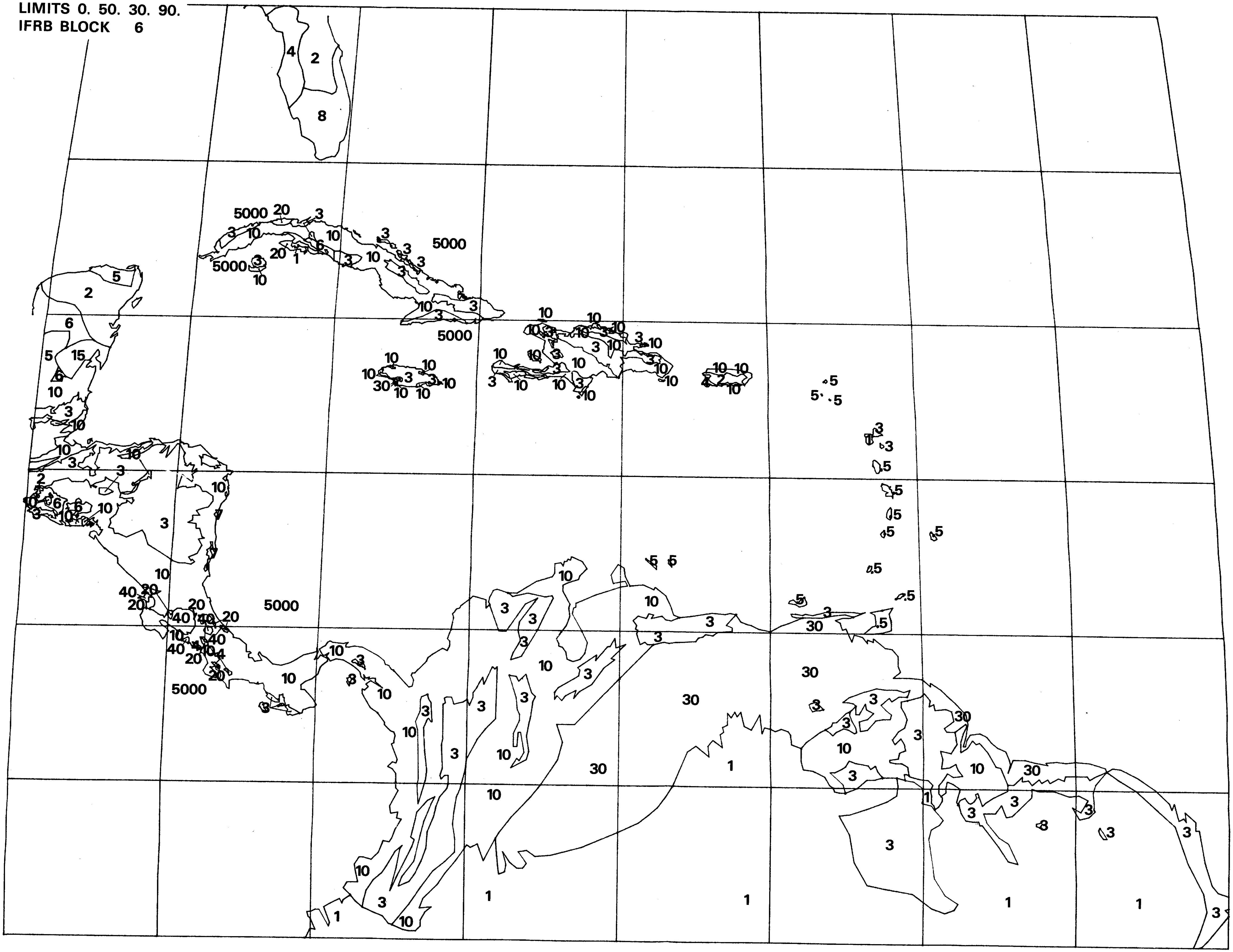

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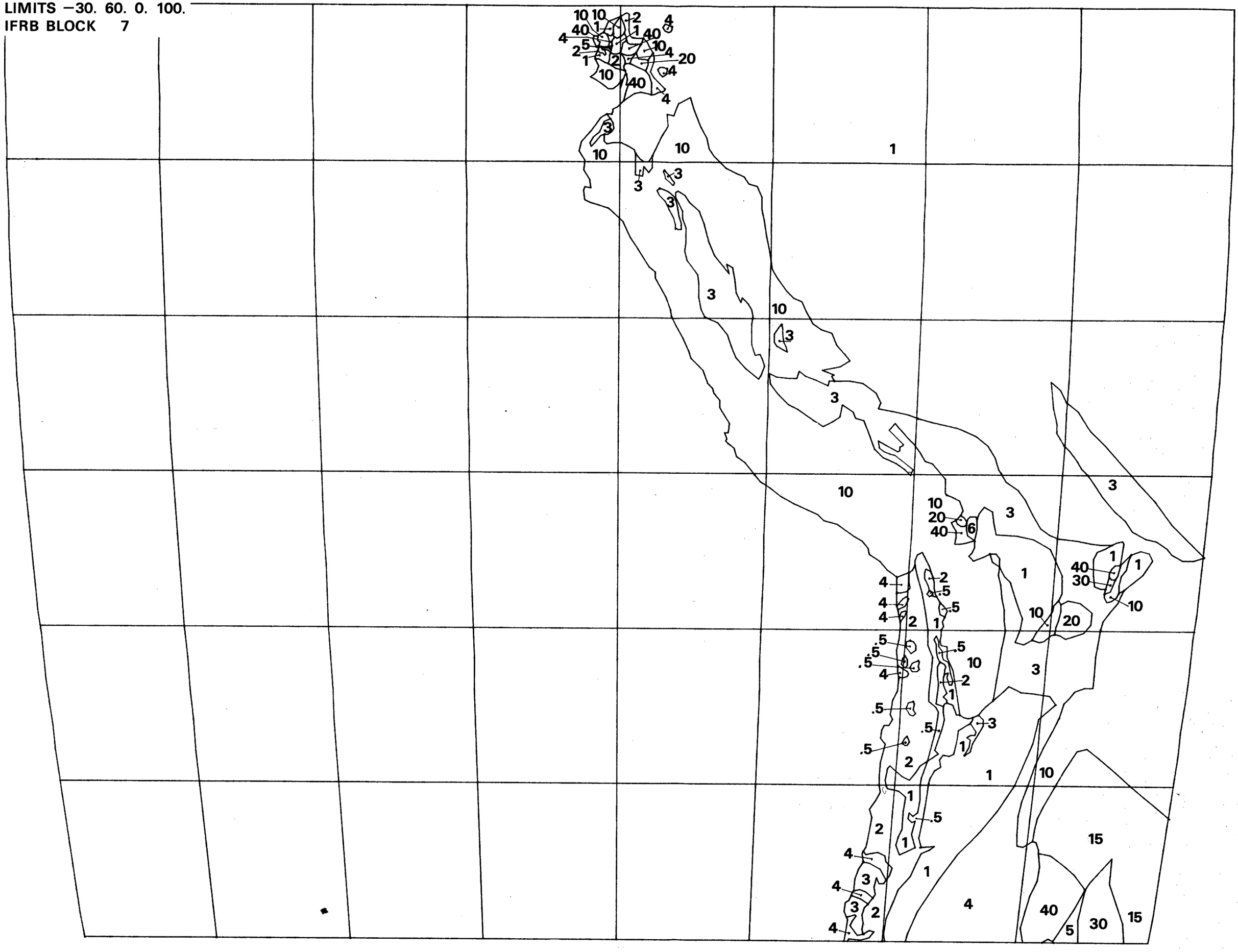

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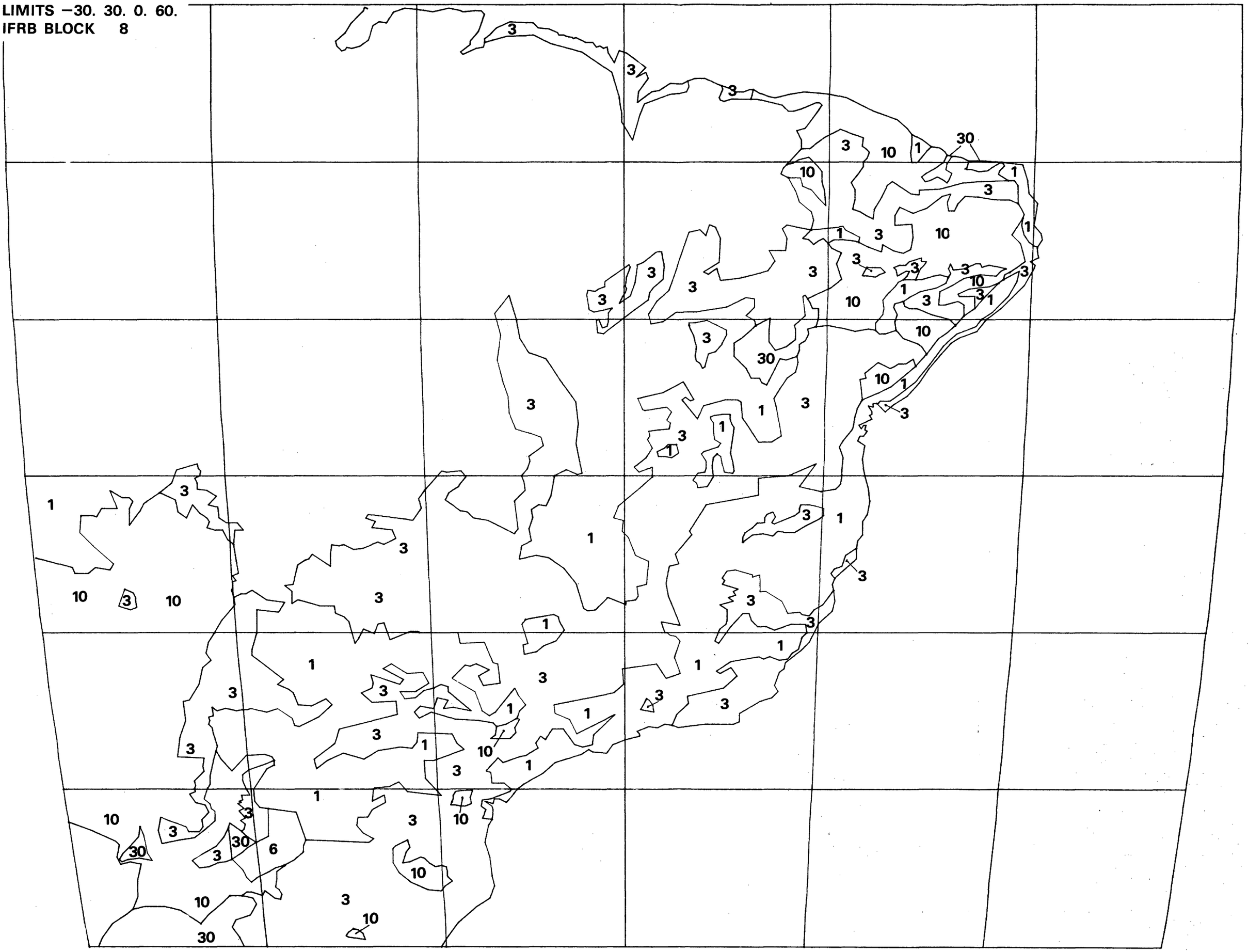

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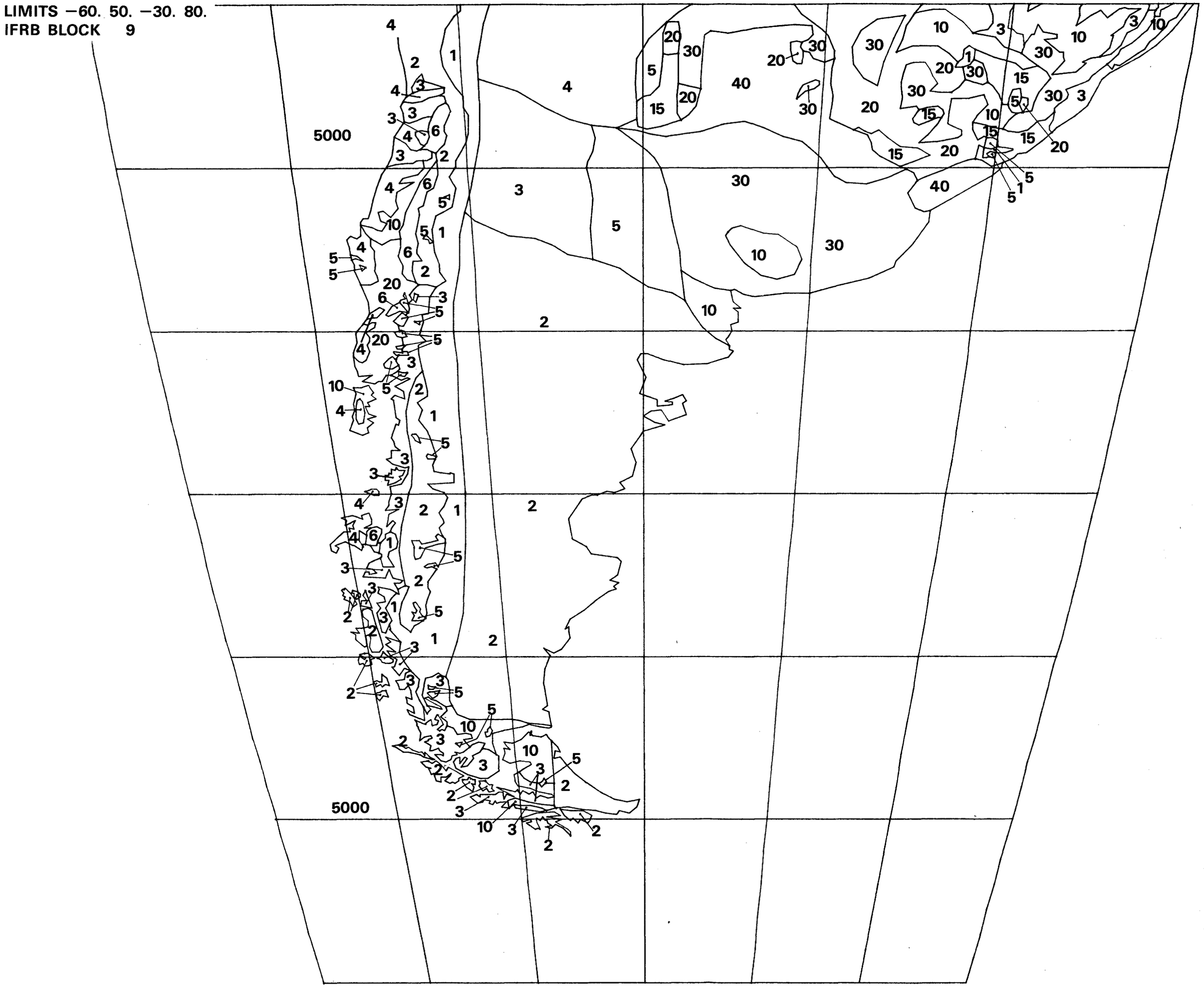
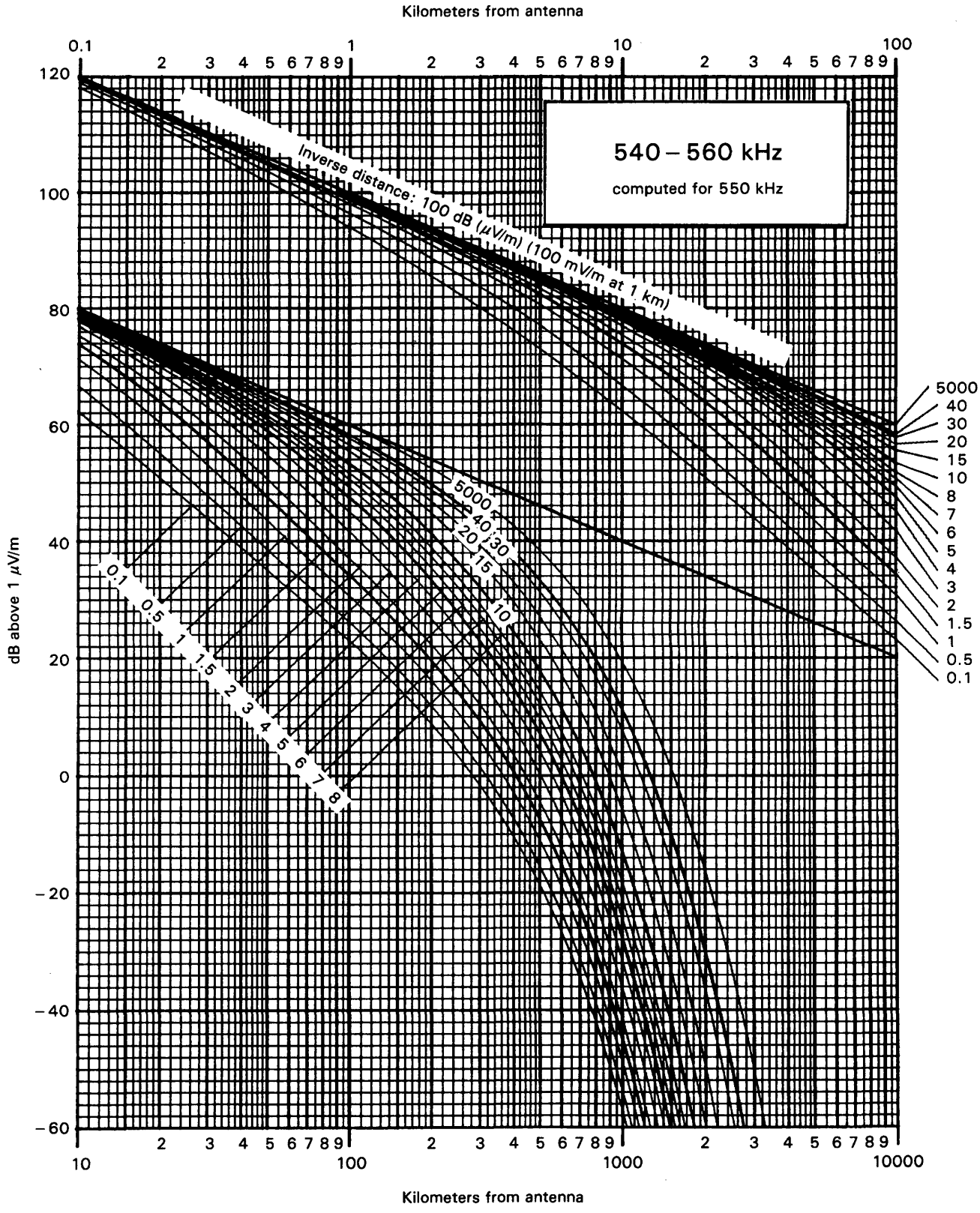


APPENDIX 2

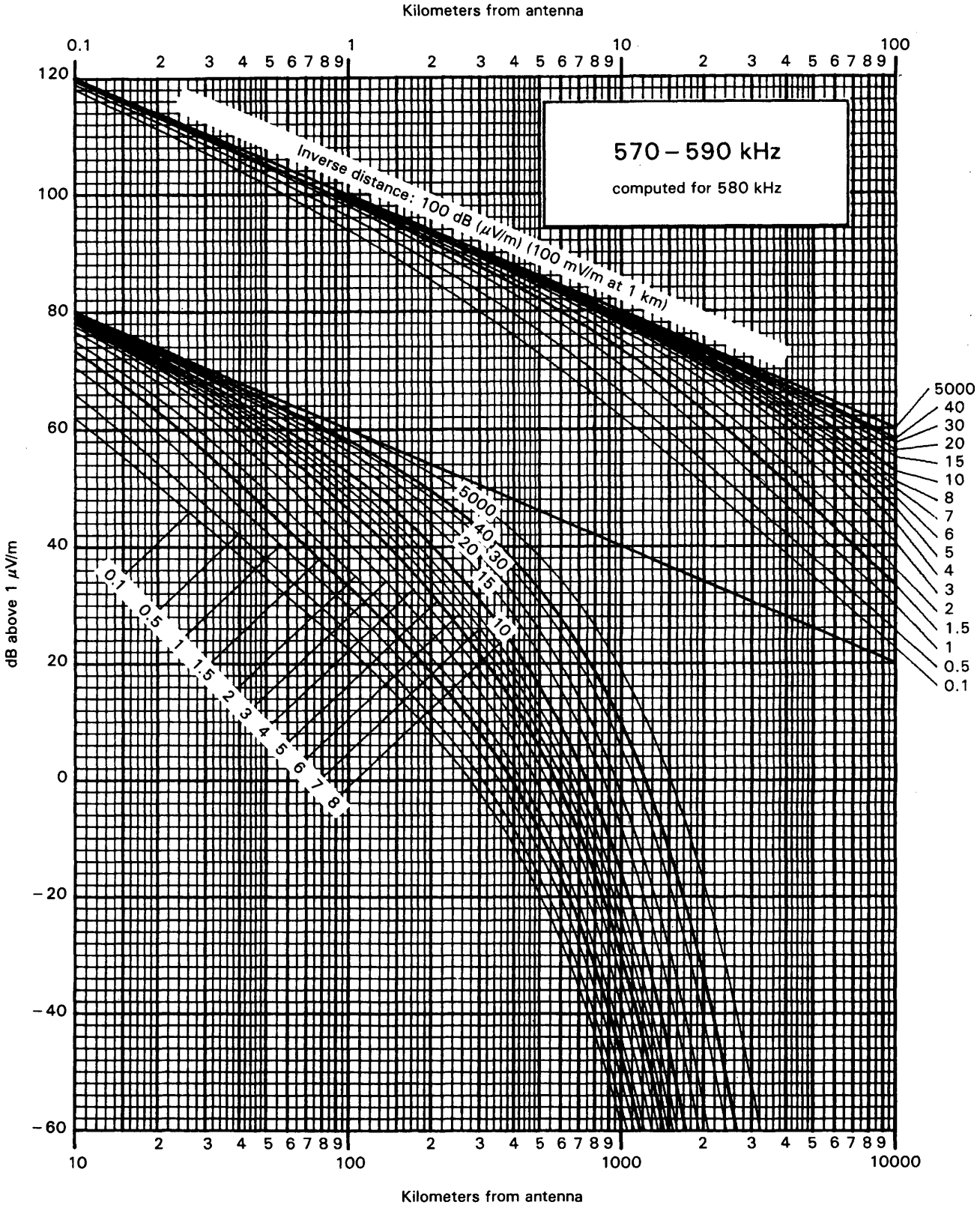
(to Annex 2)

