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INTERNATIONAL TELECOMMUNICATION UNION

FINAL ACTS

of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries

Geneva, 1989

Geneva 1990

COVERING NOTE

GENERAL SECRETARIAT OF THE INTERNATIONAL TELECOMMUNICATION UNION

Geneva, 7 October 1991

Subject: Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries, Geneva, 1989

ERRATUM

1. Page 5: Replace text of section 4.2.8a) by the following text:

"a) identify the administrations whose assignments or services are likely to be affected in conformity with sections 4.2.2, 4.2.3 and 4.2.4;"

2. Page 15: Replace the first sentence of Annex 2 by the following text:

"These technical data were used for the preparation of the Plan and they shall also be used for the application of the Agreement."

3. Replace pages 13, 14 and 87 by the attached new pages. These corrections will necessitate corresponding amendments to the microfiches annexed to the Final Acts. Therefore, the microfiches will be aligned at the time of the publication of the new edition of the Plan.

ANNEX 1

Layout of the Frequency Assignment Plan

(Information included in the columns of the Plan)

Note by the General Secretariat: The Plan is published in the form of microfiches placed in the pocket at the end of this volume. The Plan has also been published in Conference documents 112 (+Corr. 1 and 2) and 113(Rev. 2) (+Corr. 1).

No.	IFRB Serial Number
[1]	Symbol designating the Administration
[2]	Vision carrier nominal frequency (MHz)
[3]	Sound carrier nominal frequency (MHz)
[4]	Vision carrier offset (positive or negative multiples of 1/12 line frequency)
[5]	Sound carrier offset (positive or negative multiples of 1/12 line frequency)
[6]	Television system (B, G, H, I, K1)
[7]	Colour system (P = PAL, S = SECAM)
[8]	Name of the transmitting station
[9]	Symbol designating the country or geographical area in which the transmitting station is located (see Table B1 of the Preface to the International Frequency List)
[10]	Longitude and latitude of the transmitting antenna site (degrees and minutes)
[11]	Altitude of the transmitting antenna site above sea level (m)
[12]	Height of the antenna above ground level (m)
[13]	Maximum effective height of the antenna (m)
[14]	Effective height of the antenna (m) in different azimuths (every 10°)
[15]	Polarization of emission (H = horizontal, V = vertical)
[16]	Maximum effective radiated power of the vision carrier (dBW)
[17]	Vision to sound carrier effective radiated power ratio

[18] Type of transmitting antenna (ND, D)

[19] Attenuation (dB) in different azimuths with respect to the maximum effective radiated power (every 10°)

[20] **Remarks**

1/ This assignment is subject to the application of the provisions of Article 14 of the Radio Regulations.

2/ This station is situated in the European Broadcasting Area. It is shown in the present Plan for information only.

3/ Coordination of this assignment with the administration indicated was not completed during the conference.

4/ The Libyan administration does not agree to the coordinates of this assignment because it is in Libyan territory.

5/ This assignment is not in conformity with RR1240 and has been included in the Plan due to an oversight by the Conference. Accordingly, it is not taken into account in the application of Resolution 1 of the Conference nor in the modifications to the Plan. Any notification of this assignment under Article 12 of the Radio Regulations will be considered as being in contravention of the Table of Frequency Allocations.

ANNEX 3

Basic Characteristics of Television Stations to be Submitted for Modifications to the Plan in Accordance with Article 4 of the Agreement

No. IFRB Serial Number

[1] Symbol designating the Administration

[2] Vision carrier nominal frequency (MHz)

[3] Sound carrier nominal frequency (MHz)

[4] Vision carrier offset (positive or negative multiples of 1/12 line frequency)

[5] Sound carrier offset (positive or negative multiples of 1/12 line frequency)

[6] Television system (B, G, H, I, K1)

[7] Colour system (P = PAL, S = SECAM)

[8] Name of the transmitting station

[9] Symbol designating the country or geographical area in which the transmitting station is located (see Table B1 of the Preface to the International Frequency List)

[10] Longitude and latitude of the transmitting antenna site (degrees and minutes)

[11] Altitude of the transmitting antenna site above sea level (m)

[12] Height of the antenna above ground level (m)

[13] Maximum effective height of the antenna (m)

[14] Effective height of the antenna (m) in different azimuths (every 10°)

[15] Polarization of emission (H = horizontal, V = vertical)

[16] Maximum effective radiated power of the vision carrier (dBW)

[17] Vision to sound carrier effective radiated power ratio

[18] Type of the transmitting antenna (ND or D)

[19] Attenuation (dB) in different azimuths with respect to the maximum effective radiated power (every 10°)

[20] Agreements obtained with ..... (administration(s))

[21] Remarks

INTERNATIONAL TELECOMMUNICATION UNION

FINAL ACTS

of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries

Geneva, 1989

Geneva 1990

ISBN 92-61-03991-X

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(Figures between parentheses indicate the order in which the statements appear in the Final Protocol.)

RESOLUTIONS

RECOMMENDATIONS

REGIONAL AGREEMENT

(Geneva, 1989)

Relating to the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries

PREAMBLE

The duly accredited delegates of the following Members of the International Telecommunication Union:

People's Democratic Republic of Algeria, Kingdom of Saudi Arabia, State of Bahrain, People's Republic of Benin, Republic of Botswana, Burkina Faso, Republic of Burundi, Republic of Cameroon, People's Republic of the Congo, Republic of Côte d'Ivoire, Arab Republic of Egypt, United Arab Emirates, Spain, People's Democratic Republic of Ethiopia, France, Gabonese Republic, Ghana, Republic of Guinea, Islamic Republic of Iran, Republic of Iraq, Republic of Kenya, State of Kuwait, Kingdom of Lesotho, Republic of Liberia, Socialist People's Libyan Arab Jamahiriya, Democratic Republic of Madagascar, Malawi, Republic of Mali, Kingdom of Morocco, Mauritius, Islamic Republic of Mauritania, People's Republic of Mozambique, Republic of the Niger, Federal Republic of Nigeria, Sultanate of Oman, State of Qatar, Rwandese Republic, Republic of Senegal, Kingdom of Swaziland, Republic of Chad, Togolese Republic, Yemen Arab Republic, People's Democratic Republic of Yemen, Republic of Zambia, Republic of Zimbabwe,

meeting in Geneva for a Regional Administrative Radio Conference convened under the terms of Articles 7 and 54 of the International Telecommunication Convention (Nairobi, 1982) to establish an Agreement incorporating a Plan for television broadcasting in the bands indicated in Article 3 of this Agreement have adopted, subject to the approval of the competent authorities of their respective countries, the following provisions and the related Plan concerning the television broadcasting service in those bands, together with provisions for other primary and permitted services in the planning area as defined in Article 1 of this Agreement.

ARTICLE 1

Definitions

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

1.1 *Union:* The International Telecommunication Union.

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

1.3 *IFRB:* The International Frequency Registration Board.

1.4 *CCIR:* The International Radio Consultative Committee.

1.5 *Convention*: The International Telecommunication Convention (Nairobi, 1982).

1.6 *Radio Regulations:* The Radio Regulations (1982 edition, revised in 1985, 1986, 1988 and by WARC MOB-87) annexed to the *Convention.*

1.7 *Conference:* The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries[1)]

1.8 *Planning Area:* The African Broadcasting Area as defined in Nos. **400** to **403** of the *Radio Regulations* and the following neighbouring countries: Bahrain, the Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Yemen Arab Republic and the remainder of the People's Democratic Republic of Yemen which is not situated in the African Broadcasting Area.

1.9 *Agreement:* The Regional Agreement and its Annexes as drawn up by this *Conference.*

1.10 *Plan:* The Plan as specified in section 3.1.1.

1.11 *Contracting Member:* Any Member of the *Union* in the *planning area* which has approved or acceded to this *Agreement.*

1.12 *Administration:* Unless otherwise indicated, the term administration designates the administration, as defined in No. **2002** of the *Convention*, of a *Contracting Member.*

1.13 *Assignment in conformity with this Agreement:* Any assignment appearing in the *Plan,* or for which the procedure of Article 4 has been successfully applied.

ARTICLE 2

Execution of the Agreement

2.1 The Contracting Members shall adopt for their television broadcasting stations in the planning area operating in the VHF and UHF bands referred to in Article 3 the characteristics specified in the Plan.

1) This Conference was held in two sessions:

- the First Session, responsible for preparing a report to the Second Session, was held in Nairobi from 22 September to 9 October 1986;
- the Second Session, responsible for drawing up an Agreement and an associated Frequency Assignment Plan, was held in Geneva from 13 November to 8 December 1989.

2.2 The Contracting Members shall not modify these characteristics or establish new stations, except under the conditions provided for in Article 4.

2.3 Administrations of the planning area may use different technical criteria from those contained in Annex 2 to the Agreement on the condition of providing the same protection to the Plan, confirmed by the IFRB, as provided for in the Agreement.

2.4 The Contracting Members undertake to apply the procedures of Article 5 for the other services to which these bands are also allocated.

2.5 The Contracting Members undertake to study and, in common agreement, to put into practice the measures necessary to eliminate any harmful interference that might result from the application of the Agreement.

2.6 Should agreement, as envisaged in section 2.5 above, prove impossible, the Contracting Members concerned may, in accordance with Article 35 of the Convention, resort to the procedure laid down in Article **22** of the Radio Regulations.

ARTICLE 3

Annexes to the Agreement

3.1 *Annex 1: The Plan and its Appendix*

Frequency Assignment Plan for VHF/UHF Television Broadcasting Stations in the African Broadcasting Area and Neighbouring Countries.

3.1.1 The Plan contains frequency assignments and associated characteristics of television broadcasting stations, agreed to either during the Conference or by the application of the provisions of Article 4, or agreed to after the Conference in accordance with Resolution No. 3, in the following frequency bands:

- 47 - 68 MHz (the Plan is limited to the band 54 - 68 MHz in the following countries: Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe);
- 174 - 230 MHz;
- 230 - 238 MHz and 246 - 254 MHz for the countries listed in No. **635** of the Radio Regulations;
- 470 - 862 MHz.

3.1.2 The Appendix to the Plan contains the list of the frequency requirements for a specified period, which could not be agreed to during the Conference (see Resolution No. 3).

3.2 *Other Annexes*

Annex 2: Technical data

Annex 3: Basic characteristics of television stations to be submitted for modifications to the Plan in accordance with Article 4 of the Agreement

Annex 4: Limits for determining when agreement with another administration is required

Annex 5: Additional technical data which may be used for coordination between administrations.

ARTICLE 4

Procedure Concerning Modifications to the Plan

4.1 *Modifications to the Plan*

When an administration proposes to make a modification to the Plan, i.e.:

- to modify the characteristics of a frequency assignment to a television broadcasting station appearing in the Plan; *or*
- to add to the Plan a frequency assignment to a television broadcasting station; *or*
- to cancel from the Plan a frequency assignment to a television broadcasting station,

the procedure contained in this Article shall be applied before any notification is made under Article 5.

4.2 *Initiation of the modification procedure*

4.2.1 Any administration proposing to modify the characteristics of an assignment appearing in the Plan or to add a new assignment to the Plan shall, either directly or through the IFRB, obtain the agreement of any other administration whose primary or permitted services are likely to be affected.

4.2.2 The television broadcasting service of an administration is likely to be affected by a proposed modification to the Plan if the appropriate limits indicated in Chapter 1 of Annex 4 are exceeded.

4.2.3 The assignments to stations of the fixed service of an administration recorded in the Master Register with a favourable finding are likely to be affected by a proposed modification to the Plan if the appropriate limits indicated in Chapter 2 of Annex 4 are exceeded.

4.2.4 The assignments to stations of the mobile service of an administration recorded in the Master Register with a favourable finding are likely to be affected by a proposed modification to the Plan if the appropriate limits indicated in Chapter 3 of Annex 4 are exceeded.

4.2.5 The agreement referred to in section 4.2.1 is not required if:

a) the proposed modification related to a reduction in effective radiated power or to other changes which would not increase the level of interference to services of other countries; *or*

b) none of the appropriate limits referred to in § 4.2.2, 4.2.3 and 4.2.4 are exceeded; *or*

c) the proposed modification relates to a change in the site of the station and the distance between the actual site of the transmitter and the site indicated in the Plan is not greater than:

- 5 km for low power stations as defined in section 1.6 of Annex 2;
- 15 km for all other stations,

provided that the change in topographical conditions does not increase the probability of interference caused to the stations of other countries.

4.2.6 An administration proposing to modify the Plan shall communicate to the IFRB the information listed in Annex 3 and shall also indicate, if appropriate:

a) that the agreement referred to in section 4.2.1 is not required with any administration; *or*

b) the names of any administrations which have already agreed to the modification proposed on the basis of the characteristics communicated to the IFRB.

4.2.7 When requesting the agreement of another administration, the administration proposing to modify the Plan may also communicate any additional information relating to proposed methods and criteria to be used as well as other details concerning the terrain, particular propagation conditions, etc. (see also Annex 5).

4.2.8 On receipt of the information referred to in section 4.2.6 above, the IFRB shall within 90 days:

a) identify the administrations whose assignments or services are likely to be affected in conformity with sections 4.2.2, 4.2.3, 4.2.4 and 4.2.5;

b) immediately send a telex to those administrations identified in *a)* above which have not yet given their agreement, drawing their attention to the information contained in the special section of a forthcoming weekly circular and indicating the nature of the modification to the Plan;

c) publish the information received in the special section of this weekly circular, together with the names of the administrations identified, indicating those whose agreement has been obtained.

4.3 *Consultation of the administrations whose assignments may be affected*

4.3.1 The special section of the IFRB weekly circular referred to in section 4.2.8 *c)* constitutes the formal request for agreement addressed to those administrations whose agreement remains to be obtained.

4.3.2 Any administration which considers that it should have been included in the list of administrations whose frequency assignments are likely to be affected may, within 40 days from the date of publication of the weekly circular, request the IFRB by telex to include its name. A copy of the request shall be sent to the administration proposing the modification to the Plan.

4.3.3 On receipt of the telex, the IFRB shall consider the matter and, if it finds that the name of the administration should have been included in the list, it shall :

- inform the administrations concerned by telex; and
- publish the name of the administration in an addendum to the special section of the weekly circular referred to in section 4.2.8 *c)*.

For this administration, the overall period of 100 days specified in section 4.3.10 shall run from the date of publication of the addendum to the special section of the weekly circular referred to above.

4.3.4 An administration receiving a telex from the IFRB sent in accordance with sections 4.2.8 or 4.3.3 above shall acknowledge receipt within 50 days.

4.3.5 If the IFRB has not received an acknowledgement after 50 days, it shall send a reminder telex and inform the administration that, if no reply is received within 10 days, it will be deemed to have received the request for agreement.

4.3.6 On receipt of the special section of the IFRB weekly circular referred to in sections 4.2.8 *c)* and 4.3.3, any administration listed therein shall determine the effect produced on its assignments by the proposed modification to the Plan, using any of the additional information referred to in section 4.2.7 which it finds acceptable.

4.3.7 If the administration consulted is responsible for:

4.3.7.1 a television broadcasting assignment, it should normally accept the proposed modification provided that the resulting nuisance field strength does not exceed :

47 dB (μV/m) in band I

53 dB (μV/m) in band III

62 dB (μV/m) in band IV

67 dB (μV/m) in band V

4.3.8 An administration receiving a telex from the IFRB sent in accordance with sections 4.2.8 or 4.3.3 may request the IFRB to calculate the increase in the usable field strength or the nuisance field strength resulting from the proposed modification, using the method described in Annex 2.

The IFRB shall send these results by the most expeditious means.

4.3.9 An administration may ask the administration proposing the modification to the Plan for any additional information it considers necessary to calculate the increase in the usable field strength. Similarly, the administration proposing the modification may ask any administration whose agreement it seeks for any additional information it considers necessary. The administrations shall inform the IFRB of such requests.

4.3.10 An administration which is not in a position to give its agreement to the proposed modification shall give its reasons within 100 days from the date of the weekly circular referred to in section 4.2.8 *c)*.

4.3.11 Seventy days after publication of the weekly circular referred to in section 4.2.8 or 4.3.3, the IFRB shall request by telex any administration which has not yet given its decision in the matter to do so and shall inform it that, if no reply is received within an overall period of 100 days following the date of publication of the weekly circular, it is deemed to have agreed to the proposed modification to the Plan. This time limit may be extended by 14 days in the case of an administration which has requested additional information or which has asked the IFRB to carry out technical studies.

4.3.12 If at the end of the 100-day period (possibly extended by 14 days) there is continuing disagreement, the IFRB shall make any study that may be requested by these administrations; it shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.3.13 An administration may request the assistance of the IFRB in the following cases:

- in seeking the agreement of another administration;
- in applying any stage of the procedure described in this Article;
- in carrying out technical studies in relation to this procedure;
- in applying the procedure with respect to other administrations.

4.4 *Comments of other administrations*

4.4.1 On receipt of the special section of the IFRB weekly circular published pursuant to section 4.2.8, administrations may send their comments to the administration proposing the modification either directly or through the IFRB. In any event the IFRB shall be informed that comments have been made.

4.4.2 An administration which has not notified its comments to the administration concerned, either directly or through the IFRB, within a period of 100 days following the date of the weekly circular referred to in section 4.2.8 *c)* shall be understood to have no objection to the proposed change. This time limit may be extended by 14 days in the case of an administration which has requested additional information or which has asked the IFRB to carry out technical studies.

4.5 *Cancellation of an assignment*

When an assignment in conformity with the Agreement is cancelled, whether or not as a result of a modification (for instance, in connection with a change of frequency), the administration concerned shall immediately inform the IFRB, which shall publish this information in a special section of its weekly circular.

4.6 *Updating of the Plan*

4.6.1 An administration which has obtained the agreement of the administrations whose names were published in the special section referred to in sections 4.2.8 and 4.3.3 shall inform the IFRB within one year after the end of the 100-day period (possibly extended by 14 days) indicating the final agreed characteristics of the assignment together

with the names of the administrations with which agreement has been reached. It may bring the assignment in question into use. If the notifying administration informs the IFRB after the one year period, the procedure shall be re-initiated from the beginning.

4.6.2 The IFRB shall publish in the special section of its weekly circular the information received under section 4.2.6 or 4.6.1 together with the names of any administrations with which the provisions of this Article have been successfully applied. With respect to Contracting Members, the assignment concerned shall enjoy the same status as those appearing in the Plan.

4.6.3 The IFRB shall maintain an up-to-date master copy of the Plan, taking account of any modifications, additions and deletions made in accordance with the procedure of this Article.

4.6.4 The Secretary-General shall publish an up-to-date version of the Plan in an appropriate form as and when the circumstances justify and in any case an addendum every three years.

4.7 *Elimination of harmful interference*

If a modification, although made in accordance with the provisions of this Article, causes harmful interference to services of other Contracting Members, the administration which has made the modification shall take the requisite action to eliminate such interference.

4.8 *Settlement of disputes*

If, after application of the procedure described in this Article, the administrations concerned have been unable to reach agreement, they may resort to the procedure described in Article 50 of the Convention. They may also agree to apply the Optional Additional Protocol to the Convention.

ARTICLE 5

Notification of Frequency Assignments

5.1 *Notification of frequency assignments to television broadcasting stations*

When an administration of a Contracting Member proposes to bring into use a television broadcasting assignment in conformity with this Agreement, it shall notify the assignment to the IFRB in accordance with the provisions of Article 12 of the Radio Regulations. In the case of frequency assignments in the band 230 - 238 MHz or 246 - 254 MHz, see also Resolution No. 1.

In relations between Contracting Members, assignments thus brought into use and entered in the Master International Frequency Register will have the same status, irrespective of the date on which they were brought into service.

5.2 *Notification in the planned bands of frequency assignments to the other primary and permitted services, with the exception of assignments covered by section 5.3*

5.2.1 In the case of frequency assignments to stations in the other non-planned services to which the bands are also allocated, the provisions of Article 12 of the Radio Regulations shall apply, account being taken of the category of service. However, assignments made to stations of these services shall be notified to the Board, if the proposed assignment requires the agreement of another administration in accordance with Chapter 4 of Annex 4.

5.2.2 In the application of No. **1245** of the Radio Regulations, the Board shall examine the notices of these assignments using the criteria in Chapter 4 of Annex 4:

a) if the Board finds that agreement is not required with any other administration, then the assignment shall be recorded in the Master Register;

b) if the Board finds that agreement is required with another administration and such agreement has not been communicated to the Board, the notice shall be returned to the notifying administration;

c) if the Board finds that agreement is required and the agreement has been communicated to the Board, the assignment shall be recorded in the Master Register.

5.3 *Notification of assignments of the fixed service in the band 790 - 862 MHz using a frequency assignment in the Plan for a television broadcasting station*

5.3.1 Administrations may use their broadcasting assignments in the frequency band 790 - 862 MHz for the fixed service on the following conditions:

- the assigned bandwidth of the fixed station is all within the assigned channel;
- the geographical position of the fixed station is the same as that of the broadcasting station in the Plan, or is within the limits of section 4.2.5 *c)* of Article 4;
- the station of the fixed service shall not cause more interference in any direction than would be caused by the broadcasting assignment it replaces;
- the station of the fixed service shall not require greater protection than would be given to the planned broadcasting station it replaces.

5.3.2 When the conditions set out in section 5.3.1 above are satisfied, the Board shall not examine the fixed assignment against the existing or planned broadcasting assignments of the Contracting Members.

ARTICLE 6

Accession to the Agreement

6.1 Any Member of the Union in the planning area 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 to the Agreement shall be made without reservations and shall apply to the Plan as it stands at the time of accession.

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

ARTICLE 7

Scope of Application of the Agreement

7.1 This Agreement shall bind Contracting Members in their relations with one another but shall not bind those Members in their relations with non-Contracting Members.

7.2 If a Contracting Member enters reservations with regard to the application of any provision of this Agreement, other Contracting Members shall be free to disregard such provision in their relations with the Member which has made such reservations.

ARTICLE 8

Approval of the Agreement

8.1 Members signatories to the Agreement shall notify their approval of this Agreement, as promptly as possible, to the Secretary-General, who shall at once inform the other Members of the Union.

ARTICLE 9

Denunciation of the Agreement

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

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

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

ARTICLE 10

Revision of the Agreement

10.1 No revision of the Agreement shall be undertaken except by a competent regional administrative radio conference convened in accordance with the procedure laid down in the Convention, to which all the Members of the Union in the planning area shall be invited.

ARTICLE 11

Entry into Force and Duration of the Agreement

11.1 The Agreement shall enter into force on 1 July 1992 at 0001 hours UTC.

11.2 On that date, with the exception of stations operating in conformity with No. **342** of the Radio Regulations, television broadcasting stations in operation with frequency assignments which do not appear in the Plan or which are not in conformity with the Plan shall cease transmitting. Such stations may resume operation only after the necessary agreements have been obtained in accordance with Article 4.

At this same date, stations in operation which are included in the Appendix to the Plan may only continue to operate until 1 July 1997 with the characteristics shown in the Appendix to the Plan and on condition that they do not cause interference to stations operating in accordance with the Plan.

11.3 The Agreement shall remain in force until it is revised in accordance with Article 10.

IN WITNESS THEREOF, the undersigned delegates of the Members of the Union have, on behalf of the competent authorities of their respective countries, signed this Agreement in a single copy in the Arabic, English, French and Spanish languages; in case of dispute, the French text shall be authentic. This copy shall remain deposited in the archives of the Union. The Secretary-General shall forward one certified true copy to each Member of the Union in the planning area.

Done at Geneva, 8 December 1989

For the People's Democratic Republic of Algeria:

M. OUHADJ
A. KHIDER
M. DERRAGUI
B. NAÏT-DJOUDI

For the Kingdom of Saudi Arabia:

AREF A. FAHD
FOUAD A. TAHER
HABEEB K. AL-SHANKITI
SAMI S. AL-BASHEER
IBRAHIM S. AL-ZAKARI
TARIK S. GHARBAWI
SULAIMAN ALI AL-SAMNAN
SAUD A. AL-RASHEED
YOUSEF SAUD AL-DEHAIM
SAAD MOSLEH AL-HARBI
ABDELRAHIM A. DHAHI
MOHAMED K. AL-NAHEDH
MUSTAFA SIRAJ JAN

For the State of Bahrain:

AL-THAWADI ABDULLA SALEH

For the People's Republic of Benin:

AGNAN BARTHELEMY
OTENIA BEATRIX REMY

For the Republic of Botswana:

HABUJI SOSOME

For Burkina Faso:

ONADIA L. RAPHAEL

For the Republic of Burundi:

KANZINYA PHILIPPE

For the Republic of Cameroon

KAMDEM KAMGA EMMANUEL
MAGA RICHARD
MBEGA HILAIRE

For the People's Republic of the Congo:

POUEBA PAUL ALBERT

For the Republic of Côte d'Ivoire:

YAO KOUAKOU JEAN-BAPTISTE
NIAMIEN YEFFE
LORN PIERRE

For the Arab Republic of Egypt:

FAROUK YOUSEF AMER
IBRAHIM A.M. IBRAHIM
ABDOH HAMED EL FAYOUMI

For the United Arab Emirates:

FAWZI SALEH MUSTAFA
RAIS UL HAQ
ABDULRAHMAN ALMULLA
MOHAMAD ZUBAIR
AHMED NAJEEB HASEEB

For Spain:

PASCUAL MENÉNDEZ-SÁNCHEZ
JOSÉ RAMÓN CAMBLOR-FERNÁNDEZ
ANTONIO JIMÉNEZ-GONZÁLEZ
JUAN MANUEL GONZÁLEZ DE LINARES PALOU
CARLOS-LUIS CRESPO MARTÍNEZ

For the People's Democratic Republic of Ethiopia:

GESSESE ABAI
TESFAYE BEZA

For France:

CHRISTIAN DUTHEIL DE LA ROCHERE
MICHEL POPOT
ALAIN SCHLATTER

For the Gabonese Republic:

YOMBIYENI ISIDORE J.
LEGNONGO JULES
IMOUNGA FRANCIS
NKOGHE N'DONG L.

For Ghana:

KOFI ASAFUA JACKSON

For the Republic of Guinea:

ABDOURAHMANE SYLLA

For the Islamic Republic of Iran:

A.R. BAHRAINIAN
M. TABESHIAN

For the Republic of Iraq:

KHALID A.H. AMIN

M.T. BARAKAT

MOHAMMED R. AL-ANI

DHIYA M. KHAMAS

AUDAY A. ABDULAMIR

ABDUL WAHID A. AL-SAAD

For the Republic of Kenya:

KILONZO W.M.

NZOI PETER S.

SIELE W.K.

For the State of Kuwait:

MAHER N. AL-MUTAWA

MOHAMMED A. HEGAZI

For the Kingdom of Lesotho:

F. L. LETELE

For the Republic of Liberia:

JULIUS F. HOFF

For the Socialist People's Libyan Arab Jamahiriya:

WALID A. LUFTI

EMHEMED SALEH SEBIE

JAMAL A.M. AL-FITURI

SHABAN M. DADESH

SALEH S. AL-MANFI

For the Democratic Republic of Madagascar:

ANDRIANJAKA EUGÈNE

RAKOTOARIVELO BENJAMIN

For Malawi:

PHILIP PETER FRANCIS CHINSEU

For the Republic of Mali:

NOUHOUM TRAORE

SERIBA BAGAYOKO

For the Kingdom of Morocco:

EL GHALI BENHIMA

TOUMI AHMED

HILALE OMAR

HAMMOUDA MOHAMED

For Mauritius:

ST. LAMBERT JOSEPH LEO HERBERT

For the Islamic Republic of Mauritania:

EL HADJ OUMAR OULD MOHAMED VALL

For the People's Republic of Mozambique:

JOÃO JORGE

For the Republic of the Niger:

AMADOU MAMAN SANI

For the Federal Republic of Nigeria:

DAVID E. MORDI

ISAAC M. WAKOMBO

JULIUS O. FADARE

ILESANMI H. IDOWU

GEOFFREY O. OBI

MUHAMMED S. ABUBAKAR

For the Sultanate of Oman:

HAMED BIN YAHYA AL-KINDY

LUFTI BIN SULEIMAN KHALIFA AL-BUSAIDI

For the State of Qatar:

HASSAN MOHAMMAD AL-MASS

HASHIM AHMED MUSTAFAWI

For the Rwandese Republic:

BIZIMANA ASSUMANI

SERUGENDO JOSEPH

For the Republic of Senegal:

CHEIKH TIDIANE NDIONGUE

GUILA THIAM

MAKHTAR FALL

SEYDOU DIALLO

JOSEPH NESSEIM

For the Kingdom of Swaziland:

DLAMINI DAN SIBANGANI
MKHONTA PETROS MLINISELI
FINTELMANN HORST

For the Republic of Chad:

LAONODJI MBAINODJI G. KEITOYO

For the Togolese Republic:

GNASSOUNOU-AKPA KOUASSI ELE
KOMLAN KADZA KWAMI

For the Yemen Arab Republic:

HUSSEIN HUSSEIN AL-NONO

For the People's Democratic Republic of Yemen:

MOHAMED ALI AZZANI
MOHAMED KHUDA BUX WAZIA

For the Republic of Zambia:

MULENGA EDWARD C.
CHILESHE ELIAS
HAMATANGA MUDENDA

For the Republic of Zimbabwe:

DZIMBANHETE FREDSON MATAVIRE
KENNETH HEROLD
ELLIOTT MUCHIMBIRI
ISHMAEL E. CHIKWENHERE

ANNEX 1

Layout of the Frequency Assignment Plan

(Information included in the columns of the Plan)

Note by the General Secretariat: The Plan is published in the form of microfiches placed in the pocket at the end of this volume. The Plan has also been published in Conference documents 112 (+ Corr. 1 and 2) and 113 (Rev.2) (+ Corr. 1)

No. IFRB Serial Number

[1] Symbol designating the Administration

[2] Vision carrier frequency (MHz)

[3] Sound carrier frequency (MHz)

[4] Vision carrier offset (positive or negative multiples of 1/12 line frequency)

[5] Sound carrier offset (positive or negative multiples of 1/12 line-frequency)

[6] Television system

[7] Colour system

[8] Name of the transmitting station

[9] Symbol designating the country or geographical area in which the station is located

[10] Geographical coordinates of the transmitting antenna site (degrees and minutes)

[11] Altitude of the transmitting antenna site above sea level (m)

[12] Height of the antenna above ground level (m)

[13] Maximum effective antenna height (m)

[14] Effective antenna height (m) in different azimuths, every 10°, or at least every 30°

[15] Polarization

[16] Maximum value of effective radiated power (dBW) of the horizontal polarization component of the vision carrier in case of horizontal or mixed polarization

[17] Maximum value of effective radiated power (dBW) of the vertical polarization component of the vision carrier in case of vertical or mixed polarization

[18] Vision to sound effective radiated power ratio

[19] Directivity of the transmitting antenna

[20] Attenuation (dB) with respect to the maximum value of effective radiated power in different azimuths, every 10°

Remarks

1/ This assignment is subject to the application of the provisions of Article 14 of the Radio Regulations.