Field-strength curves for groundwave propagation

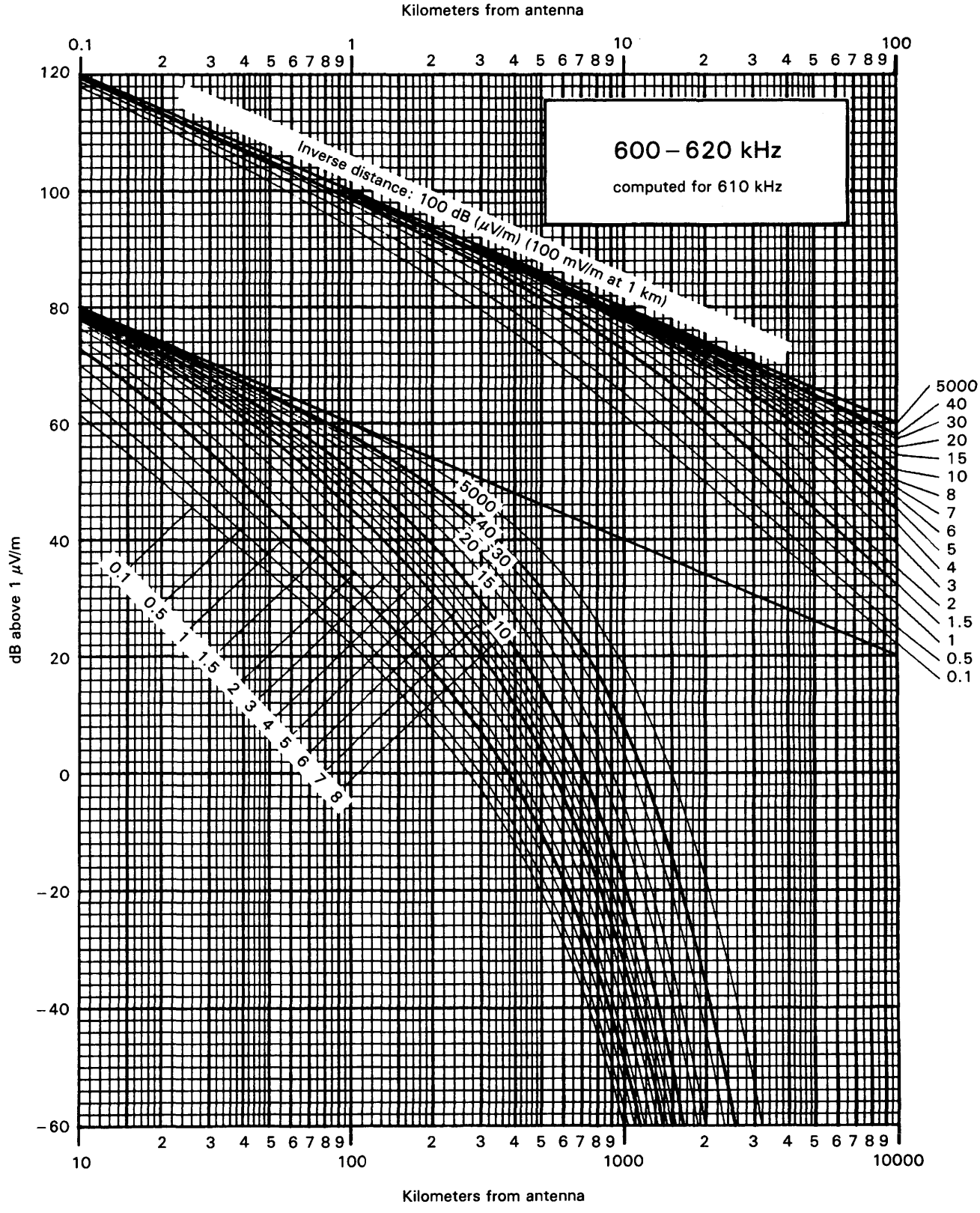
The curves are labelled with the ground conductivities in millisiemens/metre. All curves, except the 5000 mS/m (sea water) curve, are derived for a relative dielectric constant of 15. The sea water curve is derived for a dielectric constant of 80.



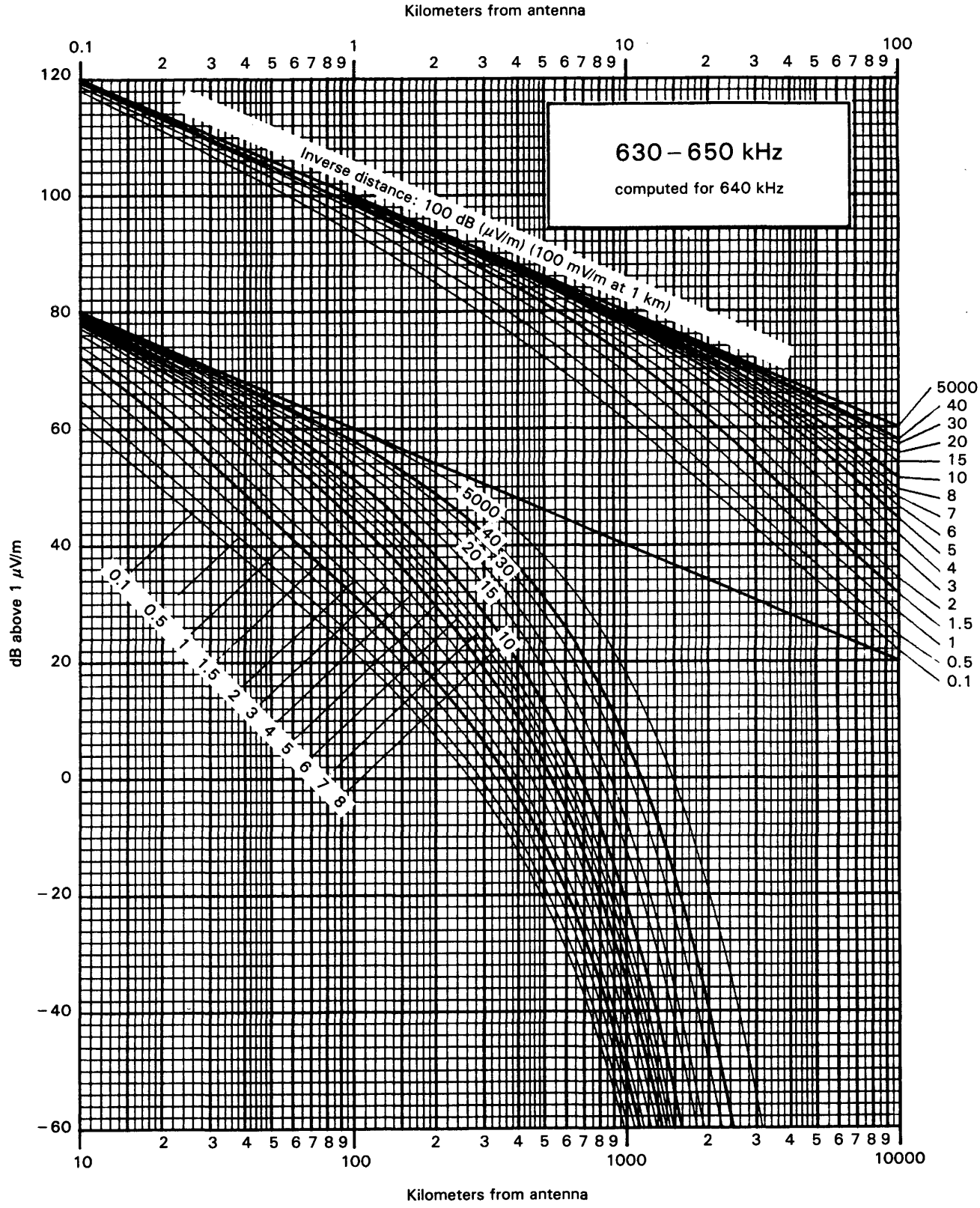
GRAPH 1 – *Ground wave field strength versus distance*



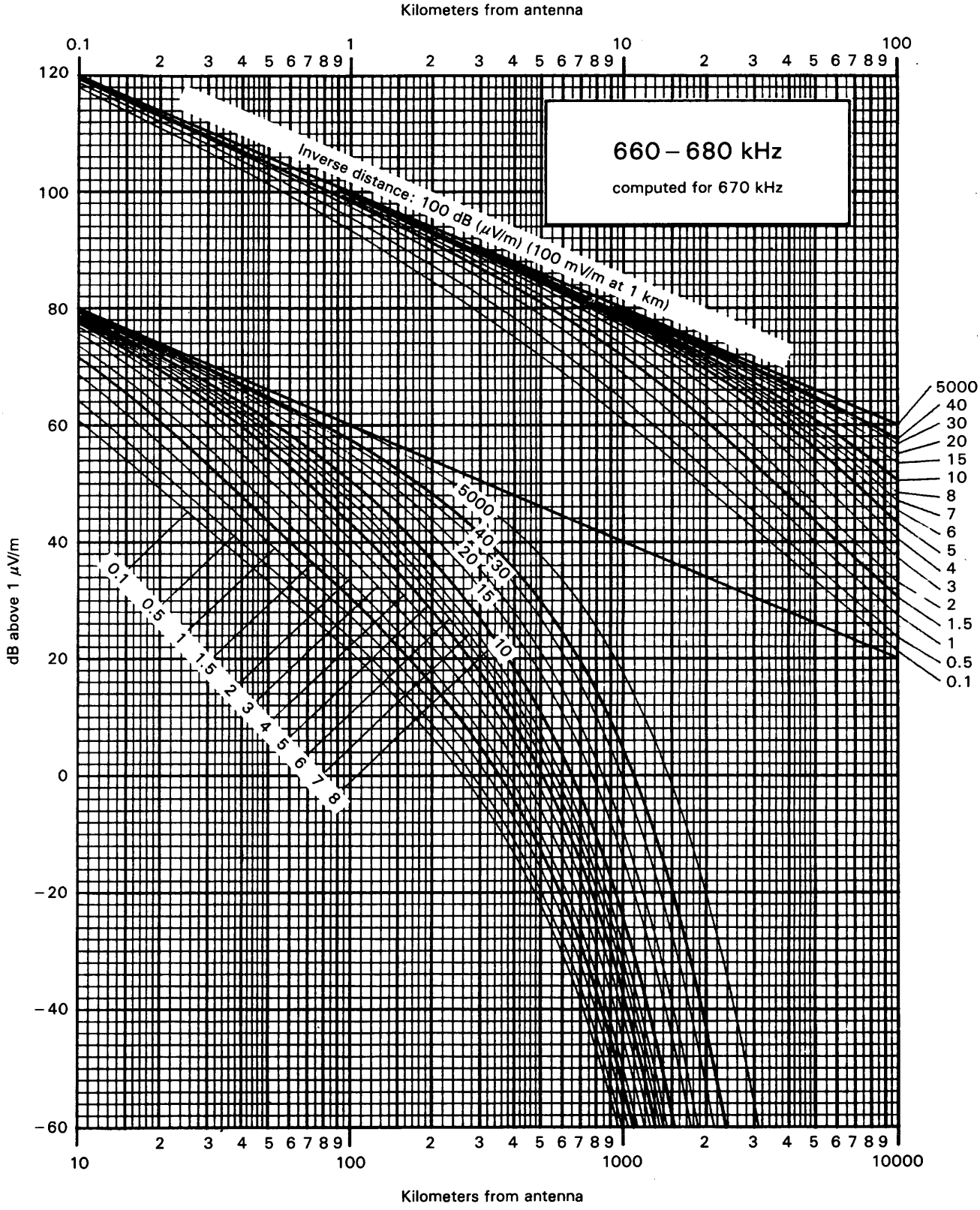
GRAPH 2 – *Ground wave field strength versus distance*



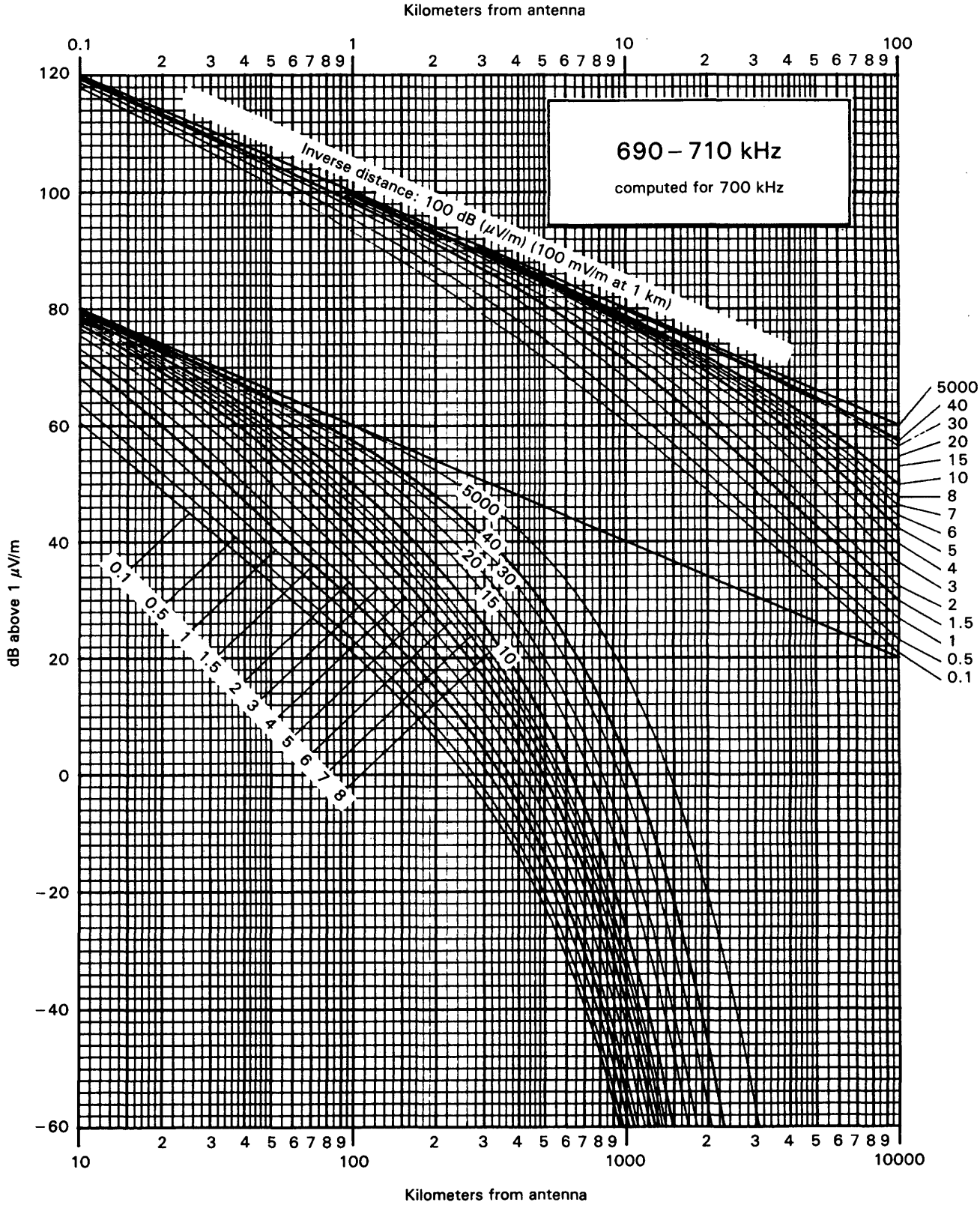
GRAPH 3 – *Ground wave field strength versus distance*



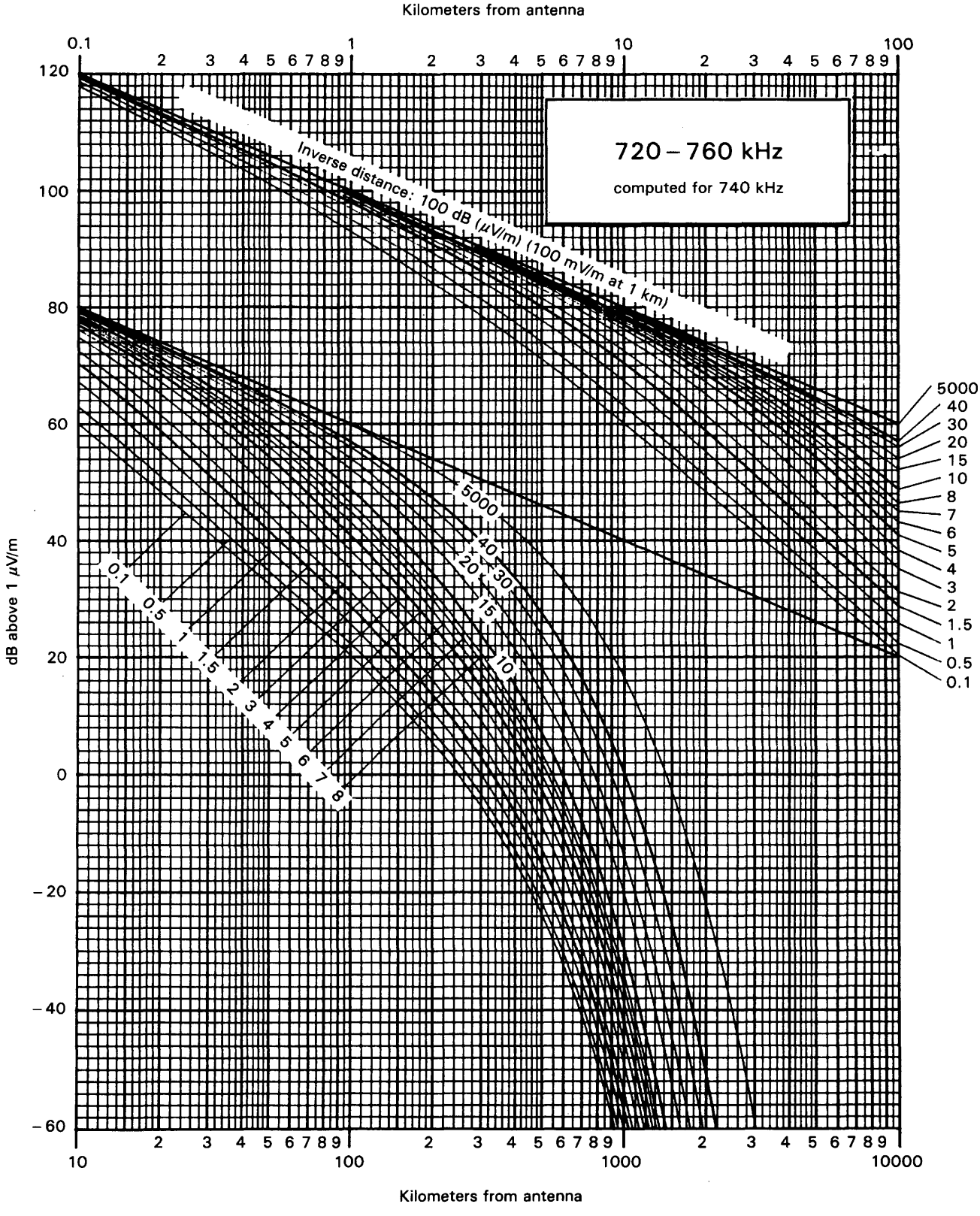
GRAPH 4 – *Ground wave field strength versus distance*



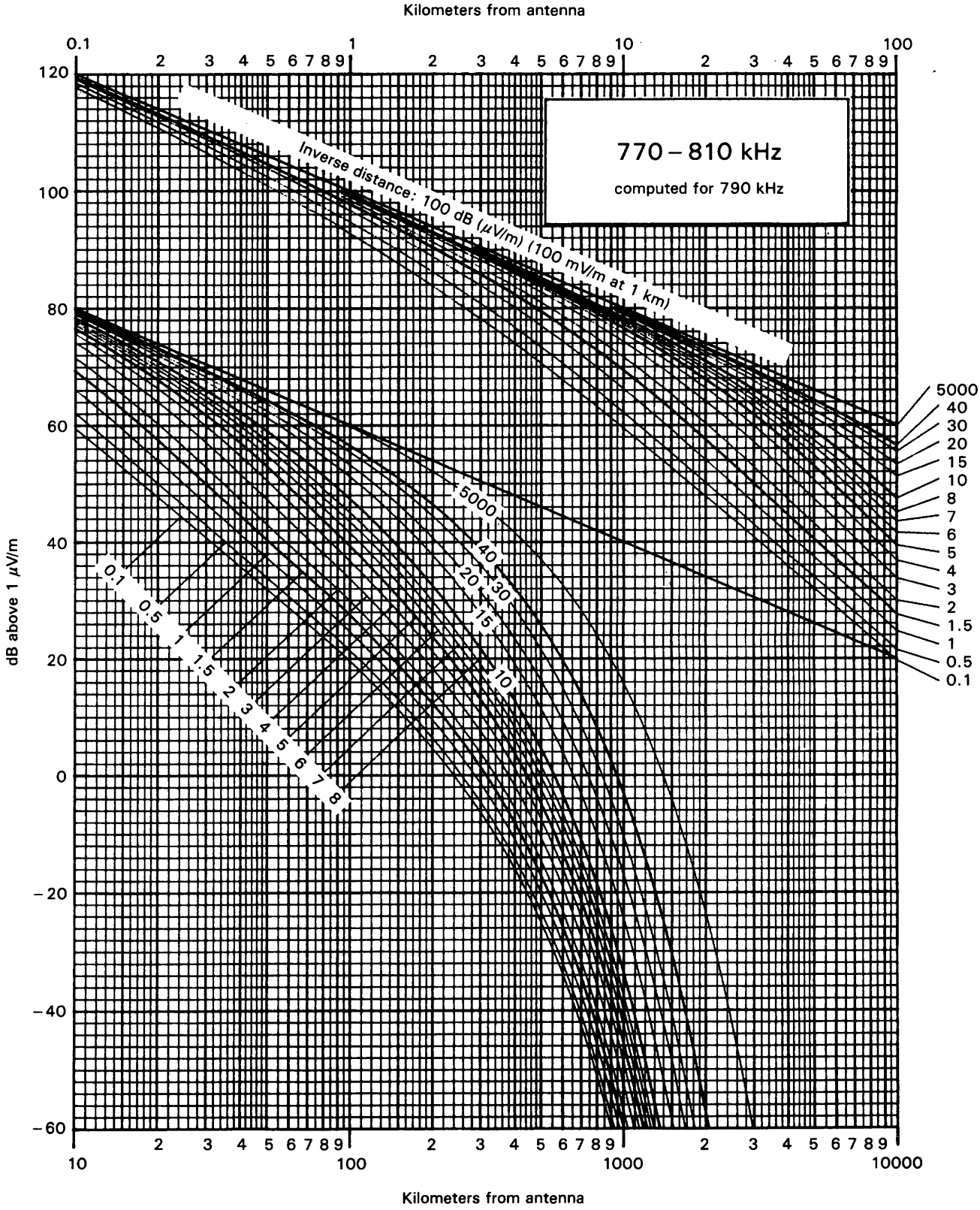
GRAPH 5 – *Ground wave field strength versus distance*



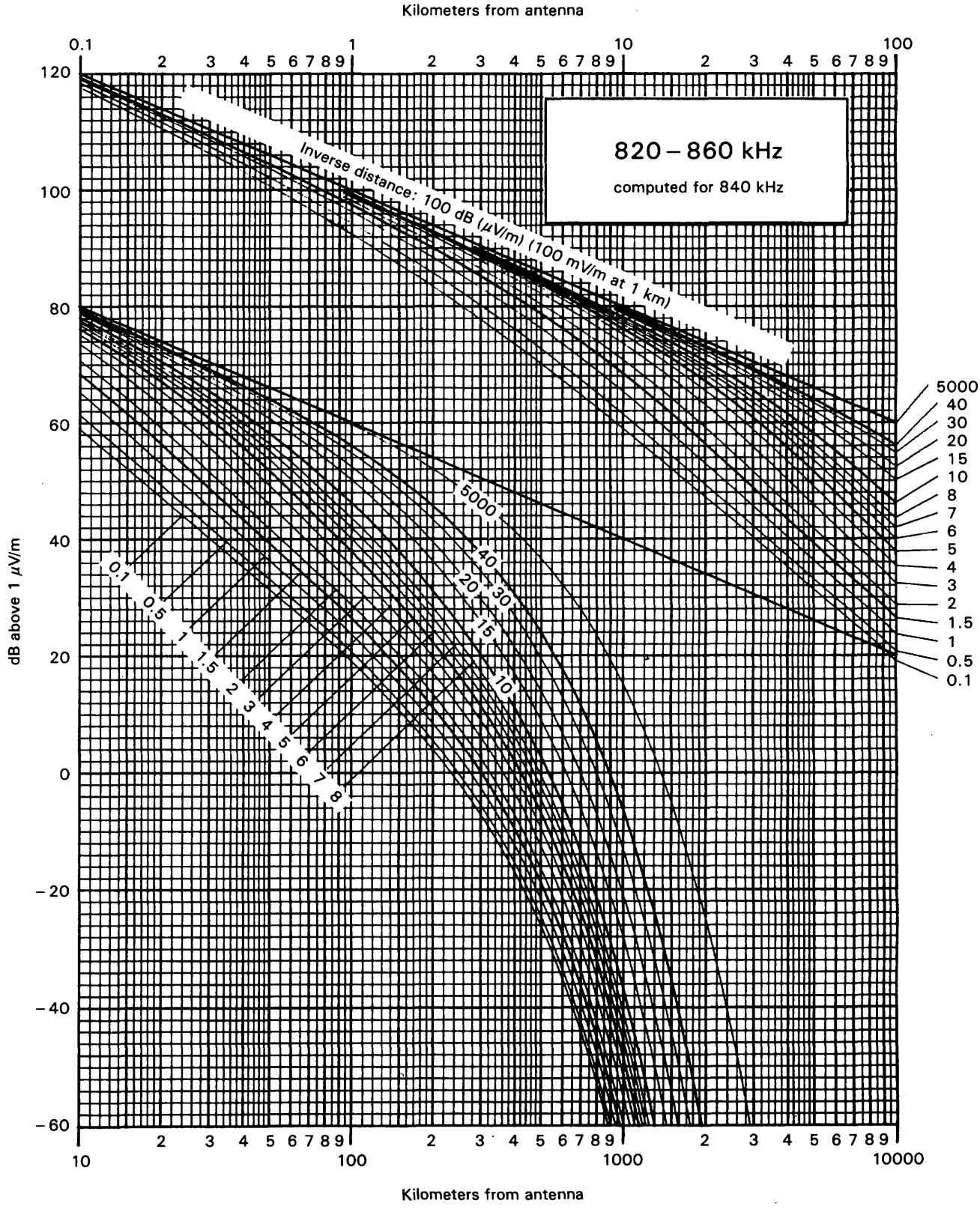
GRAPH 6 – *Ground wave field strength versus distance*



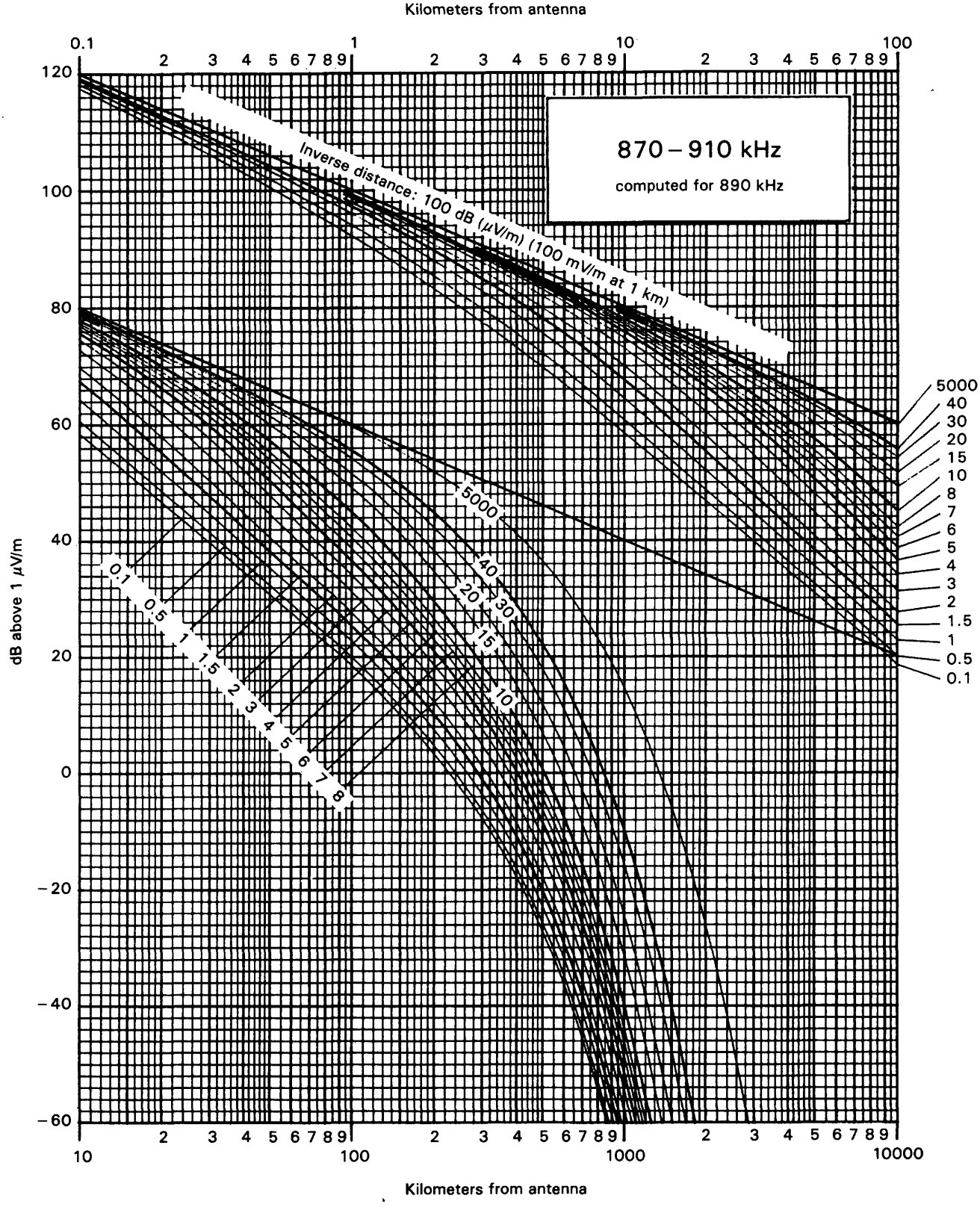
GRAPH 7 – *Ground wave field strength versus distance*



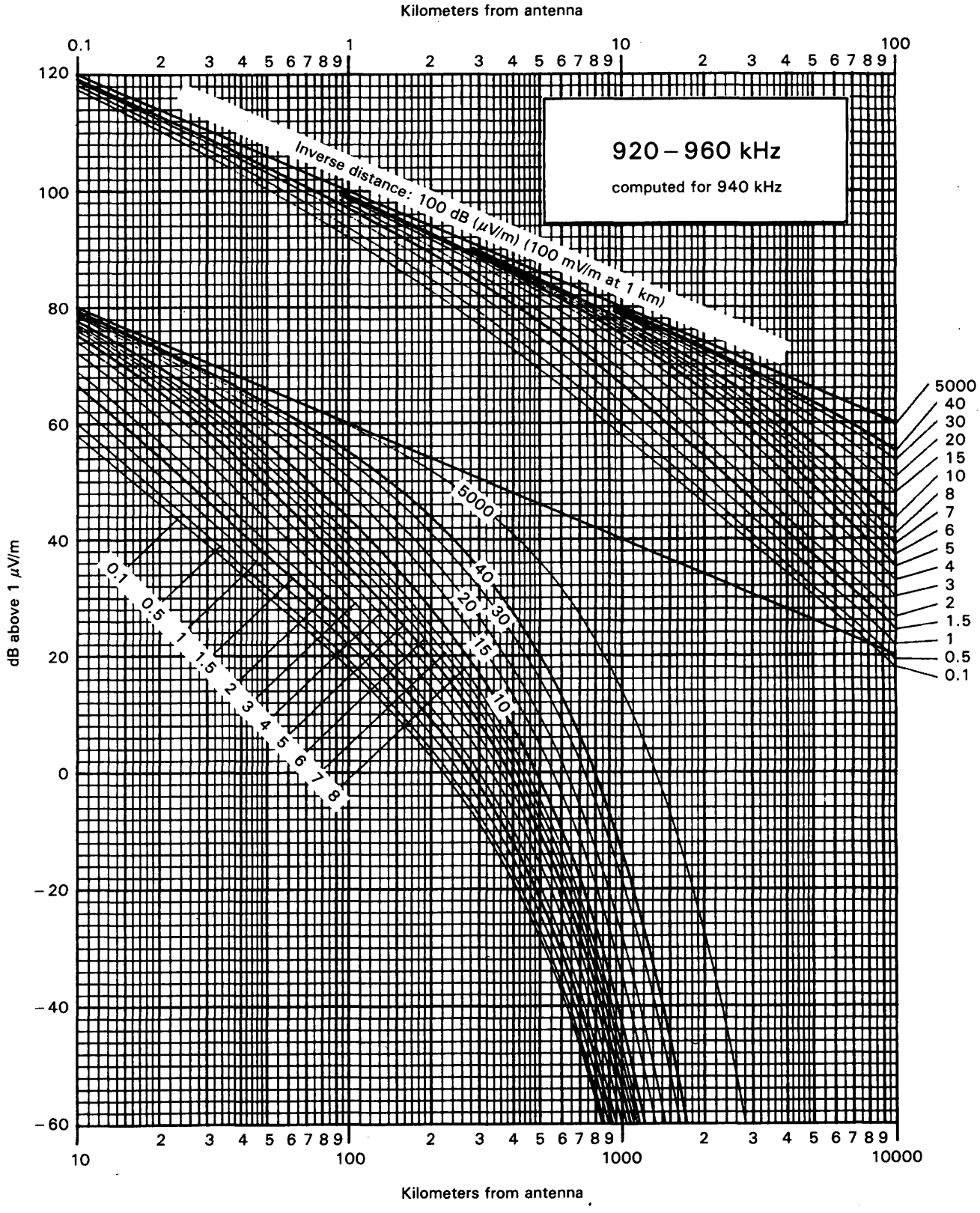
GRAPH 8 – *Ground wave field strength versus distance*



GRAPH 9 – *Ground wave field strength versus distance*



GRAPH 10 – *Ground wave field strength versus distance*



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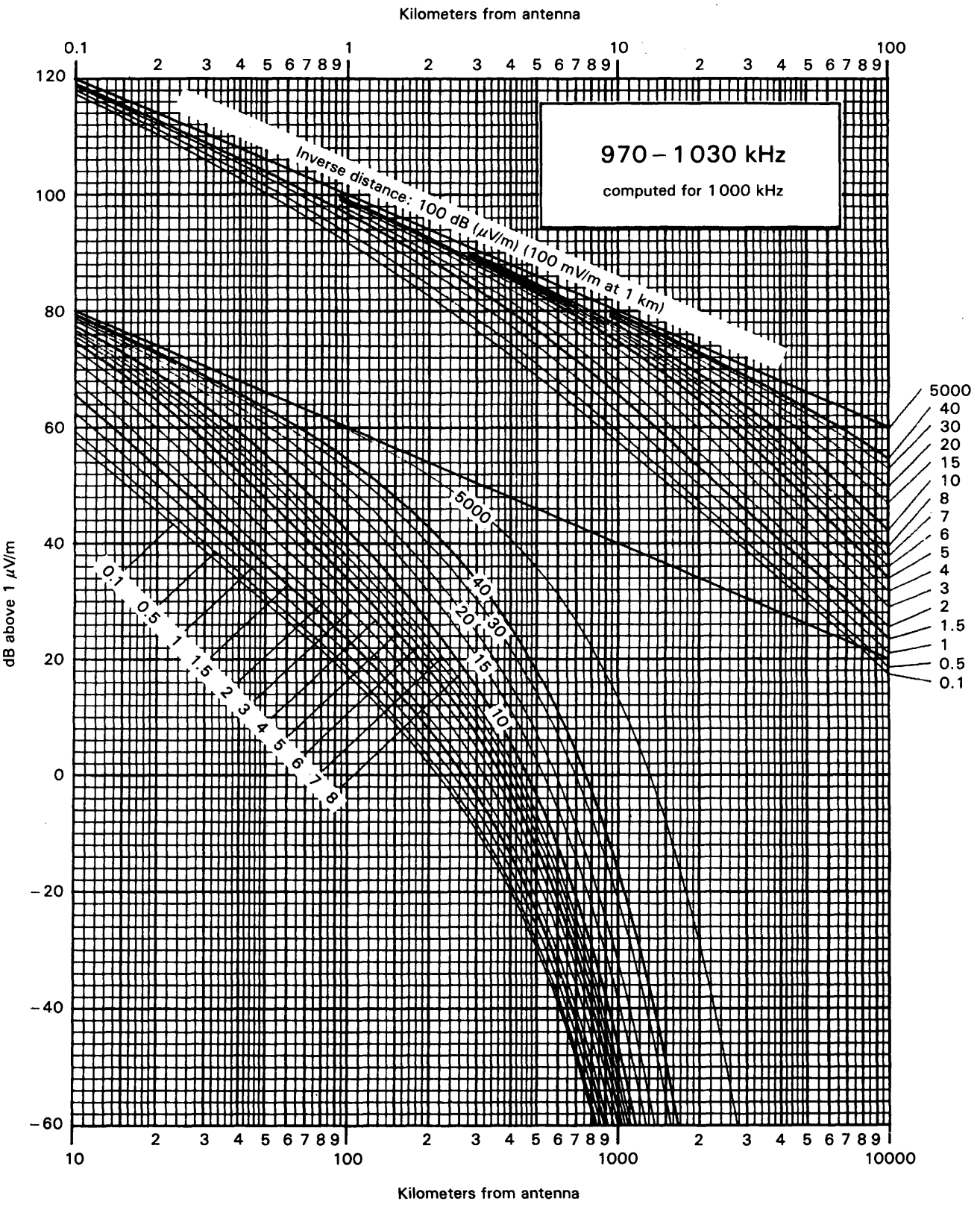
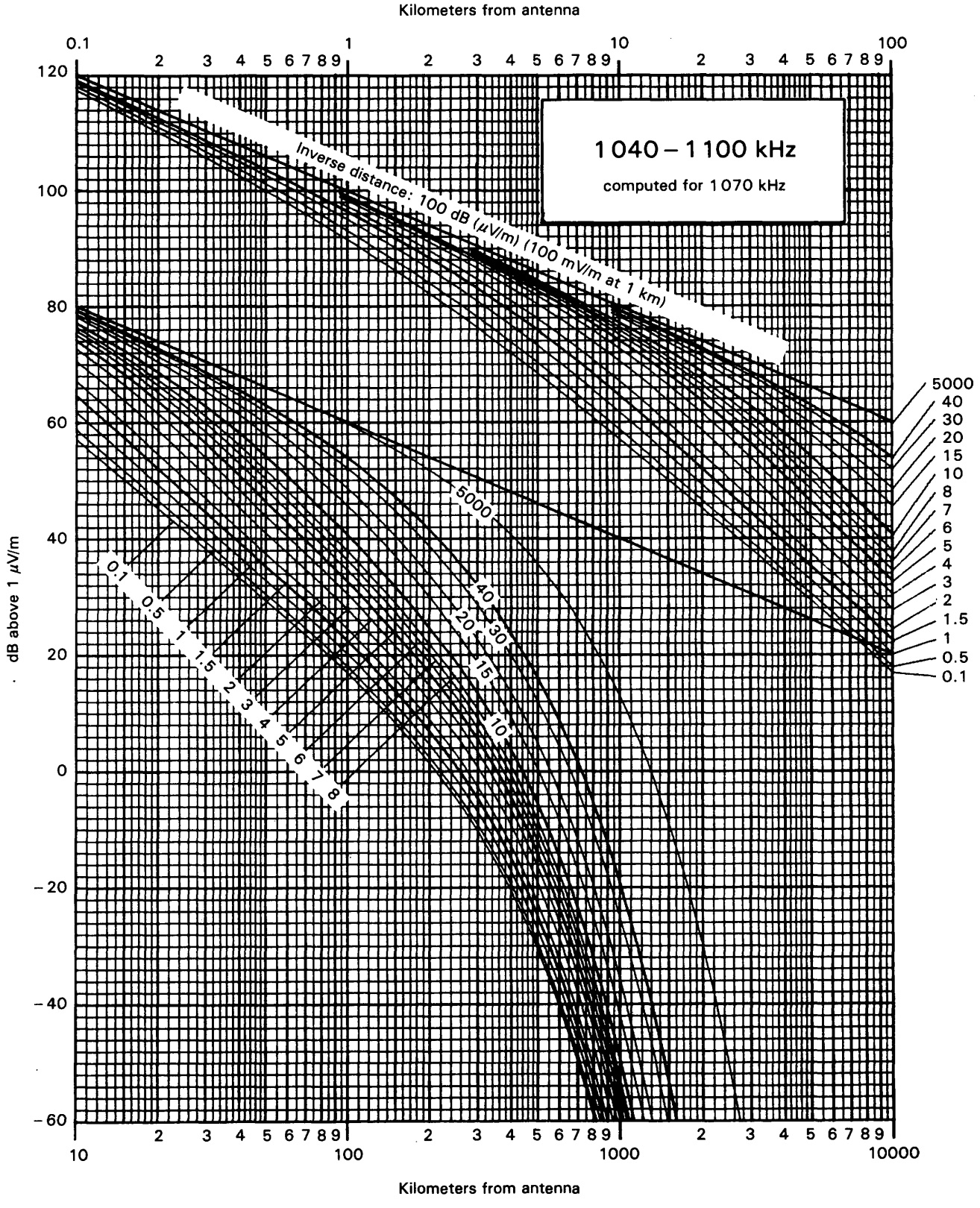
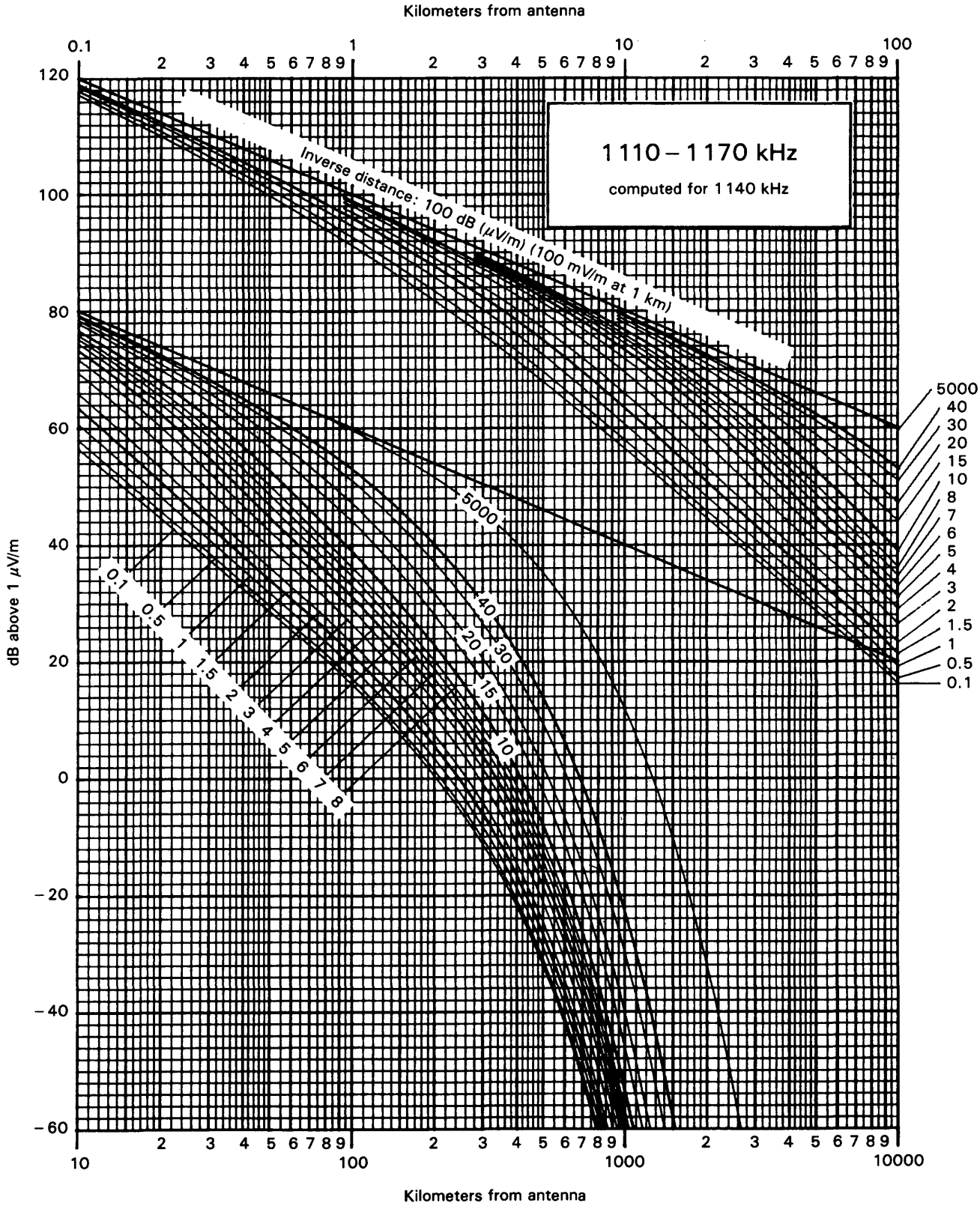