2/ This station is situated in the European Broadcasting Area. It is shown in the present Plan for information only.

3/ Coordination of this assignment with the administration indicated was not completed during the conference.

4/ The Libyan administration does not agree to the coordinates of this assignment because it is in Libyan territory.

ANNEX 2

Technical data

These technical data were used for the preparation of the Plan and they shall also be used for the preparation of the Agreement.

CHAPTER 1

Definitions

1. The following definitions supplement those contained in the International Telecommunication Convention and in the Radio Regulations.

1.1 *Coverage area*

The area within which the field strength of a transmitter is equal to or greater than the usable field strength.

1.2 *Service area*

The part of the coverage area in which the administration has the right to demand that the agreed protection conditions be provided.

1.3 *Minimum usable field strength*

Minimum value of field strength necessary to guarantee satisfactory service quality in the presence of natural and man-made noise but *in the absence of interference* from other transmitters.

1.4 *Usable field strength*

Minimum value of field strength necessary to guarantee satisfactory service quality for at least 99% of the time and in at least 50% of locations, in the presence of natural and man-made noise and *in the presence of interference* from other transmitters.

1.5 *Reference usable field strength*

The agreed value of the usable field strength that serves as a reference or basis for the Plan.

1.6 *Low power station*

A station with an effective radiated power equal to or less than:

- 100 watts for band 47 - 68 MHz;
- 300 watts for bands 174 - 230 MHz, 230 - 238 MHz and 246 - 254 MHz;
- 500 watts for band 470 - 862 MHz.

CHAPTER 2

Propagation in the VHF/UHF Bands

2.1 *Propagation data for the VHF/UHF television broadcasting service*

2.1.1 *General considerations*

The propagation curves shown in Figures 2.2 to 2.27 are used for the planning of the television broadcasting service. They give, on the basis of statistics of measurement results and also of theoretical considerations, the field strength value exceeded for 50% of locations for time percentages of 50%, 10% and 1%.

The data are given for various types of areas and climates, namely, land, warm sea and areas subject to extreme superrefractivity.

The method used to forecast field strength values in the various propagation zones of the planning area is explained below.

It was also noted that abnormal long-distance (500 - 9 000 km) propagation by ionospheric layers could severely constrain frequency reuse in Band I. However, this factor is disregarded in the application of the Agreement.

2.1.2 *Propagation curves and their application to geographical zones*

2.1.2.1 *Propagation curves*

The propagation curves represented in Figures 2.2 to 2.27 establish a relation between the field strength and the path length; in the case of Figures 2.2 to 2.25 the effective height of the transmitting antenna is the characteristic parameter of each curve in the same figure; the values obtained correspond to a receiving antenna height of 10 m over local ground. The values are expressed in decibels relative to 1 μV/m (dB(μV/m)) for an e.r.p. of 1 kW in the direction of the reception point. The curves give the field strength exceeded at 50% of locations and each figure corresponds to time percentages of 50%, 10% and 1% for one of the geographical zones defined in the following section and shown on the map in Figure 2.28.

The curves for 50% of the time shall be used to determine coverage areas and for calculations of continuous interference, and those for 1% of the time to calculate tropospheric interference.

2.1.2.2 *Geographical division*

Zone 1: temperate and subtropical (continental) regions, displaying propagation conditions similar to those found over land in Europe and North America;

Zone 2: desert regions, displaying propagation conditions found in regions having low humidity and small annual variations in climate;

Zone 3: equatorial regions, displaying propagation conditions found in regions with hot and humid climates;

Zone 4: maritime regions, displaying propagation conditions found over warm seas and in terrestrial zones at low altitude bordering warm seas, where superrefraction conditions occasionally occur. (All the seas around the African continent are Zone 4 except Zones A and B designated below);

Zone A: maritime zone at low latitudes, frequently displaying superrefractivity, for which the propagation curves applicable to Zone 4 shall be used with a correction factor of +10 dB, under the condition that the resulting field strength does not exceed the value calculated for free-space propagation plus 6 dB;

Zone B: maritime zone at low latitudes, frequently displaying superrefractivity, for which the propagation curves applicable to Zone 4 shall be used with a correction factor of +5 dB, under the condition that the resulting field strength does not exceed the value calculated for free-space propagation plus 6 dB:

Zone C: maritime zone from the junction of the coastline of the Islamic Republic of Iran with its border to Pakistan westward along the coastline of the Islamic Republic of Iran and of Iraq, through point 48E 30N along the coastline of Kuwait, the eastern coastline of Saudi Arabia, the coastline of Qatar, of the United Arab Emirates and of Oman down to its intersection with parallel 22N.

For 50% of the time and for all frequency bands, the propagation curves applicable to Zone 4 shall be used with a correction factor of +15 dB, under the condition that the resulting field strength does not exceed the value calculated for free-space propagation.

For 10% of the time and for all frequency bands, the propagation curves applicable to Zone 4 shall be used with a correction factor of +15 dB, under the condition that the resulting field strength does not exceed the value calculated for 1% of the time.

At VHF and for 1% of the time, the propagation curve applicable to Zone 4 for an effective antenna height of 150 m shall be used with a correction factor of +15 dB, under the condition that the resulting field strength does not exceed the value calculated for free-space propagation.

At UHF and for 1% of the time, the formula $E = (106.9 - 20 \log(d) - 0.012\ d)$ shall be used under the condition that the resulting field strength does not exceed the value calculated for free-space propagation;

Zone C1: landstrip of maximum depth of 100 km surrounding Zone C.

For 50% of the time and for all frequency bands, the propagation curves applicable to Zone 1 or Zone 2 shall be used, according to the relevant path.

For 10% of the time and for all frequency bands, the propagation curves applicable to Zone 1 or Zone 2 shall be used, according to the relevant path.

At VHF and for 1% of the time, the field strength results from averaging the following two values:

– the field strength value given for an effective antenna height of 150 m, for Zone 1 or Zone 2;

– the field strength value given for an effective antenna height of 150 m applicable to Zone 4 and corrected by a factor of +15 dB, under the condition that the value thus obtained does not exceed the value calculated for free-space propagation.

At UHF and for 1% of the time, the formula:

(*a*) $E = 106.9 - 20 \log(d) - 0.1\ d$ shall be used.

In bilateral negotiations between administrations concerned, the formula:

(*b*) $E = 106.9 - 20 \log(d) - 0.025\ d$ may also be used.

2.1.3 *Effective transmitting antenna height*

The effective transmitting antenna height, h_1, is defined as the antenna height above the average ground level between 3 km and 15 km from the transmitter in the direction of the receiver. The height of the receiving antenna, h_2, is assumed to be 10 m above the ground.

The curves in Figures 2.2 to 2.25 are given for effective transmitting antenna heights between 37.5 m and 1 200 m, each value given of the "effective height" being twice that of the previous one. For different values of effective height a linear interpolation between the two curves corresponding to effective heights immediately above and below the true value shall be used.

For an effective transmitting antenna height, h_1, in the range 0 to 37.5 m, the field strength at a distance x from the transmitter is taken as the same as that given on the curve for 37.5 m at a distance of $(x + 25 - 4.1\sqrt{h_1})$ km. An effective antenna height of less than 0 m is replaced by 0 m. This procedure is valid for distances beyond the radio horizon given by $(4.1\sqrt{h_1})$ km. Field strength values for shorter distances are obtained by:

- calculating the difference between the field strength value at the radio horizon for height h_1 (using the procedure given above) and the value on the 37.5 m curve for the same distance;
- subtracting the absolute value of the difference thus obtained from the field strength value on the 37.5 m curve for the actual distance involved.

This may be expressed as follows:

For $x \geq 4.1\sqrt{h_1}$ $F(x, h_1)^{1)} = F((x + 25 - 4.1\sqrt{h_1}), 37.5)$

For $x < 4.1\sqrt{h_1}$ $F(x, h_1) = F(x, 37.5) - F(4.1\sqrt{h_1}, 37.5) + F(25, 37.5)$

For an effective transmitting antenna height, h_1, greater than 1 200 m, the field strength at a distance x from the transmitter is taken as the same as that given on the curve for 1 200 m at a distance of $(x + 140 - 4.1\sqrt{h_1})$ km. This procedure is valid for distances beyond the radio horizon, given by $(4.1\sqrt{h_1})$ km. Field strength values for shorter distances are obtained by:

- calculating the difference between the field strength value at the radio horizon for height h_1 (using the procedure given above) and the value on the 1 200 m curve for the same distance;
- adding the absolute value of the difference thus obtained to the field strength value on the 1 200 m curve for the actual distance involved.

This may be expressed as follows:

For $x \geq 4.1\sqrt{h_1}$ $F(x, h_1) = F((x + 140 - 4.1\sqrt{h_1}), 1\,200)$

For $x < 4.1\sqrt{h_1}$ $F(x, h_1) = F(x, 1\,200) - F(4.1\sqrt{h_1}, 1\,200) + F(140, 1\,200)$

This procedure is subject to the limitation that the value obtained does not exceed the free-space value.

2.1.4 *Correction for terrain irregularities*

Data which would allow for terrain irregularities are generally not known with sufficient precision to be usable in the development of a plan.

However, for bilateral or multilateral coordination in zones 1, 2, 3 and C1, it is possible, when the terrain relief on the propagation paths of concern is known with sufficient precision, to take account of the information given in Annex 2.A of this Chapter. These corrections do not however have to be made in type 4 zones, which have been delineated taking account of the fact that their relief is fairly flat and that the propagation conditions observed within them are close to those found over the adjacent seas.

2.1.5 *Variations as a function of the percentage of locations*

The curves referred to correspond to 50% of locations, the percentage used for planning. Corrections for other percentages of locations are given in Annex 2.B.

2.1.6 *Calculations for mixed paths*

When paths occur over zones of different propagation characteristics, as defined in section 2.1.2 above, the following method is used which takes account of the different characteristics of the various parts of the path:

a) At UHF, for percentages of time < 10%, use the following procedure for calculating the field strength for paths crossing a *land/sea or land/coastal land boundary*:

1) Where $F(x, h_1)$ is the field strength (dB(μV/m)) for a distance x (km) and an effective transmitting antenna height h_1 (m).

$$E_{m,t} = E_{1,t} + A\,[E_{s,t} - E_{1,t}]$$

where:

$E_{1,t}$: field strength for land path equal in length to the mixed path for t% of the time;

$E_{s,t}$: field strength for sea or coastal land path equal in length to the mixed path for t% of the time;

$E_{m,t}$: field strength for mixed path for t% of the time; and

A: interpolation factor as given in Figure 2.1 below.

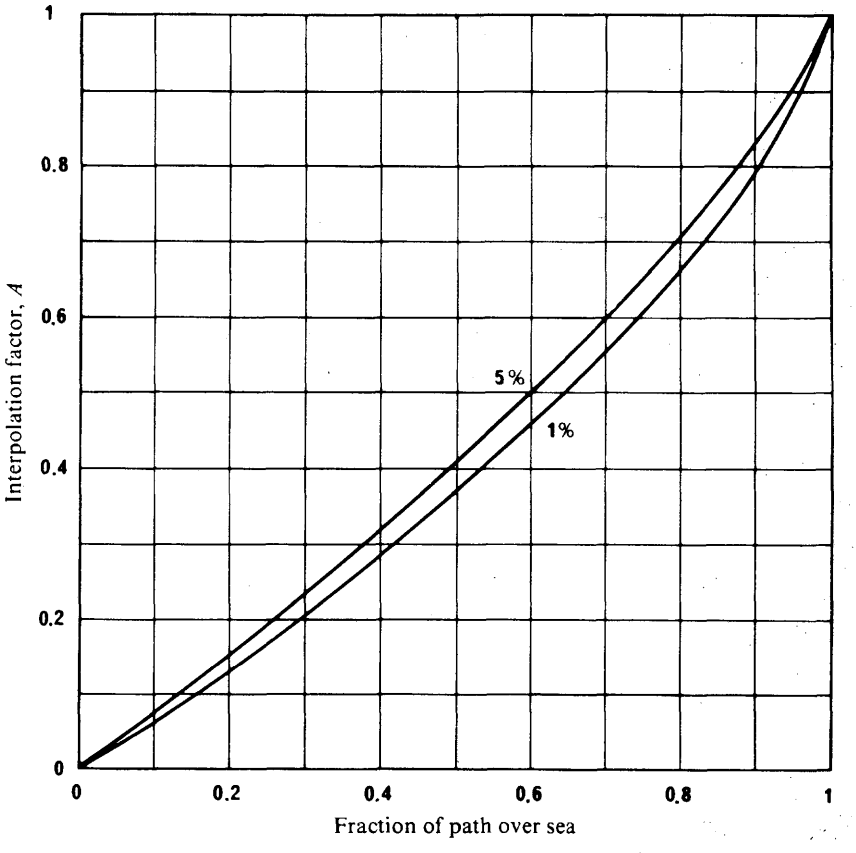


FIGURE 2.1 – *Interpolation for mixed land/sea paths*

In cases where the path crosses more than two zones (of which at least one is sea or coastal land), the linear procedure given in *b*) is applied, first, to those sections of the path crossing sea zones and, secondly, to those sections crossing land zones. The two resulting values of field strength are then combined using the non-linear procedure given above. It should be noted that "sea zones" include the coastal land area C1. For all other cases, the procedure given in *b*) is applied.

This method is also used for mixed paths between zones with different propagation characteristics in the VHF and the UHF bands.

b) To determine the field strength value for the mixed path ($E_{m,t}$), the following formula is used:

$$E_{m,t} = \sum_i \frac{d_i}{d_T} E_{i,t}$$

where:

$E_{i,t}$: field strength for path in zone i equal in length to the mixed path for t% of time;

$E_{m,t}$: field strength for mixed path for t% of time;

d_i : length of path in zone i; and

d_T : length of total path.

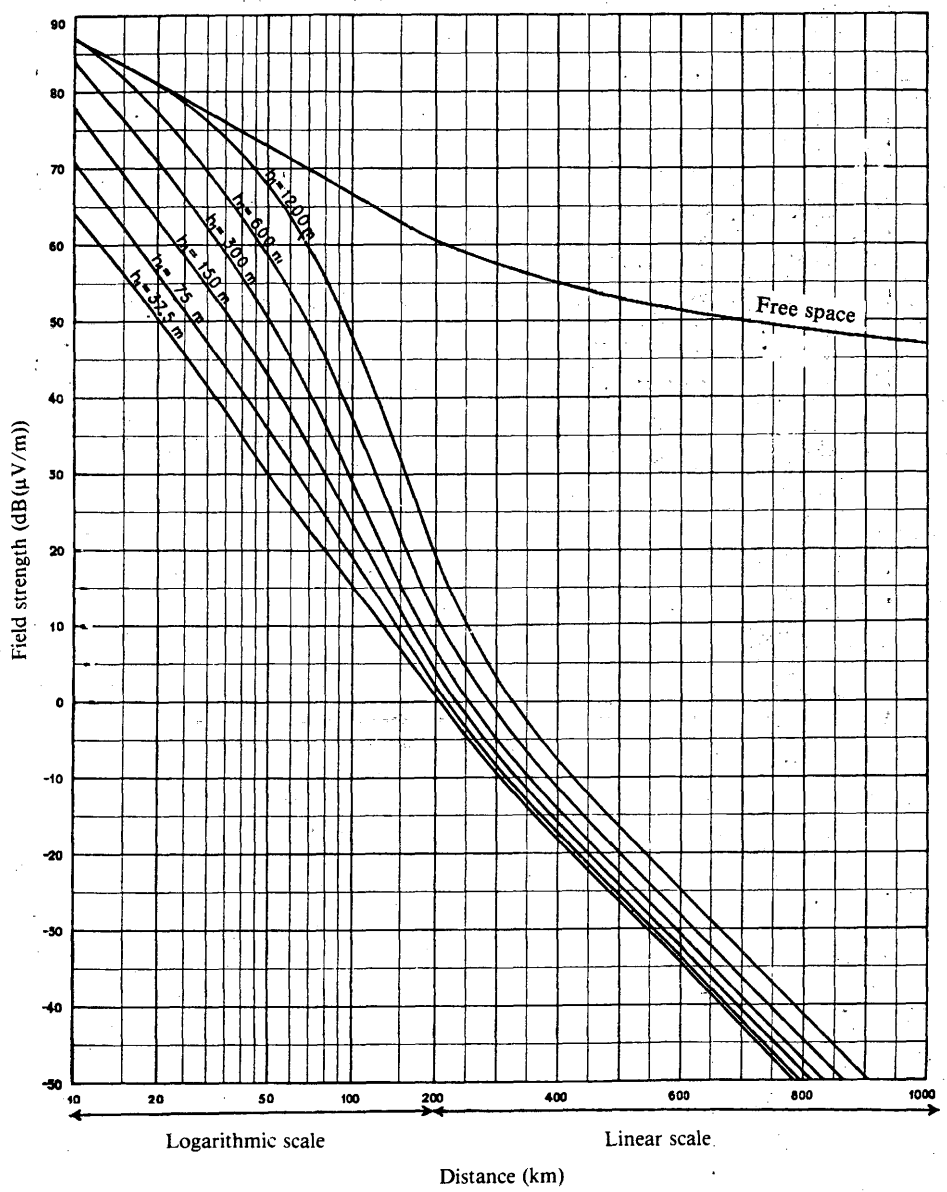


FIGURE 2.2 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; temperate and subtropical (continental) regions
50% of the time; 50% of the locations; h_2 = 10 m

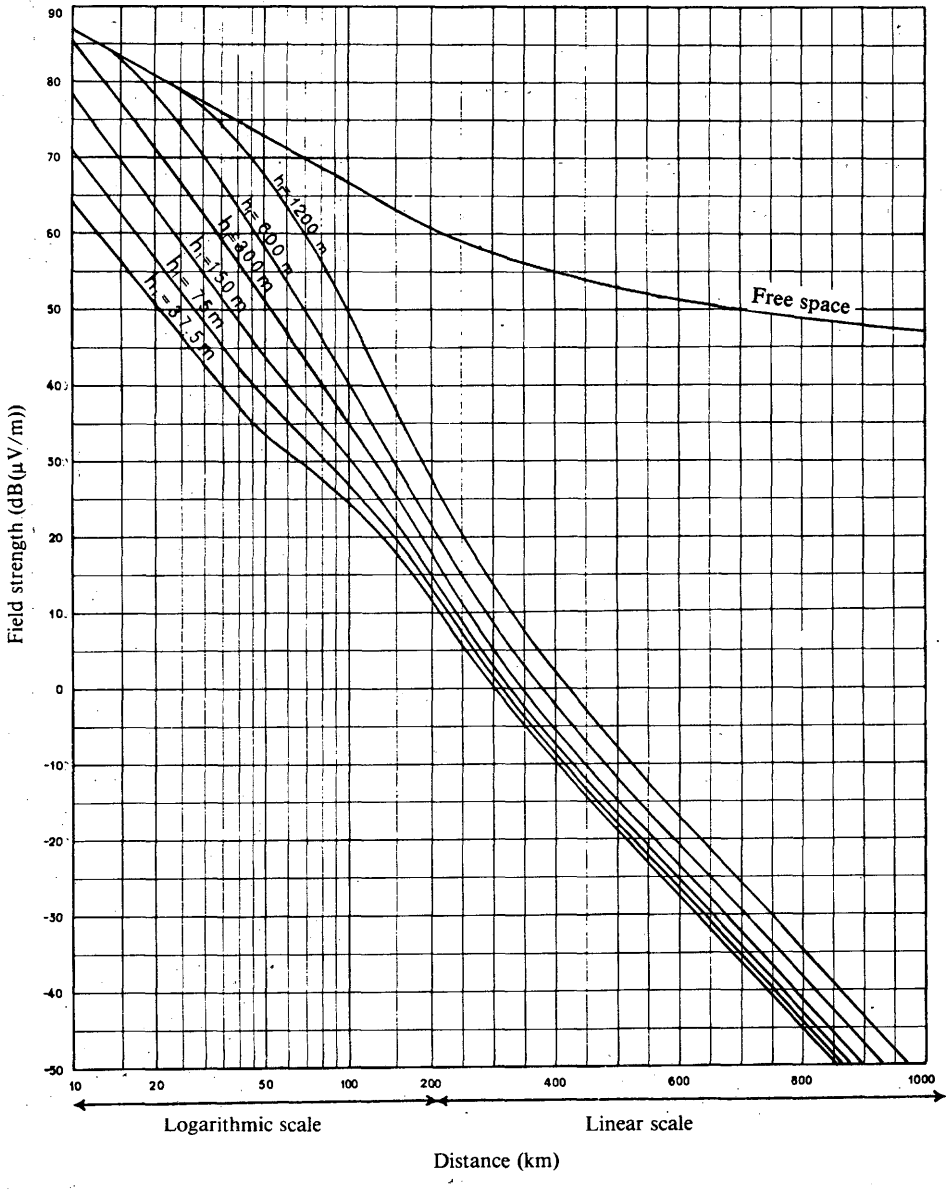


FIGURE 2.3 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; temperate and subtropical (continental) regions
10% of the time; 50% of the locations; h_2 = 10 m

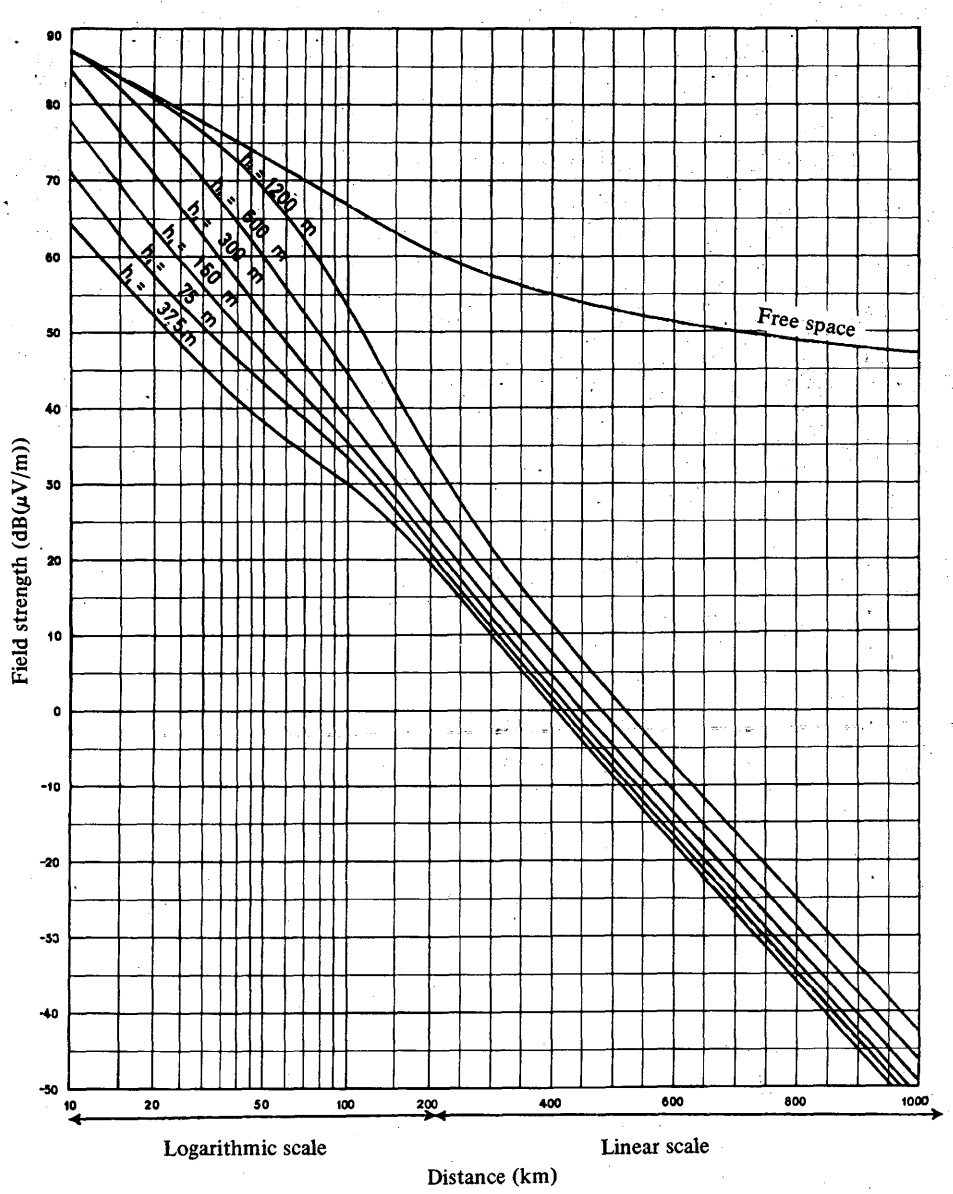


FIGURE 2.4 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; temperate and subtropical (continental) regions

1% of the time; 50% of the locations; h_2 = 10 m

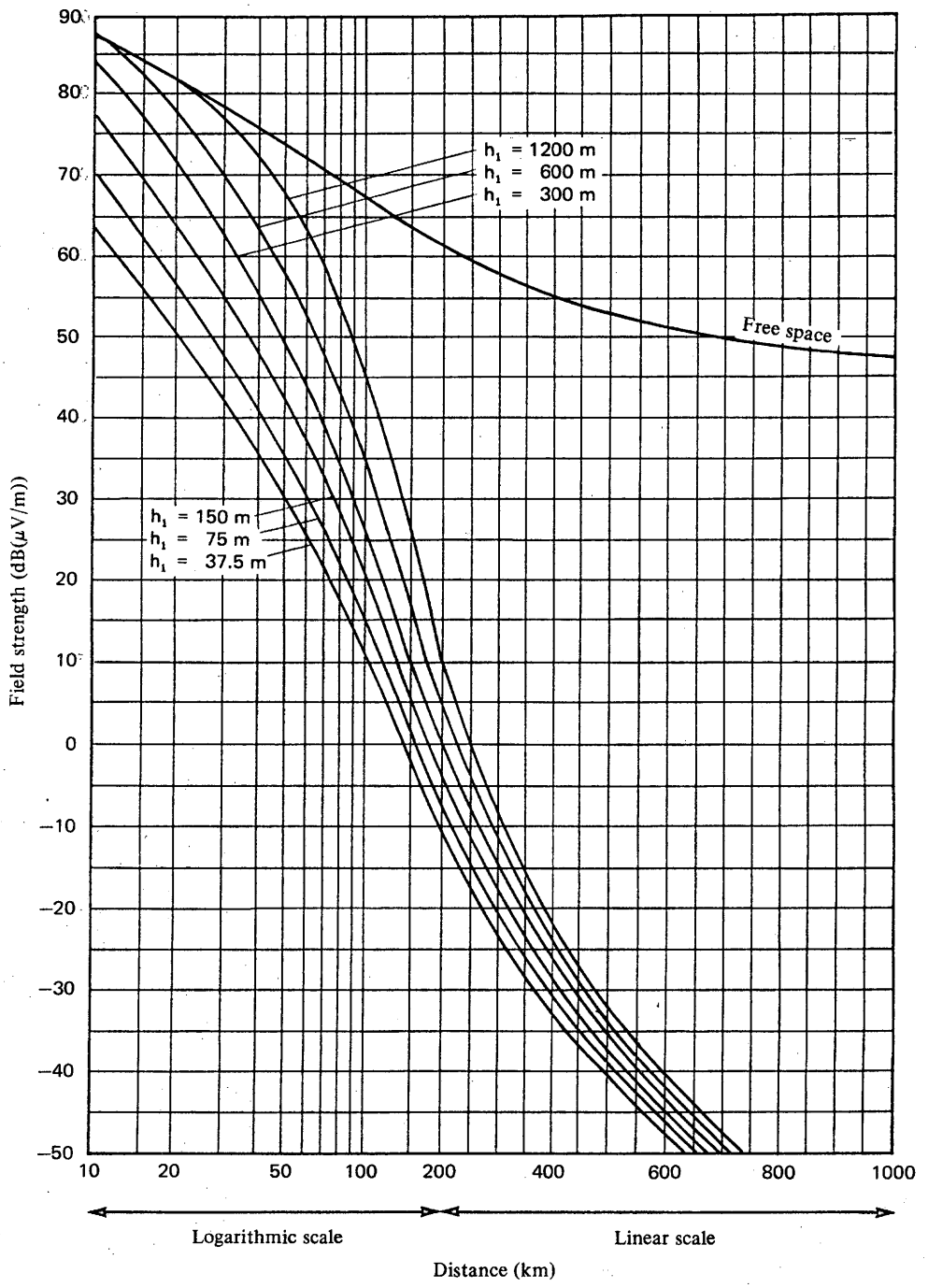


FIGURE 2.5 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; desert regions
50% of the time; 50% of the locations; $h_2 = 10$ m

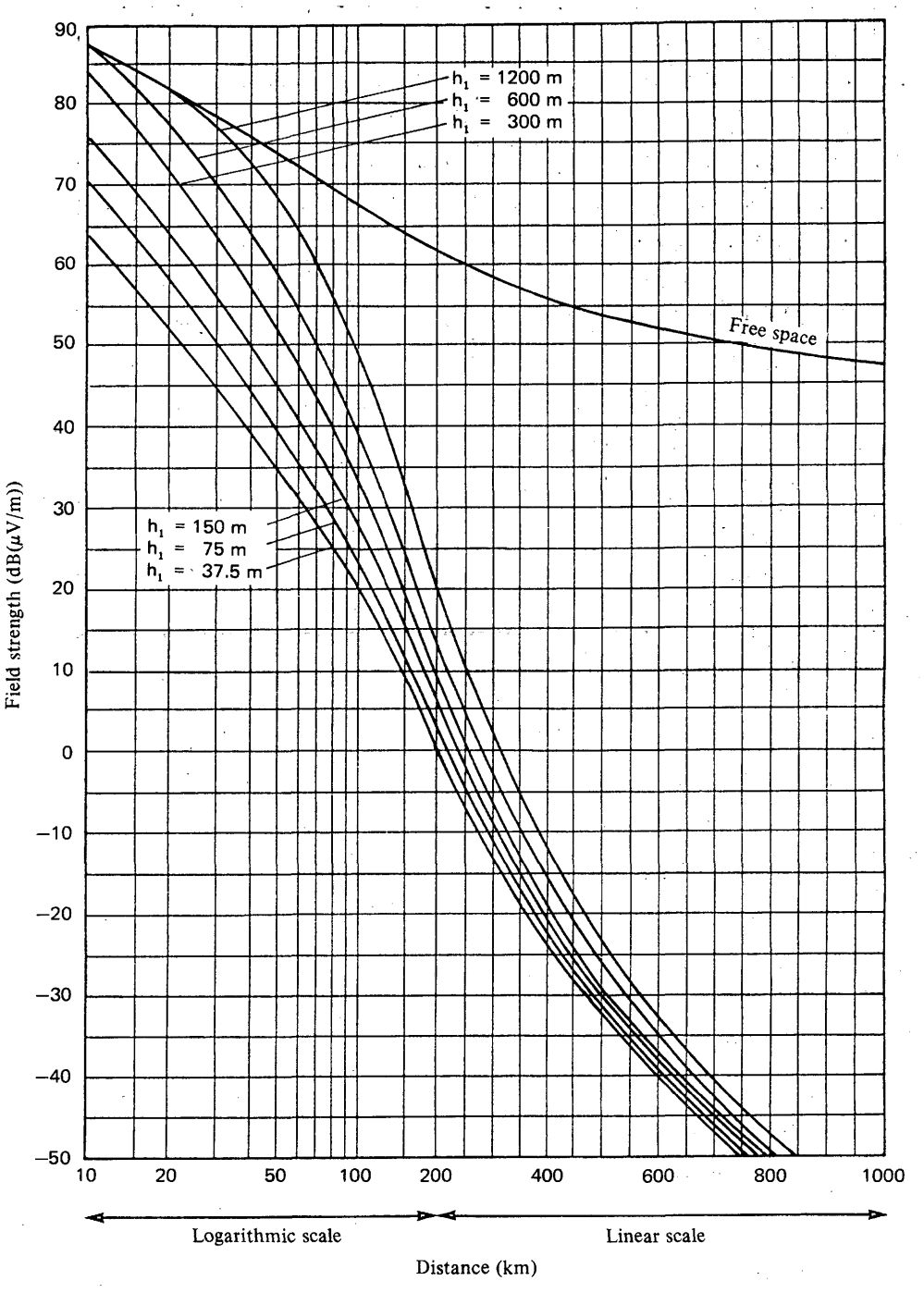


FIGURE 2.6 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; desert regions
10% of the time; 50% of the locations; h_2 = 10 m