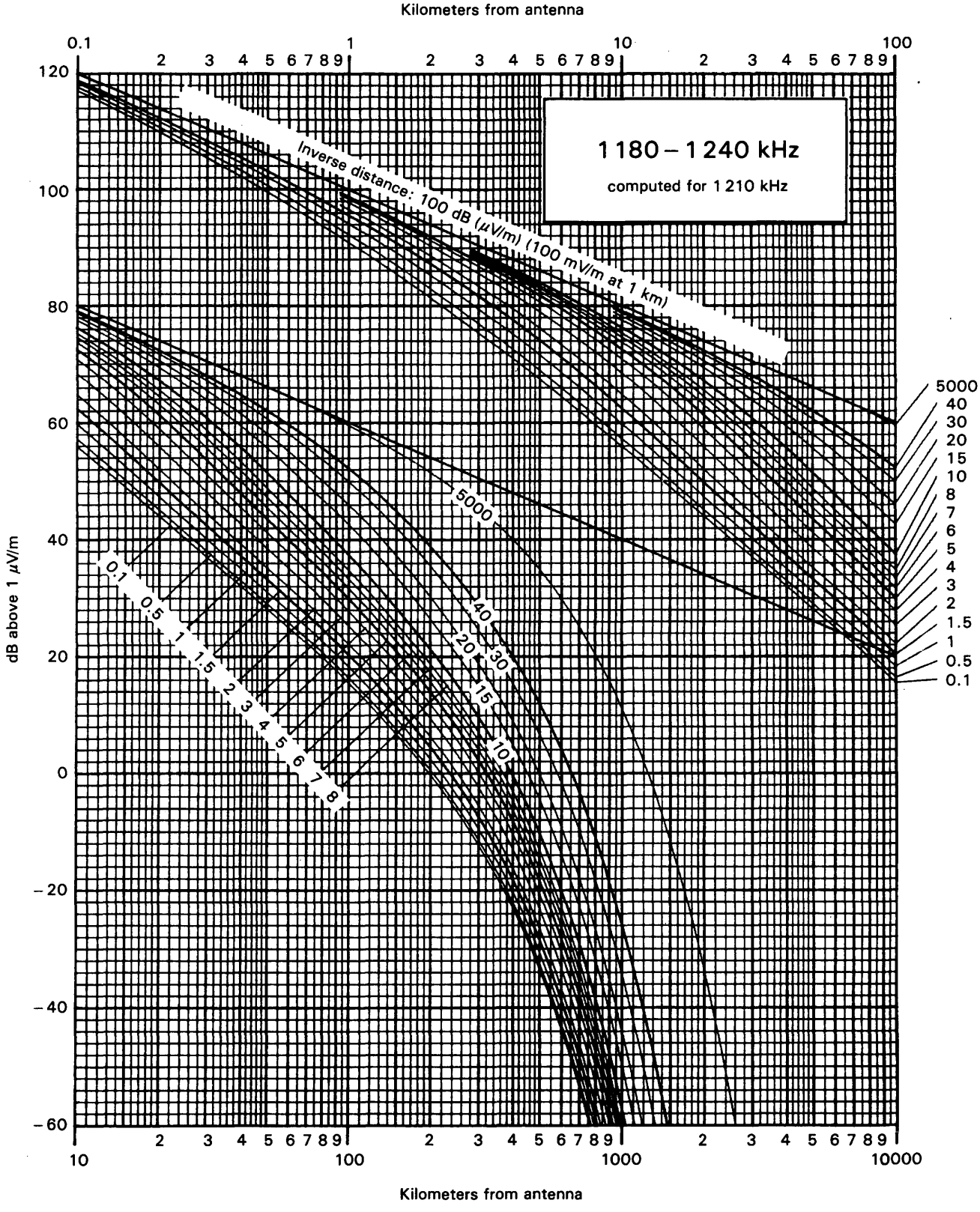
GRAPH 12 – *Ground wave field strength versus distance*



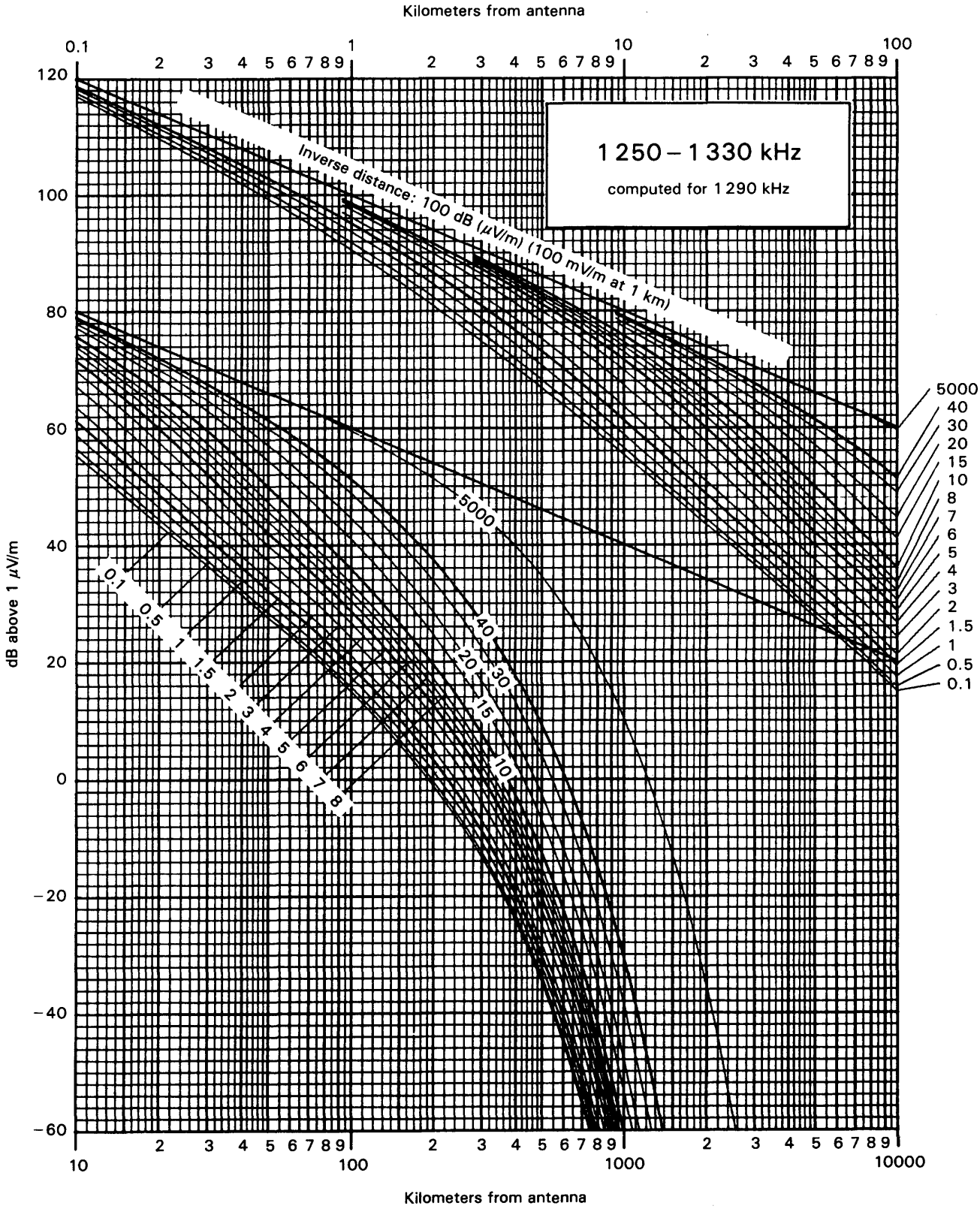
GRAPH 13 – *Ground wave field strength versus distance*



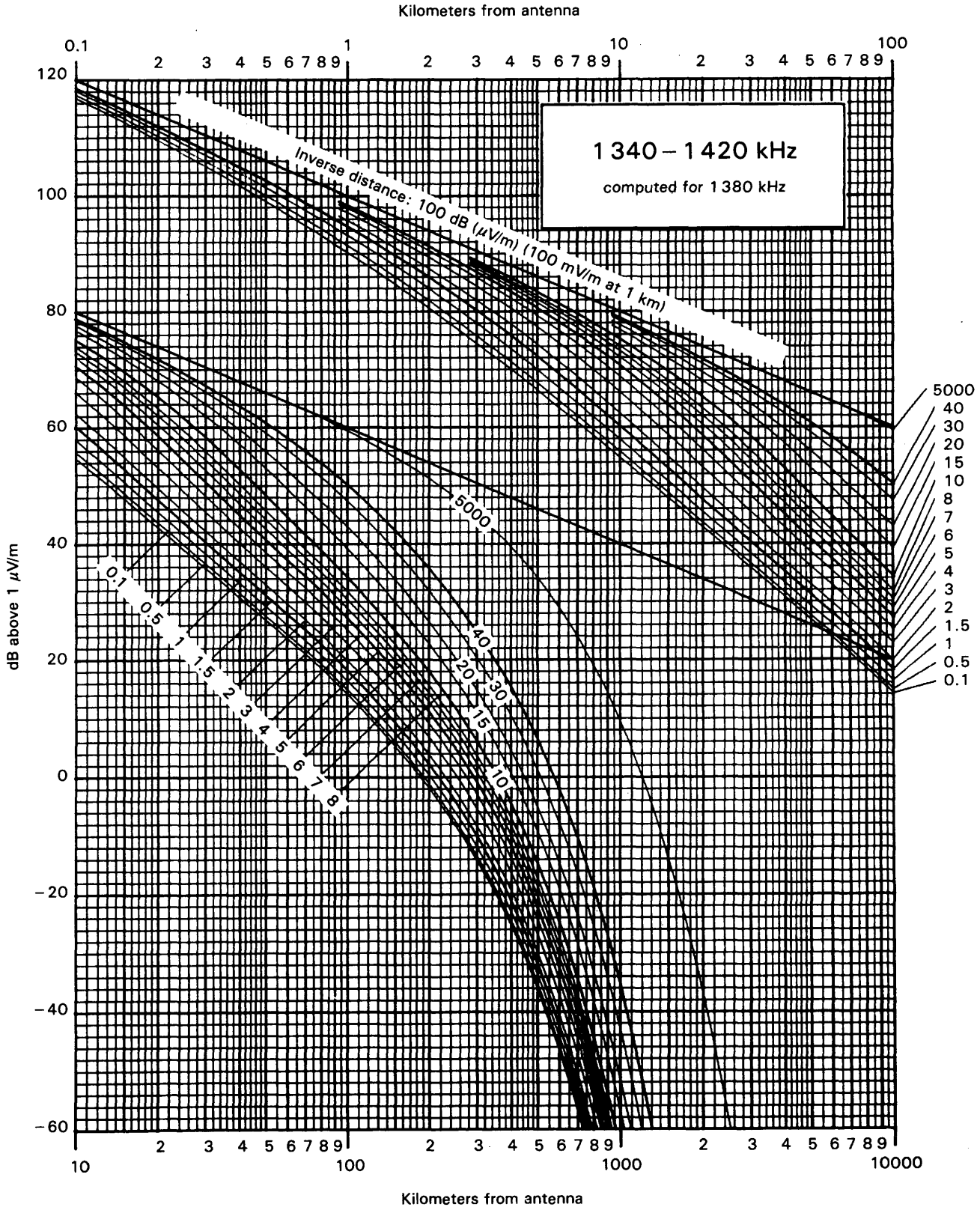
GRAPH 14 – *Ground wave field strength versus distance*



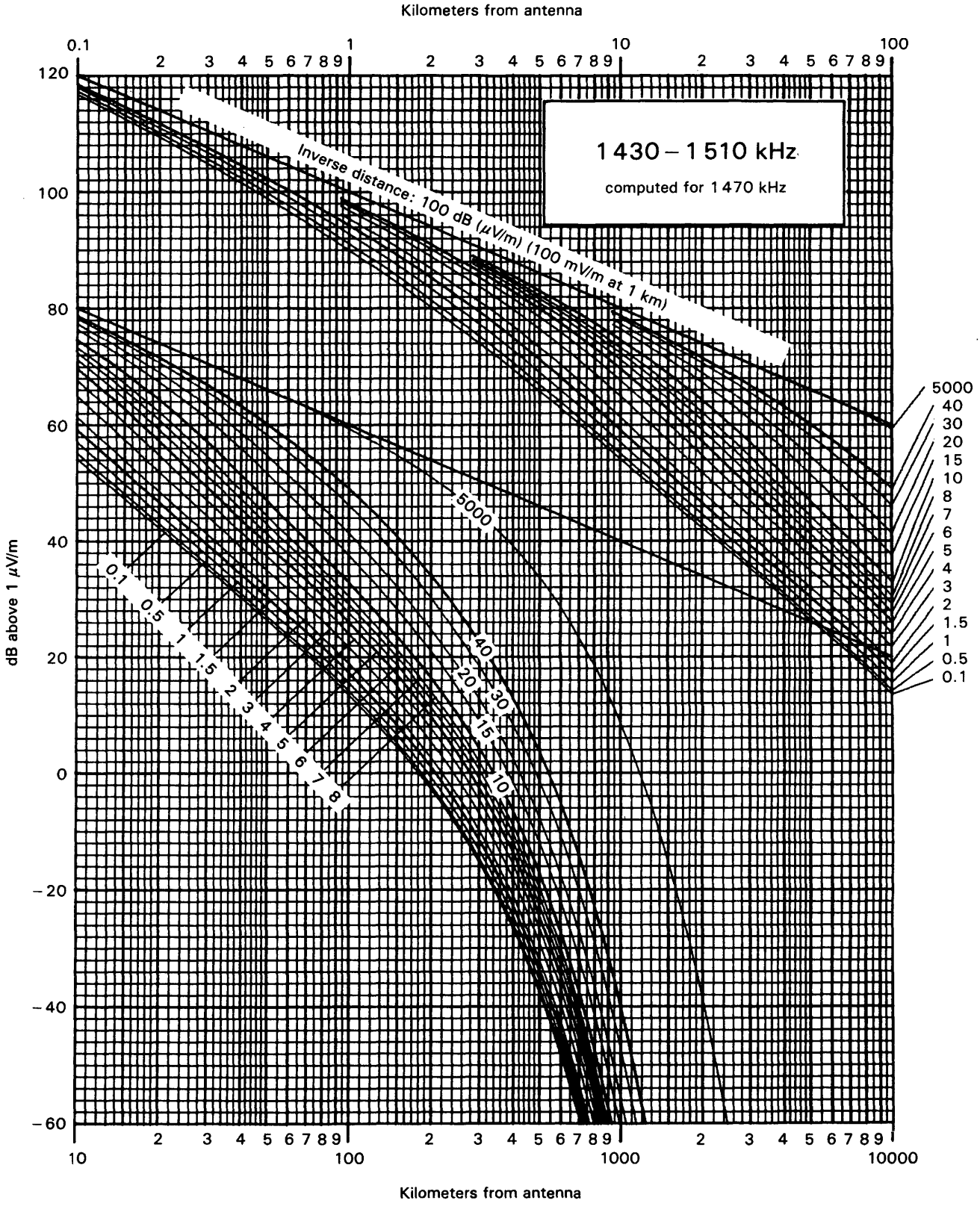
GRAPH 15 – *Ground wave field strength versus distance*