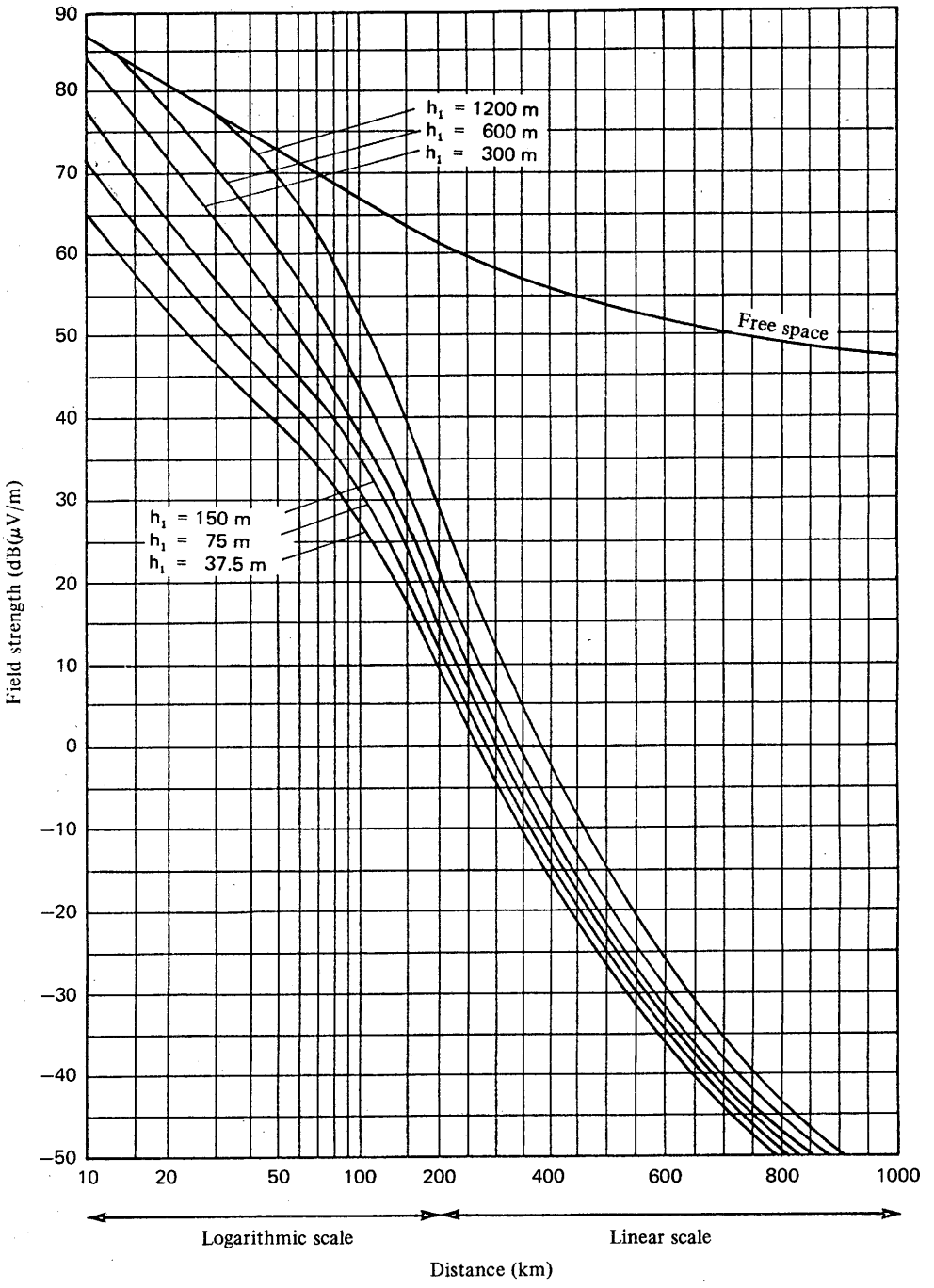


FIGURE 2.7 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; desert regions
1% of the time; 50% of the locations; h_2 = 10 m

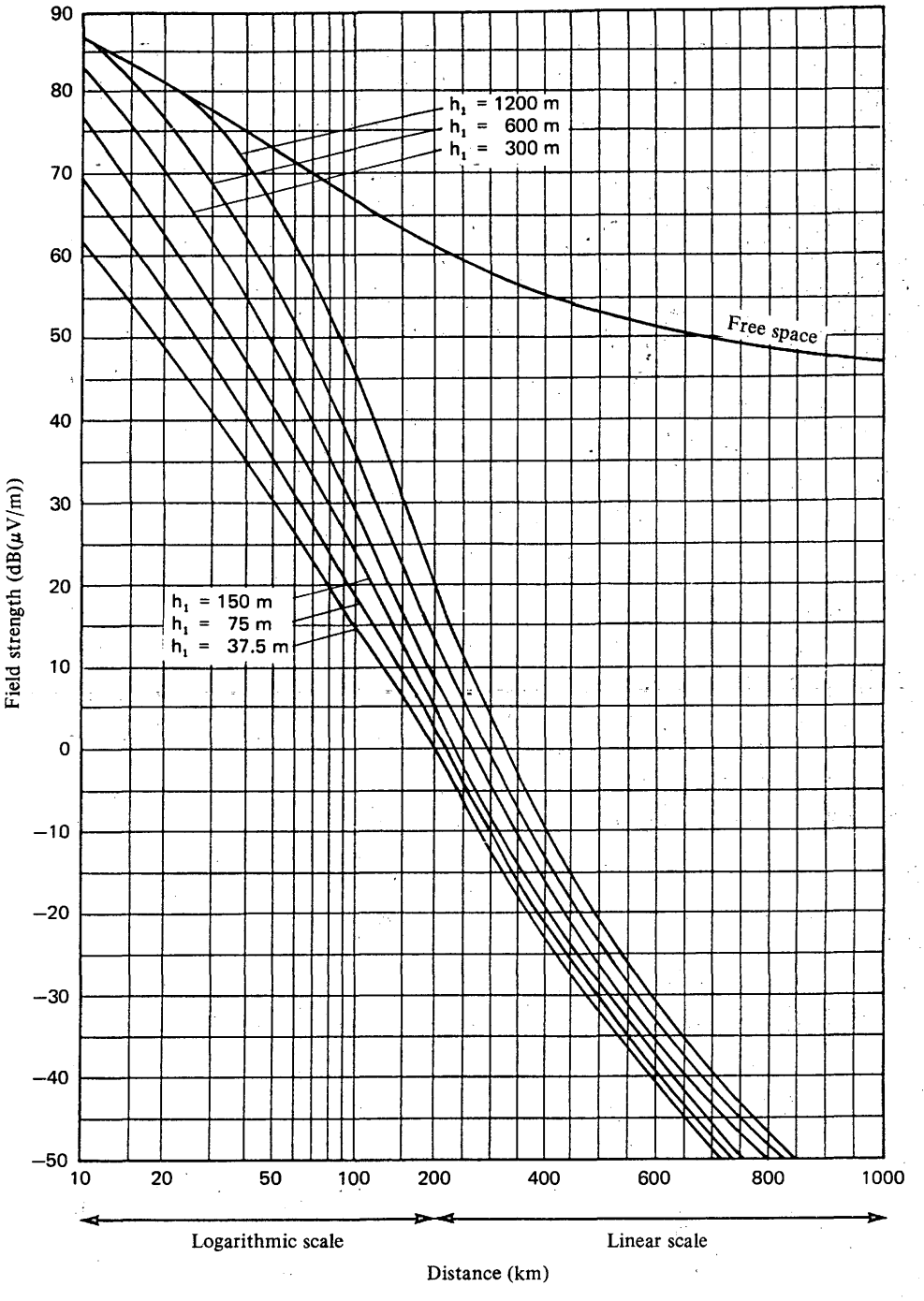


FIGURE 2.8 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; equatorial regions
50% of the time; 50% of the locations; $h_2 = 10$ m

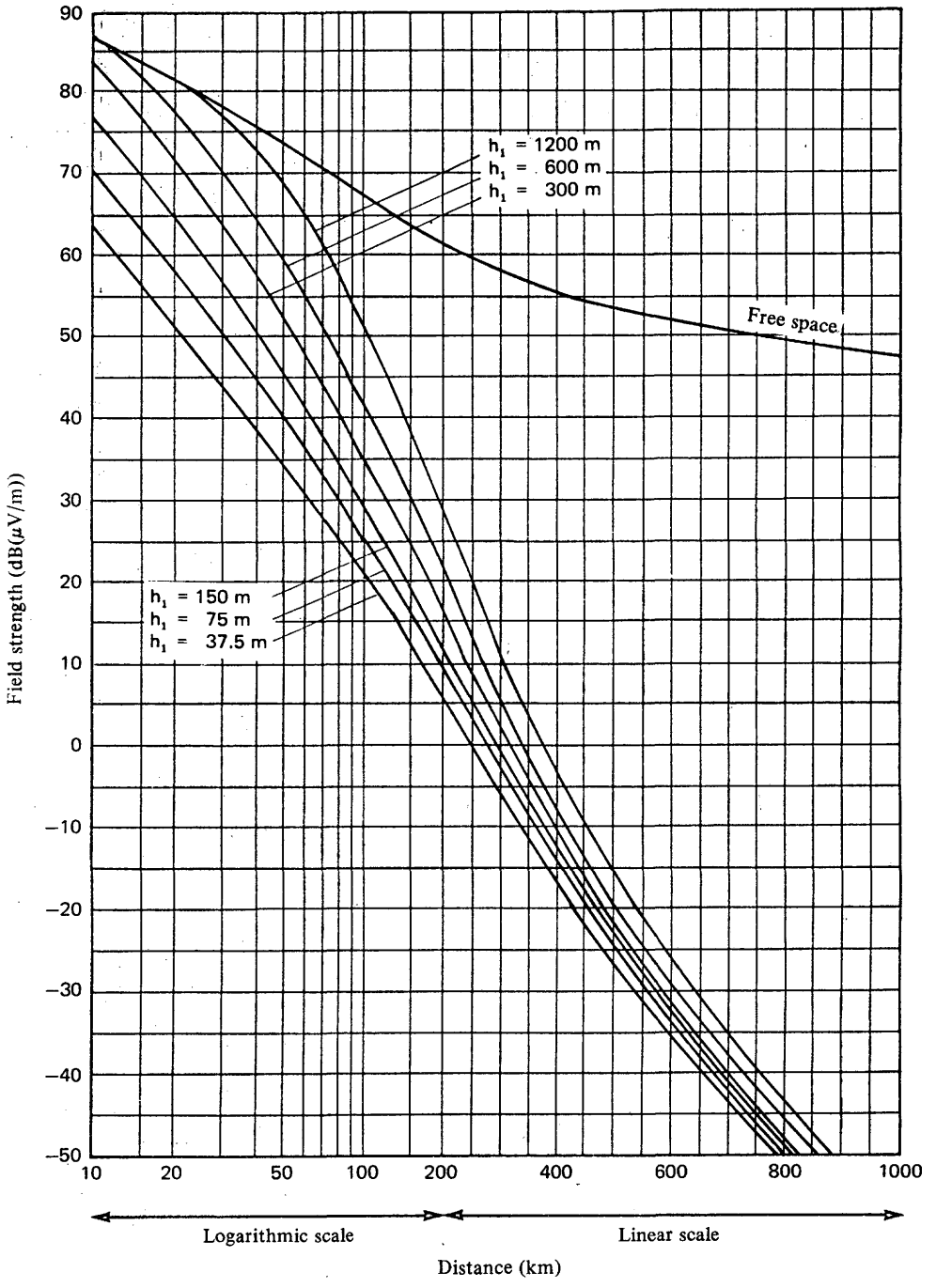


FIGURE 2.9 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; equatorial regions
10% of the time; 50% of the locations; h_2 = 10 m

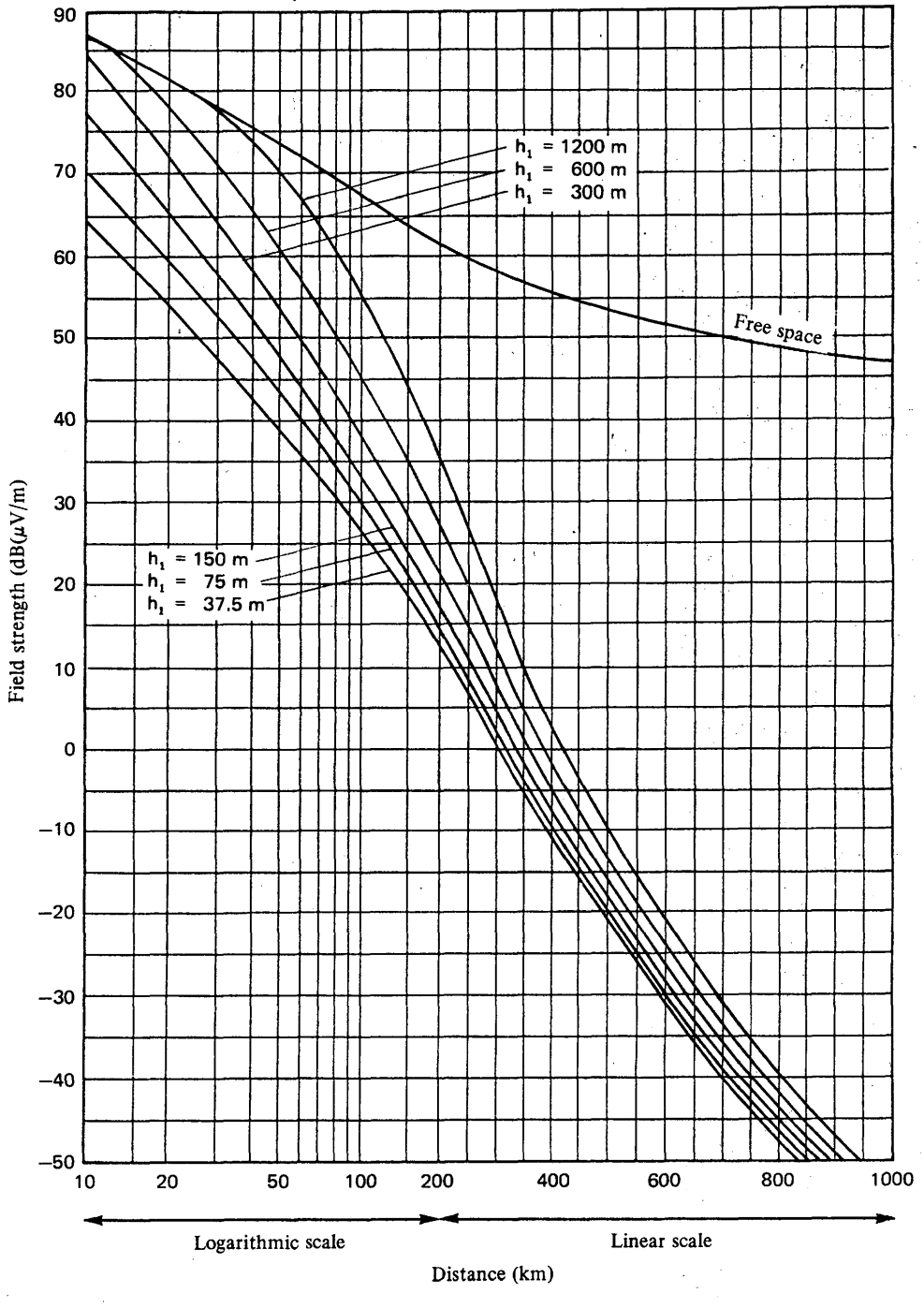


FIGURE 2.10 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; equatorial regions
1% of the time; 50% of the locations; h_2 = 10 m

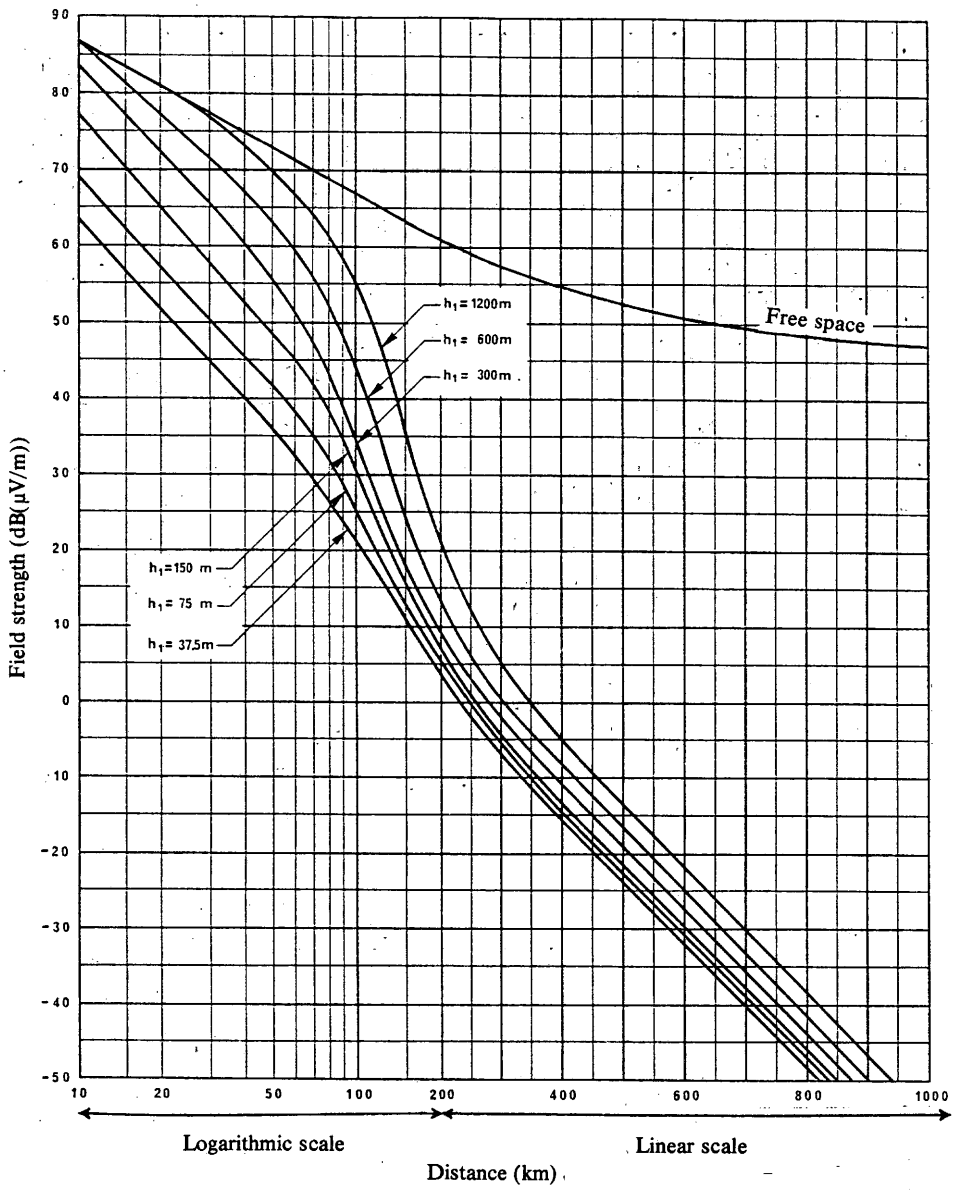


FIGURE 2.11 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; maritime regions and low-altitude coastal land
50% of the time; 50% of the locations; h_2 = 10 m

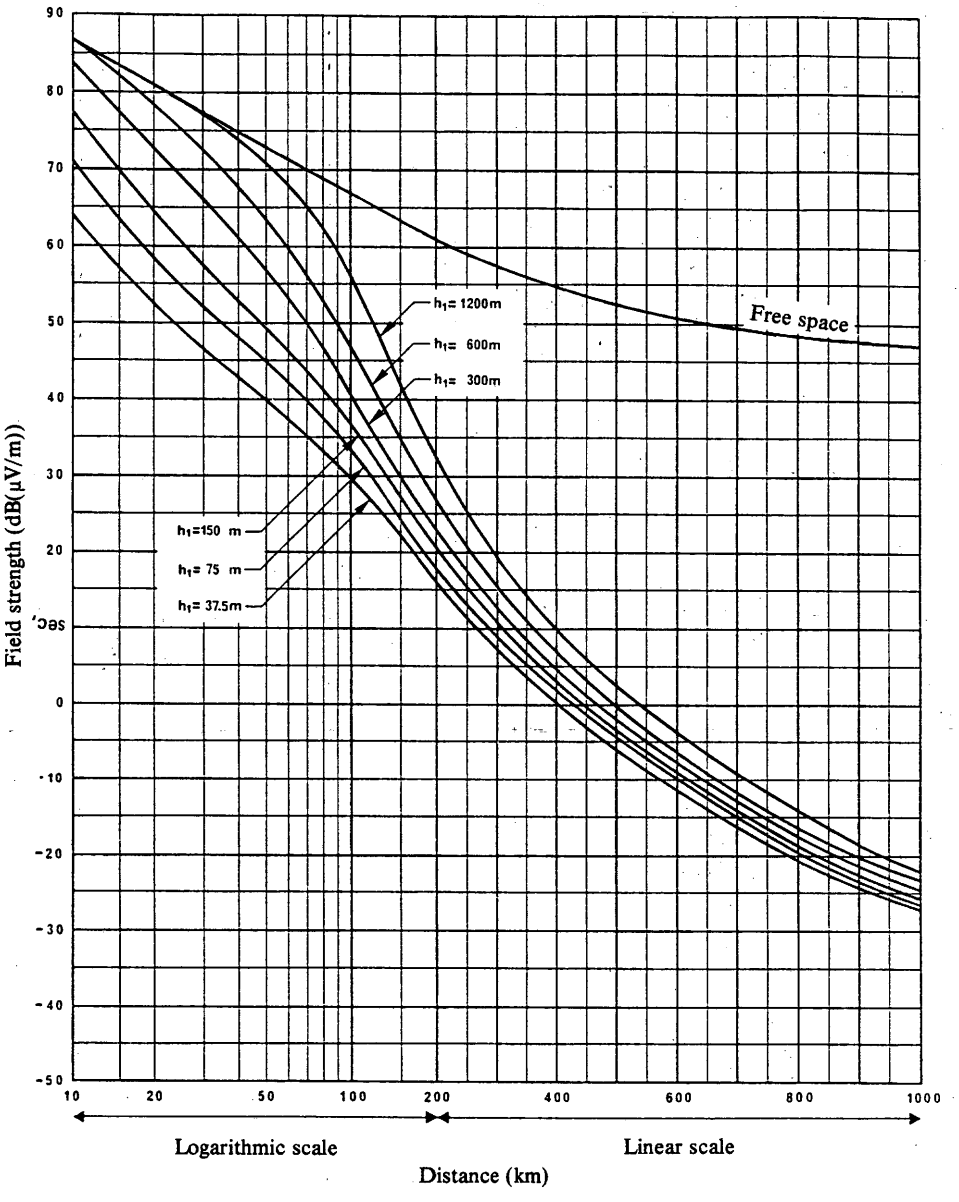


FIGURE 2.12 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; maritime regions and low-altitude coastal land
10% of the time; 50% of the locations; h_2 = 10 m

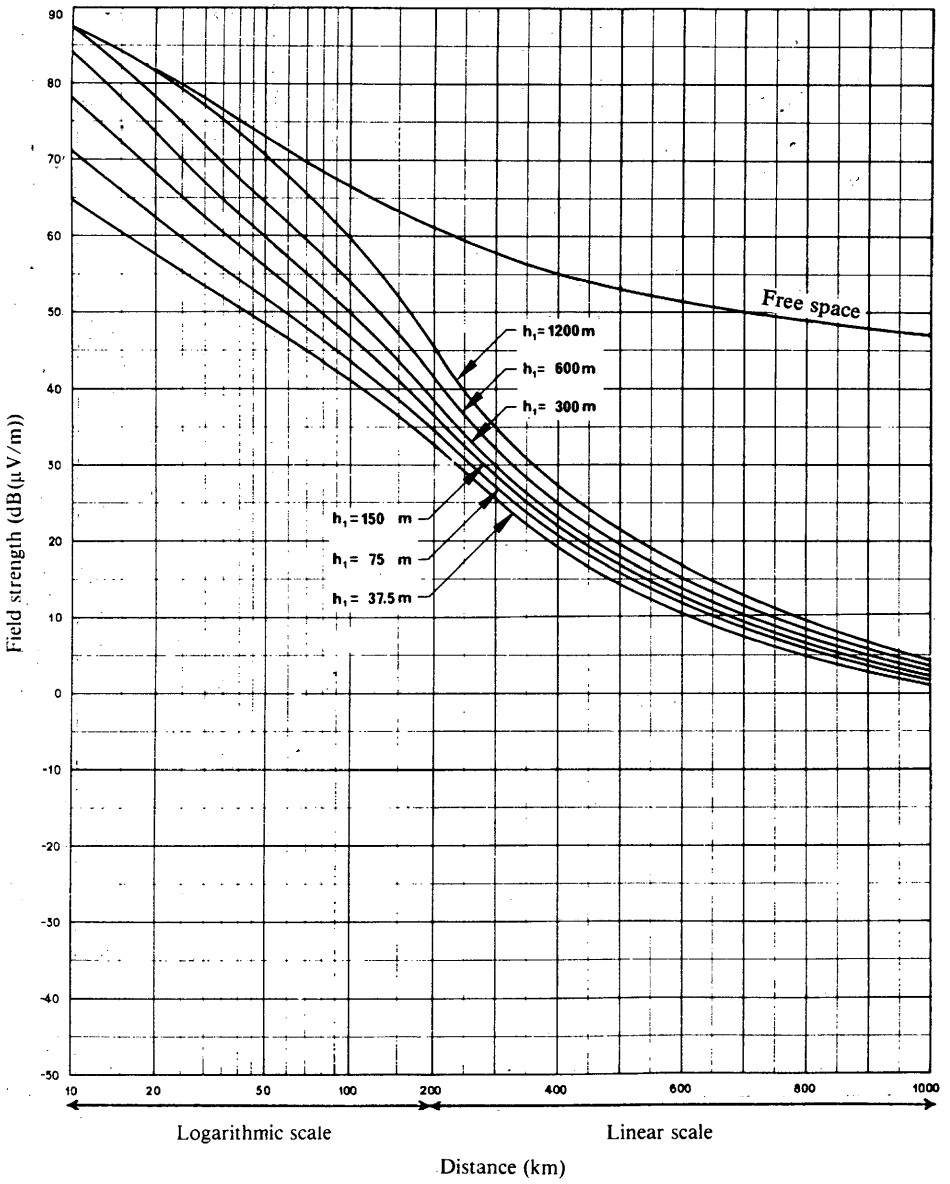


FIGURE 2.13 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 30 to 250 MHz; maritime regions and low-altitude coastal land
1% of the time; 50% of the locations; h_2 = 10 m

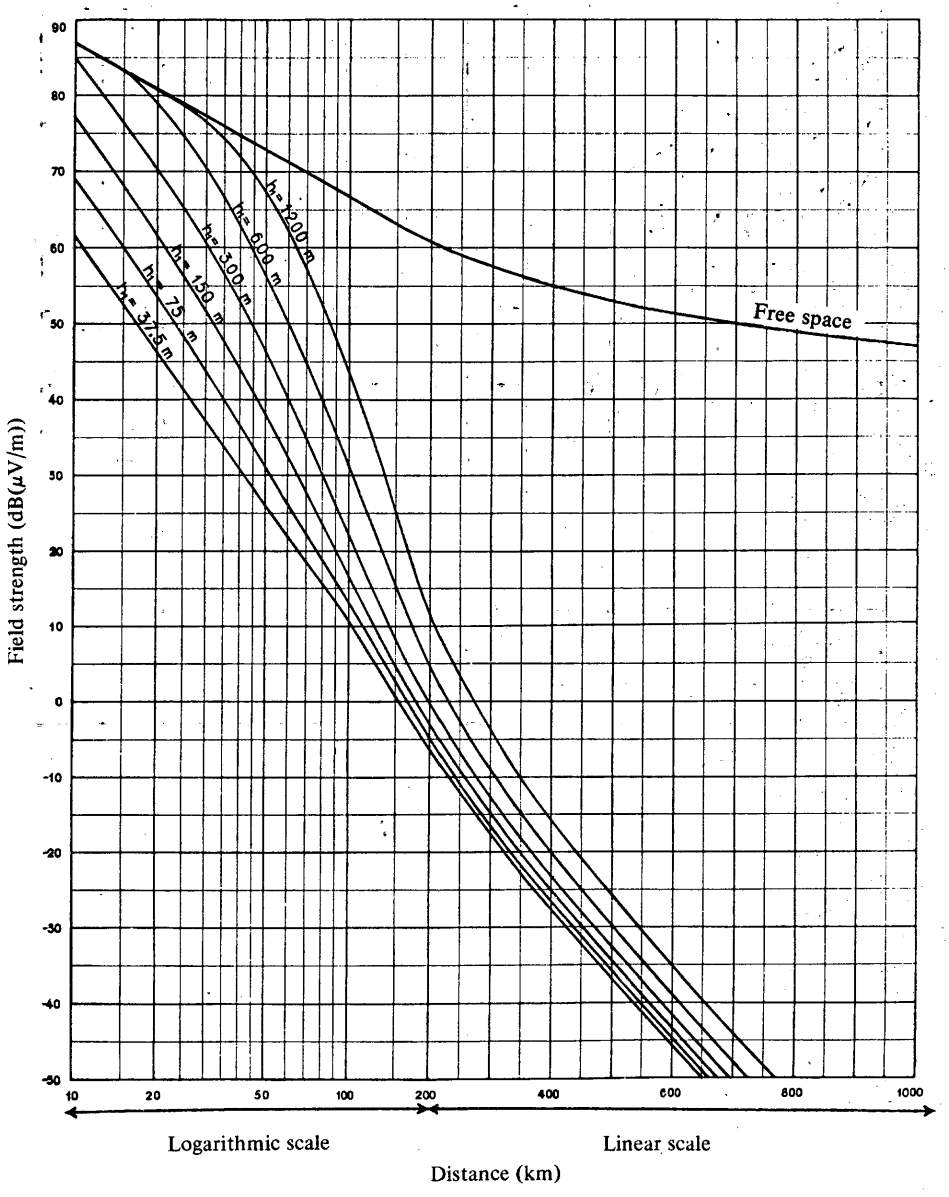


FIGURE 2.14 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; temperate and subtropical (continental) regions
50% of the time; 50% of the locations; h_2 = 10 m

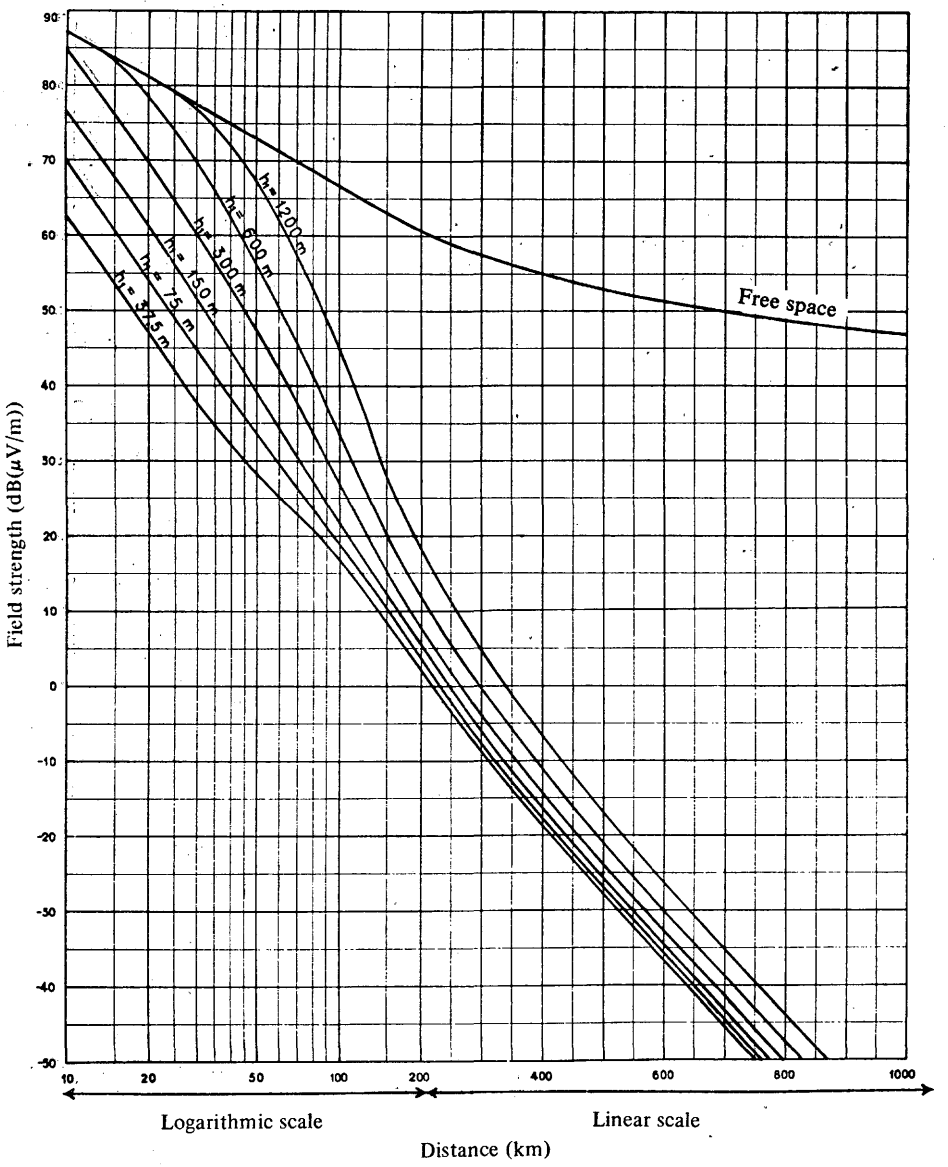


FIGURE 2.15 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; temperate and subtropical (continental) regions
10% of the time; 50% of the locations; $h_2 = 10$ m

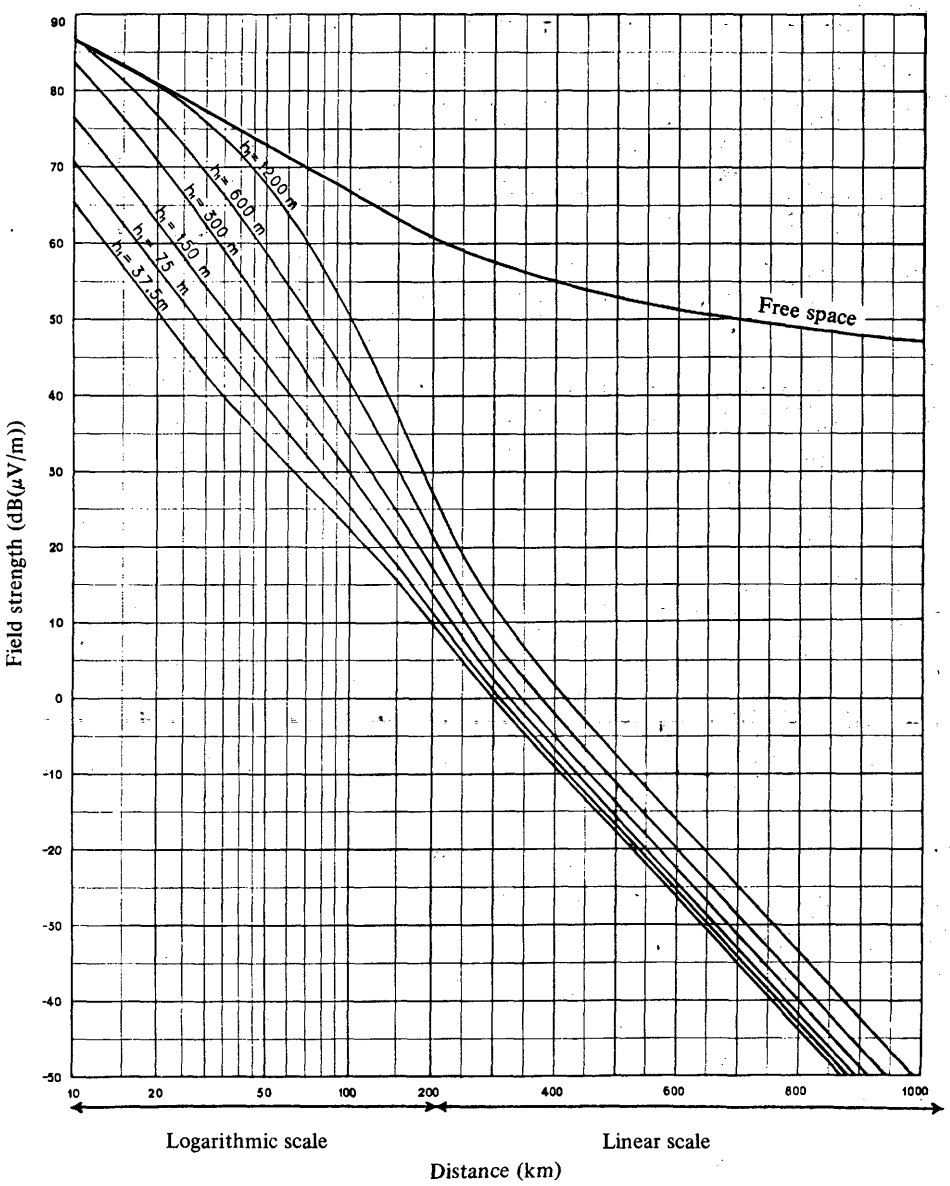


FIGURE 2.16 – *Propagation curves for the broadcasting service in Zone 1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; temperate and subtropical (continental) regions
1% of the time; 50% of the locations; h_2 = 10 m

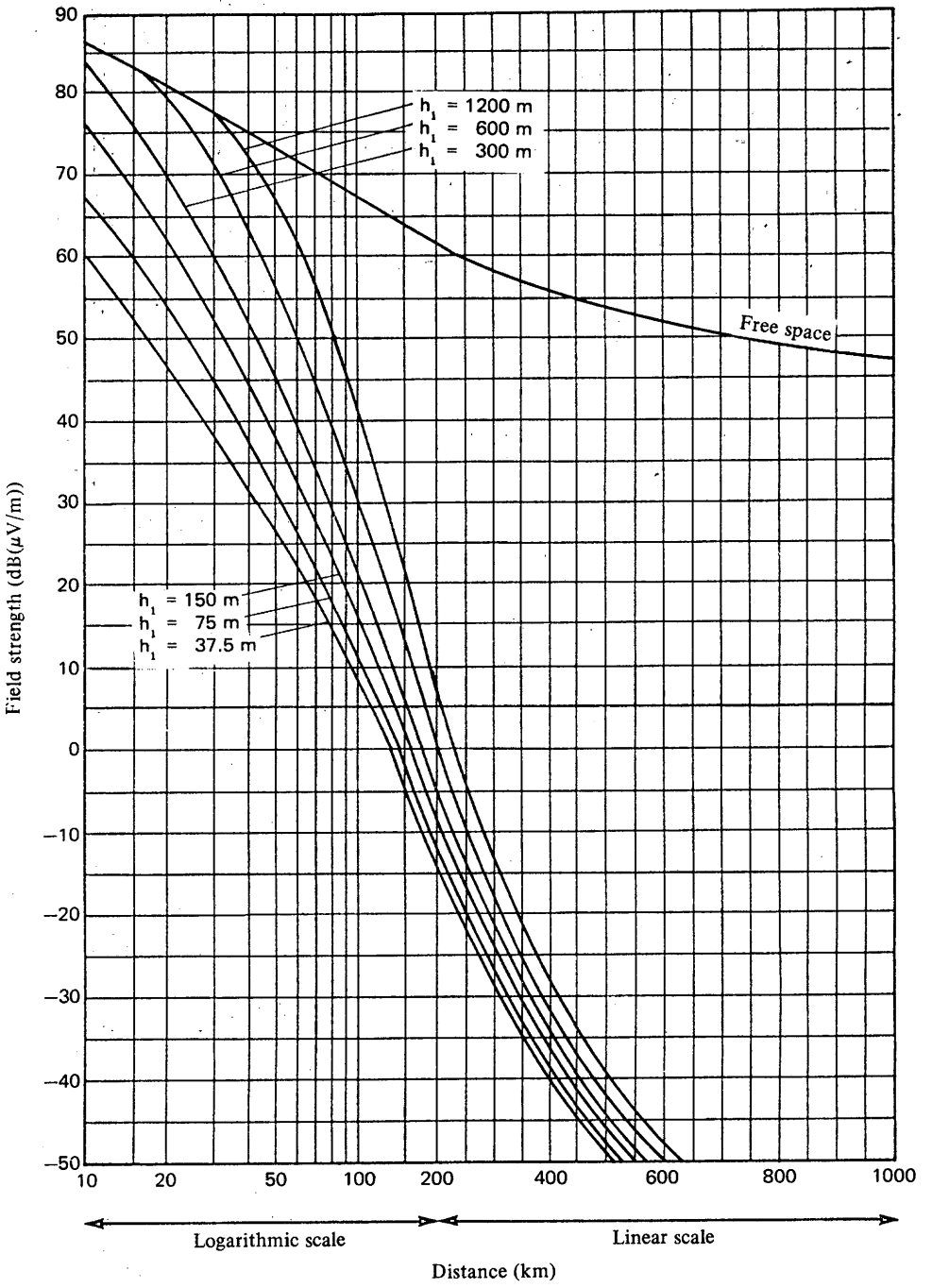


FIGURE 2.17 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 0000 MHz; desert regions
50% of the time; 50% of the locations; h_2 = 10 m

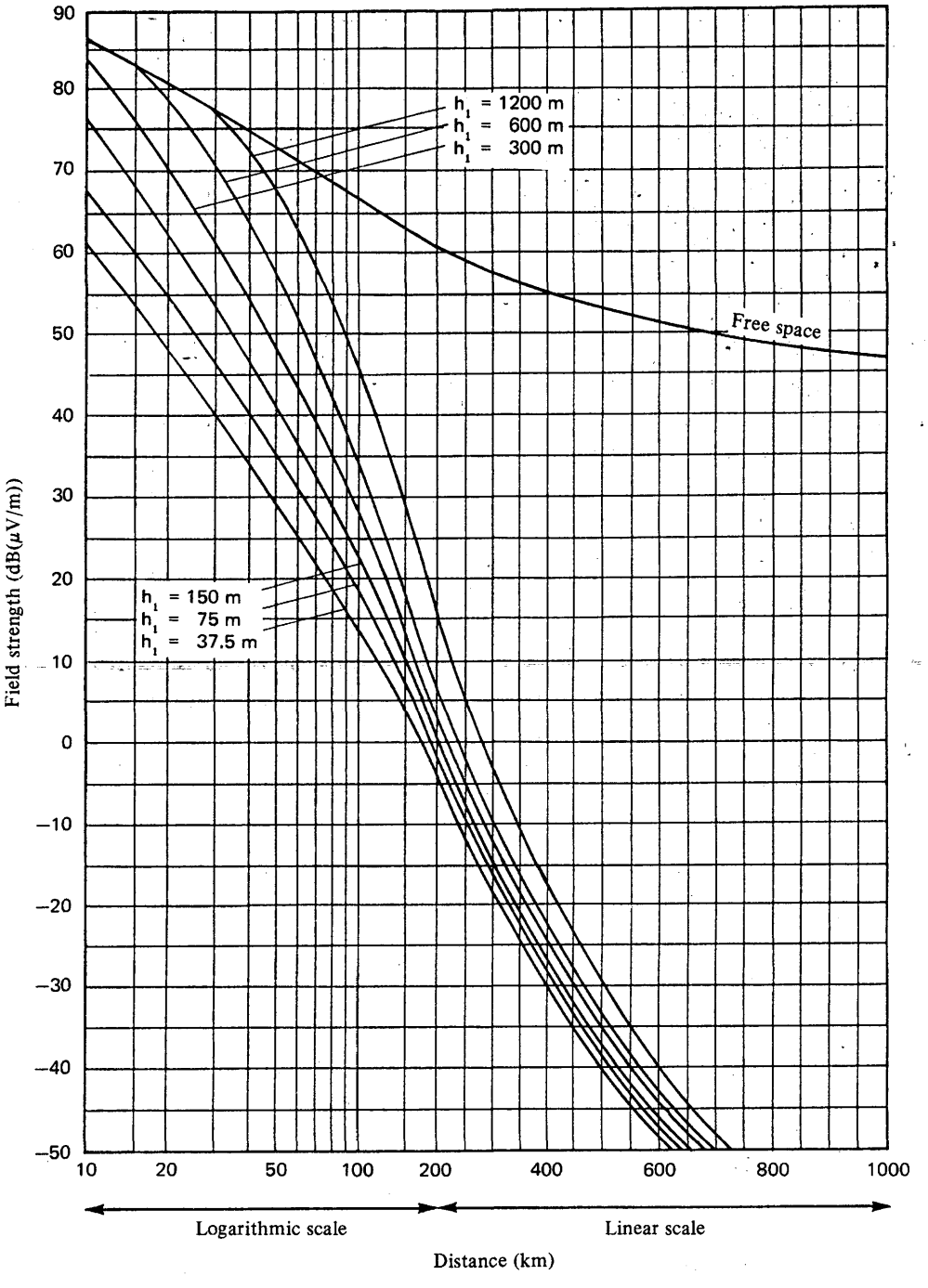


FIGURE 2.18 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; desert regions
10% of the time; 50% of the locations; h_2 = 10 m

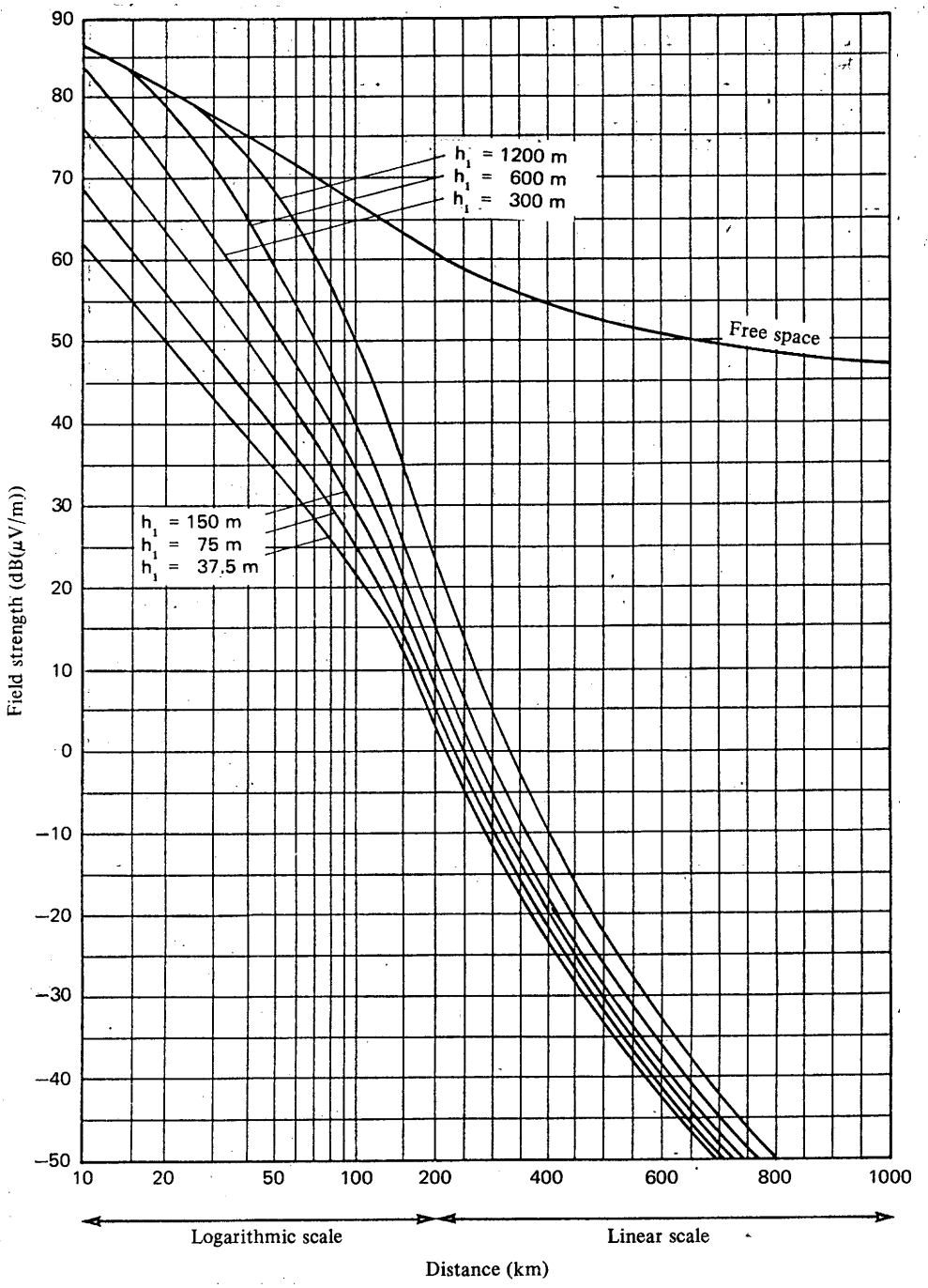


FIGURE 2.19 – *Propagation curves for the broadcasting service in Zone 2*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; desert regions
1% of the time; 50% of the locations; $h_2 = 10$ m

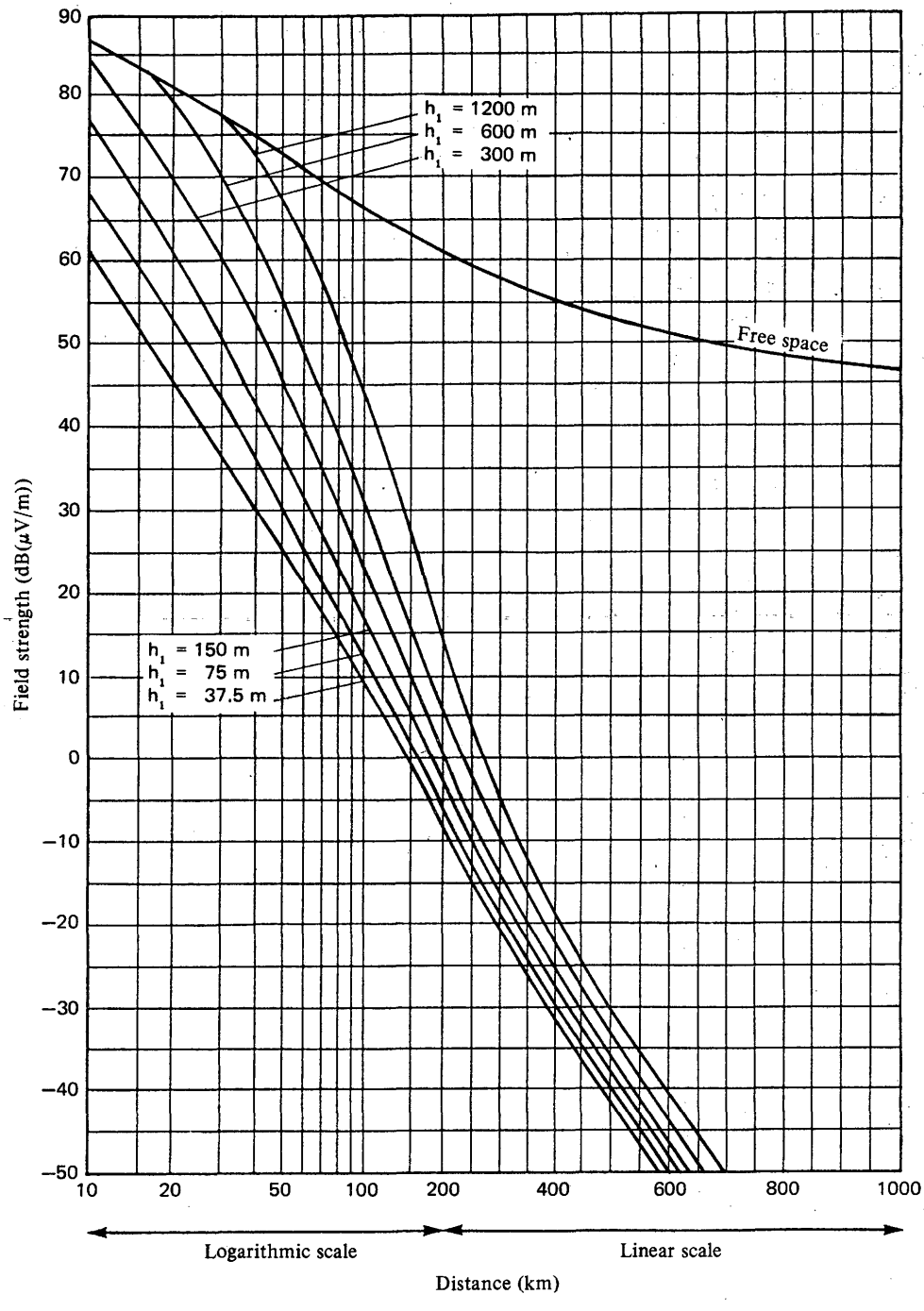


FIGURE 2.20 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000MHz; equatorial regions
50% of the time; 50% of the locations; $h_2 = 10$ m

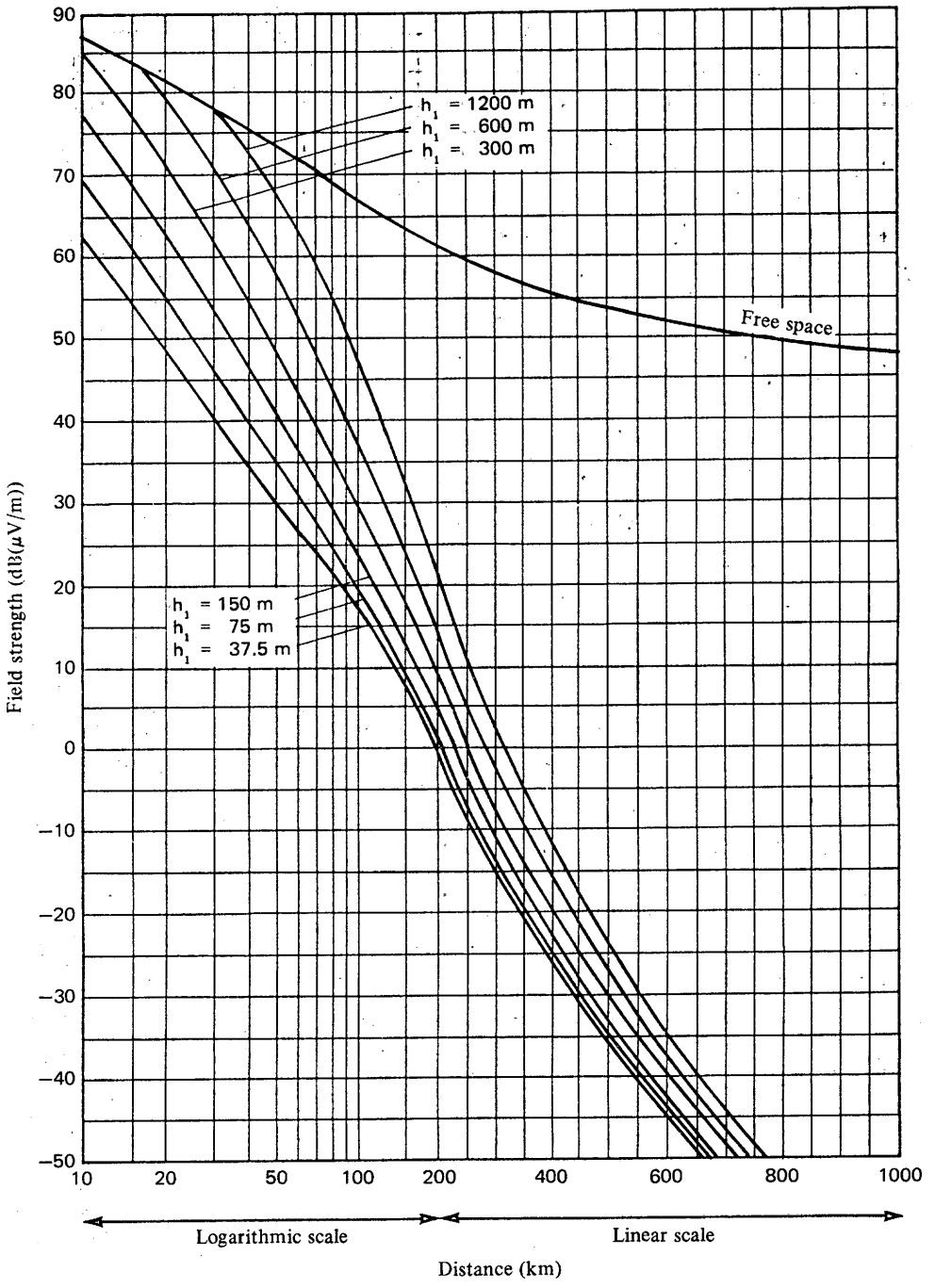


FIGURE 2.21 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; equatorial regions
10% of the time; 50% of the locations; $h_2 = 10$ m

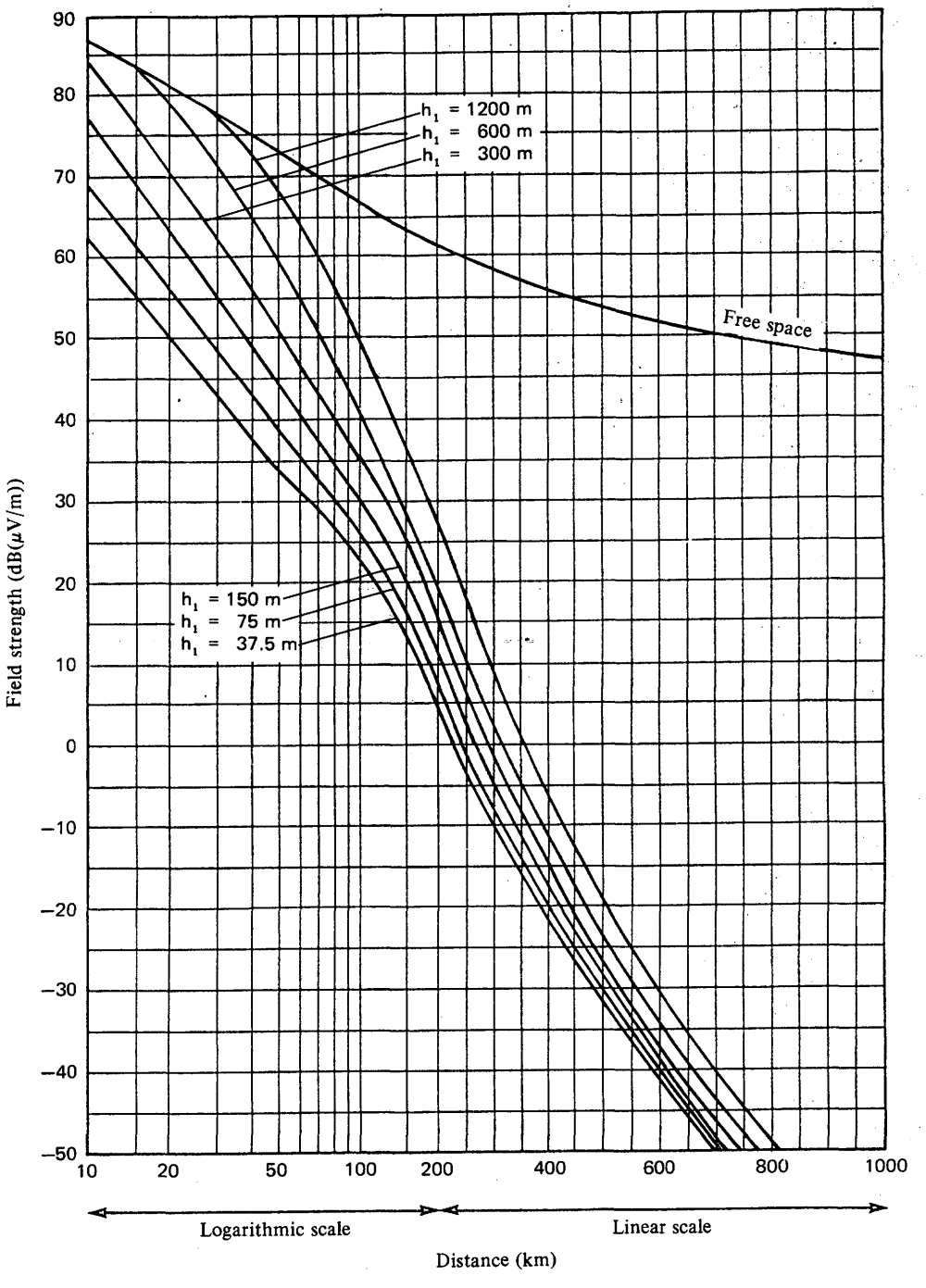


FIGURE 2.22 – *Propagation curves for the broadcasting service in Zone 3*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to1 000 MHz; equatorial regions
1% of the time; 50% of the locations; h_2 = 10 m