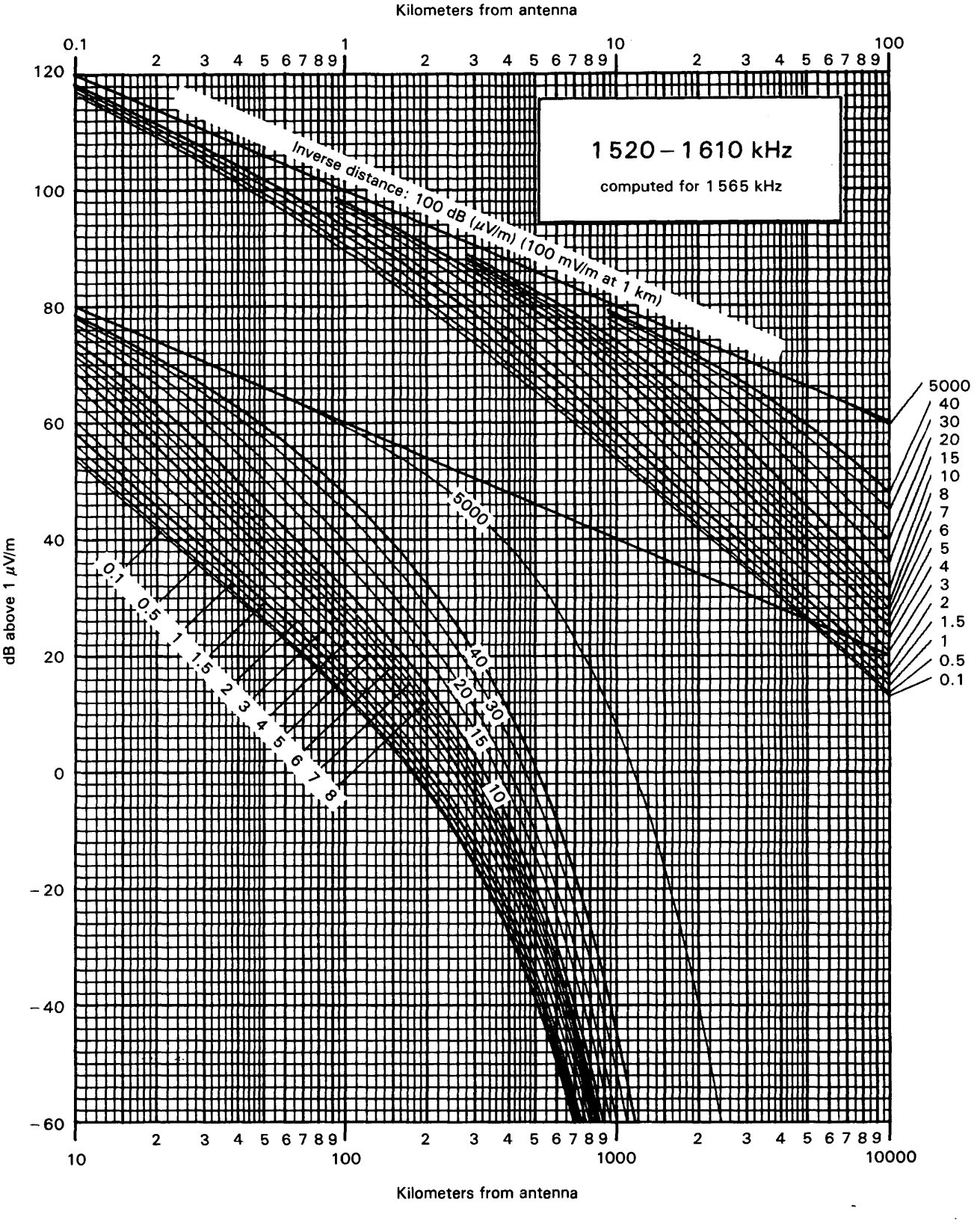
GRAPH 16 – *Ground wave field strength versus distance*



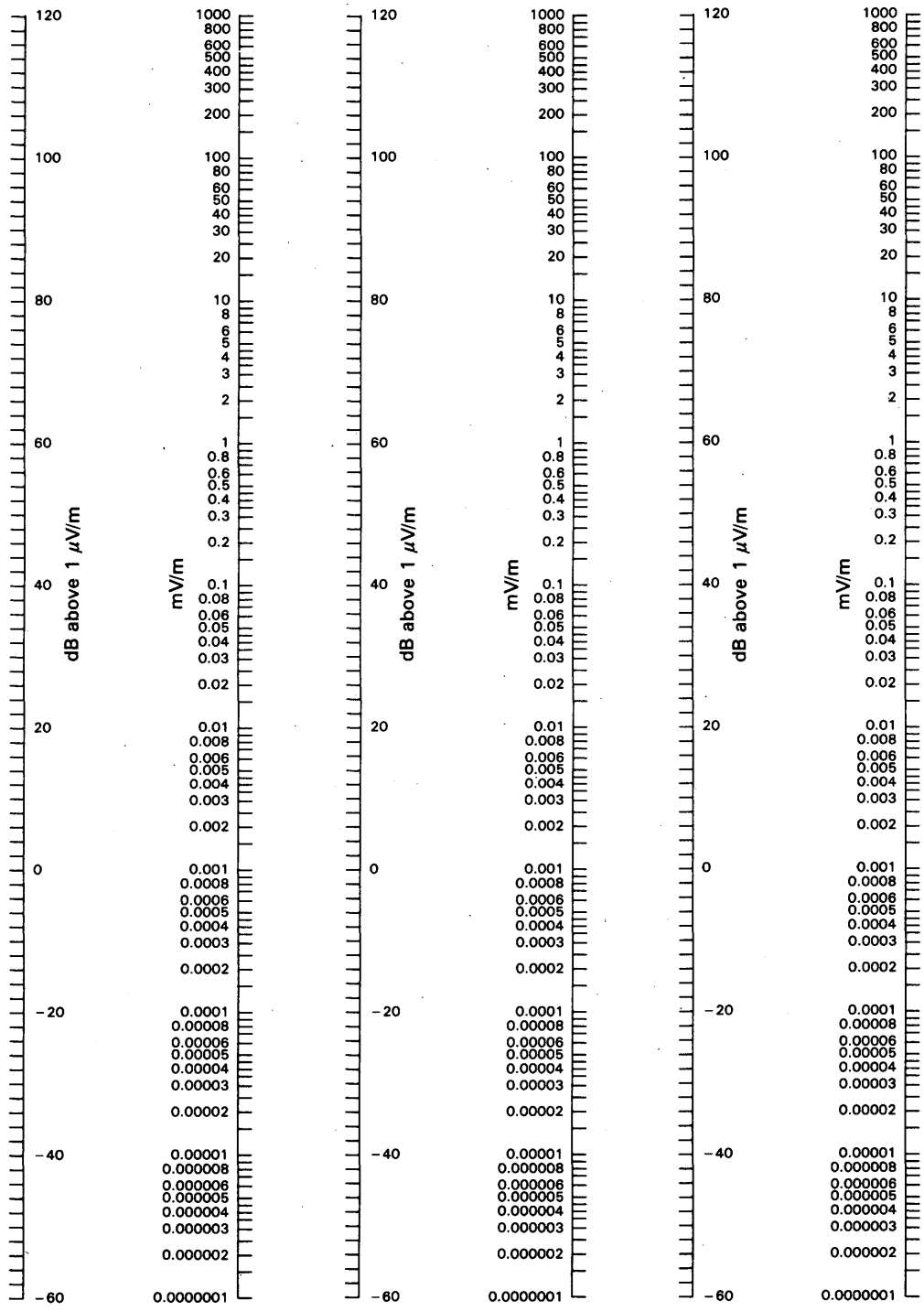
GRAPH 17 – *Ground wave field strength versus distance*



GRAPH 18 – *Ground wave field strength versus distance*



GRAPH 19 – *Ground wave field strength versus distance*



GRAPH 20 – *Scale for use with ground wave field strength graphs 1-19*

APPENDIX 3
(to Annex 2)

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.

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

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 one kilometre in mV/m for the given azimuth and elevation;

K_L : multiplying constant in mV/m which determines the pattern size (see paragraph 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:

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

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 antenna 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 antenna, in metres;

θ: vertical elevation angle, in degrees.

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

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

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

hence:

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

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 ith element;

K: no-loss multiplying constant computed as shown in paragraph 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 the array 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 ith tower [1];

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

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 paragraph 2.1 above;

P: array input power (kW);

P_L: total power loss (kW).

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

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.

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

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 paragraph 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]:

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

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.

APPENDIX 4

(to Annex 2)

Equations for the calculation of the normalized vertical radiation from top-loaded and typical sectionalized antennas

Basically, the 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, the values of which are given in columns 6, 7, 8 and 9 respectively, of Part II-C of Annex 1.

[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.

1. *Top-loaded antenna* (when column 12 of Part II-A of Annex 1 is 1)

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

where:

A : electrical height of the antenna tower;

B : difference between the apparent electrical height (based on current distribution) and the actual 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* (when column 12 of Part II-A of Annex 1 is 2)

$$\int\theta = \frac{\begin{array}{l}[\cos B \cos (A \sin \theta) - \cos (A + B)] \sin (C + D - A) + \sin B[\cos D \cos (C \sin \theta) - \sin \theta) \\ - \sin \theta \sin D \sin (C \sin \theta) - \cos (C + D - A) \cos (A \sin \theta)]\end{array}}{\cos \theta([\cos B - \cos (A + B)] \sin (C + D - A) + \sin B[\cos D - \cos (C + D - A)])}$$

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 height of the lower section (A);

C : actual total height of the antenna;

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

θ : vertical angle 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.

APPENDIX 5

(to Annex 2)

Additional technical information

This Appendix contains additional technical material and examples of methods of calculation which may be of assistance to administrations in performing their calculations to establish their plans.

1. *Examples of field strength calculations for homogeneous paths* (see paragraph 2.3.1 of this Annex)

a) Determination of the electrical field strength at a given distance from a station

Consider a station with a power of a 5 kW at 1 240 kHz. The antenna has a characteristic field strength for 1 kW of 306 mV/m.

The field strength at a distance of 40 km is to be determined for a conductivity of 4 mS/m throughout the path.

From graph 15 (1 180 - 1 240 kHz) we obtain a field strength of 45.5 dB(μV/m) which corresponds to 188 μV/m from the curve corresponding to 4 mS/m.

Therefore:

$$E = E_0 \frac{E_c}{100}\sqrt{P} = \frac{188 \times 306}{100}\sqrt{5} = 1286\ \mu V/m \text{ or } 62.2\ dB(\mu V/m)$$

b) Determination of the distance at which a given field strength is obtained

On the basis of the data from the preceding example, at what distance can a field strength of 500 μV/m or 54 dB(μV/m) be obtained?

Since the antenna involved has a characteristic field strength of 306 m/Vm and the station power is 5 kW, i.e. conditions different from those of graphs 1 to 19 (100 mV/m at 1 km), the field strength value must be determined before referring to the corresponding figure.

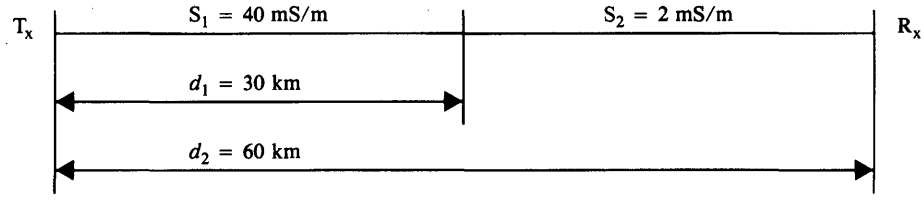
The calculated value is:

$$E_0 = \frac{100E}{E_c\sqrt{P}} = \frac{100 \times 500}{306 \times \sqrt{5}} = 73.1\ \mu V/m \text{ or } 37.3\ dB(\mu V/m)$$

Taking the corresponding curve at 4 mS/m in graph 15, we arrive at 37.3 dB(μV/m) at 62 km.

2. *Example of a field strength calculation for non-homogeneous paths* (see paragraph 2.3.2 of this Annex)

Consider the following path:



a) For a 25 kW station at 1 000 kHz and an antenna with a characteristic field strength of 100 mV/m, what field strength is obtained at 60 km?

In graph 12 we obtain on the 40 mS/m curve a field strength of 69 dB(μV/m) or 2.8 mV/m at the point of discontinuity (30 km).

We obtain the same field strength at 9.5 km (d = 9.5 km) on the 2 mS/m curve.

The equivalent distance for d_2 = 60 km, is

$$d + (d_2 - d_1) = 9.5 + (60 - 30) = 39.5 \text{ km.}$$

From the 2 mS/m curve, we obtain a field of 43 dB(μV/m) for 1 kW or 141 μV/m at 39.5 km.

Lastly, we calculate the field strength:

$$E = E_0 \times \frac{E_c}{100}\sqrt{P} = 141 \times \frac{100}{100} \times \sqrt{25} = 705 \qquad \mu V/m$$

b) Taking the preceding example, at what distance will the 500 μV/m contour be?

First we determine the field strength:

$$E_0 = \frac{100E}{E_c\sqrt{P}} = \frac{100}{100\sqrt{25}} \times 500 = 100 \qquad \mu V/m$$

Following the 40 mS/m curve of graph 12, we note that at 30 km the field strength is 69 dB(μV/m) or 2.8 mV/m. This value is higher than the one we seek (0.1 mV/m) and therefore we shall have a distance greater than 30 km.

The equivalent distance for a 2 mS/m conductivity is 9.5 km.

Following the 2 mS/m curve, we find the 100 μV/m or 40 dB(μV/m) contour at 46 km giving us the equivalent distance. The true distance is 46 + (30 − 9.5) km = 66.5 km.

3. *Path parameters*

If a_T and b_T respectively are the latitude and longitude of the transmitting terminal, and a_R and b_R are those of the receiving terminal, the parameters of the short great-circle path may be calculated. The North and East coordinates are considered positive and the South and West coordinates negative.

3.1 Great-circle path distance

$$d = 111.18 \times d^\circ \qquad \text{km}$$

where:

$$d^\circ = \arccos\left[\sin a_T \sin a_R + \cos a_T \cos a_R \cos (b_R - b_T)\right]$$

3.2 Azimuth of the path from either terminal.

For the transmitting terminal, for example,

$$\alpha_T = \arccos \frac{\sin a_R - \cos d^\circ \sin a_T}{\sin d^\circ \cos a_T}$$

determined such that $0^\circ \leqslant \alpha < 180^\circ$. The geographical bearing in degrees East or North to the receiving terminal is α_T if $\sin (b_R - b_T) \geqslant 0$ or is $(360^\circ - \alpha_T)$ if $\sin (b_R - b_T) < 0$. The same equation, with the latitudes reversed, is used for the receiving terminal.

3.3 Coordinates of a point on a given great-circle path at a distance d from a transmitter:

$$a = \arcsin [\sin a_T \cos d^\circ + \cos a_T \sin d^\circ \cos \alpha_T]$$

$$b = b_T + k$$

where:

$$d^\circ = \frac{d}{111.18} \qquad \text{km}$$

$$k = \arccos \frac{(\cos d^\circ - \sin a_T \sin a)}{\cos a_T \cos a}$$

if $\sin (b_R - b_T) \geqslant 0$

$$k = -\arccos \frac{(\cos d^\circ - \sin a_T \sin a)}{\cos a_T \cos a}$$

if $\sin (b_R - b_T) < 0$

Note that the transmitting location was used in these equations for a and b, but alternatively the receiving location may be used.

4. *Example illustrating the application of the 50% exclusion principle* (see paragraph 4.7.2 of this Annex)

Interfering signal (1)	Interfering signal field strength		Protection radio	Individual interference contribution		Calculated RSS		Remarks
	μV/m	dB(μV/m)	dB	dB(μV/m)	μV/m	dB(μV/m)	μV/m	
A	140	42.9	26	68.9	2800			
C	130	42.3	26	68.3	2600	71.6	3812	$\sqrt{A^2 + C^2}$
B	125	41.9	26	67.9	2500	73.2	4555	Contribution to E_u greater than 50% of $\sqrt{A^2 + C^2}$ therefore $\sqrt{A^2 + C^2 + B^2}$
D	65	36.3	26	62.3	1300			Contribution to E_u less than 50% of $\sqrt{A^2 + C^2 + B^2}$ therefore disregard
E	52	34.3	26	60.3	1040			idem

(1) In descending order of individual interference contribution.

5. *Simplified method of calculating skywave interference to Class A stations*

The use of the RSS method on a site-to-contour basis to determine the interference to a Class A station can be simplified in the following way:

5.1 The site-to-site usable field strength for the station to be protected is determined. The contributors to the usable field strength are identified (the number of contributions are limited mathematically by the 50% exclusion principle to a maximum of five, these being the most significant).

5.2 For each contributor to the usable field strength, a protection point at the intersection of the skywave protected contour and the great circle line between the protected transmitter site and the contributor transmitter site is identified (when all the contributor stations have non-directional antennas, this point would correspond to the worst case for site-to-contour protection).

5.3 When all the contributor stations have directional antennas, the interfering signal is calculated on a site-to-site basis, using one or more radiation maxima in the arc towards the protected contour. If one or more signals are found to be contributor to the usable field strength established under point 5.1 above, the protection points will be found at the intersections of the protected contour and the great circle lines along the azimuths corresponding to these radiation maxima.

5.4 To determine protection to Class A stations in accordance with this procedure, the interference contribution of each station previously identified as a contributor to the site-to-site usable field strength is calculated for each protection point. The results of such calculations are to be employed as in paragraph 4.10.2 of this Annex.

6. *Less restrictive protection criteria in the case of Special Arrangements*

In bilateral or multilateral arrangements between the administrations concerned, the following less restrictive criteria may be adopted if necessary.

Inside the national boundary of a country, the protected contour is the higher of the two following values: nominal usable field strength or usable field strength resulting from the Plan, determined as follows:

6.1 For a class A, B or C station during daytime, the protected contour (skywave or groundwave) is the E_{nom} contour, or the contour which is the locus of the location of the E_u, whichever is closer to the transmitter. The value of E_u is determined in accordance with paragraphs 4.7.1 and 4.7.2.

6.2 For a class A station during the night-time, the contour (skywave or groundwave, whichever is farther from the transmitter) protected against skywave interference is the E_{nom} contour or the contour which is the locus of the location of E_u, whichever is the closer to the transmitter. The value of E_u is determined in accordance with paragraphs 4.7.1 and 4.7.2.

6.3 For a class B or C station during night-time, the contour protected against skywave interference is the contour having the value E_u, where E_u is calculated in accordance with paragraphs 4.7.1 and 4.7.2.

6.4 The calculations of E_u referred to above will exclude the contribution of any station entered in the Plan under paragraph 4.3 of the Agreement.

6.5 The provisions of paragraph 4.10.2 of this Annex do not apply.

7. *Receiver image frequency considerations*

For planning purposes, an administration, in seeking the frequency most appropriate for use by a new station, may consider an additional groundwave protection consideration, i.e. the receiver image frequency constraint, to minimize the risk of interference due to the characteristics of receivers when the service areas of several stations overlap.

However, in areas where there are few available channels, administrations may decide to disregard this constraint.

If an administration wishes to ensure this protection, it must ensure that the field strength of a station with a frequency 900 to 920 kHz higher than the frequency of the station to be protected does not exceed by more than 29.5 dB the field strength corresponding to the protected contour of the station. The protection level thus required is the same for the second adjacent channel.

8. *Matrix showing the conditions of application of the protection criteria as indicated in paragraphs 4.10.2 and 4.10.3 of this Annex*

Section number	4.10.2.1	4.10.2.2	4.10.2.2	4.10.2.3	4.10.3	4.10.3	4.10.3
Channel relationship	co-channel	co-channel	co-channel	co-channel	adjacent channel	adjacent channel	adjacent channel
Time	daytime	night-time	night-time	night-time	daytime	night-time	day and night
Class of protected station	A, B, C	A 50% criterion	A 10% criterion	B, C	A	A	B, C
Protection from	groundwave	skywave	skywave	skywave	groundwave	groundwave	groundwave
Protected contour	groundwave *Enom*	*Enom*(1)	*Enom*(1)	groundwave contour corresponding to the greater of *Enom* or *Eu*	groundwave *Enom*	groundwave *Enom*	groundwave contour corresponding to value of daytime *Enom*
Value to be protected	*Enom*	greater of *Enom* or *Eu*	*Enom*	greater of *Enom* or *Eu*	adjacent channel daytime groundwave *Enom*	night-time groundwave *Enom*	daytime groundwave *Enom*
How *Eu* is calculated	Not applicable	4.7 (of Annex 2)	Not applicable	4.7 (of annex 2)	Not applicable	Not applicable	Not applicable
Where *Eu* is calculated	Not applicable	*Enom*(1)	Not applicable	Station site	Not applicable	Not applicable	Not applicable
How protection is applied	$\frac{Enom}{\text{protection ratio}}$ applied separately	4.7 (of Annex 2)	$\frac{Enom}{\text{protection ratio}}$ applied separately	using 4.7 (of Annex 2) maximum permissible field strength at the station site is not to be exceeded at the protected contour	$\frac{Enom}{\text{protection ratio}}$ applied separately	$\frac{Enom}{\text{protection ratio}}$ applied separately	$\frac{Enom}{\text{protection ratio}}$ applied separately

(1) Groundwave or 50% skywave contour, whichever is farther from the site.

APPENDIX 6

(to Annex 2)

Method used by the IFRB for calculating sectionalized antenna radiation characteristics

(The columns referred to below are those of Part II-A of Annex 1)

1. Sectionalized tower, when the value entered in column 12 is 3.

$$f(\theta) = \frac{2 \cos (90 \sin \theta) \cos [(A + 90) \sin \theta] + \cos (A \sin \theta) - \cos A}{\cos \theta (3 - \cos A)}$$

where:

A : electrical height of bottom section;

θ : elevation angle.

2. Sectionalized tower, when the value entered in column 12 is 4.

$$f(\theta) = \frac{\cos (A \sin \theta) [\cos (A \sin \theta) - \cos A]}{\cos \theta (1 - \cos A)}$$

where:

A : electrical height of bottom section;

θ : elevation angle.