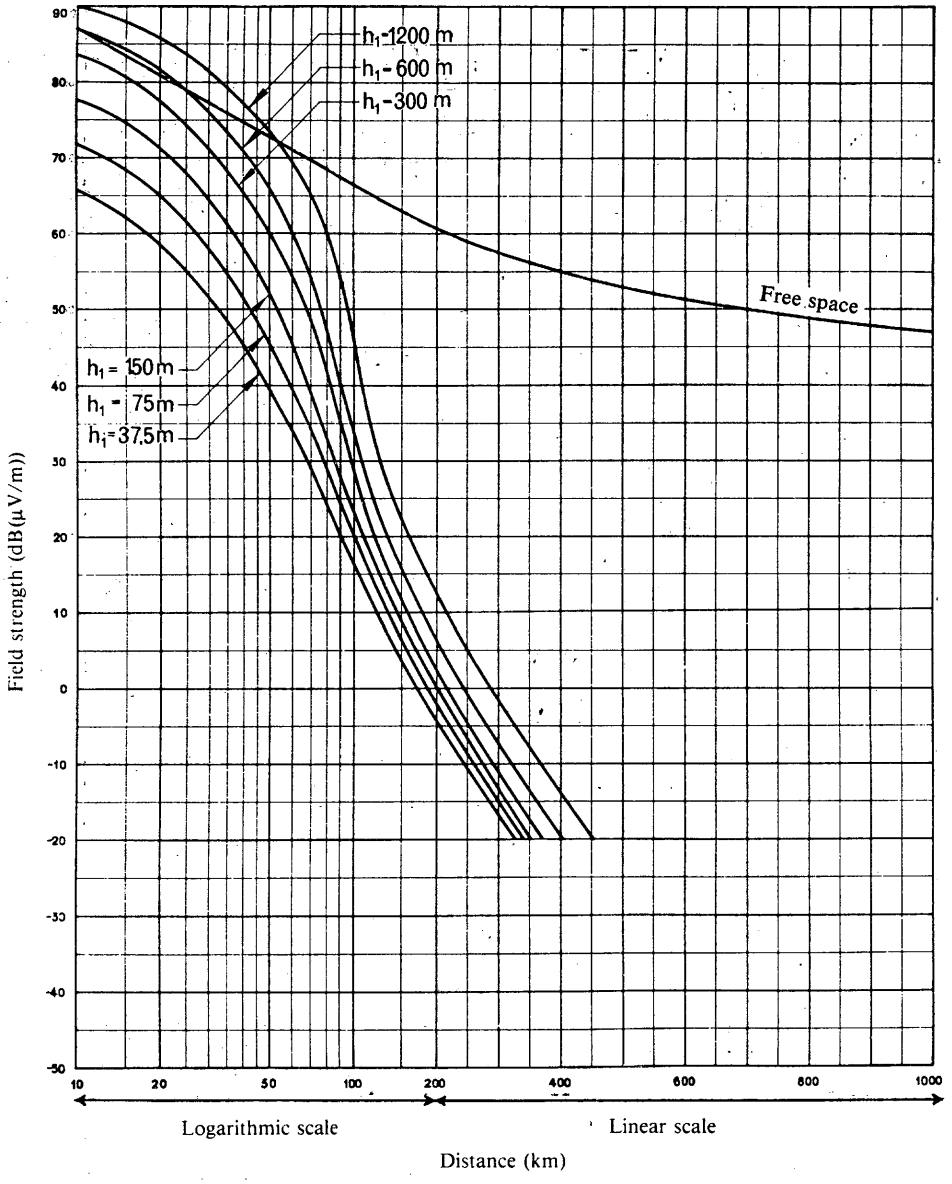


FIGURE 2.23 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; maritime regions and low-altitude coastal land
50% of the time; 50% of the locations; h_2 = 10 m

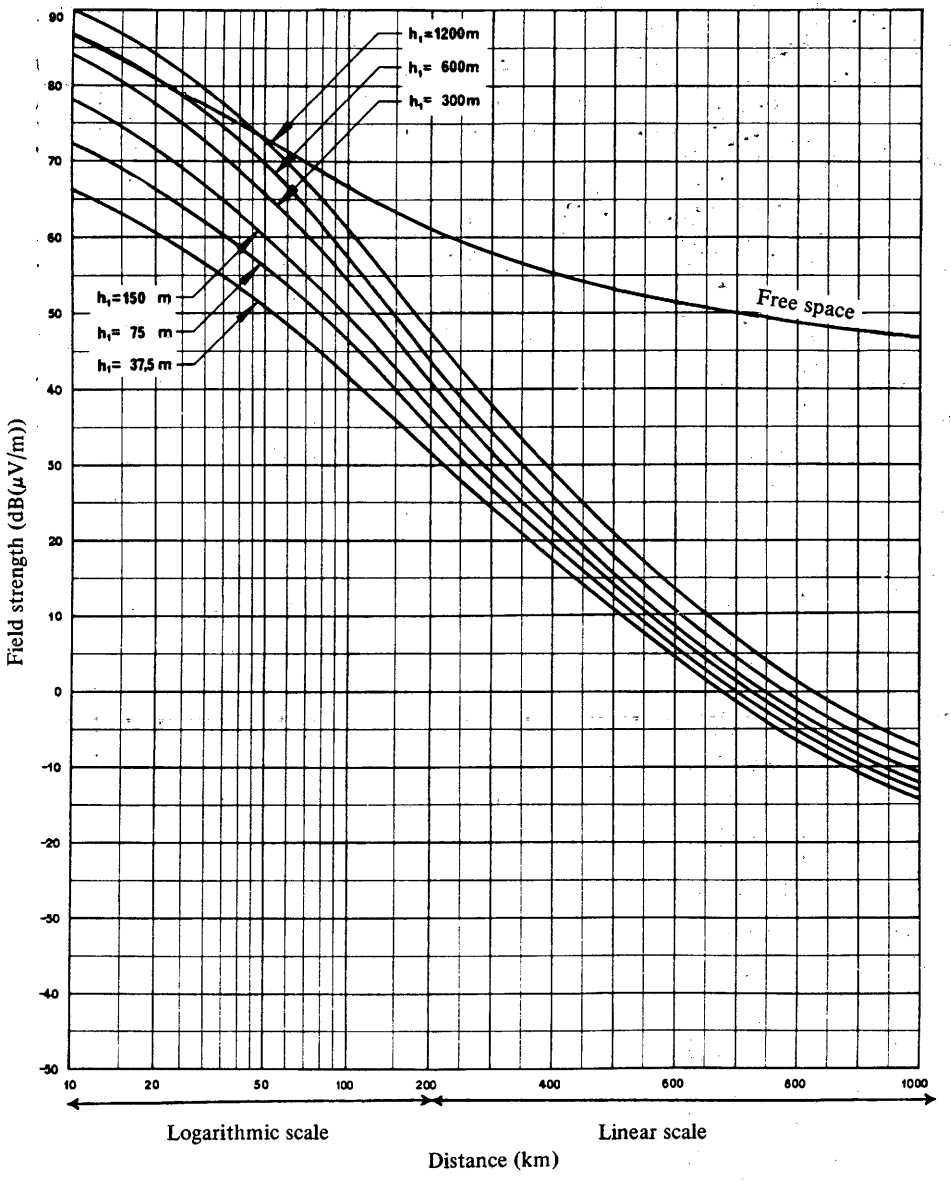


FIGURE 2.24 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; maritime regions and low-altitude coastal land
10% of the time; 50% of the locations; h_2 = 10 m

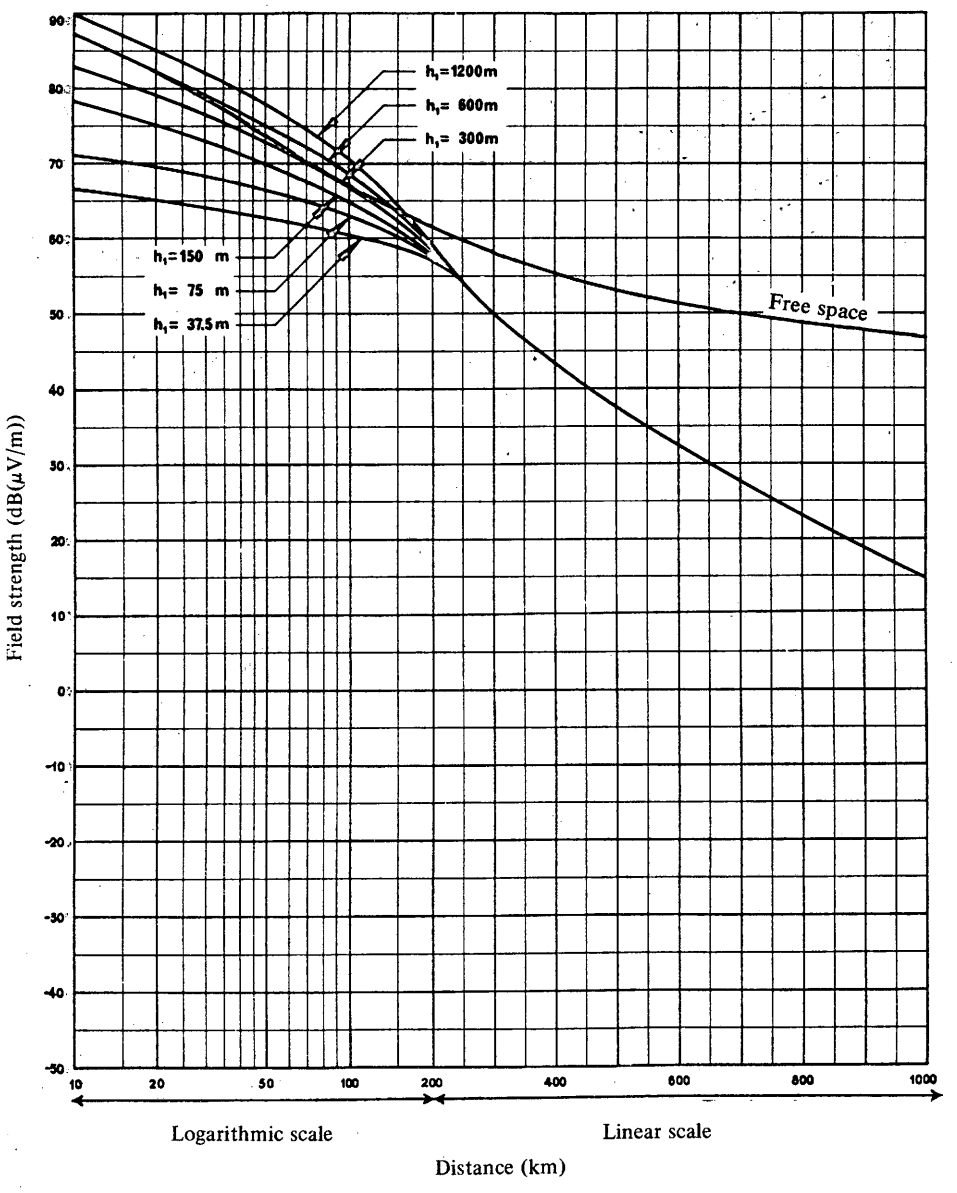
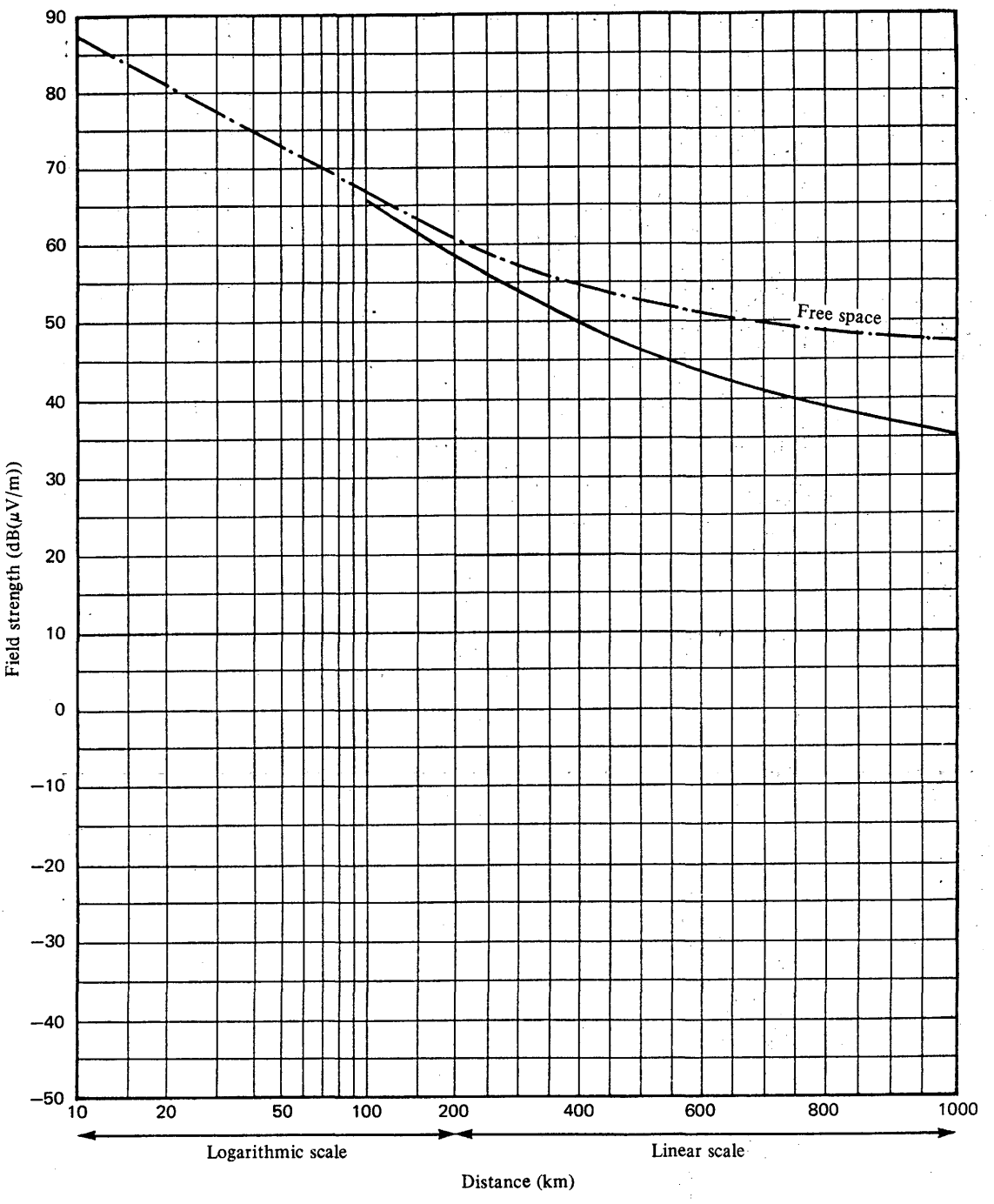


FIGURE 2.25 – *Propagation curves for the broadcasting service in Zone 4*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz; maritime regions and low-altitude coastal land
1% of the time, 50% of the locations; h_2 = 10 m

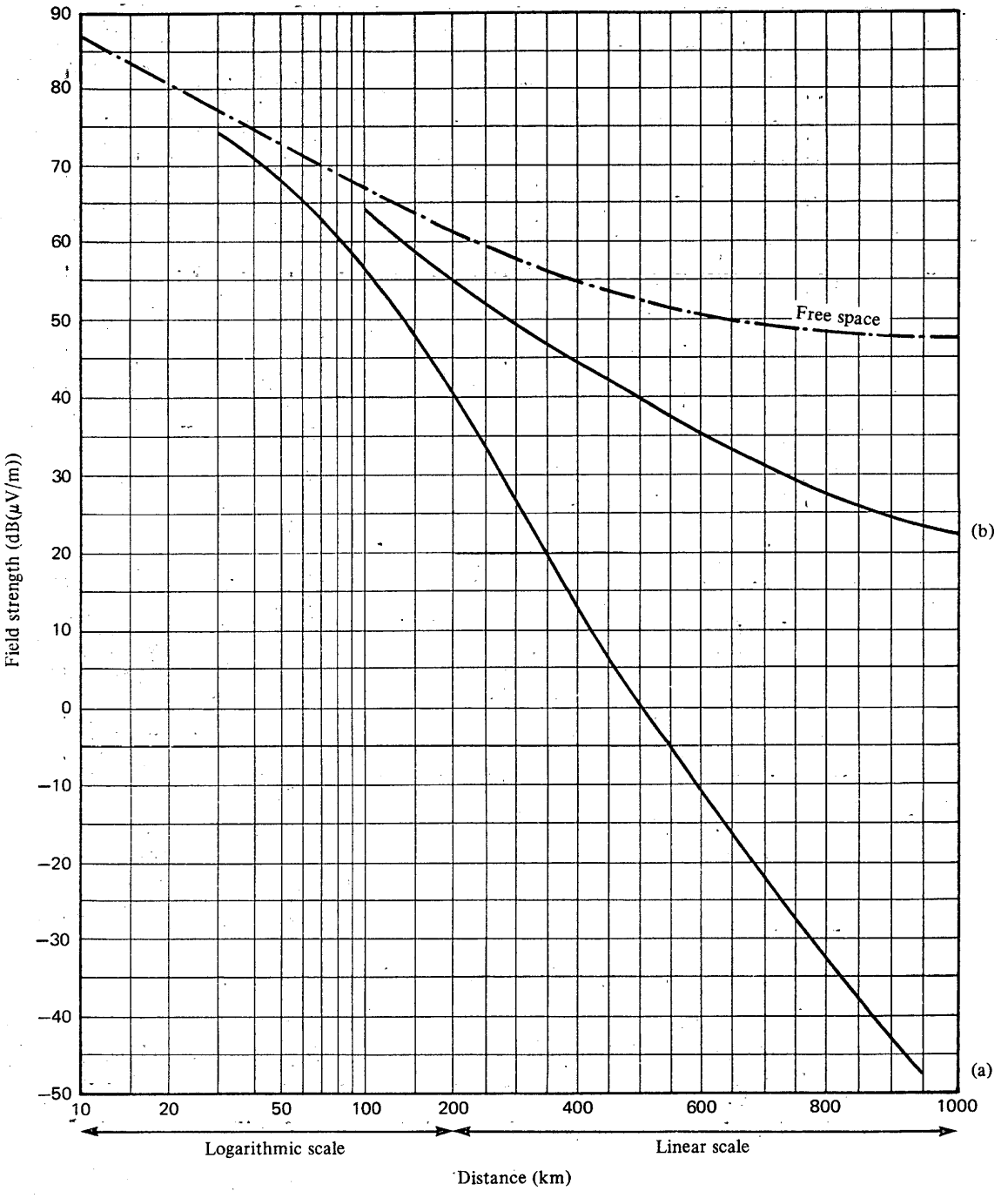


$(E = 106.9 - 20 \log(d) - 0.012\ d)$

FIGURE 2.26 – *Propagation curves for the broadcasting service in Zone C*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz
1% of the time; 50% of the locations; h_2 = 10 m



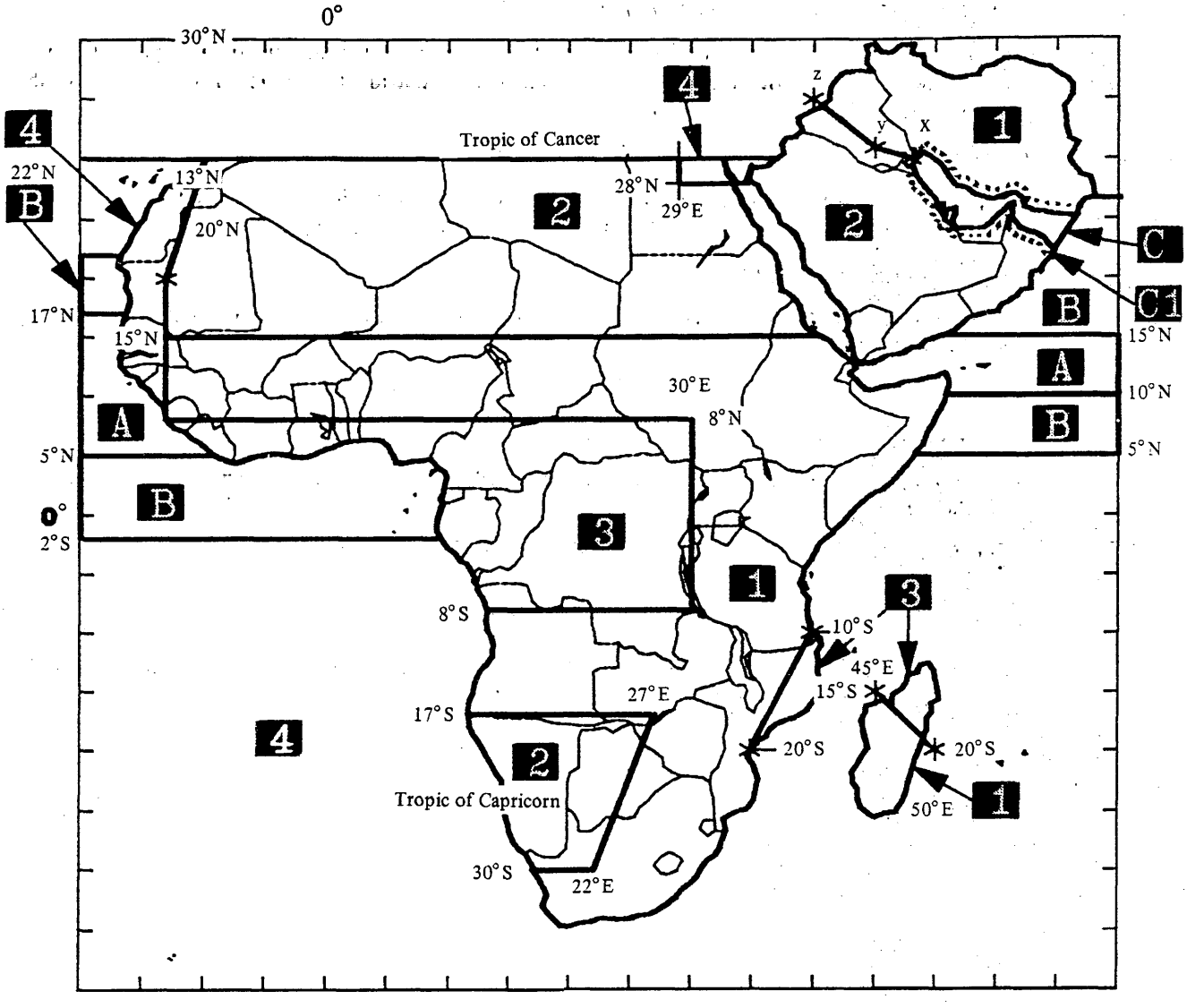
(a) $(E_a = 106.9 - 20 \log(d) - 0.100\ d)$

(b) $(E_b = 106.9 - 20 \log(d) - 0.025\ d)$

FIGURE 2.27 – *Propagation curves for the broadcasting service in Zone C1*

Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency: 450 to 1 000 MHz;
1% of the time, 50% of the locations; $h_2 = 10$ m



The geographical coordinates of the points x, y, z are *as follows:*

x: 48° E and 30° N
y: 45° E and 31° N
z: 40° E and 35° N

FIGURE 2.28 – *Geographical division of the planning area into propagation zones*

2.2 *Propagation information for shared services*

This section contains information in connection with compatibility between the broadcasting and the mobile and fixed services.

a) In the case of interference from the broadcasting service, the land mobile service or the fixed service, the propagation curves described in section 2.1.2 are to be used together with the following information on transmitting and receiving antenna height gain.

Transmitter sited at base station or other fixed locations

The propagation curves described in section 2.1.2 are to be used for the effective height of the base station antenna. If the effective height of this antenna is outside the range 37.5 to 1 200 m, the procedure in section 2.1.3 is to be applied.

Transmitter of a mobile station in the land mobile service

The propagation curves described in section 2.1.2 are to be used with the procedure in section 2.1.3 applied to derive field strength values for an effective transmitting antenna height of 1.5 m.

Receiving antenna height gain

The following formula shall be used to take into account the height of the receiving antenna above ground level:

$$\text{Height gain (dB)} = 20 \log_{10} (r)$$

where r = height ratio.

In the range 2-40 m above ground level, a value of 6 dB shall be used for the increase of field strength when the height doubles.

In bilateral or multilateral negotiations, the following formula may be used:

$$\text{Height gain (dB)} = \frac{v}{6} \cdot 20 \log_{10} (r)$$

Table 2.I indicates the values of the height gain factor, v, for doubling of antenna height that may be used when information is available on the location of the receiver.

TABLE 2.I – *Typical height gain factors, v, for doubling of antenna height*

Zone	VHF (dB)	UHF (dB)
Rural	4	4
Suburban	5	6
Urban	6	8

No distinction is made here between types of polarization, or the effect the directivity of the antenna has in determining the absolute value in a particular situation. The results correspond to 50% of the time and 50% of locations, but for the application of the Agreement it is assumed that the results are independent of time percentage.

The information relates specifically to reception in the land mobile and fixed services, but it is applicable, with the same reservations, to reception in the broadcasting service.

b) In the case of interference from the aeronautical mobile service, Figures 2.C.1 and 2.C.2 of Annex 2.C are to be used.

Note – Whenever use is made of the propagation curves referred to in section 2.1.2.1 (whether for wanted or for interfering signals), it is essential to evaluate the e.r.p. *in the direction of the receiving site* under consideration.

ANNEX 2.A

Correction for terrain irregularities

When this correction is applied, it is a function of a parameter Δh defining the degree of terrain irregularity. It represents the difference between the altitudes exceeded by 10% and 90% of the terrain on the propagation path between 10 and 50 km from the transmitter (see Figure 2.A.1).

The curves relating to propagation above the ground for zones 1, 2 and 3 correspond to a moderately rolling terrain for which a value of Δh equal to 50 m is regarded as appropriate. Figures 2.A.2 and 2.A.3 show the corrections (in dB) to be applied to propagation curves for other values of Δh in the case of VHF and UHF.

These corrections are not made for VHF Band I.

It should also be recalled that the attenuation correction factor, g, as derived from Figures 2.A.2 and 2.A.3 is also used for the determination of the usable field strength by the simplified multiplication method (see Annex 2, Chapter 4, section 4.1). (It should be noted that $g = 0$ for $\Delta h = 50$.)

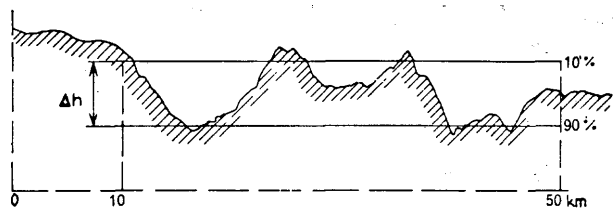


FIGURE 2.A.1 – *Definition of the parameter* Δh

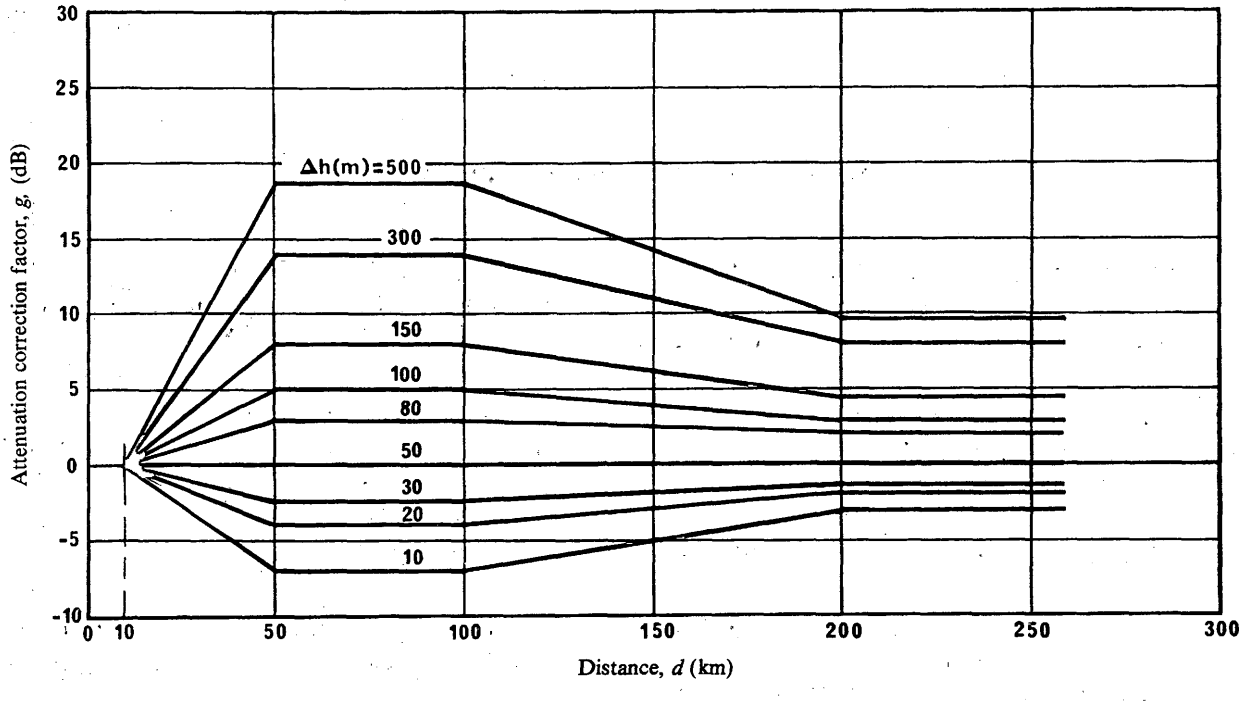


FIGURE 2.A.2 – *Attenuation correction factor, g, as a function of the distance d(km) and Δh*

VHF (Band III only)

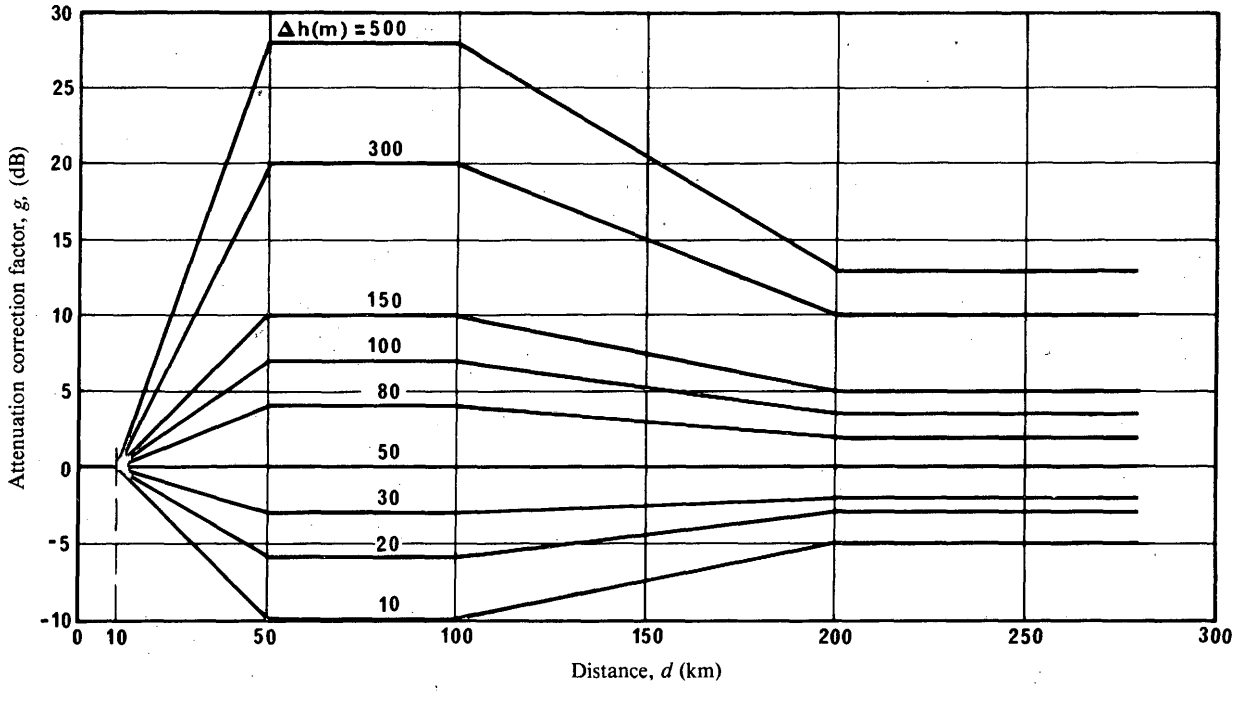


FIGURE 2.A.3 – *Attenuation correction factor, g, as a function of the distance d(km) and Δh*

UHF (Bands IV and V)

Receiver terrain correction (clearance angle)

The correction according to location referred to in Annex 2.B is applicable on a statistical basis only. If more precision is required for predicting field strengths in a small receiving area, a correction may be made on the basis of a "terrain clearance angle". This angle θ is measured at a point considered to be representative of the reception area; it is the angle between the horizontal at the receiving antenna and the line which clears all obstacles within 16 km in the direction of the transmitter. The example given in Figure 2.A.4 shows the sign convention, which is negative if the line which clears the obstacles is above the horizontal. Figure 2.A.5 shows, in accordance with angle θ, the correction to be applied to the results obtained for 50% of locations. If this correction is applied, the correction according to location described in Annex 2.B (Figures 2.B.1 and 2.B.2) may no longer be applicable.

Correction for terrain clearance angles outside the range –5° to 0.5° are not given in Figure 2.A.5. They may, however, be obtained tentatively by linear interpolation between the curves of Figure 2.A.5 and limiting values of 30 dB for VHF and 40 dB for UHF at 1.5° and –40 dB for both VHF and UHF at –15°, on condition that the free-space field strength is not exceeded.

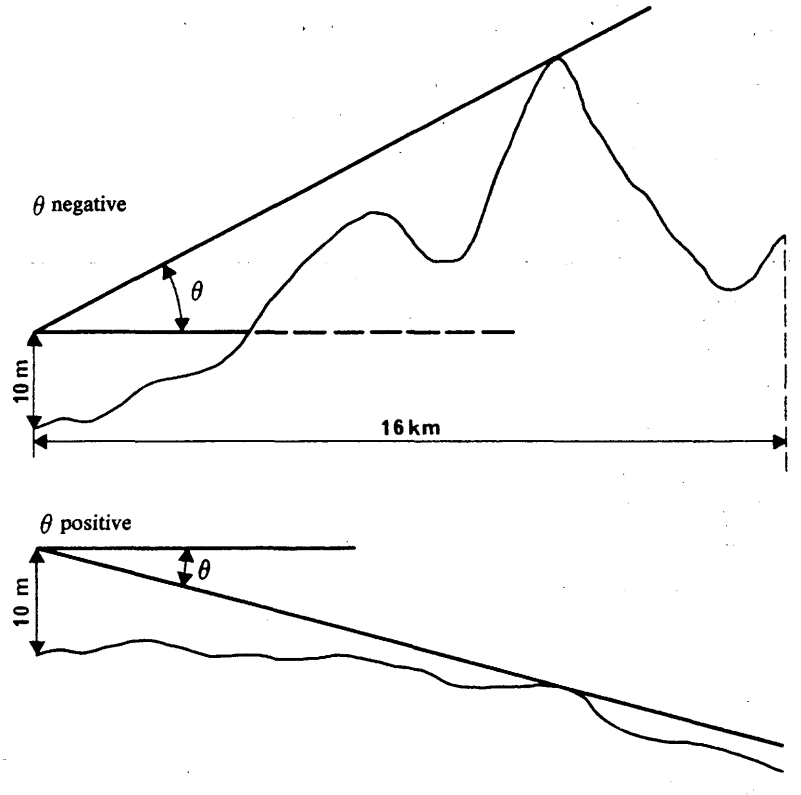


FIGURE 2.A.4 – *Terrain clearance angle*

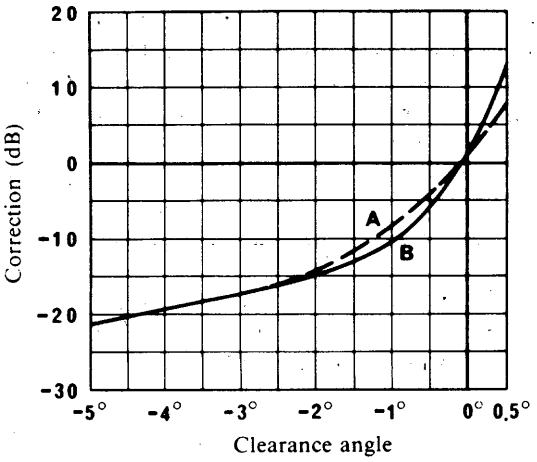


FIGURE 2.A.5 – *Receiving terrain clearance angle correction*

Curve A: VHF (Bands I and III)
B: UHF (Bands IV and V)

ANNEX 2.B

Correction for various percentages of locations

The curves described in Chapter 2 are representative of 50% of locations. Figures 2.B.1 and 2.B.2 give the correction (in dB) to be applied for other percentages of reception locations in the case of VHF and UHF.

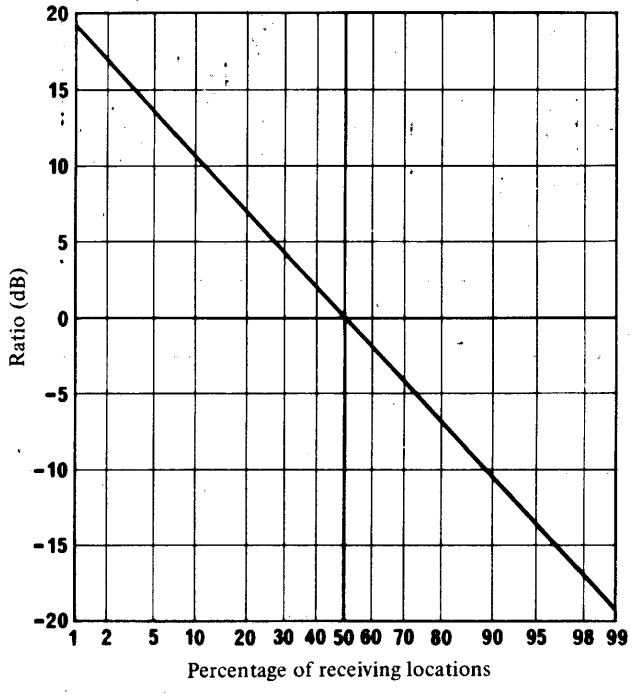


FIGURE 2.B.1 – *Ratio (dB) of the field strength for a given percentage of the receiving locations to the field strength for 50% of the receiving locations*

VHF (Bands I and III)

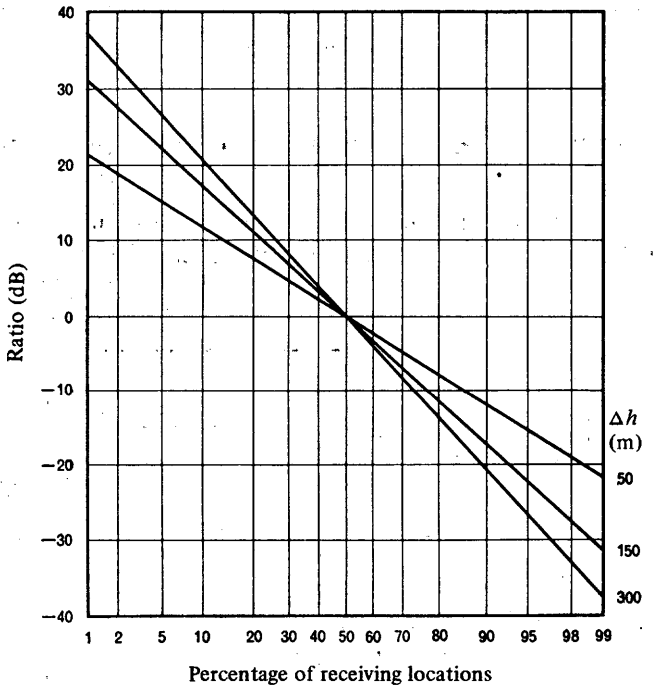


FIGURE 2.B.2 – *Ratio (dB) of the field strength for a given percentage of the receiving locations to the field strength for 50% of the receiving locations*

The parameter Δh is described in Annex 2.A

UHF (Bands IV and V)

ANNEX 2.C

Additional propagation data concerning compatibility with other services in the shared bands

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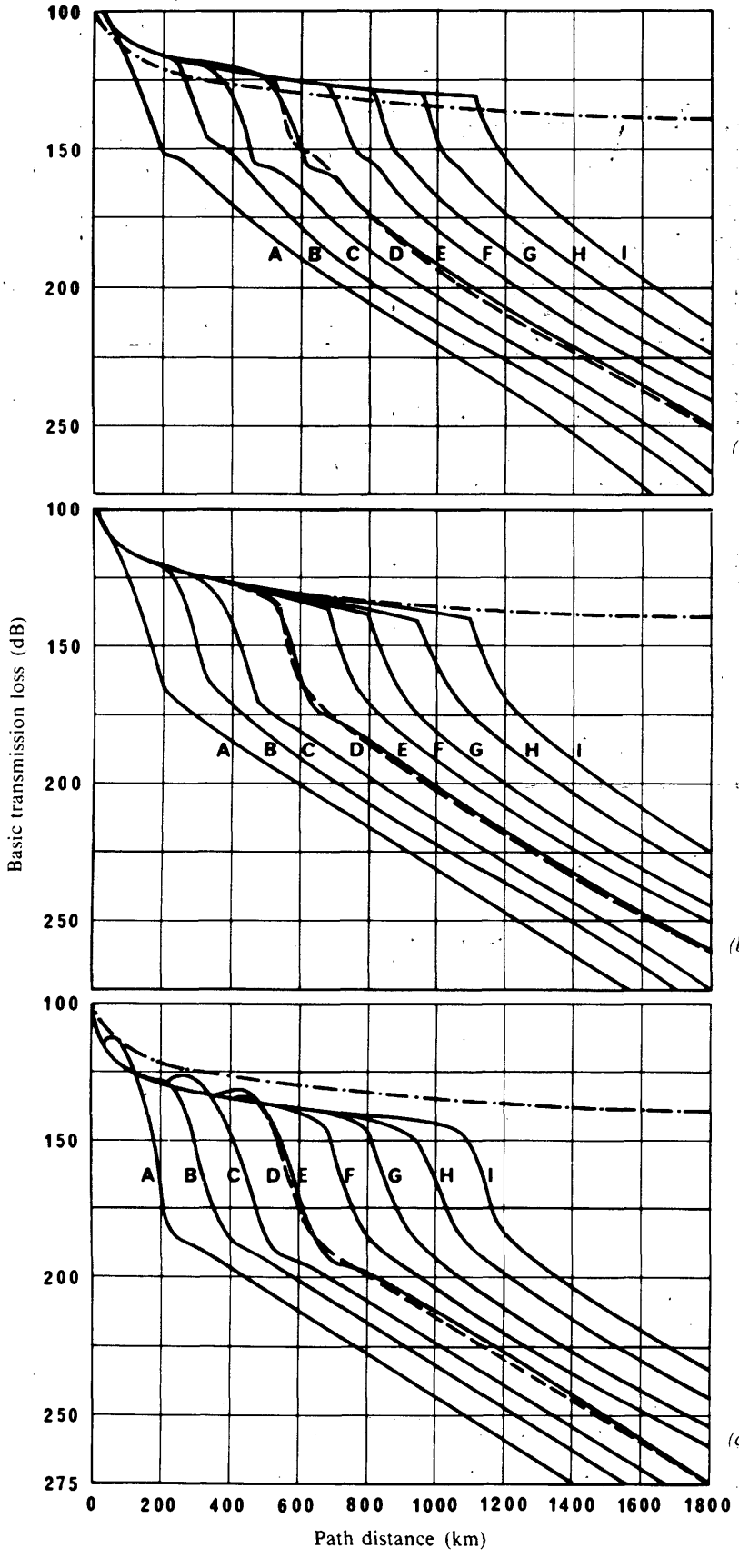
Code for antenna heights

Code	H_1 (m)	H_2 (m)
A	15	1000
B	1000	1000
C	15	10000
D	1000	10000
E	15	20000
F	1000	20000
G	10000	10000
H	10000	20000
I	20000	20000



(a) 125 MHz
$L_b(0.05)$

(b) 125 MHz
$L_b(0.50)$

(c) 125 MHz
$L_b(0.95)$

FIGURE 2.C.1 – *Basic transmission loss at 125 MHz for 5%, 50% and 95% of the time*

– · – · – Free-space propagation

Propagation curves for the aeronautical services

Code for antenna heights

Code	H_1 (m)	H_2 (m)
A	15	1000
B	1000	1000
C	15	10000
D	1000	10000
E	15	20000
F	1000	20000
G	10000	10000
H	10000	20000
I	20000	20000

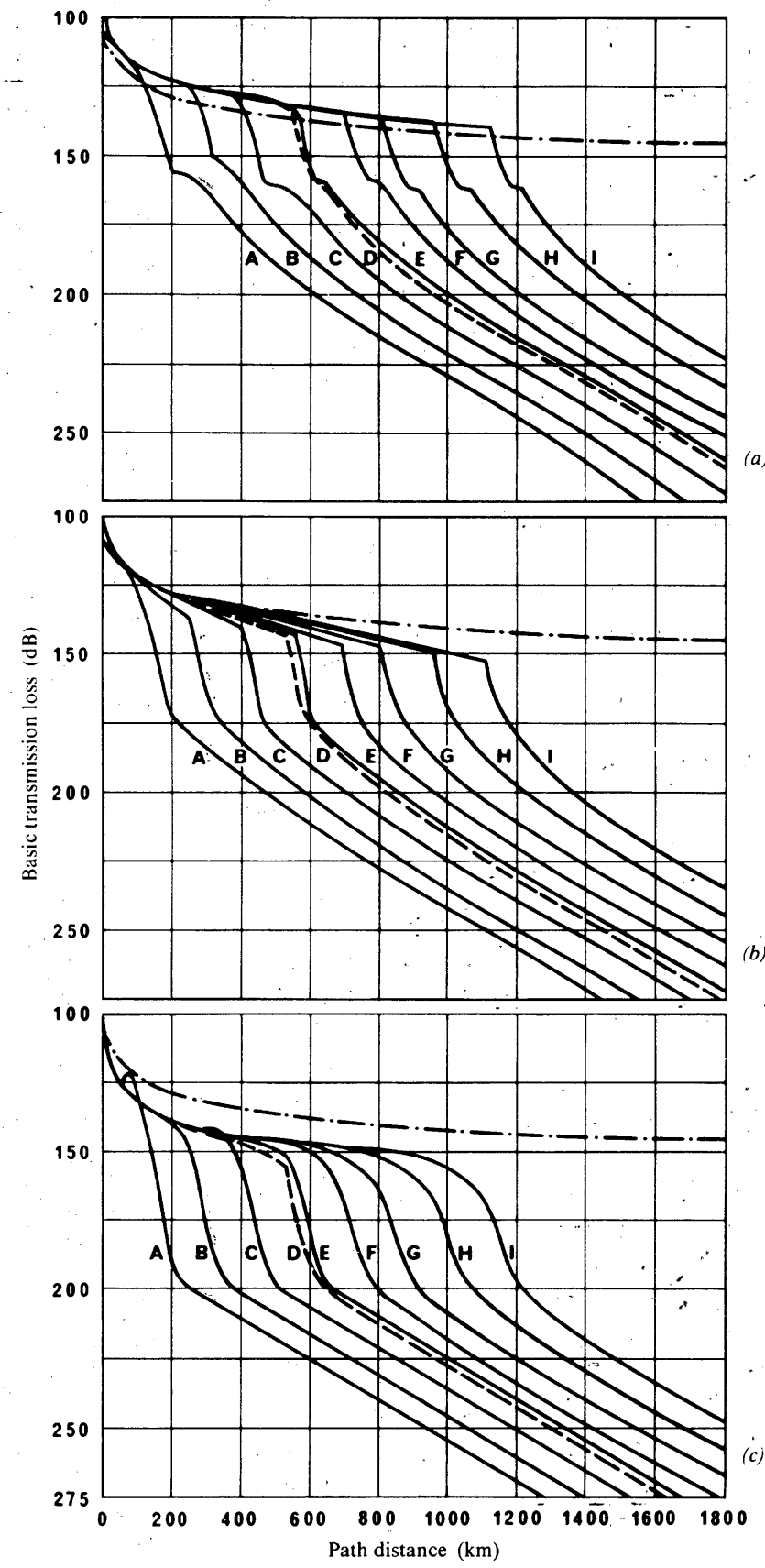


FIGURE 2.C.2 – *Basic transmission loss at 300 MHz for 5%, 50% and 95% of the time*

– · – · – Free-space propagation

Propagation curves for the aeronautical services

CHAPTER 3

Technical standards and transmission characteristics for the broadcasting (television) service

3.1 *Channel spacing, channel distribution*

3.1.1 *Channel spacing*

A uniform channel spacing of 7 MHz or 8 MHz shall be used for Bands I and III. The 7 MHz channel spacing shall be applicable for systems using 7 MHz bandwidth; the 8 MHz channel spacing shall be applicable for systems using 8 MHz bandwidth.

A uniform channel spacing of 8 MHz shall be used for Bands IV/V.

3.1.2 *Channel distribution*

In each channel the nominal vision carrier frequency is situated at 1.25 MHz above the lower limit of the channel and the associated sound carrier frequency is higher than the vision carrier frequency.

3.1.2.1 *Channel numbering in Band I (47 - 68 MHz)*

Channel number	*Channel limits* (MHz)	*Nominal vision carrier frequency* (MHz)
	7 MHz channel spacing	
2	47 - 54	48.25
3	54 - 61	55.25
4	61 - 68	62.25
	8 MHz channel spacing	
2	47 - 55	48.25
3	55 - 63	56.25

3.1.2.2 *Channel numbering in Band III (174 - 230 MHz)*

Channel number		*Channel limits* (MHz)	*Nominal vision carrier frequency* (MHz)
		7 MHz channel spacing	
5		174 - 181	175.25
6		181 - 188	182.25
7		188 - 195	189.25
8		195 - 202	196.25
9		202 - 209	203.25
10		209 - 216	210.25
11		216 - 223	217.25
12		223 - 230	224.25
		8 MHz channel spacing	
4[1]	5[1]	174 - 182	175.25
5	6	182 - 190	183.25
6	7	190 - 198	191.25
7	8	198 - 206	199.25
8	9	206 - 214	207.25
9	10	214 - 222	215.25
10	11	222 - 230	223.25

3.1.2.3 *Channel numbering in the bands 230 - 238 MHz and 246 - 254 MHz*[2]

Channel number		*Channel limits* (MHz)	*Nominal vision carrier frequency* (MHz)
		7 MHz channel spacing	
	13	230 - 237	231.25
	14	246 - 253	247.25
		8 MHz channel spacing	
11	12	230 - 238	231.25
12	13	246 - 254	247.25

1) Numbering applicable for countries already using it.

2) See No. **635** of the Radio Regulations.

3.1.2.4 *Channel numbering in Band IV (channels 21 - 34) and in Band V (channels 35 - 69)*

Channel number	*Channel limits*	*Nominal vision carrier frequency*
21	470 - 478	471.25
22	478 - 486	479.25
23	486 - 494	487.25
24	494 - 502	495.25
25	502 - 510	503.25
26	510 - 518	511.25
27	518 - 526	519.25
28	526 - 534	527.25
29	534 - 542	535.25
30	542 - 550	543.25
31	550 - 558	551.25
32	558 - 566	559.25
33	566 - 574	567.25
34	574 - 582	575.25
35	582 - 590	583.25
36	590 - 598	591.25
37	598 - 606	599.25
38	606 - 614	607.25
39	614 - 622	615.25
40	622 - 630	623.25
41	630 - 638	631.25
42	638 - 646	639.25
43	646 - 654	647.25
44	654 - 662	655.25
45	662 - 670	663.25
46	670 - 678	671.25
47	678 - 686	679.25
48	686 - 694	687.25
49	694 - 702	695.25
50	702 - 710	703.25
51	710 - 718	711.25
52	718 - 726	719.25
53	726 - 734	727.25
54	734 - 742	735.25
55	742 - 750	743.25
56	750 - 758	751.25
57	758 - 766	759.25
58	766 - 774	767.25
59	774 - 782	775.25
60	782 - 790	783.25
61	790 - 798	791.25
62	798 - 806	799.25
63	806 - 814	807.25
64	814 - 822	815.25
65	822 - 830	823.25
66	830 - 838	831.25
67	838 - 846	839.25
68	846 - 854	847.25
69	854 - 862	855.25

3.2 *Modulation standards, emission bandwidth*

TABLE 3.I – *Characteristics of the radiated signals*

No.	Characteristics		B, G	H	I	K1
1	Frequency spacing (see Figure 3.1)	Nominal radio-frequency channel bandwidth (MHz)	B:7 G:8	8	8	8
2		Sound carrier relative to vision carrier (MHz)	+5.5 ±0.001	+5.5	+5.9996 ±0.0005	+6.5
3		Nearest edge of channel relative to vision carrier (MHz)	– 1.25	– 1.25	– 1.25	– 1.25
4		Nominal width of main sideband (MHz)	5	5	5.5	6
5		Nominal width of vestigial sideband (MHz)	0.75	1.25	1.25	1.25
6	Minimum attenuation of vestigial sideband (dB and MHz)		20 (– 1.25) 20 (– 3.0) 30 (– 4.43)	20 (– 1.75) 20 (– 3.0)	20 (– 3.0) 30 (– 4.43)	0 (+0.8) 20 (– 2.7) 30 (– 4.3)
7	Type and polarity of vision modulations		C3F neg.	C3F neg.	C3F neg.	C3F neg.
8	Levels in the radiated signal (% of peak carrier)	Synchronizing level	100	100	100	100
		Blanking level	75 ± 2.5	72.5 to 77.5	76 ± 2	75 ± 2.5
		Difference between black level and blanking level	0 to 2 (nominal)	0 to 7	0 (nominal)	0 to 4.5
		Peak white-level	10 to 12.5	10 to 12.5	20 ± 2	10 to 12.5
9	Type of sound modulation		F3E	F3E	F3E	F3E
10	Frequency deviation (kHz)		± 50	± 50	± 50	± 50
11	Pre-emphasis for modulation (μs)		50	50	50	50
12	Ratio of effective radiated powers of vision/sound		10/1	10/1	10/1	10/1
13	Line frequency f_H and tolerance when operated non-synchronously (Hz)		15 625 (± 0.02%)* ± 0.0001%	15 625 (± 0.02%)* ± 0.0001%	15 625 ± 0.0001%	15 625 (± 0.02%)* ± 0.0001%
13*a)*	Maximum variation rate of line frequency valid for monochrome transmission (%/s)		0.05	0.05	0.05	0.05

* The values in parentheses apply to monochrome television systems.

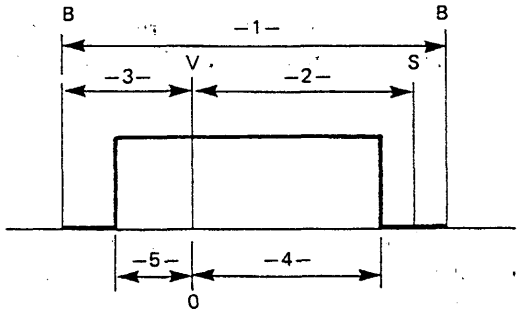


FIGURE 3.1 – *Significance of items 1 to 5 of Table 3.I*

B: channel limit
V: vision carrier
S: sound carrier

3.3 *Protection ratio*

The protection ratio values corresponding to tropospheric interference and the propagation curves for 1% of the time shall be used to calculate the nuisance field strength. In exceptional cases, the protection ratio values corresponding to continuous interference and the propagation curves for 50% of the time may be used.

3.3.1 *Co-channel interference*

In this section the protection ratios between two television signals apply only to interference due to the modulated vision carrier of the unwanted signal. Additional protection may be necessary if the wanted sound carrier is affected, or if the unwanted sound carrier lies within the wanted vision channel, e.g. the unwanted sound carrier of system G or H lies within the vision channel of system K1.

Table 3.II shows the protection ratios for carriers separated by multiples of one twelfth of the line frequency up to about ± 36/12 f_{line} (about ± 50 kHz). These protection ratio values do not necessarily apply for greater carrier separations.

TABLE 3.II – *Protection ratio*

Offset in multiples of 1/12 line-frequency		0	1	2	3	4	5	6	7	8	9	10	11	12
Non-precision offset	Tropospheric interference	45	44	40	34	30	28	27	28	30	34	40	44	45
(Transmitter stability ± 500 Hz)	Continuous interference	52	51	48	44	40	36	33	36	40	44	48	51	52

(Value in the first column is only valid for 0/12 case. All other values between 1/12 and 12/12 are the same by addition or subtraction of integer multiples of 12/12 up to ± 36/12.)

3.3.2 *Adjacent channel interference*

The given protection ratios apply to tropospheric interference, and are defined in terms of wanted and unwanted vision carrier levels. For continuous interference the values shall be increased by 10 dB.

3.3.2.1 *Lower adjacent-channel interference*

The worst interference on the picture signal from another signal using the same standard results from the sound signal in the lower adjacent channel.

Linear correction shall be made to take into account vision-to-sound power ratios different from those assumed in the following sub-sections.

VHF bands

The protection ratio below relates to the cases where the separation between the wanted vision carrier frequency and the unwanted sound carrier frequency is 1.5 MHz and the ratio between the unwanted vision and unwanted sound powers is 10 dB.

Protection ratio: all systems: –9 dB.

UHF bands

For 8 MHz channels in the UHF bands, Table 3.III gives the protection required by a signal of any system against a lower adjacent-channel signal of the same or any other systems, assuming a vision-to-sound power ratio of 10 dB for unwanted signals of all systems used in the planning area. A correction shall be made for different vision-to-sound power ratios.

TABLE 3.III – *Protection ratio for lower adjacent-channel interference (UHF bands)*

Wanted signal \ Unwanted signal	Protection ratio (dB)			
	G	H	I	K1
G	–9	–9	–9	–9
H	–9	–9	–9	+13
I	–9	–9	–9	+13
K1	–9	–9	–9	–9

3.3.2.2 *Upper adjacent-channel interference – VHF and UHF bands*

Protection ratio: all systems: –12 dB.

3.3.3 *Image channel interference*

TABLE 3. IV – *Protection ratio for image channel interference (UHF bands)*

Wanted signal (channel n) \ Unwanted signal	Protection ratio (dB)			Image channel	Remarks
	G, H	I	K1		
G	– 1	– 4	– 11	n + 9	Interference from sound carrier
H	– 1	– 4	– 9	n + 9	
I	– 13	– 10	– 10	n + 9	
K1	– 1	0	– 2	n – 9*	
	– 1	– 4	– 5	n + 9	
	+ 7	+ 7	+ 7	n + 10	Interference from vision carrier

* Local oscillator below the vision carrier

The image-channel protection ratios in Table 3.IV apply to tropospheric interference, and are defined in terms of wanted and unwanted vision carrier levels assuming a vision-to-sound power ratio of 10 dB for unwanted signals. A correction shall be made for different vision-to-sound ratios. For continuous interference the values shall be increased by 10 dB.

3.3.4 *Overlapping channel interference*

All the tables in this section give protection ratios to be applied when a CW signal lies within the vision channel of the wanted transmission, the wanted vision signal being negatively modulated.

Corrections to be made for other types of potentially interfering signals are as given in Table 3.V. When the interfering signal is a television signal, two calculations of protection ratio are necessary: one for the interfering vision carrier and one for the interfering sound carrier.

TABLE 3. V – *Correction values for different wanted and unwanted signals*

Wanted signal \ Unwanted signal	Correction factors (dB)			
	CW	TV-negative modulation	FM-sound	AM-sound
Vision signal negatively modulated	0	– 2	0	+ 4

Tables 3.VI and 3.VII give protection ratios applicable for tropospheric and for continuous interference. The values shown refer to the case of a wanted negatively modulated vision signal affected by an unwanted CW signal. The previously indicated corrections apply when considering other combinations of wanted and unwanted signals.