3. Sectionalized tower, when the value entered in column 12 is 5.

$$f(\theta) = \frac{\dfrac{\cos (A \sin \theta) - \cos A}{\cos \theta} + \dfrac{CD \cos \theta \{\cos (A \sin \theta) + \{\cos [(A + B) \sin \theta]\}}{C^2 - \sin^2 \theta}}{1 + \dfrac{2D}{C} - \cos A}$$

where:

A : electrical height of bottom section;

B : electrical height of top section;

C : current distribution factor;

D : ratio of maximum current in top section to maximum current in bottom section;

θ : elevation angle.

4. Sectionalized tower, when the value entered in column 12 is 6.

$$f(\theta) = \frac{\cos (A \sin \theta) - \cos (A - B) \cos (B \sin \theta) + \sin \theta \sin (A - B) \sin (B \sin \theta)}{\cos \theta [1 - \cos (A - B)]}$$

where:

A : total electrical height of tower;

B : electrical height of lower section;

θ : elevation angle.

5. Sectionalized tower, when the value entered in column 12 is 7.

$$f(\theta) = \frac{C\,[\cos(A \sin\theta) - \cos A] + \cos(B \sin\theta) - [\cos(B - A)\cos(A \sin\theta) + \sin(B - A)\sin\theta \sin(A \sin\theta)]}{C\,[1 - \cos A] + \cos\theta\,[1 - \cos(B - A)]}$$

where:

A : electrical height of lower section;

B : total electrical height of antenna;

C : ratio of the loop currents in the two sections;

θ : elevation angle.

6. Sectionalized tower, when the value entered in column 12 is 8.

If $\theta = 0$: $f(\theta) = 1$

If $\theta > 0$: $f(\theta) = \dfrac{\sqrt{\text{real component}^2 + \text{imaginary component}^2}}{C}$

The real component is equal to:

$$\left[\frac{2.28 \cos\theta}{1.14^2 - \sin^2\theta}\right]\{-\cos[1.14(B - A)] + 2\cos(1.14B)\cos(A \sin\theta) - \cos[(A + B)\sin\theta]\}$$

The imaginary component is equal to:

$$D\cos\theta\left\{\frac{\sin[(A + B)\sin\theta]}{\sin\theta} + \frac{1.14}{1.14^2 - \sin^2\theta}\left[\sin[1.14(B - A)] - 2\sin(1.14B)\cos(A \sin\theta) + \frac{\sin\theta \sin[(A + B)\sin\theta]}{114}\right]\right\}$$

where:

A : electrical height of lower section of tower;

B : electrical height of upper section of tower;

C : scaling factor so that $f(\theta)$ is 1 in horizontal plane;

D : absolute ratio of the real component of current to the imaginary component of current at the point of maximum amplitude;

θ : elevation angle.

Note: 1.14 is the ratio of velocity of light to propagation velocity along radiator.

7. Sectionalized tower, when the value entered in column 12 is 9.

$$f(\theta) = \frac{\cos(A \sin\theta)\,[\cos(B \sin\theta) + 2\cos(A \sin\theta)]}{3\cos\theta}$$

where:

A : electrical height of centre of bottom dipole;

B : electrical height of centre of top dipole;

θ : elevation angle.

ANNEX 3

to the Regional Agreement
for the Medium Frequency Broadcasting
Service in Region 2

FORMS

to be used for the Application of Article 4 of the Agreement

1. This Annex describes the forms to be used for the application of Article 4 of the Agreement.

2. Administrations wishing to submit the equivalent information on magnetic tape, with special permission of the IFRB, shall submit such data *only in the format approved* by the IFRB.

3. Four forms are foreseen; each one corresponds to the following information:

PART I – *General information* on the transmitting station.

PART II – Section I: *Characteristics of directional antennas* (when the antenna design is known).

Section II: *Radiated field in various sectors* (for use when the antenna design is not yet known).

PART III – *Supplementary information* for directional antennas with augmented (modified expanded) patterns.

PART IV – *Supplementary information* for top-loaded or sectionalized towers.

4. *Administrations shall use only these forms or exact reproductions thereof.*

5. The IFRB shall return forms which have not been completed correctly.

6. When known, the IFRB Serial Number shall be inserted on each form by the notifying administration. Otherwise, the space provided shall be left blank.

PART I

General Information

Instructions for completing the forms

Box No.

01 *Administration*

Indicate the name of the administration, the sheet number and the date on which the form was completed;

02 *Assigned frequency (kHz)*

03 *Name of the transmitting station*

Indicate the name of the locality or the name by which the station is known. Limit the number of letters and numerals to a total of 14;

04 *Call sign*

This information is optional. Limit the number of letters and numerals to a total of 7;

05 *Additional identification*

Indicate any additional information which may be considered essential for complete identification. Where this information is not essential, this box may be left blank;

06 *Station Class (A, B or C)*

Insert A, B or C according to the station classes defined in Chapter 1 of Annex 2 to the Agreement;

07 *Operational status*

Enter O for a station already in operation and enter P for a station to be brought into operation;

08 *Country*

Indicate the name of the country or geographical area in which the station is located. Use the symbols in Table 1 of the Preface to the International Frequency List;

09 *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. Delete the letter N or S, as appropriate. If no seconds are indicated, the IFRB will use a value of 0 in its calculations;

11 *Indicate the reason for the application of Article 4:*

a) New assignment;

b) Modification of the characteristics of an assignment recorded in the Plan;

c) Cancellation of an assignment;

12 Indicate whether the modification is of the type specified in section 4.2.14 of Article 4 of the Agreement;

13 In the case of a new station, indicate the date of bringing into service. In the case of a change in the characteristics of a station already recorded in the Plan, indicate the date of start of operation with the modified characteristics or the date of cessation of operation;

DAYTIME OPERATION

21 *Station power (kW)*

Indicate the carrier power supplied to the antenna for daytime operation (to the second decimal position for powers less than 1 kW);

Box No.

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

26 *Antenna type*

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

A – Simple omnidirectional antenna;

B – Directional antenna when the design is known (complete Part II, Section I);

C – Directional antenna where the design is not known, indicated by sectors of radiation (complete Part II, Section II);

1 – Top-loaded omnidirectional antenna (complete Part IV);

2 – Sectionalized omnidirectional antenna (complete Part IV);

27 *Simple vertical antenna electrical height*

Indicate here the electrical height, in degrees, for a simple vertical antenna in use for daytime operation. In the case of an antenna type other than A, this box should be left blank;

NIGHT-TIME OPERATION

31 *Station power (kW)*

Indicate the carrier power supplied to the antenna for night-time operation (to the second decimal position for powers less than 1 kW);

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

36 *Antenna type*

Indicate the type of antenna used for night-time operation (use the symbols in Box No. 26);

37 (See Box No. 27);

44 *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;

Coordination under article 4

Country – Indicate the name of the countries which may be affected and with which coordination is considered necessary, using the symbols in Table 1 of the Preface to the International Frequency List;

In progress – Add an "X" if coordination is under way with these countries;

Acceptance obtained – Indicate with an "X" if coordination has been successful.

RJ81

FORM

IFRB Serial No.

TO BE USED IN APPLICATION OF ARTICLE 4 OF THE REGIONAL MF BROADCASTING AGREEMENT (REGION 2), RIO DE JANEIRO, 1981. (BAND 535 – 1 605 kHz)

CHARACTERISTICS OF A BROADCASTING STATION

PART I GENERAL INFORMATION

(01) Administration | Form No. | Date

Assigned frequency (kHz)		(02)
Transmitting station	Name of the station	(03)
	Call sign	(04)
	Additional identification	(05)
	Station class (A, B or C)	(06)
Country		(07)
Geographical coordinates of the transmitting station		(08) E W N S

(11) a) New assignment ☐ b) Modification of the characteristics of an assignment recorded in the Plan ☐ c) Cancellation of an assignment ☐

(12) Modification under Section 4.2.14 Yes ☐ No ☐

(13) Date of bringing into service or cessation of operation ☐☐☐ Day Month Year

Station parameters	Daytime operation	Night-time operation
Status of the station (O or P)	(20)	(30)
Station power (kW)	(21)	(31)
r.m.s. value of radiation (mV/m à 1 km) (except when symbol B or C appears in box 26 or 36)	(25)	(35)
Antenna type	(26)	(36)
Simple vertical antenna electrical height (degrees)	(27)	(37)

(44) Remarks

	Coordination under Article 4							
Country								
In progress	☐	☐	☐	☐	☐	☐	☐	☐
Acceptance obtained	☐	☐	☐	☐	☐	☐	☐	☐

PART II

Description of the directional antenna

Radiation characteristics of the transmitting antenna

1. The form for Part II Section I is used when the design of the directional antenna is known. When a directional antenna is intended to be used, but the design is not yet known, the form Part II Section II should be used. The latter form should be replaced by a completed Part II Section I form as soon as the design parameters are determined.

2. Administrations are invited to use Part II of the form to furnish the electrical characteristics of the antenna. From the information thus furnished, the IFRB will determine the radiation pattern.

3. When Part II of the form is not suitable for describing a particular type of antenna, administrations may communicate the particulars of the antenna in question on a separate sheet, taking care that all the parameters necessary for the calculation of the radiation diagram have been included.

4. Radiation diagrams shall be used only when the information requested in Part II is not available. See Appendix 3 to Annex 2 to the Agreement.

PART II – SECTION I

Description of the directional antenna consisting of vertical conductors

Instructions for completing the form

Box 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 1 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.

Column No.

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 orientation are shown with respect to a common reference point which is generally the first tower;

1 : where the spacing and 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 Appendix 4 to Annex 2.

Note: In the absence of a specific code to refer to other types of sectionalized antennas, administrations may use the codes indicated in Appendix 6 to Annex 2.

Box No.

14 r.m.s. value of radiation (mV/m at 1 km);

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 normal expanded pattern quadrature factor when special precautions are taken to ensure pattern stability);

17 Supplementary information.

RJ81

FORM

TO BE USED IN APPLICATION OF ARTICLE 4 OF THE REGIONAL MF BROADCASTING AGREEMENT (REGION 2), RIO DE JANEIRO, 1981, (BAND 535 – 1 605 kHz)

IFRB Serial No.

CHARACTERISTICS OF A BROADCASTING STATION

PART II – Section 1

DESCRIPTION OF A DIRECTIONAL ANTENNA CONSISTING OF VERTICAL CONDUCTORS

Form No. Date

(01) Name of transmitting station

(02) Country

(03) Hours of operation (D, N or DN)

(04) Total number of towers

(05) Tower No.	(06) Tower field ratio	(07) Phase difference of the field (± degrees)	(08) Electrical tower spacing (degrees)	(09) Angular tower orientation (degrees)	(10) Definition point indicator	(11) Electrical height of tower (degrees)	(12) Tower structure
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

(Use a supplementary sheet in cases where there are more than 10 towers.)

(14) r.m.s. value of theoretical radiation	(15) Type of pattern (T, E or M)	(16) Special quadrature factor
mV/m at 1 km		mV/m at 1 km

(17) SUPPLEMENTARY INFORMATION

PART II – SECTION II

Radiated field limitations in specific sectors in the absence of information on directional antennas

1. In the absence of a detailed description of the directional antenna system, an indication of the radiated field limitations in specific sectors is required. In these cases, the radiation pattern (0°-360°) is subdivided in sectors with an indication of the maximum radiated field for each sector.

2. This form is to be used for a proposed station only ("P" entered in Part I, Box 07).

3. The Sheet No. box is for the convenience of administrations. Indicate the date on which the form was completed.

Instructions for completing the form

Box No.

01 Name (usually town or locality) of transmitting station;

02 Country

Indicate the country or geographical area in which the transmitting station is located, using the symbols in Table 1 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".

Column No.

DAYTIME OPERATION

18 Sectors of radiation in degrees from True North for daytime operation. The entire circumference from 0 to 360 degrees shall be specified;

19 Maximum radiated field strength in the sector indicated in column 18, in the horizontal plane in mV/m at 1 km; (see Appendix to this Annex);

NIGHT-TIME OPERATION

28 Sectors of radiation in degrees from True North for night-time operation. The entire circumference from 0 to 360 degrees shall be specified;

29 Maximum radiated field strength in the vertical plane in the sector indicated in column 28, in mV/m at 1 km.

Box No.

20 Any further information which should be included in the IFRB weekly circular. Any further explanatory notes for the information of the IFRB may be attached.

Note: This form should be replaced by the form corresponding to Part II, Section I, duly completed, as soon as the antenna design is known.

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FORM

IFRB Serial No.

TO BE USED IN APPLICATION OF ARTICLE 4 OF THE REGIONAL MF BROADCASTING AGREEMENT (REGION 2) RIO DE JANEIRO, 1981, (BAND 535 – 1 605 kHz)

CHARACTERISTICS OF A BROADCASTING STATION

PART II – Section 2

DESCRIPTION OF RADIATION CHARACTERISTICS IN THE ABSENCE OF ANY INFORMATION ON THE DIRECTIONAL ANTENNA DESIGN

Form No. Date

(01) Name of transmitting station

(02) Country

NOTE: This form should only be used for planned stations (Symbol P in box 20 or 30 in part I).

Daytime operation	
(18) Sector of radiation (degrees)	(19) Maximum field strength in the horizontal plane (mV/m at 1 km)
0	

Night-time operation	
(28) Sector of radiation (degrees)	(29) Maximum field strength in any vertical plane in the sector (mV/m at 1 km)
0	

(20) 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 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 Box 15 of Section I of Part II contains the symbol "M" for "augmented (modified expanded)".

Box No.

01 Indicate the name of transmitting station;

02 Country

Indicate the country or geographical area in which the station is located, using the symbols in Table 1 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, 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.

Column No.

05 Indicate the serial number of the augmentations, as they will be described in columns 06, 07 and 08 (see section 2.7 of Appendix 3 to Annex 2);

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.

Box No.

09 Supplementary information. Indicate any supplementary information concerning augmented (modified expanded) patterns. If a supplementary sheet has been used for further augmentations, please indicate in this box.

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FORM

IFRB Serial No.

TO BE USED IN APPLICATION OF ARTICLE 4 OF THE REGIONAL MF BROADCASTING AGREEMENT (REGION 2), RIO DE JANEIRO, 1981. (BAND 535 – 1 605 kHz)

CHARACTERISTICS OF A BROADCASTING STATION

PART III

DESCRIPTION OF THE PARAMETERS OF DIRECTIONAL ANTENNAS AUGMENTED (MODIFIED EXPANDED) PATTERNS, TO BE SUBMITTED WHENEVER THE SYMBOL M IS ENTERED IN PART II SECTION I BOX 15

Form No. Date

(01) Name of transmitting station

(02) Country

(03) Hours of operation (D, N or DN)

(04) Total number of augmentations

(05) Augmentation No.	(06) Radiation at central azimuth of augmentation (mV/m at 1 km)	(07) Central azimuth of augmentation (degrees)	(08) Total span of augmentation (degrees)
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

(Use a supplementary sheet in cases where there are more than 20 augmentations.)

(09) SUPPLEMENTARY INFORMATION

PART IV

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

1. Where an omnidirectional antenna is top-loaded or sectionalized, the figures 1 or 2 will have been entered in Part I, Box 26 and/or 36. Proceed as for a single tower of a directional antenna.

2. When an antenna tower of a directional antenna is either top-loaded or sectionalized, column 12, Section 1 of 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:

Box 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 1 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".

Column No.

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 – Section I)	*Description of the characteristic the value of which is given in the column (these values are used in the equations given in Appendix 4 to Annex 2)*
	1	Electrical height of the antenna tower (degrees);
	2	Height of lower section (degrees);

06	*Code used in Col. 12** (Part II – Section I)	*Description of the characteristic the value of which is given in the column (these values are used in the equations given in Appendix 4 to Annex 2)*
	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 – Section I)	*Description of the characteristic the value of which is indicated in the column (these values are used in the equations contained in Appendix 4 to Annex 2)*
	1	Blank;
	2	Total height of antenna (degrees);

* See Note for Column 12 (Part II – Section I).

Column No.

08	*Code used in Col. 12** (Part II – Section I)	*Description of the characteristic the value of which is indicated in the column (these values are used in the equations entered in Appendix 4 to Annex 2)*
	1	Blank;
	2	Difference between apparent electrical height (based on current distribution) of the total tower and the actual height of the total tower (degrees).

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FORM

TO BE USED IN APPLICATION OF ARTICLE 4 OF THE REGIONAL MF BROADCASTING AGREEMENT (REGION 2), RIO DE JANEIRO, 1981, (BAND 535 – 1 605 kHz)

IFRB Serial No.

CHARACTERISTICS OF A BROADCASTING STATION

PART IV

DESCRIPTION OF TOP-LOADED OR SECTIONALIZED TOWERS USED FOR DIRECTIONAL OR OMNIDIRECTIONAL ANTENNA SYSTEMS

Form No. Date

(01) Name of transmitting station (02) Country (03) Hours of operation (D, N or DN)

(04) Tower number	(05) A	(06) B	(07) C	(08) D

* See Note for Column 12 (Part II – Section I).

APPENDIX

(to Annex 3)

Typical radiation values of a directional antenna

1. *Introduction*

When an administration intends to propose a new station under Article 4 of the Agreement, using a directional antenna, and the antenna design is not known, the form in Annex 3, Part II, Section II, is to be used. This form requires information on the arcs of suppression.

The following information may be used as a guide for determining realistic values which might be entered on the form.

2. *Minimum radiation*

When the radiated field is suppressed in one or more directions so as to afford protection to other stations, the minimum level of radiation achievable in practice (E_{min}) over arcs up to about 30 degrees, is given by the following equation

$$E_{min} = 10\sqrt{P} \qquad \text{mV/m at 1 km}$$

where P is the station power in kW.

Thus the degree of suppression required by a planned station necessarily limits the station power to a practical value. When the maximum suppression is required over wide spans exceeding 30 degrees, a considerably more complex antenna array or lower power is usually required.

3. *Maximum radiation*

The radiated field in the direction generally opposite to the direction of suppression tends to increase such that the maximum field E_{max} achieves an approximate value of 1.35 × the r.m.s. value of the radiation in mV/m at 1 km.

4. *Radiation in the other directions*

In directions other than in the spans of E_{min} and E_{max}, the radiated field may exceed the r.m.s. value of the radiation by more than up to a maximum of 10%.

5. *Table of typical values*

Station power (kW)	Typical values of E (μV/m at 1 km)		
	E_{min}	r.m.s. value + 10%	E_{max}
1	10	330	405
2.5	16	520	640
5	22	735	900
10	32	1040	1280
25	50	1650	2030
50	71	2330	2860

FINAL PROTOCOL *

to the

Regional Agreement for the Medium Frequency Broadcasting Service in Region 2

At the time of signing the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2, the undersigned delegates take note of the following statements forming part of the Final Acts of the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981:

No. 1

For the Bahamas:

The Delegation of the Bahamas reserves the right of its Government to take such action as it may consider necessary to protect its interests should any Member fail to observe the provisions of the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2, or its Annexes, or the Protocol(s) attached thereto, or should reservations by other countries jeopardize Bahamian broadcasting services.

No. 2

For the Argentine Republic:

A. The Argentine Republic, exercising its sovereign right over the Malvinas Islands, the South Georgia Islands, the South Sandwich Islands and the Argentine Antarctic, located between 25° and 74° West and South of 60° South, states that:

1. Its Government does not recognize frequency assignments which other administrations may make in the above-mentioned territories, irrespective of the band and service;

2. This statement shall apply particularly to the band between 535 kHz and 1 605 kHz allocated to the broadcasting service under Article 5 of the Radio Regulations and for which a plan has been drawn up at this Regional Administrative Broadcasting Conference;

3. Furthermore, the Argentine delegation reserves its Government's right to take the steps it considers appropriate to ensure the satisfactory development of its broadcasting services in the territories referred to above, should the interests of its country be affected by the decisions of this Conference;

* *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.

4. The said territories of the Malvinas Islands, the South Georgia Islands and the South Sandwich Islands, which come under the jurisdiction of the National Territory of Tierra del Fuego, the Antarctic and the Islands of the South Atlantic, were occupied by the United Kingdom of Great Britain and Northern Ireland by an act of force, resulting in an illegal situation which has never been accepted by the Argentine Republic;

5. Moreover, the illegality of the occupation of the Malvinas Islands, the South Georgia Islands and the South Sandwich Islands by the United Kingdom has been recognized by the United Nations in General Assembly Resolutions 2065 (XX), 3160 (XXVIII) and 3149 calling for the speeding up of negotiations between the two governments with a view to bringing the colonial situation to an end.

B. The Argentine delegation reserves its Government's right to take any steps it considers necessary to provide and protect its broadcasting services should its interests be affected by the decisions of this Conference, particularly in the event of a Contracting Member notifying an assignment in excess of the interference values resulting from the application of the technical standards of the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2.

C. The Argentine delegation also reserves its Government's right to take any steps it considers appropriate to ensure the provision of its broadcasting services, should any reservations entered by other countries to the Final Acts jeopardize or restrict their satisfactory operation.

No. 3

For Chile:

The Delegation of the Republic of Chile, considering that its country exercises sovereign rights over the Antarctic territory between 53° and 90° West, in virtue of Supreme Decree No. 1747 of 6 November 1940, states that it does not recognize any frequency assignments made in the name of any other State(s) within that Antarctic territory. The Republic of Chile reserves the right to make use of the radio frequencies which may be assigned under the above-mentioned conditions.

No. 4

For the Bahamas and Canada:

Canada and the Bahamas, parties to the North American Regional Broadcasting Agreement and participating in the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro (Brazil), in accordance with the provisions of the International Telecommunication Convention (Málaga-Torremolinos, 1973), express, in signing the Final Acts of this Conference, their firm intention to approve the Regional Agreement adopted by the Conference and to take immediate steps to denounce the North American Regional Broadcasting Agreement under the notification procedure specified in Article I, 3 of the latter Agreement.

In its capacity as depository of the North American Regional Broadcasting Agreement, the Government of Canada will inform without delay the other Governments parties to the said Agreement and the Secretary-General of the International Telecommunication Union of the notifications received under the above-mentioned paragraph.

No. 5

For the Republic of Colombia:

The delegation of the Republic of Colombia reserves the right of its Government to take such steps as it considers necessary to safeguard its interests should any country fail to comply with the terms of the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2 reached at this Conference, or should reservations entered by other countries jeopardize those broadcasting services in the territories over which the Republic of Colombia exercises full sovereignty.

No. 6

For Nicaragua:

In signing the Final Acts of the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, the delegation of Nicaragua states that:

It does not accept the definition in Document No. 150 whereby the delegation of Colombia laid claim to sovereignty over the Islands of San Andrés and Providencia by expressly requesting their inclusion in noise zone 2; accordingly, it reserves the right to adopt such measures as it may deem appropriate, in virtue of the declaration by the Government of National Reconstruction in Decree No. 324 of 4 February 1980, under which the Government assumes responsibility for recovering, maintaining and defending Nicaragua's national sovereignty and territorial integrity as the inalienable right of all free nations.

Circumstances of history have prevented the people of Nicaragua from properly defending its national integrity, including its territorial waters and continental shelf. Such lack of sovereignty was demonstrated by the imposition on Nicaragua of two treaties which were absolutely contrary to its national interest, namely, the Treaty of Chamorro Bryan of 5 August 1914 and the Treaty of Barcenas-Meneses-Ezguerra, which Nicaragua was forced to sign in 1928 prior to ratification in 1930. Both treaties were imposed under the total political and military occupation of Nicaragua by the United States of America.

Besides being detrimental to the interests of Nicaragua, the Barcenas-Meneses-Ezguerra Treaty implies the occupation of much of its island territory, such as the Islands of San Andrés and Providencia and the surrounding keys.

Although much time has passed since the signing of the Barcenas-Meneses-Ezguerra Treaty, the fact remains that until 19 July 1979, Nicaragua had not recovered its national sovereignty and, prior to the victory of its people, had been unable to defend its island, marine and submarine territory.

The Administration of Nicaragua cannot but seize this opportunity to let the sister people and Government of Colombia know that this reservation is not intended as a slight to a country which we have always loved and respected and whose people were splendidly at one with our country in its struggle for national liberation.

Our intention is to let both the people and the Government of Colombia know that Nicaragua lays claim not to territories which lie within Colombia's continental shelf or within 100-200 miles of its mainland territory, but to areas which geographically, historically and legally form an integral part of Nicaragua's national territory.

"The way is therefore clear for dialogue between our two countries, since we believe that a more thorough knowledge of the historical situations which both Colombia and Nicaragua have inherited will make the sister nation of Colombia see the justice of our position; for it is a historical fact that Nicaragua was dispossessed of these territories in a manner both abusive and in all respects contrary not only to the principles of international law but also to the principles which have always governed relations between the countries of Latin America."

Unfortunately, the amendment proposed by the Colombian Administration does not seem to be in keeping with the spirit demonstrated by our country in the paragraph transcribed above.

No. 7

For Ecuador:

The delegation of Ecuador to the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981 reserves the right of its Government to adopt such measures as it deems appropriate should any decisions taken by this Conference affect its broadcasting services and particularly its stations already in operation.

It further reserves the right of its Government not to accept any decision of this Conference which might affect the exercise of its sovereign rights or any reservation entered by other countries if they are detrimental to the national interests of Ecuador.

No. 8

For Grenada:

The delegation of Grenada reserves the right of its Government to take whatever measures it sees fit to safeguard its national broadcasting coverage should other countries fail to observe the technical provisions adopted by the Conference as the means of minimizing interference, or should other countries act in such a manner as to jeopardize Grenada's broadcasting services.

No. 9

For the Republic of Panama:

The delegation of Panama states that, should the interests of its country be affected by the decisions of this Conference, the Republic of Panama reserves the right to take any steps it considers necessary, as a sovereign country throughout the whole of its territory, to ensure the satisfactory development of its national radiocommunication services.

No. 10

For Guyana:

whereas

the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, does not recognize the specific needs of countries which lack sufficient alternative means in other frequency bands (for example VHF FM);

and whereas

the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2 and its associated plan are inconsistent with the principles adopted by the Regional Administrative MF Broadcasting Conference (Region 2) at its First Session, Buenos Aires, 1980, and do not assign frequencies on the basis of equal rights;

the delegation of the Cooperative Republic of Guyana:

– *states* that the signing of the Final Acts of the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, and any subsequent ratification thereof by its Government shall in no way imply acceptance of the values used to determine nominal usable field strength, and

– *reserves* the right of its Government to take any measures (including the use of any frequencies within the band 535 - 1 605 kHz) it may consider necessary to meet the needs of its National Broadcasting Service.

No. 11

For Mexico:

In signing the Final Acts of the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, the delegation of Mexico expresses the intention of its Administration to adhere to the provisions of the Final Acts; however, the Mexican delegation reserves the right of its Government to take any steps it considers appropriate to ensure the satisfactory operation of its MF broadcasting stations should such operation be affected by the failure of any Member of the Union to comply with the provisions of the Final Acts.

No. 12

For Costa Rica:

The delegation of the Republic of Costa Rica to the Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981, reserves the right to accept or to reject any decision of this Conference which might affect, in whole or in part, its sovereign right to use the radio spectrum for medium frequency broadcasting within its national territory.

No. 13

For the Republic of Trinidad and Tobago:

The delegation of the Republic of Trinidad and Tobago reserves on behalf of its Government the right to take whatever steps it deems necessary to protect its broadcasting services should other administrations signatories to the Agreement fail to comply with the provisions of the Regional Agreement for the Medium Frequency Broadcasting Service in Region 2.

No. 14

For the United States of America:

The United States of America calls attention to the fact that its MF Broadcasting Service is adversely affected to a serious degree by objectionable interference from numerous stations in the Region. In these circumstances, while the United States of America is prepared to fulfil its obligations as a signatory to the Final Acts and to pursue the resolution of incompatibilities between its MF broadcasting stations and those of other countries of Region 2, it is compelled, in view of the seriousness of that interference, to reserve the right to take such action as may prove necessary to assure the provision of needed services to the adversely affected areas if its efforts to eliminate such interference fail to lead to satisfactory solutions.

No. 15

For the Republic of Venezuela:

The delegation of the Republic of Venezuela states that its Government reserves the right to take any steps it may consider necessary to ensure the development and satisfactory operation of its MF broadcasting service should its interests be affected by the decisions taken at this Conference, particularly by the application of this Agreement, its complete Annexes and the Resolutions and Recommendations adopted.

It also reserves the right to take any steps it may consider necessary to protect its MF broadcasting service from any adverse consequences of the reservations entered 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. 16

For Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela:

The delegations of the following countries Members of the International Telecommunication Union: Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela, parties to the South American Radiocommunication Agreement of Buenos Aires, 1935, as revised at Santiago de Chile in 1940, and meeting in Rio de Janeiro for the Regional Administrative Conference on MF Broadcasting in the band 535 - 1 605 kHz (Region 2), which was convened under the provisions of the International Telecommunication Convention (Malaga-Torremolinos, 1973),

considering

a) that the Agreement adopted at this Conference contains provisions that are better suited to the current situation and to the development of broadcasting services in the band in question than the earlier Agreement;

b) that Articles 5, 7, 8, 9, 10 and 12 of the South American Radiocommunication Agreement of Buenos Aires, 1935, as revised at Santiago de Chile, 1940, together with Annexes II, III, V, VII and VIII and parts of Annexes IV and VI thereto, deal with technical and planning matters relating to the broadcasting service which are covered by the new Regional Agreement;

c) that under the principles of international law the most recent agreement takes precedence over others dealing with the same subject-matter;

d) that the broadcasting service in the band 535 - 1 605 kHz will therefore be governed by the provisions of the Regional Agreement adopted at this Conference,

recognize

that some parts of the South American Radiocommunication Agreement of Buenos Aires, 1935, as revised at Santiago de Chile, 1940, relating to the broadcasting service, have been superseded by the provisions of the Regional Agreement on the MF Broadcasting Service (Region 2).

No. 17

For Jamaica:

The delegation of Jamaica reserves the right of its Government to take whatever measures it deems necessary to safeguard its interests should other countries operate their stations in a manner prejudicial to the National Broadcasting Service of Jamaica.

No. 18

For the Republic of Paraguay:

In view of the geographical location of the Republic of Paraguay between countries having large numbers of high-power class A stations giving rise to mutual interference with Paraguayan stations, the Paraguayan delegation accepted reasonable interference values in respect of its stations and moreover reduced the power of most of its transmitters for night-time operation so that all Paraguayan stations could be included in List A of the Plan.

Despite the efforts made by the delegation of Paraguay to achieve that aim, however, Station ZP-70 "RADIO PRIMERO DE MARZO" appears in List B on account of incompatibility with stations belonging to one of the negotiating administrations.

Accordingly, this Delegation reserves the right of its Government to take such measures as it deems appropriate to protect the transmissions of all Paraguayan stations, particularly those of Station ZP-70 "RADIO PRIMERO DE MARZO" so long as it remains in List B.

No. 19

For the United Kingdom of Great Britain and Northern Ireland:

With reference to statement No. 2 made by the Argentine Republic, the Government of the United Kingdom of Great Britain and Northern Ireland have no doubt as to United Kingdom sovereignty over the Falkland Islands, the Falkland Island dependencies and the British Antarctic Territory. In this context attention is drawn to Article IV of the Antarctic Treaty, to which both the United Kingdom and the Argentine Republic are parties, which freezes territorial claims in the Antarctic.

The United Kingdom Government therefore do not accept the declaration of the Argentine Republic claiming to contest United Kingdom sovereignty over the above-mentioned territories. Furthermore the United Kingdom is entitled to have frequencies assigned to it for radio services to be operated from these territories, and would regard any use of frequencies by the Argentine Republic which caused harmful interference to these assignments as a breach of the Convention and the Radio Regulations.

Furthermore, with reference to the claim by the Argentine Republic to have the right to establish its own radiocommunication services in these territories, the United Kingdom wishes to state that it does not recognize the validity of any such claim, and that any notification of a frequency assignment by the Argentine Republic in respect of these territories would be inconsistent with the terms of Resolution 1 adopted by the World Administrative Radio Conference, Geneva, 1979.

The United Kingdom does not accept the assertion in the Argentine statement that "the illegality of the occupation of the Malvinas Islands, the South Georgia Islands and the South Sandwich Islands by the United Kingdom has been recognized by the United Nations". United Nations Resolutions have simply called for the settlement of the dispute by negotiation between the two Governments.

No. 20

For the United Kingdom of Great Britain and Northern Ireland:

The delegation of the United Kingdom of Great Britain and Northern Ireland does not accept reservation No. 3 by Chile insofar as it disputes the sovereignty of Her Majesty's Government over the British Antarctic Territory. Attention is drawn in this context to Article IV of the Antarctic Treaty, which freezes territorial claims in the Antarctic.

No. 21

For the Republic of Colombia:

On behalf of its Government, the delegation of the Republic of Colombia, in signing the Final Acts of the Regional Administrative MF Broadcasting Conference, Rio de Janeiro, 1981, and in noting Reservation No. 6 entered by the delegation of Nicaragua, states that it does not in any way accept the claims of the Government of Nicaragua, it having no doubt as to the legitimacy and sovereignty of the Republic of Colombia throughout the whole of its territory.

Moreover, the delegation of Colombia wishes to state, in connection with the claims made by Nicaragua in disregard of the Treaty on Territorial Matters between Colombia and Nicaragua and alleging sovereignty over the Islands of San Andrés and Providencia, that:

1. The Treaty on Territorial Matters between Colombia and Nicaragua was signed in Managua on 24 March 1928, approved in Colombia by Act No. 93 of 1928, and in Nicaragua by an Act of 6 March 1930; the instruments of ratification were exchanged in Managua on 5 May 1930 and the Treaty was subsequently promulgated by Decree No. 993 of 1930.

2. Article One of the Treaty states that:

"The Republic of Colombia recognizes the sovereignty and full dominion of the Republic of Nicaragua over the Mosquito Coast between the Cape of Gracias a Dios and the San Juan river, and over the Islands Mangle Grande and Mangle Chico in the Atlantic (Great Corn Island and Little Corn Island), and the Republic of Nicaragua recognizes the sovereignty and full dominion of the Republic of Colombia over the Islands of San Andrés, Providencia, Santa Catalina and all the remaining islands, islets and keys which form part of the said Archipelago of San Andrés".

3. The arguments put forward by Nicaragua in regard to its alleged sovereignty over the Archipelago of San Andrés and Providencia violates the most fundamental principle of international law, *pacta sunt servanda*, according to which any treaty is binding on the contracting parties and must be executed in good faith. It is logical that this principle should constitute the cornerstone of relations between States, since failure by States to recognize the principle of faithful and strict compliance with treaties might seriously jeopardize international peace and security.

4. In claiming to denounce the Treaty, the Government of Nicaragua overlooks the fact that treaties may be terminated only by express or tacit agreement between the contracting parties or in conformity with clear norms of international law.

5. Under international law, a treaty such as that of Esguerra-Barcenas may not be denounced, as may be inferred from Article 56 of the Vienna Convention on the Law of Treaties, on which the International Law Commission commented in the following terms: the inherent nature of some treaties precludes the possibility of the contracting States having intended to allow one party to denounce them or withdraw from them of its own will. This is the case of treaties of the demarcation of territorial borders. (Report of the International Law Commission, Supplement No. 9 (A/6309 and Rev. 1) United Nations, Twenty-first Session, New York, 1966).

6. It must be said once more that the treaty of 1928, being an instrument that defines territorial matters and therefore establishes an objective regime, is not open to termination. Finally, far from it having been impossible to implement the Treaty, it has been complied with on a frank, cordial and uninterrupted basis.

7. In these conditions, since the Treaty of Esguerra-Barcenas is not an instrument that may be denounced or terminated merely at the will of one of the contracting parties, the Government of Nicaragua must continue to comply with it as it has done hitherto: it has no other alternative. For its part, Colombia will be vigilant in demanding and ensuring compliance with the duties and obligations which are incumbent on both parties, in accordance with international law, under the Treaty on Territorial Matters between Colombia and Nicaragua.

8. The location and characteristics of the Archipelago of San Andrés and Providencia entail territorial waters, a continental shelf and an exclusive economic zone, in accordance with the standards and principles of international law. To affirm that the said Archipelago is situated within the continental shelf of Nicaragua and that it therefore belongs to that country is no less than a legal absurdity.

9. The entire Archipelago of San Andrés and Providencia, including the Corn Islands and the territory included between the Cape Gracias a Dios and the San Juan river, belonged first to the Tierra Firme Kingdom and subsequently to the Viceroyalty of New Granada. Such was the status of those territories in 1810 at the beginning of the struggle for independence. The Governments of Colombia and Nicaragua freely agreed on a valid and complete international treaty and exchanged the instruments for its ratification, under which our country recognized the sovereignty and full dominion of Nicaragua over the Mosquito Coast between the Cape Gracias a Dios and the San Juan river, and over the Great Corn and Little Corn Islands. For its part, the Republic of Nicaragua recognized the sovereignty and full dominion of the Republic of Colombia over the Islands of San Andrés, Providencia, Santa Catalina, and all the remaining islands, islets and keys which form part of the said Archipelago of San Andrés.

The Republic of Colombia will meet its obligations and ensure the respect of its rights under the said instrument.

(The signatures follow)

(The signatures following the Final Protocol are the same as those shown on pages 1 and 2)

RESOLUTIONS AND RECOMMENDATIONS

RESOLUTION No. 1

Notification of Assignments Recorded in the Plan for Stations in Service

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

noting

a) that the IFRB, in accordance with Article 9 * of the Radio Regulations (Geneva, 1959), does not carry out a technical examination of stations of the MF broadcasting service in Region 2 but lists them in the Master International Frequency Register for information only;

b) that the World Administrative Radio Conference (Geneva, 1979) amended the former Article 9 * and adopted Resolution No. 501 concerning the examination by the IFRB of the notices relating to stations of the broadcasting service in Region 2 in the band 535 - 1 605 kHz;

considering

a) that the stations in Regions 1, 2 and 3 must operate in conformity with the Radio Regulations in order to prevent any harmful interference between stations in the three Regions;

b) that the provisions of Article 12 of the Radio Regulations (Geneva, 1979) shall apply to the stations of the MF broadcasting service in Region 2 on the date of coming into force of the Final Acts of this Conference;

resolves

1. that the IFRB consider all the assignments of participating countries in both List A and List B of the Plan for the stations in service as having been notified on 1 January 1982 to ensure their earliest recording in the Master Register with the above-mentioned date in the appropriate part of column 2;

2. that when an assignment is already recorded in the Master Register with a date in column 2c, the IFRB shall modify the existing entry in conformity with the Plan and retain the existing date in column 2c;

* Which corresponds to Article 12 of the Radio Regulations, Geneva, 1979.

3. in cases where an assignment in the Plan is not yet recorded in the Master Register, the IFRB shall consider 1 January 1982 as the date of bringing into service of the station concerned until the administration notifies the precise date on which it was brought into service;

4. that the IFRB shall request the non-signatory countries to notify the assignments to their stations that are in operation or to confirm that the information submitted for the Basic Inventory is to be considered as notification on 1 January 1982.

RESOLUTION No. 2

Interim Post-Conference Procedures

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

considering

a) the large number of stations submitted for inclusion in the Plan in relation to the availability of channels in the MF band allocated to the broadcasting service in Region 2;

b) that all the assignments of Region 2 countries appearing in the Basic Inventory as modified before and during the Conference have been included in the Plan in two separate lists:

- List A: which includes only the assignments whose caused and received interference are both accepted;
- List B: which includes all the assignments which are not included in List A;

c) the limited time available during the Conference to carry out the necessary planning studies, as well as the necessary verification and correction of the thousands of assignments in the Plan;

d) the progress which has nevertheless been made towards the development of a comprehensive Plan;

e) that the development of an optimum Plan requires the resolution of a large number of long standing incompatibilities between stations for which the provisions of Article 12 of the Radio Regulations relating to protection against harmful interference were not hitherto applicable;

f) that it has not proved possible to resolve all these incompatibilities as well as those resulting from planned stations in the time available;

g) that it is therefore necessary to establish procedures for resolving these incompatibilities so as to enable the negotiating process to be continued and completed as quickly and effectively as possible;

h) that the Plan can be improved and kept up to date only through the continued goodwill and cooperation of all the administrations concerned with the resolution of incompatibilities;

i) that Resolution No. 7 and Recommendation No. 6 of the World Administrative Radio Conference, Geneva, 1979, provide for the IFRB to assist developing countries in the development of national radio-frequency management units and with the selection of frequency assignments;

resolves

1. to adopt the procedure set out in Annex 1 to the present Resolution for the verification and correction of the assignments included in the Plan;

2. to adopt the procedure described in Annex 2 to this Resolution for the resolution of incompatibilities, thus permitting the transfer of assignments from List B to List A, and for the protection of assignments in the Plan;

3. that this Resolution, including its annexes, shall enter into force upon the signing of the Final Acts of this Conference;

strongly urges administrations whose stations appear in List B

to make every effort to resolve the incompatibilities relating to their stations as quickly as possible;

urges non-signatory countries

to accede to the Agreement and meanwhile to apply the procedures of this Resolution;

requests the IFRB

1. to give all the necessary assistance to administrations, particularly those of developing countries, in carrying out the procedures described in the annexes to this Resolution, and in particular:

a) to assist them in a thorough analysis of their incompatibilities (especially in congested areas);

b) to make recommendations, at the request of the parties concerned, on possible means of resolving incompatibilities by using the principles enunciated in Annex 3 to this Resolution;

2. to submit its recommendations by late 1982 and to assist administrations in organization and coordination of sub-regional meetings to resolve incompatibilities;

3. to take appropriate steps to select the short-term staff needed to help in formulating the above-mentioned recommendations, having regard to their skills and knowledge of the problems involved in the different parts of Region 2;

recommends the Administrative Council

to provide the IFRB with adequate resources to enable it to perform the tasks outlined in this Resolution and, in particular, to make provision for the early recruitment of the staff referred to in "*requests the IFRB*" paragraph 3 above.