TABLE 3.VI – *Tropospheric interference (non-precision offset)*

Offset in multiples of 1/12 line-frequency	Frequency difference (MHz) (separation between wanted and unwanted carriers)											
	Luminance range								PAL***		SECAM***	
	–1.25*	–1.25**	–0.5	0.0	0.5	1.0	2.0	3.0	3.6 – 4.8	5.7 – 6.0	3.6 – 4.8	5.7 – 6.0
0	32	23	44	47	50	50	44	36	35	18	40	25
1	31	20	43	46	49	49	42	34	39	20	40	25
2	28	17	39	42	45	45	39	32	42	22	40	25
3	25	13	34	36	39	39	35	29	45	25	40	25
4	22	10	30	32	35	35	32	27	42	22	40	25
5	20	8	28	30	32	32	30	25	39	20	40	25
6	19	7	27	29	31	31	29	24	35	18	40	25
7	20	8	28	30	32	32	30	25	35	18	40	25
8	22	10	30	32	35	35	32	27	39	20	40	25
9	25	13	34	36	39	39	35	29	42	22	40	25
10	28	17	39	42	45	45	39	32	39	20	40	25
11	31	20	43	46	49	49	42	34	35	18	40	25
12	32	23	44	47	50	50	44	36	35	18	40	25
Protection ratio (dB)												

* H, I, K1 television systems

** B, G television systems

*** B, G television systems: the separation is 5.3 - 6.0 MHz.

TABLE 3.VII – *Continuous interference*
(non-precision offset)

Offset in multiples of 1/12 line-frequency	Frequency difference (MHz) (separation between wanted and unwanted carriers)											
	Luminance range								PAL***		SECAM***	
	–1.25*	–1.25**	–0.5	0.0	0.5	1.0	2.0	3.0	3.6 – 4.8	5.7 – 6.0	3.6 – 4.8	5.7 – 6.0
0	40	32	50	54	58	58	54	44	45	30	45	30
1	38	30	49	53	57	57	53	43	48	32	45	30
2	34	27	46	50	55	55	51	41	51	33	45	30
3	30	23	42	46	50	50	46	38	53	35	45	30
4	28	21	38	42	45	45	42	35	51	33	45	30
5	26	19	35	38	41	41	38	32	48	32	45	30
6	24	17	33	35	37	37	36	30	45	30	45	30
7	26	19	35	38	41	41	38	32	45	30	45	30
8	28	21	38	42	45	45	42	35	48	32	45	30
9	30	23	42	46	50	50	46	38	51	33	45	30
10	34	27	46	50	55	55	51	41	48	32	45	30
11	38	30	49	53	57	57	53	43	45	30	45	30
12	40	32	50	54	58	58	54	44	45	30	45	30
Protection ratio (dB)												

* H, I, K1 television systems.
** B, G television systems.
*** B, G television systems: the separation is 5.3 - 6.0 MHz.

3.3.5 *Out-of-channel interference*

TABLE 3.VIII – *Protection ratio values for out-of-channel interference*

Frequency of CW signal relative to vision carrier (MHz)	Protection ratio (dB)		TV system
	Tropospheric interference	Continuous interference	
– 14 to –6	– 15	– 10	B, G, I, K1
– 2.5 to –1.5	+ 1	+ 11	B,G, I, K1
6.2 to +15	– 12	– 2	B, G
7.3 to +15	– 12	– 2	I, K1
– 1.25	+ 32	+ 40	I, K1
– 1.25	+ 23	+ 32	B, G

3.3.6 *Protection ratio for sound signals*

Protection ratios for the wanted sound signal are given in Table 3.IX for tropospheric and continuous interference. The values quoted refer to the level of the wanted sound carrier.

TABLE 3.IX – *Protection ratio for wanted sound carriers*
Unwanted signal; CW or FM sound carrier

Difference between wanted sound carrier and unwanted carrier (kHz)	Wanted sound signal	
	Tropospheric interference	Continuous interference
	FM	FM
0	32	39
15	30	35
50	22	24
250	– 6	– 6

Note – For unwanted vision carrier subtract 2 dB.

3.3.7 *Calculation of nuisance field*

The nuisance field for continuous interference is given by the formula:

$$E_c = P + E(50, 50) + A_c$$

and the nuisance field for tropospheric interference is given by the formula:

$$E_t = P + E(50, T) + A_t$$

where

P : e.r.p. (dB(1 kW)) of the interfering transmitter;

A : radio-frequency protection ratio (dB);

$E(50, T)$: field strength (dB(μV/m)) of the interfering transmitter, normalized to 1 kW, and exceeded during T% of the time[1)]

and where indices c and t indicate continuous and tropospheric interference, respectively.

The protection ratio tables for continuous interference are applicable when the resulting field is stronger than that resulting from tropospheric interference,

i.e. $E_c \geq E_t$

This means that A_c shall be used in all cases when:

$E(50, 50) + A_c \geq E(50, T) + A_t$

3.3.8 *Calculation of multiple interference*

The simplified multiplication method shall be used to calculate the effects of multiple interference. See Chapter 4 for details of its application.

3.4 *Minimum field strength to be protected*

The minimum median field strengths to be protected against interference in Bands I, III, IV and V are:

BAND	I	III	IV	V
dB(μV/m)	+48	+55	+65	+70

The values refer to the field strength at a height of 10 metres above ground level. Protection shall be sought for 99% of the time.

The above values are identical to the values of reference usable field strength (see Definitions).

3.5 *Maximum radiated power*

The maximum power limits (e.r.p.) are as follows:

BAND	I	III	IV/V
max power (kW)	100	200	500
(dBW)	50	53	57

It should be noted that in accordance with No. **2666** of the Radio Regulations, powers in excess of those necessary to provide a national service of good quality should not be used.

1) For the calculation of tropospheric interference, 1% of the time is used.

3.6 *Basic characteristics of transmitting and receiving antennas – Polarization*

3.6.1 *Transmitting antennas*

When polarization discrimination is taken into account in the process of coordination between administrations, a value of 16 dB for orthogonal polarization discrimination shall be used.

3.6.2 *Receiving antennas*

Calculations are based on the used of a non-directional receiving antenna.

For special interference problems to be treated on an individual basis (i.e. bi- or multilaterally), the discrimination that can be obtained by the use of directional receiving antennas is given in Figure 3.2.

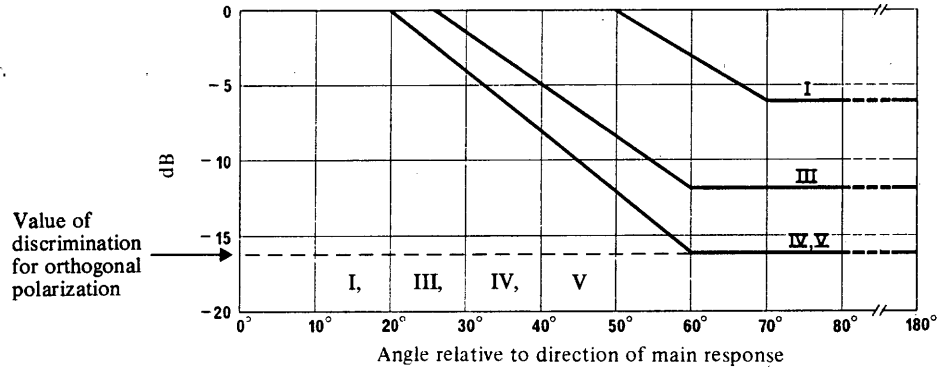


FIGURE 3.2 – *Discrimination obtained by the use of directional receiving antennas in broadcasting*
(The number of the broadcasting band is shown on the curve)

Note 1 – It is considered that the discrimination shown will be available at the majority of antenna locations in built-up areas. At clear sites in open country, slightly higher values may be obtained.

Note 2 – The unbroken curves are valid when the wanted and the unwanted signals have the same linear polarization, whether horizontal or vertical.

CHAPTER 4

Determination of the usable field strength by the simplified multiplication method

4.1 *The concept of usable field strength*

The usable field strength, E_u, a quantity characterizing the coverage situation. To calculate the usable field strength, it is necessary to identify all the transmitters:

- which lie within a definite range of the wanted transmitter (according to experience: up to 800 km);
- which might cause interference in relation to the required protection ratio (A_i).

For the n interfering transmitters identified, the resulting nuisance field, E_{si}, is:

$$E_{si} = P_i + E_{ni}(50, T) + A_i + B_i \quad (1)$$

where:

$E_{ni}(50, T)$: field strength in dB(μV/m) of the unwanted signal normalized to 1 kW effective radiated power (e.r.p) at 50% locations for T% time (value derived from field strength curves in section 2.1.1, Annex 2, Chapter 2);

P_i: e.r.p. in dB(kW) of the interfering transmitter in the direction of the wanted transmitter;

A_i: protection ratio (dB);

B_i: receiving antenna discrimination (dB).

The usable field strength, E_u, is a function of the n nuisance fields, E_{si}, and is calculated by way of the formula:

$$P_c = \prod_{i=1}^{n} L(x_i) \text{ with } x_i = \frac{E_u - E_{si}}{\sigma_n \sqrt{2}} \quad (2)$$

in which:

P_c: the coverage probability. To initiate the iterative calculation of E_u a predetermined value, P_{cp}, of the coverage probability is taken, e.g. $P_{cp} = 0.5$. With the value of E_u obtained at the end of the iterative process, the coverage probability is $P_c = P_{cp} = 0{,}5$, i.e. 50% of locations[1];

L: the probability integral for a normal distribution:

$$L(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} [\exp(-t^2/2)]\, dt \quad (3)$$

In this function x is the difference between the levels of the usable field-strength, E_u, and the nuisance field E_{si}, referred to σ, the standard deviation (with location) of the resulting difference in level.

1) P_c can be set to any other value of coverage probability (e.g. 45% → $P_c = 0.45$).

Identical values are assumed for the standard deviations (with location) of the wanted and interfering field-strength levels: $\sigma_n = \sigma_s$. Thus, the standard deviation of the resulting level difference is:

$$\sigma = \sqrt{\sigma_n^2 + \sigma_s^2} = \sigma_n \sqrt{2}$$

The value $\sigma_n = 8.3$ dB is assumed for the frequency Bands I to III. For Band IV/V this value is dependent on the terrain attenuation, g. σ is then calculated using the formula $\sigma_n = 9.5 + 0.405\ g$. The attenuation correction factor g (in dB) can be derived from Δh (see Annex 2.A).

4.2 *Calculation of the probability integral*

4.2.1 *Tabular evaluation*

The probability integral is as follows:

$$\varphi(x) = \frac{2}{\sqrt{2\pi}} \int_0^x [\exp(-t^2/2)]\, dt \qquad (4)$$

Its numerical values are given in Table 4.I.

Since

$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} [\exp(-t^2/2)]\, dt = 1$$

and

$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{0} [\exp(-t^2/2)]\, dt = 1/2$$

it follows that:

$$L(x) = \frac{\varphi(x)}{2} + 1/2$$

4.2.2 *Evaluation using the Hastings approximation*

If the calculations are to be done by computer (or programmable pocket or table calculator), the following rational approximation is very useful:

$$x \geq 0\text{: } L(x) = 1 - \frac{1}{(2\pi)^{1/2}} e^{-x2/2} H(y) \qquad (5)$$

$$x < 0\text{: } L(x) = 1 - L(-x)$$

with:

$$H(y) = C_5 y^5 + C_4 y^4 + C_3 y^3 + C_2 y^2 + C_1 y^1$$

and:

$$y = [1 + 0.2\,316\,419\,|x|]^{-1}$$

$$C_5 = 1.330\,274\,429$$

$$C_4 = -1.821\,255\,978$$

$$C_3 = 1.781\,477\,937$$

$$C_2 = -0.356\,563\,782$$

$$C_1 = 0.319\,381\,530$$

By means of approximation (5), one can avoid the integration in formula (3) and avoid using tables to evaluate the probability integral. The error involved by using this approximation is less than 10^{-7}.

4.3 *Practical calculation procedures to determine the usable' field strength*

Since it is impossible to calculate formula (2) explicitly for E_u for a predetermined value P_{cp} (e.g. $P_{cp} = 0.5$), it must be calculated iteratively. Begin with an initial value for E_u, which, according to experience, should be some 6 dB greater that the largest of the E_{si}, and determine, successively, for each value of E_{si} :

$$z_i = E_u - E_{si} = \Delta_i$$

$$x_i = \frac{\Delta_i}{\sigma_n \sqrt{2}} \text{ (in bands I to III: } x_i = \Delta_i / 11.738)$$

$\varphi(x_i)$ from Table 4.I.

$$L(x_i) = \frac{\varphi(x_i)}{2} + \frac{1}{2}$$

Since for the standard deviation a value $\sigma_n = 8.3$ dB is assumed to apply for Bands I to III, it is appropriate to use Table 4.II where $L(x_i)$ is presented as a function of Δ_i for $\sigma_n = 8.3$ dB. In Bands IV and V, where $\sigma_n = 9.5 + 0.405\ g$, Table 4.II may also be used once the Δ_i values have been corrected using:

$$\Delta'_i = \Delta_i \cdot \frac{8.3}{9.5 + 0.405\ g}$$

P_c is then determined by means of formula (2). If P_c is different from P_{cp} (e.g. $P_{cp} = 0.5$), the value obtained is used as a basis to correct, as a part of the iterative process, the initial E_u value. From experience, the correction may be assumed to correspond approximately to:

$$\Delta E_u \approx \frac{P_{cp} - P_c}{0.05} \text{ dB}$$

$$\varphi(x) = \frac{2}{\sqrt{2\pi}} \int_0^x [\exp(-t^2/2)]\, dt$$

TABLE 4.I

x	$\varphi(x)$	x	$\varphi(x)$	x	$\varphi(x)$	x	$\varphi(x)$
0.00	0.0000	0.60	0.4515	1.20	0.7699	1.80	0.9281
01	0.0080	61	0.4581	21	0.7737	81	0.9297
02	0.0160	62	0.4647	22	0.7775	82	0.9312
03	0.0239	63	0.4713	23	0.7813	83	0.9328
04	0.0319	64	0.4778	24	0.7850	84	0.9342
0.05	0.0399	0.65	0.4843	1.25	0.7887	1.85	0.9357
06	0.0478	66	0.4907	26	0.7923	86	0.9371
07	0.0558	67	0.4971	27	0.7959	87	0.9385
08	0.0638	68	0.5035	28	0.7995	88	0.9399
09	0.0717	69	0.5098	29	0.8029	89	0.9412
0.10	0.0797	0.70	0.5161	1.30	0.8064	1.90	0.9426
11	0.0876	71	0.5223	31	0.8098	91	0.9439
12	0.0955	72	0.5285	32	0.8132	92	0.9451
13	0.1034	73	0.5346	33	0.8165	93	0.9464
14	0.1113	74	0.5407	34	0.8198	94	0.9476
0.15	0.1192	0.75	0.5467	1.35	0.8230	1.95	0.9488
16	0.1271	76	0.5527	36	0.8262	96	0.9500
17	0.1350	77	0.5587	37	0.8293	97	0.9512
18	0.1428	78	0.5646	38	0.8324	98	0.9523
19	0.1507	79	0.5705	39	0.8355	99	0.9534
0.20	0.1585	0.80	0.5763	1.40	0.8385	2.00	0.9545
21	0.1663	81	0.5821	41	0.8415	05	0.9596
22	0.1741	82	0.5878	42	0.8444	10	0.9643
23	0.1819	83	0.5935	43	0.8473	15	0.9684
24	0.1897	84	0.5991	44	0.8501	20	0.9722
0.25	0.1974	0.85	0.6047	1.45	0.8529	2.25	0.9756
26	0.2041	86	0.6102	46	0.8557	30	0.9786
27	0.2128	87	0.6157	47	0.8584	35	0.9812
28	0.2205	88	0.6211	48	0.8611	40	0.9836
29	0.2282	89	0.6265	49	0.8638	45	0.9857
0.30	0.2358	0.90	0.6319	1.50	0.8664	2.50	0.9876
31	0.2434	91	0.6372	51	0.8690	55	0.9892
32	0.2510	92	0.6424	52	0.8715	60	0.9907
33	0.2586	93	0.6476	53	0.8740	65	0.9920
34	0.2661	94	0.6528	54	0.8764	70	0.9931
0.35	0.2737	0.95	0.6579	1.55	0.8789	2.75	0.9940
36	0.2812	96	0.6629	56	0.8812	80	0.9949
37	0.2886	97	0.6680	57	0.8836	85	0.9956
38	0.2961	98	0.6729	58	0.8859	90	0.9963
39	0.3035	99	0.6778	59	0.8882	95	0.9968

TABLE 4.I (*cont.*)

x	$\varphi(x)$	x	$\varphi(x)$	x	$\varphi(x)$	x	$\varphi(x)$
0.40	0.3108	1.00	0.6827	1.60	0.8904	3.00	0.99730
41	0.3182	01	0.6875	61	0.8926	10	0.99806
42	0.3255	02	0.6923	62	0.8948	20	0.99863
43	0.3328	03	0.6970	63	0.8969	30	0.99903
44	0.3401	04	0.7017	64	0.8990	40	0.99933
0.45	0.3473	1.05	0.7063	1.65	0.9011	3.50	0.99953
46	0.3545	06	0.7109	66	0.9031	60	0.99968
47	0.3616	07	0.7154	67	0.9051	70	0.99978
48	0.3688	08	0.7199	68	0.9070	80	0.99986
49	0.3759	09	0.7243	69	0.9090	90	0.99990
0.50	0.3829	1.10	0.7287	1.70	0.9109	4.00	0.99994
51	0.3899	11	0.7330	71	0.9127		
52	0.3969	12	0.7373	72	0.9146	4.417	$1-10^{-5}$
53	0.4039	13	0.7415	73	0.9164		
54	0.4108	14	0.7457	74	0.9181	4.892	$1-10^{-6}$
0.55	0.4177	1.15	0.7499	1.75	0.9199	5.327	$1-10^{-7}$
56	0.4245	16	0.7540	76	0.9216		
57	0.4313	17	0.7580	77	0.9233		
58	0.4381	18	0.7620	78	0.9249		
59	0.4448	19	0.7660	79	0.9265		
0.60	0.4515	1.20	0.7699	1.80	0.9281		

TABLE 4.II

Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$
0.0	0.50000	7.000	5.0	0.66493	4.121	10.0	0.80288	2.217	15.0	0.89936	1.071	20.0	0.95580	0.457
0.1	0.50340	6.932	5.1	0.66803	4.074	10.1	0.80523	2.188	15.1	0.90085	1.054	20.1	0.95659	0.448
0.2	0.50680	6.864	5.2	0.67112	4.028	10.2	0.80757	2.158	15.2	0.90233	1.038	20.2	0.95737	0.440
0.3	0.51020	6.796	5.3	0.67419	3.981	10.3	0.80989	2.129	15.3	0.90379	1.022	20.3	0.95813	0.432
0.4	0.51359	6.729	5.4	0.67726	3.936	10.4	0.81219	2.101	15.4	0.90524	1.005	20.4	0.95889	0.424
0.5	0.51699	6.663	5.5	0.68031	3.890	10.5	0.81448	2.072	15.5	0.90667	0.989	20.5	0.95964	0.416
0.6	0.52038	6.596	5.6	0.68335	3.845	10.6	0.81675	2.044	15.6	0.90808	0.974	20.6	0.96037	0.408
0.7	0.52378	6.531	5.7	0.68638	3.801	10.7	0.81900	2.016	15.7	0.90948	0.958	20.7	0.96109	0.401
0.8	0.52717	6.466	5.8	0.68939	3.756	10.8	0.82124	1.989	15.8	0.91086	0.943	20.8	0.96180	0.393
0.9	0.53056	6.401	5.9	0.69239	3.712	10.9	0.82345	1.962	15.9	0.91222	0.928	20.9	0.96251	0.386
1.0	0.53395	6.337	6.0	0.69538	3.669	11.0	0.82565	1.935	16.0	0.91357	0.913	21.0	0.96320	0.379
1.1	0.53733	6.273	6.1	0.69836	3.626	11.1	0.82784	1.908	16.1	0.91491	0.898	21.1	0.96388	0.372
1.2	0.54071	6.209	6.2	0.70132	3.583	11.2	0.83000	1.882	16.2	0.91623	0.884	21.2	0.96455	0.365
1.3	0.54409	6.147	6.3	0.70427	3.541	11.3	0.83215	1.856	16.3	0.91753	0.869	21.3	0.96521	0.358
1.4	0.54747	6.084	6.4	0.70721	3.499	11.4	0.83428	1.830	16.4	0.91882	0.855	21.4	0.96586	0.351
1.5	0.55084	6.022	6.5	0.71013	3.457	11.5	0.83639	1.804	16.5	0.92009	0.841	21.5	0.96650	0.344
1.6	0.55421	5.960	6.6	0.71304	3.416	11.6	0.83848	1.779	16.6	0.92135	0.827	21.6	0.96713	0.338
1.7	0.55758	5.889	6.7	0.71593	3.375	11.7	0.84056	1.754	16.7	0.92259	0.814	21.7	0.96775	0.331
1.8	0.56094	5.839	6.8	0.71881	3.334	11.8	0.84262	1.729	16.8	0.92382	0.800	21.8	0.96836	0.325
1.9	0.56430	5.778	6.9	0.72168	3.294	11.9	0.84466	1.705	16.9	0.92503	0.787	21.9	0.96896	0.318
2.0	0.56765	5.719	7.0	0.72453	3.254	12.0	0.84669	1.681	17.0	0.92623	0.774	22.0	0.96955	0.312
2.1	0.57099	5.659	7.1	0.72737	3.215	12.1	0.84869	1.657	17.1	0.92741	0.761	22.1	0.97013	0.306
2.2	0.57434	5.600	7.2	0.73019	3.176	12.2	0.85068	1.633	17.2	0.92858	0.748	22.2	0.97071	0.300
2.3	0.57767	5.542	7.3	0.73300	3.137	12.3	0.85265	1.610	17.3	0.92974	0.736	22.3	0.97127	0.294
2.4	0.58100	5.484	7.4	0.73579	3.098	12.4	0.85461	1.587	17.4	0.93088	0.723	22.4	0.97183	0.289
2.5	0.58433	5.426	7.5	0.73857	3.060	12.5	0.85634	1.564	17.5	0.93200	0.711	22.5	0.97237	0.283
2.6	0.58765	5.369	7.6	0.74134	3.023	12.6	0.85846	1.541	17.6	0.93312	0.699	22.6	0.97291	0.277
2.7	0.59096	5.312	7.7	0.74408	2.985	12.7	0.86036	1.519	17.7	0.93421	0.687	22.7	0.97344	0.272
2.8	0.59427	5.256	7.8	0.74682	2.948	12.8	0.86225	1.497	17.8	0.93530	0.676	22.8	0.97396	0.266
2.9	0.59757	5.200	7.9	0.74954	2.912	12.9	0.86412	1.475	17.9	0.93637	0.664	22.9	0.97447	0.261
3.0	0.60086	5.144	8.0	0.75224	2.875	13.0	0.86596	1.453	18.0	0.93742	0.653	23.0	0.97497	0.256
3.1	0.60415	5.089	8.1	0.75492	2.839	13.1	0.86780	1.432	18.1	0.93846	0.641	23.1	0.97546	0.251
3.2	0.60743	5.035	8.2	0.75760	2.804	13.2	0.86961	1.411	18.2	0.93949	0.630	23.2	0.97595	0.246
3.3	0.61070	4.980	8.3	0.76025	2.768	13.3	0.87141	1.390	18.3	0.94051	0.619	23.3	0.97643	0.241
3.4	0.61396	4.926	8.4	0.76289	2.733	13.4	0.87319	1.369	18.4	0.94151	0.609	23.4	0.97690	0.236
3.5	0.61722	4.873	8.5	0.76551	2.699	13.5	0.87495	1.349	18.5	0.94250	0.598	23.5	0.97736	0.231
3.6	0.62046	4.820	8.6	0.76812	2.664	13.6	0.87670	1.329	18.6	0.94347	0.588	23.6	0.97781	0.227
3.7	0.62370	4.768	8.7	0.77071	2.630	13.7	0.87843	1.309	18.7	0.94443	0.577	23.7	0.97826	0.222
3.8	0.62693	4.715	8.8	0.77328	2.597	13.8	0.88014	1.289	18.8	0.94538	0.567	23.8	0.97870	0.217
3.9	0.63015	4.664	8.9	0.77584	2.563	13.9	0.88183	1.270	18.9	0.94632	0.557	23.9	0.97913	0.213
4.0	0.63336	4.612	9.0	0.77838	2.530	14.0	0.88351	1.251	19.0	0.94724	0.547	24.0	0.97956	0.209
4.1	0.63657	4.561	9.1	0.78091	2.497	14.1	0.88517	1.232	19.1	0.94815	0.538	24.1	0.97997	0.204
4.2	0.63976	4.511	9.2	0.78342	2.465	14.2	0.88681	1.213	19.2	0.94905	0.528	24.2	0.98038	0.200
4.3	0.64294	4.461	9.3	0.78591	2.433	14.3	0.88844	1.195	19.3	0.94994	0.519	24.3	0.98078	0.196
4.4	0.64611	4.411	9.4	0.78838	2.401	14.4	0.89005	1.176	19.4	0.95081	0.509	24.4	0.98118	0.192
4.5	0.64928	4.362	9.5	0.79084	2.370	14.5	0.89164	1.158	19.5	0.95167	0.500	24.5	0.98157	0.188
4.6	0.65243	4.313	9.6	0.79328	2.339	14.6	0.89322	1.140	19.6	0.95252	0.491	24.6	0.98195	0.184
4.7	0.65557	4.264	9.7	0.79571	2.308	14.7	0.89478	1.123	19.7	0.95336	0.482	24.7	0.98232	0.180
4.8	0.65870	4.216	9.8	0.79811	2.277	14.8	0.89632	1.105	19.8	0.95418	0.474	24.8	0.98269	0.176
4.9	0.66182	4.168	9.9	0.80050	2.247	14.9	0.89785	1.088	19.9	0.95500	0.465	24.9	0.98305	0.173

TABLE 4.II *(Cont.)*

Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$	Δ	$L(x)$	$-\log L(x)$
25.0	0.98341	0.169	30.0	0.99470	0.054	35.0	0.99857	0.014	40.0	0.99967	0.003	45.0	0.99994	0.001
25.1	0.98376	0.165	30.1	0.99483	0.052	35.1	0.99861	0.014	40.1	0.99968	0.003	45.1	0.99994	0.001
25.2	0.98410	0.162	30.2	0.99496	0.051	35.2	0.99864	0.014	40.2	0.99969	0.003	45.2	0.99994	0.001
25.3	0.98443	0.158	30.3	0.99508	0.050	35.3	0.99868	0.013	40.3	0.99970	0.003	45.3	0.99994	0.001
25.4	0.98476	0.155	30.4	0.99520	0.049	35.4	0.99872	0.013	40.4	0.99971	0.003	45.4	0.99995	0.001
25.5	0.98509	0.152	30.5	0.99532	0.047	35.5	0.99875	0.013	40.5	0.99972	0.003	45.5	0.99995	0.001
25.6	0.98541	0.148	30.6	0.99543	0.046	35.6	0.99879	0.012	40.6	0.99973	0.003	45.6	0.99995	0.001
25.7	0.98572	0.145	30.7	0.99554	0.045	35.7	0.99882	0.012	40.7	0.99974	0.003	45.7	0.99995	0.000
25.8	0.98603	0.142	30.8	0.99565	0.044	35.8	0.99886	0.012	40.8	0.99975	0.003	45.8	0.99995	0.000
25.9	0.98633	0.139	30.9	0.99576	0.043	35.9	0.99889	0.011	40.9	0.99975	0.002	45.9	0.99995	0.000
26.0	0.98662	0.136	31.0	0.99587	0.042	36.0	0.99892	0.011	41.0	0.99976	0.002	46.0	0.99996	0.000
26.1	0.98691	0.133	31.1	0.99597	0.041	36.1	0.99895	0.011	41.1	0.99977	0.002	46.1	0.99996	0.000
26.2	0.98719	0.130	31.2	0.99607	0.040	36.2	0.99898	0.010	41.2	0.99978	0.002	46.2	0.99996	0.000
26.3	0.98747	0.127	31.3	0.99617	0.039	36.3	0.99901	0.010	41.3	0.99978	0.002	46.3	0.99996	0.000
26.4	0.98775	0.125	31.4	0.99626	0.038	36.4	0.99904	0.010	41.4	0.99979	0.002	46.4	0.99996	0.000
26.5	0.98802	0.122	31.5	0.99636	0.037	36.5	0.99906	0.009	41.5	0.99980	0.002	46.5	0.99996	0.000
26.6	0.98828	0.119	31.6	0.99645	0.036	36.6	0.99909	0.009	41.6	0.99980	0.002	46.6	0.99996	0.000
26.7	0.98854	0.116	31.7	0.99654	0.035	36.7	0.99912	0.009	41.7	0.99981	0.002	46.7	0.99997	0.000
26.8	0.98879	0.114	31.8	0.99663	0.034	36.8	0.99914	0.009	41.8	0.99982	0.002	46.8	0.99997	0.000
26.9	0.98904	0.111	31.9	0.99671	0.033	36.9	0.99917	0.008	41.9	0.99982	0.002	46.9	0.99997	0.000
27.0	0.98928	0.109	32.0	0.99680	0.032	37.0	0.99919	0.008	42.0	0.99983	0.002	47.0	0.99997	0.000
27.1	0.98952	0.106	32.1	0.99688	0.032	37.1	0.99921	0.008	42.1	0.99983	0.002	47.1	0.99997	0.000
27.2	0.98976	0.104	32.2	0.99696	0.031	37.2	0.99924	0.008	42.2	0.99984	0.002	47.2	0.99997	0.000
27.3	0.98999	0.102	32.3	0.99704	0.030	37.3	0.99926	0.007	42.3	0.99984	0.002	47.3	0.99997	0.000
27.4	0.99021	0.099	32.4	0.99711	0.029	37.4	0.99928	0.007	42.4	0.99985	0.002	47.4	0.99997	0.000
27.5	0.99043	0.097	32.5	0.99719	0.028	37.5	0.99930	0.007	42.5	0.99985	0.001	47.5	0.99997	0.000
27.6	0.99065	0.095	32.6	0.99726	0.028	37.6	0.99932	0.007	42.6	0.99986	0.001	47.6	0.99997	0.000
27.7	0.99086	0.093	32.7	0.99733	0.027	37.7	0.99934	0.007	42.7	0.99986	0.001	47.7	0.99998	0.000
27.8	0.99107	0.091	32.8	0.99740	0.026	37.8	0.99936	0.006	42.8	0.99987	0.001	47.8	0.99998	0.000
27.9	0.99127	0.089	32.9	0.99747	0.026	37.9	0.99938	0.006	42.9	0.99987	0.001	47.9	0.99998	0.000
28.0	0.99147	0.087	33.0	0.99753	0.025	38.0	0.99940	0.006	43.0	0.99988	0.001	48.0	0.99998	0.000
28.1	0.99167	0.085	33.1	0.99760	0.024	38.1	0.99941	0.006	43.1	0.99988	0.001	48.1	0.99998	0.000
28.2	0.99186	0.083	33.2	0.99766	0.024	38.2	0.99943	0.006	43.2	0.99988	0.001	48.2	0.99998	0.000
28.3	0.99205	0.081	33.3	0.99772	0.023	38.3	0.99945	0.006	43.3	0.99989	0.001	48.3	0.99998	0.000
28.4	0.99223	0.079	33.4	0.99778	0.022	38.4	0.99946	0.005	43.4	0.99989	0.001	48.4	0.99998	0.000
28.5	0.99241	0.077	33.5	0.99784	0.022	38.5	0.99948	0.005	43.5	0.99989	0.001	48.5	0.99998	0.000
28.6	0.99259	0.075	33.6	0.99790	0.021	38.6	0.99950	0.005	43.6	0.99990	0.001	48.6	0.99998	0.000
28.7	0.99276	0.073	33.7	0.99795	0.021	38.7	0.99951	0.005	43.7	0.99990	0.001	48.7	0.99998	0.000
28.8	0.99293	0.072	33.8	0.99801	0.020	38.8	0.99953	0.005	43.8	0.99990	0.001	48.8	0.99998	0.000
28.9	0.99309	0.070	33.9	0.99806	0.020	38.9	0.99954	0.005	43.9	0.99991	0.001	48.9	0.99998	0.000
29.0	0.99326	0.068	34.0	0.99811	0.019	39.0	0.99955	0.005	44.0	0.99991	0.001	49.0	0.99999	0.000
29.1	0.99341	0.067	34.1	0.99816	0.019	39.1	0.99957	0.004	44.1	0.99991	0.001	49.1	0.99999	0.000
29.2	0.99357	0.065	34.2	0.99821	0.018	39.2	0.99958	0.004	44.2	0.99992	0.001	49.2	0.99999	0.000
29.3	0.99372	0.064	34.3	0.99826	0.018	39.3	0.99959	0.004	44.3	0.99992	0.001	49.3	0.99999	0.000
29.4	0.99387	0.062	34.4	0.99831	0.017	39.4	0.99961	0.004	44.4	0.99992	0.001	49.4	0.99999	0.000
29.5	0.99402	0.061	34.5	0.99835	0.017	39.5	0.99962	0.004	44.5	0.99992	0.001	49.5	0.99999	0.000
29.6	0.99416	0.059	34.6	0.99840	0.016	39.6	0.99963	0.004	44.6	0.99993	0.001	49.6	0.99999	0.000
29.7	0.99430	0.058	34.7	0.99844	0.016	39.7	0.99964	0.004	44.7	0.99993	0.001	49.7	0.99999	0.000
29.8	0.99444	0.056	34.8	0.99849	0.015	39.8	0.99965	0.004	44.8	0.99993	0.001	49.8	0.99999	0.000
29.9	0.99457	0.055	34.9	0.99853	0.015	39.9	0.99966	0.003	44.9	0.99993	0.001	49.9	0.99999	0.000

Then the determination of E_u has to be continued by repeating. with the corrected E_u. the calculation of new Δ_i and $L(x_i)$ for each E_{si} and of a new P_c. This procedure has to be carried out until the correction ΔE_u falls below the accuracy limit. Table 4.III gives an example for the iterative determination of E_u in the presence of five nuisance fields (σ_n = 8.3 dB). The values of $L(x_i)$ are taken from Table 4.II.