ANNEX 1

to Resolution No. 2

Procedure for Verification and Correction of the Plan

The timetable for the verification and correction of the Plan shall be as follows:

1. *1 January-31 March 1982*

Administrations shall check all their assignments in the Plan and notify the IFRB, *not later than 31 March 1982*, of any discrepancy between the information included in the Plan and the information communicated to and accepted by the IFRB before and during the Conference. During this period, the IFRB shall also check the Plan for errors. The corrections shall be communicated to the IFRB using an annotated copy of the relevant pages of the Plan.

2. The IFRB shall send administrations *not later than 31 January 1982* a list of their assignments for which the notified value of radiation (for directional or omnidirectional antennas) differs by more than twenty (20) percent from the value calculated for a one ohm loss. When sending the above list, the IFRB shall request the administrations concerned to notify the IFRB *not later than 31 March 1982* of modifications in station characteristics or parameters which will bring the value of notified radiation within ten (10) percent of the calculated radiation based upon a one ohm loss per tower. From the date of the notification, the IFRB shall use the value so notified, subject to the application by the administration concerned of the procedure of Article 4 of the Agreement.

3. *1 April-15 May 1982*

The IFRB shall check and correct errors reported to or detected by it, and shall disseminate, *by 15 May 1982* at the latest, all corrections to all administrations in Region 2, whether or not they are signatories to the Final Acts of the Conference.

4. *15 May-30 June 1982*

Administrations shall send their comments to the IFRB on the corrections so disseminated and on any entry which appears as inappropriately recorded in the Plan *by 30 June 1982 at the latest.*

An entry may be considered as inappropriately recorded if it appears in List A, but causes interference which:

a) is higher than that accepted by the affected administration due to the existence of data or calculation error, or

b) was not detected because data or calculation error led to an incorrectly determined high level of usable field strength for an assignment in List B.

The IFRB will take note of such comments, verify with any administration concerned and include the correction in the Plan or transfer the assignments affected from List A to List B. All changes made to the Plan following the comments received shall then be published.

5. Any modifications introduced into the Plan in accordance with Resolution No. 3 *before 1 August 1982* shall be reviewed by the IFRB in the light of the corrections made to the Plan up to this date. Should the IFRB alter its finding as a result of this review, the administration responsible for the station involved shall be requested to adjust as may be necessary the characteristics of its station; the necessary modifications shall bring the entry into conformity with the criteria of Annex 2 to the Agreement, taking account of the corrections introduced in the Plan. No correction made to the Plan *after 1 August 1982* shall entail a readjustment of the modifications to the Plan.

ANNEX 2

to Resolution No. 2

Procedure for the Resolution of Incompatibilities and for the Protection of Assignments Appearing in the Plan in the Post-Conference Period

Section 1 — Procedures for the Resolution of Incompatibilities

1. The administrations whose assignments appear in List B of the Plan shall continue negotiations with the administrations with which unresolved incompatibilities exist in order to find solutions as quickly as possible. To this end, administrations may request the Board to provide information on existing interference on forms similar to those used during the Conference. They may conduct negotiations by correspondence, by bilateral or multilateral meetings, or by any other means which they consider appropriate in order to achieve a satisfactory outcome in the shortest possible time. In all cases, the IFRB shall be kept informed of the progress of the discussions.

2. When the negotiations concerning a List B assignment result in its acceptance by all the administrations with assignments adversely affected, it may be transferred from List B to List A of the Plan.

3. An administration which has obtained the agreement of all the administrations with assignments adversely affected as a result of the application of paragraph 2 above shall so notify the IFRB by sending it the form referred to above, signed by the competent representatives of the administrations with which agreement has been reached. The names of those administrations which have agreed to modify the characteristics of their stations in order to resolve the incompatibility shall be indicated on the form.

4. When sending the notification of agreement as indicated in paragraph 3 above, the administration shall also notify the IFRB of any modification of the characteristics of its station, using the forms in Annex 3 to the Agreement and inserting a reference to the present Resolution in the Remarks section.

5. An administration which has agreed to modify the characteristics of any of its assignments in order to resolve the incompatibility shall also notify the IFRB of these modifications, using the forms in Annex 3 to the Agreement and inserting a reference to the present Resolution in the Remarks section.

6. When the IFRB has received the forms referred to in paragraphs 3 and 4 from all the administrations concerned, it shall assess the effect of the proposed modifications on the assignments in Lists A and B and publish the information received in a special section of its weekly circular, adding the name of any administration (other than those proposing the modifications) whose assignment in Lists A or B would be adversely affected by the proposed modification.

7. The Board shall immediately transfer the assignment concerned from List B to List A if the resolution of the incompatibility has either

a) involved no modification to the characteristics of any of the stations concerned, or

b) involved only modifications which are not capable of causing increased interference to an assignment of an administration which was not party to the negotiations resulting in the resolution of the incompatibility.

8. If an administration identified in the special section of the weekly circular in accordance with paragraph 6 does not send any comment to the IFRB within 60 days from the date of the publication of the relevant weekly circular, it shall be deemed to have accepted the proposed modification; the IFRB shall modify the characteristics of the stations recorded in the Plan and transfer from List B to List A the assignment for which this procedure has been successfully applied.

9. If, on the other hand, any such administration informs the IFRB, within 60 days from the date of publication of the relevant weekly circular, that it wishes to be further consulted about the proposed modification, the procedure for the resolution of incompatibilities shall be reapplied and negotiations resumed in accordance with paragraph 1, until a solution satisfactory to all parties is reached.

10. When applying the procedures of this annex, administrations shall take account of the principles enunciated in Annex 3 to this Resolution.

Section 2 — Protection of assignments appearing in the Plan

11. Assignments in Lists A and B of the Plan shall be protected against modifications to the Plan on the basis of the following criteria:

1) Assignments in List A are protected in accordance with the terms of the Agreement;

2) The field strength to be protected for determining whether interference to an assignment in List B is acceptable shall be the greater of the following values:

a) the nominal usable field strength value;

b) the usable field strength value resulting from the contributions in Lists A and B, with the exception of the highest contribution in List B, in cases where this contribution is from an assignment of another administration;

c) if the contour corresponding to a given azimuth lies outside the national territory of the country in which the station concerned is situated, the field strength at the national frontier as stipulated in paragraph 4.10.4 of Annex 2 to the Agreement;

d) after 31 December 1983, the maximum value of interference which the assignment causes to a List B assignment of another administration.

12. A planned station in List B may be put into operation, unless it causes unaccepted interference to a station which was in operation as of 1 January 1982.

ANNEX 3

to Resolution No. 2

Principles Recommended for the Resolution of Incompatibilities

In order to facilitate the transfer of assignments from List B to List A, it is recommended that administrations should consider the principles set out below for the resolution of incompatibilities. The IFRB will also use these principles, when appropriate, in the development of recommendations for the resolution of incompatibilities.

1. The Region shall be subdivided into several Sub-Regions. In each Sub-Region, the usable field strength E_u for each class of station shall be averaged and the results made available to administrations in order to define an interference threshold on the basis of which solutions may be proposed to the administrations concerned.

2. When an operating station cannot be entered in List A because it receives an unaccepted level of interference from a planned station, a suitable limitation of radiation towards the operating station shall be recommended for the planned station. This could be achieved by the use of a directional antenna or other suitable change in the technical characteristics of the assignment.

3. When an operating station cannot be entered in List A because it causes to or receives from another operating station an unaccepted level of interference, the two administrations concerned are encouraged to develop, on a mutual basis, the solution to be adopted. This may involve the acceptance of a higher interference level, the use of suitable directional antenna patterns, reductions in power or, if necessary, a change in frequency.

4. When an operating station cannot be entered in List A because it causes an unaccepted level of interference to a planned station, the most suitable way should be sought to modify the characteristics of the planned station in order to resolve the incompatibility, including, if possible a change of frequency.

5. In seeking the most suitable way of resolving an incompatibility, due consideration should also be given to the relative classes or powers of the stations involved.

RESOLUTION No. 3

Provisional Application of Articles 4 and 5 of the Agreement

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

considering

a) that before the date of entry into force of the Agreement, proposals may be submitted to modify the Plan pursuant to Article 4 of the Agreement;

b) that it would be advisable to avoid any delays and complications which might arise from an accumulation of unprocessed modifications;

c) that during the period in question it is possible that administrations will propose to bring into service the assignments recorded in the Plan and that it is essential to avoid interference to stations in service which have to adapt their technical characteristics in order to conform to the Plan;

d) that it is necessary to notify the bringing into service of the assignments in conformity with the provisions of the Radio Regulations;

e) that it would therefore be advisable to apply provisionally the procedures described in Articles 4 and 5 of the Agreement for modifying the Plan and for bringing assignments into service;

noting

a) that the assignments appearing in the Plan are divided into two separate lists as provided in Resolution No. 2;

b) that the application of the technical criteria of Annex 2 to the Agreement to stations in List B of the Plan may not afford them adequate protection from modifications to the Plan;

resolves

1. that, before the date of entry into force of the Agreement, any administration proposing modifications to the Plan shall apply the procedure described in Article 4 of the Agreement and take account of the provisions of section 2 of Annex 2 to Resolution No. 2;

2. that the assignments recorded in the Plan pursuant to this Resolution will have the same status as those introduced in the Plan after the entry into force of the Agreement;

3. that, if the application of Article 4 to a proposed modification under this Resolution involves time limits after the date of entry into force of the Agreement, the stages of the procedure described in Article 4 applied before that date, and the associated time limits, shall be regarded as an application of the Agreement;

4. that if, before the date of entry into force of the Agreement, an administration proposes to bring an assignment appearing in List A of the Plan into service, it shall apply the procedure described in Article 5 of the Agreement.

RESOLUTION No. 4

Assignments of Non-Signatory Countries in Region 2

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

recalling

a) that all Region 2 countries were invited to the Conference sufficiently early to submit their requirements and to participate in bilateral and multilateral negotiations;

b) that it asked the IFRB, pursuant to No. 999 of the Radio Regulations, to assist countries not represented at the Conference by dealing with the requirements submitted by them;

noting

a) that these requirements substantially affect the requirements of other countries and vice versa;

b) that owing to the difficulties of communication experienced by the IFRB, it was not possible to complete the coordination process between countries represented at the Conference and those which were not represented, despite the communication facilities provided by the Brazilian Administration;

c) that some countries in Region 2 are not at present Members of the Union;

considering

a) that the Basic Inventory contained the requirements submitted by all the countries in the Region, including the requirements of countries not represented at the Conference, and those of countries not yet Members of the Union;

b) that the Conference has included the requirements of non-signatory countries in the Plan;

c) that since the objective of the Conference was to draw up an Agreement and a Plan covering all the countries in the Region, all the countries of Region 2 should be encouraged to become contracting parties to the Agreement, after where required having acceded to the International Telecommunication Convention;

d) that it is in the interest of the non-signatory countries, including those which are not yet Members of the Union, to develop their MF broadcasting service in accordance with the Plan, so as to render it compatible with those of the other countries of the Region;

strongly urges non-signatory countries

to accede to the Agreement;

strongly urges the countries of Region 2 which are not yet Members of the Union

1. to accede to the International Telecommunication Convention and to the Agreement;

2. meanwhile, to apply the procedure for resolving incompatibilities after the Conference (Resolution No. 2), and to apply the provisions of the Agreement in the operation of their MF broadcasting service;

resolves

1. that the assignments of non-signatory countries in List B shall bear a symbol to indicate that a signatory country shall not be required to take the assignment into account in transferring its station from List B to List A or in modifying the Plan; however, for operating stations as at 10 November 1981, this symbol shall be applicable as from 1 August 1982. In the case of participating countries which did not sign the Final Acts, this symbol shall be applicable from 1 January 1982. When the IFRB receives from the non-signatory country a letter undertaking to observe the provisions of Resolutions Nos. 2, 3 and 4, the symbol shall be deleted in accordance with *resolves* 5, and the IFRB shall inform by circular telegram all the administrations in the Region of the action taken;

2. that the IFRB shall transfer from List B to List A of the Plan those assignments of List B which were prevented from entering into List A due to an incompatibility with a station bearing the symbol;

3. that the IFRB, using all the means at its disposal, shall endeavour to communicate with the administrations of non-signatory countries and explain;

   a) the conditions under which the Conference has included their assignments in the Plan;

   b) the benefits which would derive from their accession to the Agreement;

4. that if, as a result of this action, an administration indicates its intention to accede to the Agreement, the IFRB shall:

   a) examine the situation of the stations of this country in relation to the assignments in the Plan; and

   b) communicate the results of its studies to all the administrations concerned, indicating the interference level which, in its opinion, should be accepted by the acceding country and the names of the countries with which an agreement must be sought;

5. that, when the Secretary-General receives an instrument of accession from a non-signatory administration, or when the IFRB receives the letter referred to in *resolves* 1, the IFRB shall delete the symbol except in any case where interference is caused to a station in List A;

6. that, when the IFRB is advised by the acceding administration that it has reached the required agreement with the administrations whose assignments in List A of the Plan are affected, it shall publish this information and amend the Plan in accordance with Resolution No. 2;

recommends to the Administrative Council

that it should allocate sufficient resources to the IFRB to perform the tasks specified in this Resolution;

invites the Secretary-General

1. to inform the countries which are not yet Members of the Union of the provisions of this Resolution and of the favourable consideration given by the Conference to their requirements, and to explain to them the advantages of accession to the Convention and to the Agreement;

2. to support the action of the IFRB foreseen in *resolves* 3 above by bringing this Resolution to the attention of the Members concerned.

RESOLUTION No. 5

Review of the Values of Nominal Usable Field Strength

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

considering

that there is a need to review the available data concerning noise levels in order to ensure accuracy and compatibility of the values of nominal usable field strength used in Region 2;

instructs the IFRB

1. to analyze the existing data concerning noise levels in Noise Zone 2 on the basis of its technical standards, CCIR Recommendations, and its experience in administering the Plan for Region 2, taking into consideration the documents submitted to the Conference at its Second Session;

2. to communicate to the administrations of Region 2, by 31 December 1982, the results of the study together with recommended values of nominal usable field strength;

3. to invite the administrations of Region 2 to communicate their comments to the IFRB within a period of 180 days;

4. to maintain a list of those administrations which accept the recommended values of nominal usable field strength to be used in the application of the procedure of Article 4 of the Agreement for stations in noise zone 2;

5. to use these recommended values in the application of the procedure of Article 4 of the Agreement between those administrations which have accepted them;

6. to make available to the administrations in Region 2 a standard procedure for analyzing data concerning noise levels and determining appropriate values of nominal usable field strength;

invites the Administrative Council

to include in the agenda of the Conference scheduled to be held in 1986 for the planning of the 1 605 - 1 705 kHz frequency band in Region 2, consideration of the values of nominal usable field strength to be used by the IFRB in calculating interference in Noise Zone 2 in the 535 - 1 705 frequency band;

requests the CCIR

to conduct a study of the noise experienced in Region 2 in the frequency band 535 - 1 705 kHz;

invites the administration of Region 2

to submit, when a conference is called to revise the Plan, proposals concerning appropriate values of nominal usable field strength to be used thereafter in Region 2.

RESOLUTION No. 6

Abbreviated Title of the Frequency Assignment Plan For the MF Broadcasting Service in Region 2

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

noting

a) that to facilitate references an abbreviated title for the Plan will be needed;

b) that the administrations attending this Conference are grateful to the Administration of Brazil for having hosted this Conference and providing excellent facilities for the work of the Conference;

resolves

That the Frequency Assignment Plan for the MF Broadcasting Service in Region 2 shall be referred to as "The Rio de Janeiro Plan".

RECOMMENDATION No. 1

Technical Criteria for the Examination of Frequency Assignment Notices by the IFRB in Relation to Interregional Interference

The Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

noting

a) that under the terms of Article 5 of the Agreement, frequency assignments contained in the Plan are to be notified to the IFRB in accordance with the provisions of Article 12 of the Radio Regulations;

b) that in accordance with the decisions of the World Administrative Radio Conference, Geneva, 1979, assignment notices relating to broadcasting stations in the band 535 - 1 605 kHz will, upon the entry into force of the Final Acts of this Conference, be examined by the IFRB with respect to their conformity with Article 12;

c) that the registration and examination process of Article 12 will be the only procedure for avoiding harmful interference between stations operating in Region 2 on the one hand and in Regions 1 and 3 on the other and that therefore the IFRB will adopt appropriate technical standards;

d) that, in conformity with the provisions of number 47 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 such instructions do not conflict with the interests of the two other Regions;

considering

that in accordance with numbers 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* upon 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;

recognizing

that the restricted amount of data available pertaining to measurements of signal strength observed on interregional path limits the reliability of signal strength predictions on such paths;

recommends

1. that the IFRB should take account of the technical criteria set out in the Annex to this Recommendation when adopting its technical standards for the purpose of examining frequency assignment notices relating to Region 2 broadcasting stations in the band 535 - 1 605 kHz with respect to the probability of harmful interference to stations in Regions 1 and 3 and vice versa;

2. that in accordance with number 1001.1 of the Radio Regulations, the IFRB shall distribute to all Members of the Union as soon as possible the technical standards adopted for the calculations of interregional interference;

urges administrations

to carry out further measurements of signal strengths observed on inter regional paths, and to furnish the results of these measurements to the CCIR;

requests the CCIR

to use such data for refinement of the existing model for predicting MF night-time signal strengths over interregional paths, particularly those terminating in Region 2.

ANNEX

to Recommendation No. 1

1. The level of interregional interference should be determined as follows: the arithmetic mean of the signal strengths, expressed in dB(μV/m) for a specified e.m.r.p., calculated both by the method described in Annex I to CCIR Recommendation 435-3 and by the method used within Region 2 (which disregards the excess polarization coupling loss), should be used for determining signal strengths on interregional paths. In computing the mean, signal strengths calculated by the Region 2 method should be increased by 2.5 dB so as to allow for the different reference hours of the two methods.

2. The value determined in accordance with paragraph 1 applies when it is midnight at the mid-point of the path, provided that the entire path is in darkness. Signal strengths at other times are unlikely to exceed this value.

3. In calculating the interregional protection required, the protection ratio used should be adjusted according to curve A of Figure 1 of CCIR Recommendation 560. It is recommended that the IFRB, when dealing with interregional interference, should apply protection criteria to each Region which are accepted in that Region for its own stations.

RECOMMENDATION No. 2

Preparation 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 Regional Administrative MF Broadcasting Conference (Region 2), Rio de Janeiro, 1981,

noting

a) that the band 1 605 - 1 705 kHz has been allocated to the broadcasting service in Region 2 by the World Administrative Radio Conference, Geneva, 1979, under the conditions to be determined at a regional administrative radio conference to establish a plan for the broadcasting service in this band;

b) that Recommendation No. 504 of the World Administrative Radio Conference, Geneva, 1979, provides for the convening of a regional administrative radio conference to establish a plan for the broadcasting service in the band 1 605 - 1 705 kHz in Region 2;

considering

a) that is is difficult to accommodate the present needs of the broadcasting service in the frequency band 535 - 1 605 kHz;

b) that the Agreement has been established with a view to meeting the requirements of the medium frequency broadcasting service for a period of about 10 years from the date of entry into force of the Agreement;

c) that the Administrative Council has scheduled a regional administrative radio conference to be held in 1986 to establish a plan for the broadcasting service in the band 1 605 - 1 705 kHz;

recommends

1. that the administrations of Region 2, should avoid making frequency assignments to stations in services other than the broadcasting service in the band 1 605 - 1 705 kHz, in view of the adverse effect that such assignments would have on the future planning of this band for the medium frequency broadcasting service in Region 2;

2. that, in consultation with the administrations of Region 2, the Administrative Council should consider the advisability of holding a single conference not later than 1988 to plan the use of the 1 605 - 1 705 kHz band and at the same time to review and revise as necessary the Plan adopted at this Conference;

invites the CCIR

to carry out the necessary technical studies so as to allow satisfactory planning in the band 1 605 - 1 705 kHz;

instructs the IFRB

– to prepare a report to the Conference concerning the application of the Agreement and in particular the application of the procedures; and

– to consult the administrations of Region 2, 18 months prior to the convening of the Conference, regarding their frequency requirements in the 1 605 - 1 705 kHz band.

RECOMMENDATION No. 3

Interpretation of the Term "Harmful Interference" In the Case of the MF Broadcasting Service in Region 2

The Regional Administrative MF Broadcasting Conference, (Region 2), Rio de Janeiro, 1981,

noting

that the definition of harmful interference given in Article 1 of the Agreement states, in part, that "Interference which ... seriously degrades, obstructs or repeatedly interrupts a radiocommunication service";

considering

a) that the broadcasting service is the only ready means of communication to the general public in the event of abnormal situations such as highway closures, severe weather conditions or other situations of which the public should be urgently informed;

b) that safety of life may well be involved in the event of existing or imminent emergencies including natural disasters such as hurricanes, blizzards, tornadoes, forest fires or tidal waves, and other disasters such as the escape of toxic chemicals or imminent explosion;

c) that the degradation, obstruction or repeated interruption of satisfactory reception within the protected contour of a broadcasting station is harmful to the interests of the administration concerned, to the station to which the assignment belongs and to the public;

d) that harmful interference can be experienced within the broadcasting service;

recommends that the IFRB

should consider harmful interference to be the same level of interference as "objectionable interference" as defined in Annex 2 to the Agreement in interpreting the term "harmful interference" in the application of the Radio Regulations to the MF Broadcasting Service in Region 2.

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