TABLE 4.III

Approximation		1		2		3	
i	E_{si} (dB)	E_u – 78 dB		E_u – 76.6 dB		E_u – 76.44 dB	
		z_i (dB)	$L(x_i)$	z_i (dB)	$L(x_i)$	z_i (dB)	$L(x_i)$
1	64	14	0.8835	12.6	0.8585	12.44	0.8554
2	72	6	0.6954	4.6	0.6524	4.44	0.6474
3	60	18	0.9374	16.6	0.9214	16.44	0.9193
4	50	28	0.9915	26.6	0.9883	26.44	0.9878
5	45	33	0.9975	31.6	0.9964	31.44	0.9963
P_c			0.5696		0.5082		0.5010
ΔE_u (dB)			≈ – 1.4		≈ – 0.16		≈ – 0.02

The result of the iterative computation is E_u = 76.42 dB.

In view of the need to carry out numerous multiplications using at least four-digit numbers, the method may be simplified further by substituting the $L(x_i)$ values by the logarithms of their reciprocal value. This reduces the computation work to a summation of the –log $L(x_i)$ values. To facilitate the computation of ΔE_u further it is appropriate to select a base for these logarithms such that ΔE_u is immediately apparent from a comparison of the sum with –log P_{cp} (logarithm to the same base), e.g. –log 0.5 (50%).

For convenience, the –log $L(x_i)$ values are included in Table 4.II. As an example these logarithms are used in Table 4.IV. The underlying interference problem is identical in Tables 4.III and 4.IV and so are the results.

TABLE 4.IV

Approximation		1		2		3	
i	E_{si} (dB)	E_u – 78 dB		E_u – 76.7 dB		E_u – 76.45 dB	
		z_i (dB)	–log $L(x_i)$	z_i (dB)	–log $L(x_i)$	z_i (dB)	–log $L(x_i)$
1	64	14	1.251	12.7	1.519	12.45	1.575
2	72	6	3.669	4.7	4.264	4.45	4.386
3	60	18	0.653	16.7	0.814	16.45	0.848
4	50	28	0.087	26.7	0.116	26.45	0.123
5	45	33	0.025	31.7	0.035	31.45	0.037
–	– log P_c		5.685		6.748		6.969
	– log 0.5*		– 7.000		– 7.000		– 7.000
ΔE_u (dB)			≈ – 1.3		≈ – 0.25		≈ – 0.03

* For $P_{cp} = 0.5$; for other values of P_{cp}:
$-\log P_{cp} = (-7 \log_{10} P_{cp}) / \log_{10} 2$; e.g. for $P_{cp} = 0.45$: $-\log P_{cp} = 8.064$.

The result of the iterative computation is $E_u = 76.42$ dB.

CHAPTER 5

Compatibility between the Broadcasting Service (Television) and Other Services Sharing the Same Band

5.1 *Protection of the broadcasting service (television) from the fixed and mobile services*

5.1.1 *Minimum field strength values to be protected*

The minimum values of field strength for the broadcasting service (television) which require protection from the fixed and mobile services are:

46 dB (μV/m) in Band I at 10 m above ground level

49 dB (μV/m) in Band III at 10 m above ground level

53 dB (μV/m) in Band IV at 10 m above ground level

58 dB (μV/m) in Band V at 10 m above ground level

5.1.2 *Protection ratios*

Ratios for the protection of amplitude modulated vestigial sideband television systems are given in Tables 3.VI and 3.VII. The values for a CW interfering source and the zero offset (non-precision) condition should be used.

5.1.3 *Protection margin*

The protection margin (*PM*) is given, in dB, by:

$PM = FS -$ combined value of $(NF + AF)$ for all interfering sources

where:

FS : minimum field strength value in dB(μV/m), given in section 5.1.1,

NF : nuisance field in dB(μV/m), discussed in section 5.1.3.1,

AF : adjustment factor (in dB), to take account of antenna discrimination and clutter loss, discussed in section 5.1.3.2.

The combination of multiple interference from co-sited and non co-sited sources is discussed in sections 5.1.3.3 and 5.1.3.4, respectively.

The calculated protection margin should be positive at all locations where the television service is required.

5.1.3.1 *Nuisance field (NF)*

The method for calculating the nuisance field is given in section 3.3.7. The field strength from the interfering source for 1% and 50% of the time should be calculated using section 2.1. Information on fixed stations or base stations of the mobile service with effective antenna heights of less than 37.5 m is given in section 2.1.

5.1.3.2 *Antenna adjustment factor (AF)*

Four distinct cases of interference to a station of the television service from stations of the fixed or mobile services can be identified; these are dealt with separately below.

5.1.3.2.1 Interference from stations of the fixed service or base stations of the mobile service which are orthogonally polarized with respect to a station of the television service.

In this case the adjustment factor is equal to the antenna discrimination of –16 dB (see section 3.6.2).

5.1.3.2.2 Interference from stations of the fixed service or base stations of the mobile service which have the same polarization as a station of the television service.

In this case the adjustment factor is equal to the relevant receiving antenna directivity discrimination value given in section 3.6.2.

5.1.3.2.3 Interference from a mobile station operating at more than 150 km from a station of the television service.

No polarization discrimination will be taken into account.

Interference calculations will be carried out for the e.r.p. of the mobile station, assuming this to be situated at the site of the base station of the mobile service with an effective antenna height of 75 m. An adjustment factor of –15 dB should then be used to allow for clutter loss and ground reflection near the mobile station.

With the agreement of the administrations concerned, it may be possible to make an additional adjustment to allow for the directivity of the television receiving antenna, as given in section 3.6.2.

5.1.3.2.4 Interference from a mobile station operating relatively close to a receiving site from a station of the television service.

In this case, it is necessary to carry out detailed calculations for each worst-case path. Polarization discrimination may be taken into account with the agreement of the concerned administrations.

5.1.3.3 *Multiple interference from co-sited sources*

The interference arising from multiple co-sited sources should be combined by means of the power-sum method

$$E_c = \sqrt{\sum_{i=1}^{n} E_i^2}$$

where:

E_i : value, in μV/m, of (NF + AF) for each co-sited source. As indicated in section 5.1.3, NF is expressed in dB (μV/m) and AF in dB. The sum of these two is converted into μV/m to express E_i.

n : number of co-sited sources.

E_c : effective interference in μV/m.

Note – The value of E_c represents one of the terms to be included in the procedure given in section 5.1.3.4, after conversion into dB(μV/m).

5.1.3.4 *Multiple interference from non co-sited sources*

The interference arising from multiple non co-sited sources should be combined by using the simplified multiplication method given in Chapter 4.

5.1.4 *Effective transmitting antenna heights*

The case of low values of effective transmitting antenna height (< 10 m for VHF and < 37.5 m for UHF), and especially that of negative heights, is dealt with in section 2.1.3.

5.2 *Protection of the broadcasting service (television) from the aeronautical radionavigation service*

When applying Recommendation No. 3, administrations should take into account the following technical criteria.

5.2.1 *Minimum field strength values to be protected*

The minimum values of field strength for the broadcasting service (television) to be protected from the aeronautical radionavigation service are given in section 5.1.1.

5.2.2 *Protection ratios*

Ratios for the protection of amplitude modulated vestigial side-band television systems are given in Tables 3.VI and 3.VII. The values for a CW interfering source and the zero offset (non-precision) condition should be used.

5.2.3 *Nuisance field*

The calculation of the nuisance field is given in section 3.3.7. The field strength from the interfering source for 1% and 50% of the time should be calculated using section 2.1.

5.3 *Protection of the broadcasting service (television) from the radionavigation service*

When applying Recommendation No. 3, administrations should take into account the following technical criteria.

5.3.1 *Minimum field strength values to be protected*

The minimum values of field strength for the broadcasting service (television) to be protected from the radionavigation service are given in section 5.1.1.

5.3.2 *Protection ratios*

The ratios for the protection of amplitude modulated vestigial sideband television systems are given in Figure 5.2. The protection ratios given in this figure do not provide for protection of the sound signal associated with a television signal.

5.3.3 *Nuisance field*

The calculation of the nuisance field is given in section 3.3.7. The field strengths from the interfering source for 1% and 50% of the time should be calculated using section 2.1.

5.4 *Protection of the land mobile service from the broadcasting service (television)*

5.4.1 *Minimum field strength values to be protected*

5.4.1.1 The minimum protected median field strength for the land mobile service, using 25 or 30 kHz channel spacings, is given in Table 5.I below:

TABLE 5.I

Frequency range (MHz)	Minimum field strength to be protected dB(μV/m) Signal quality grade 4
44 to 68	19
174 to 254	21
470 to 582	24
582 to 862	38

For 12.5 or 15 kHz channel spacing the values should be 3 dB higher.

5.4.1.2 Calculations for the interfering field strength should be carried out for any point of the border line and at a height of 10 m above ground level using the curves in Annex 2, Chapter 2. Appropriate figures for 10% of the time and 50% of locations should be used.

5.4.2 *Protection ratios*

5.4.2.1 In the case of sharing between the broadcasting service (television) and the land mobile service the protection ratio should be 10 dB.

5.4.2.2 The curve giving the relative protection ratio values as a function of the carrier frequency separation is given in Figure 5.1. The frequency separation between the vision and sound carrier should be as indicated in Table 3.I.

5.4.3 *Receiving antenna discrimination*

For base stations: The value of the antenna polarization discrimination for horizontally polarized television broadcasting emissions is 18 dB. Where vertically or mixed polarized television broadcasting emissions are used, no antenna polarization discrimination should be taken into account.

For mobile stations: No polarization discrimination will be taken into account because:

- the mobile receiving system, consisting of an antenna and the body of a vehicle, cannot be assumed to have any orthogonal polarization discrimination;
- the effect of environmental clutter near the mobile station can be expected to introduce a degree of depolarization.

5.4.4 *Propagation model*

Propagation information for the land-mobile service can be found in section 2.2.

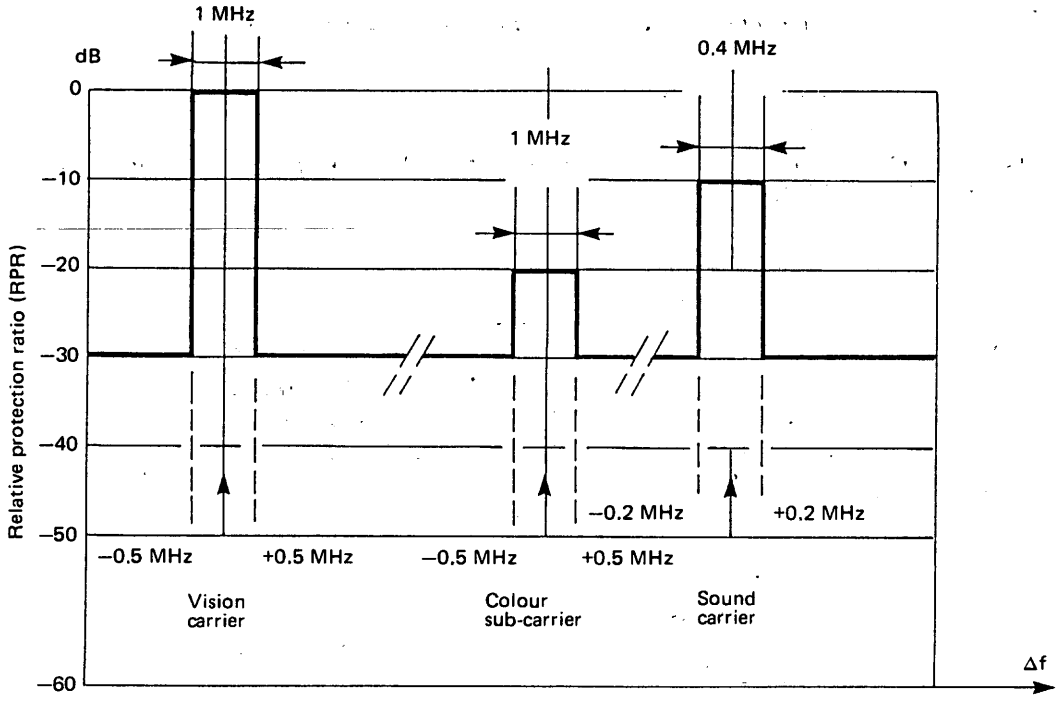


FIGURE 5.1 – *Relative values of the radio frequency protection ratio as a function of the carrier frequency separation*

5.5 *Protection of the fixed service from the broadcasting service (television)*

See Recommendation No. 1.

5.6 *Protection of the aeronautical radionavigation service in the band from 223 to 230 MHz from the broadcasting service (television)*

When applying Recommendation No. 3, administrations should take into account the following technical criteria.

5.6.1 *Values of the interfering field strength*

The value of the interfering field strength above which a station of the aeronautical radionavigation service might be affected is 51 dB(μV/m) when the assigned frequency is equal to the frequency of the vision carrier.

5.6.2 *Protection ratios*

The curve giving the relative protection ratios as a function of the frequency separation between the aeronautical radionavigation service carrier frequency and the television vision carrier is given in Figure 5.3.

5.6.3 *Interfering field strength*

The value of the interfering field strength should be calculated assuming free space propagation if there is an optical path between the television transmitting antenna and the location of the aeronautical radionavigation receiver. This location is taken to be at a height of 20 000 m above sea level and at a distance of 300 km from the aeronautical radionavigation transmitter site, and situated above a line joining the transmitter sites. For distances beyond the optical horizon, the field strength should be calculated using the CCIR atlas of ground wave propagation curves.

Note – If the aeronautical radionavigation service being considered has a range of less than 300 km, the relevant value should be used in place of 300 km.

5.6.4 *Low power television stations*

For low power television stations situated close to the site of an aeronautical radionavigation transmitter, the required protection ratio is equal to the difference between the e.r.p. value of the television station in the direction of the aeronautical radionavigation transmitter and the e.r.p. value of the aeronautical radionavigation transmitter in the direction of the television station.

The curve giving the relative protection ratio values as a function of the carrier frequency separation is given in Figure 5.3. The frequency separation between the vision and sound carrier should be indicated as in Table 3.I.

5.7 *Protection of the aeronautical radionavigation service in the band from 590 MHz to 598 MHz from the broadcasting service (television)*

5.7.1 The values and procedures given in section 5.6 should be used.

5.8 *Protection of the radionavigation service in the band from 585 MHz to 610 MHz from the broadcasting service (television)*

When applying Recommendation No. 3, administrations should take into account the following technical criteria.

5.8.1 *Values of the interfering field strength*

The value of the interfering field strength above which a station of the radionavigation service might be affected is –10 dB (μV/m) when the assigned frequency is equal to the frequency of the vision carrier.

5.8.2 *Protection ratios*

The curve giving the relative protection ratios as a function of the frequency separation between the radionavigation service carrier frequency and the television vision carrier is given in Figure 5.1.

5.8.3 *Interfering field strength*

The interfering field strength for 1% of the time should be calculated at the site of the radionavigation receiver using the method given in section 2.1 and Annex 2.A.

5.9 *Protection of the radio astronomy service in the band from 606 MHz to 614 MHz from the broadcasting service (television)*

When applying Recommendation No. 3, administrations should take into account the following technical criteria.

5.9.1 *Values of the interfering field strength*

The value of the interfering field strength above which a station of the radio astronomy service might be affected is –39 dB(μV/m) when the assigned frequency is equal to the frequency of the vision carrier.

5.9.2 *Protection ratios*

The curve giving the relative protection ratios as a function of the frequency separation between the television vision carrier and the frequency used by the radioastronomy service is given in Figure 5.1.

5.9.3 *Interfering field strength*

The interfering field strength for 1% of the time should be calculated at the site of the radioastronomy receiver using the method given in section 2.1 and Annex 2.A.

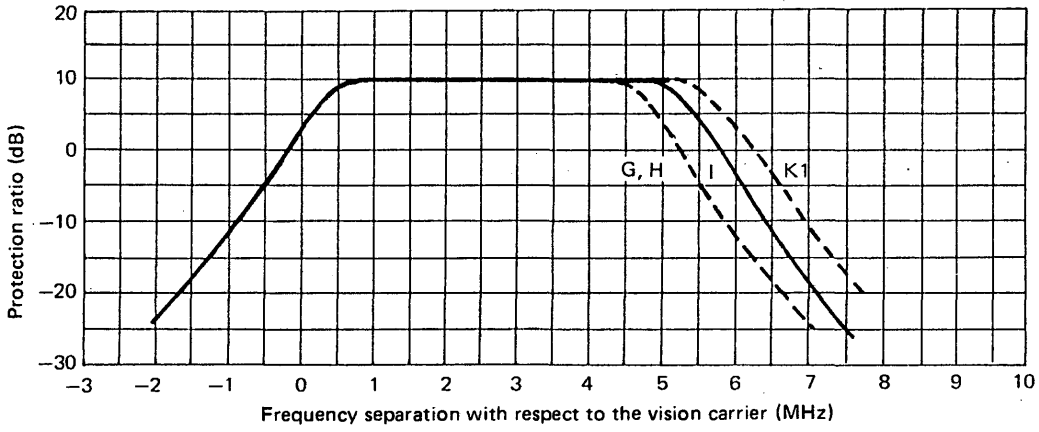


FIGURE 5.2 – *Protection ratio required by system G. H. I and K1 picture signals against a radionavigation signal in the band 582 to 606 MHz*

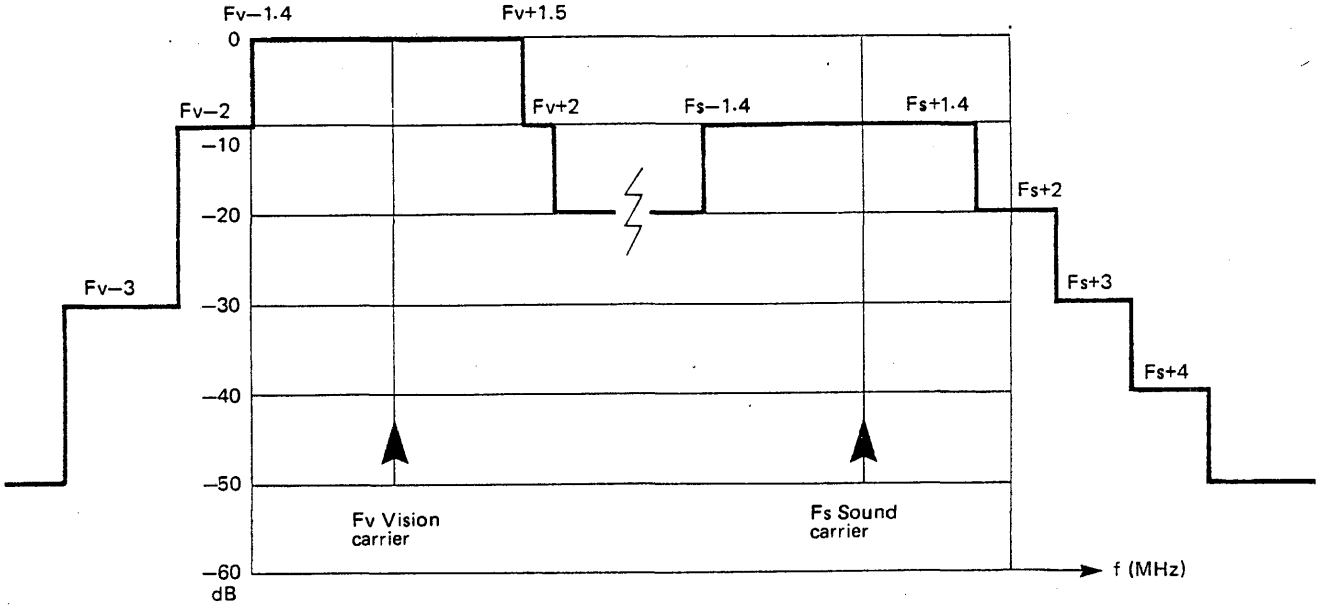


FIGURE 5.3 – *Relative values of the radio frequency protection ratio as a function of the carrier frequency separation*

ANNEX 3

Basic Characteristics of Television Stations to be Submitted for Modifications to the Plan in Accordance with Article 4 of the Agreement

No. IFRB Serial Number

[1] Symbol designating the Administration

[2] Vision carrier frequency (MHz)

[3] Sound carrier frequency (MHz)

[4] Vision carrier offset (positive or negative multiples of 1/12 line-frequency)

[5] Sound carrier offset (positive or negative multiples of 1/12 line-frequency)

[6] Television system

[7] Colour system

[8] Name of the transmitting station

[9] Symbol designating the country or geographical area in which the station is located

[10] Geographical coordinates of the transmitting antenna site (degrees and minutes)

[11] Altitude of the transmitting antenna site above sea level (m)

[12] Height of the antenna above ground level (m)

[13] Maximum effective antenna height (m)

[14] Effective antenna height (m) in different azimuths (every 10°), or at least every 30°

[15] Polarization

[16] Maximum value of effective radiated power (dBW) of the horizontal polarization component of the vision carrier in case of horizontal or mixed polarization

[17] Maximum value of effective radiated power (dBW) of the vertical polarization component of the vision carrier in case of vertical or mixed polarization

[18] Vision to sound carrier effective radiated power ratio

[19] Directivity of the transmitting antenna

[20] Attenuation (dB) with respect to the maximum value of effective radiated power in different azimuths, every 10°

Remarks

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ANNEX 4

Limits for Determining when Agreement with Another Administration is Required

CHAPTER 1

Limits Relating to Television Broadcasting

In applying section 4.2.2 of Article 4, the following tables of distances between the television broadcasting station and any point on the boundary of any other administration shall be used to identify administrations whose television broadcasting services are likely to be affected (Tables I to IV).

Each table refers to a particular frequency band and sets out the coordination distance limits for effective radiated powers of 1 W, 10 W, 100 W, 1 kW, 10 kW, 100 kW, 200 kW (for band III) and 500 kW (for bands IV and V) and effective antenna heights of 75 m, 300 m and 1 200 m in propagation zones 1, 2, 3, 4, A, B, C and C1.

For intermediate effective radiated power and effective antenna height values, linear interpolation shall be used. For effective radiated power values lower than 1 W, or for effective antenna height values below 75 m, the values corresponding to 1 W and 75 m shall be used, respectively. For effective antenna height values greater than 1 200 m, linear extrapolation shall be applied.

For mixed paths, the coordination distance, D_M, shall be the sum of the pertinent fractions of the coordination distances D_i, applicable to every type of propagation path involved.

$$D_M = \sum_i \frac{d_i}{d_\tau} D_i \quad (i = 1, 2, 3, 4, A, B, C, C1)$$

where

d_τ is the total path length from the transmitter to the nearest point on the border of the country concerned; and

d_i is the total length of those parts of the path which are over propagation zones 1, 2, 3, 4, A, B, C, C1, as the case may be.

TABLE I – *Band 47 - 68 MHz*
Coordination distance limits (km)

	Effective radiated power																	
	100 kW			10 kW			1 kW			100 W			10 W			1 W		
Hef / Z	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200
1	600	640	710	490	530	600	380	420	490	280	310	380	170	210	290	100	130	200
2	410	450	500	320	360	410	240	280	340	180	210	270	130	160	220	90	120	170
3	480	510	560	380	420	480	290	340	390	210	260	330	140	190	270	85	120	210
4	1 050	1 050	1 050	830	870	950	630	670	750	450	490	560	300	330	410	170	205	290
A	1 150	1 150	1 150	1 050	1 050	1 050	900	960	1000	640	700	800	430	470	580	240	290	410
B	1 100	1 100	1 100	1 000	1 000	1 000	760	810	880	540	590	670	360	400	490	200	240	340
C	1 500	1 500	1 500	1 200	1 200	1 200	1 050	1 050	1 050	850	850	850	550	550	550	410	410	410
C1	1 000	1 000	1 000	820	820	820	650	650	650	490	490	490	360	360	360	240	240	240

Hef.: Effective antenna height (m)
Z: Propagation zone

TABLE II – *Band 174 - 254 MHz*
Coordination distance limits (km)

	Effective radiated power																				
	200 kW			100 kW			10 kW			1 kW			100 W			10 W			1 W		
Hef / Z	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200
1	560	590	660	530	560	630	420	450	520	310	340	410	200	240	310	120	150	230	60	90	160
2	370	410	460	350	380	440	270	300	360	200	230	290	140	180	230	100	130	190	60	90	140
3	440	470	530	410	440	500	320	360	420	230	280	340	160	210	280	100	140	230	60	90	170
4	1 100	1 100	1 100	910	950	1 030	720	750	820	520	550	630	350	390	460	220	250	330	120	150	230
A	1 300	1 300	1 300	1 200	1 200	1 200	1 050	1 050	1 050	830	900	970	560	620	730	350	400	530	190	240	370
B	1 200	1 200	1 200	1 150	1 150	1 150	900	940	1 020	650	710	780	440	490	570	270	310	410	150	190	290
C	1 600	1 600	1 600	1 400	1 400	1 400	1 200	1 200	1 200	950	950	950	600	600	600	450	450	450	410	410	410
C1	930	930	930	880	880	880	700	700	700	540	540	540	400	400	400	280	280	280	170	170	170

Hef.: Effective antenna height (m)
Z: Propagation zone

TABLE III – *Band 470 - 582 MHz*
Coordination distance limits (km)

	Effective radiated power																				
	500 kW			100 kW			10 kW			1 kW			100 W			10 W			1 W		
Hef / Z	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200
1	380	430	520	310	350	450	220	250	330	130	180	240	80	130	180	50	80	140	30	50	100
2	280	310	370	230	260	320	170	200	260	120	160	210	80	120	170	50	80	130	30	50	100
3	290	340	400	240	290	350	180	220	290	130	170	230	80	120	180	50	80	140	30	50	100
4	1 300	1 300	1 300	1 100	1 100	1 100	900	900	900	750	750	750	650	650	650	460	460	460	300	300	300
A	1 400	1 400	1 400	1 350	1 350	1 350	1 100	1 100	1 100	900	900	900	750	750	750	650	650	650	460	460	460
B	1 350	1 350	1 350	1 200	1 200	1 200	1 000	1 000	1 000	800	800	800	700	700	700	550	550	550	370	370	370
C	1 500	1 500	1 500	1 400	1 400	1 400	1 200	1 200	1 200	1 000	1 000	1 000	800	800	800	700	700	700	400	400	400
C1	590	590	590	530	530	530	440	440	440	360	360	360	280	280	280	210	210	210	140	140	140

Hef.: Effective antenna height (m)
Z: Propagation zone

TABLE IV – *Band 582 - 862 MHz*
Coordination distance limits (km)

	Effective radiated power																				
	500 kW			100 kW			10 kW			1 kW			100 W			10 W			1 W		
Hef / Z	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200	75	300	1 200
1	330	370	460	260	300	380	170	210	280	100	150	210	60	100	160	40	60	120	25	50	90
2	240	280	340	200	230	290	150	180	240	100	130	190	60	100	150	40	65	120	25	50	90
3	260	300	370	210	250	320	160	190	260	110	150	210	60	100	160	35	65	120	20	40	90
4	1 200	1 200	1 200	1 000	1 000	1 000	800	800	800	650	650	650	550	550	550	370	370	370	230	230	230
A	1 300	1 300	1 300	1 200	1 200	1 200	1 000	1 000	1 000	800	800	800	650	650	650	550	550	550	370	370	370
B	1 250	1 250	1 250	1 100	1 100	1 100	900	900	900	700	700	700	600	600	600	460	460	460	300	300	300
C	1 400	1 400	1 400	1 250	1 250	1 250	1 100	1 100	1 100	900	900	900	700	700	700	500	500	500	270	270	270
C1	540	540	540	480	480	480	400	400	400	320	320	320	240	240	240	170	170	170	110	110	110

Hef.: Effective antenna height (m)
Z: Propagation zone

CHAPTER 2

Limits Relating to the Protection of the Fixed Service from Modifications to the Plan

In applying section 4.2.3 of Article 4, the following criteria shall be used to determine whether the assignment to a station of the fixed service of another administration is likely to be affected.

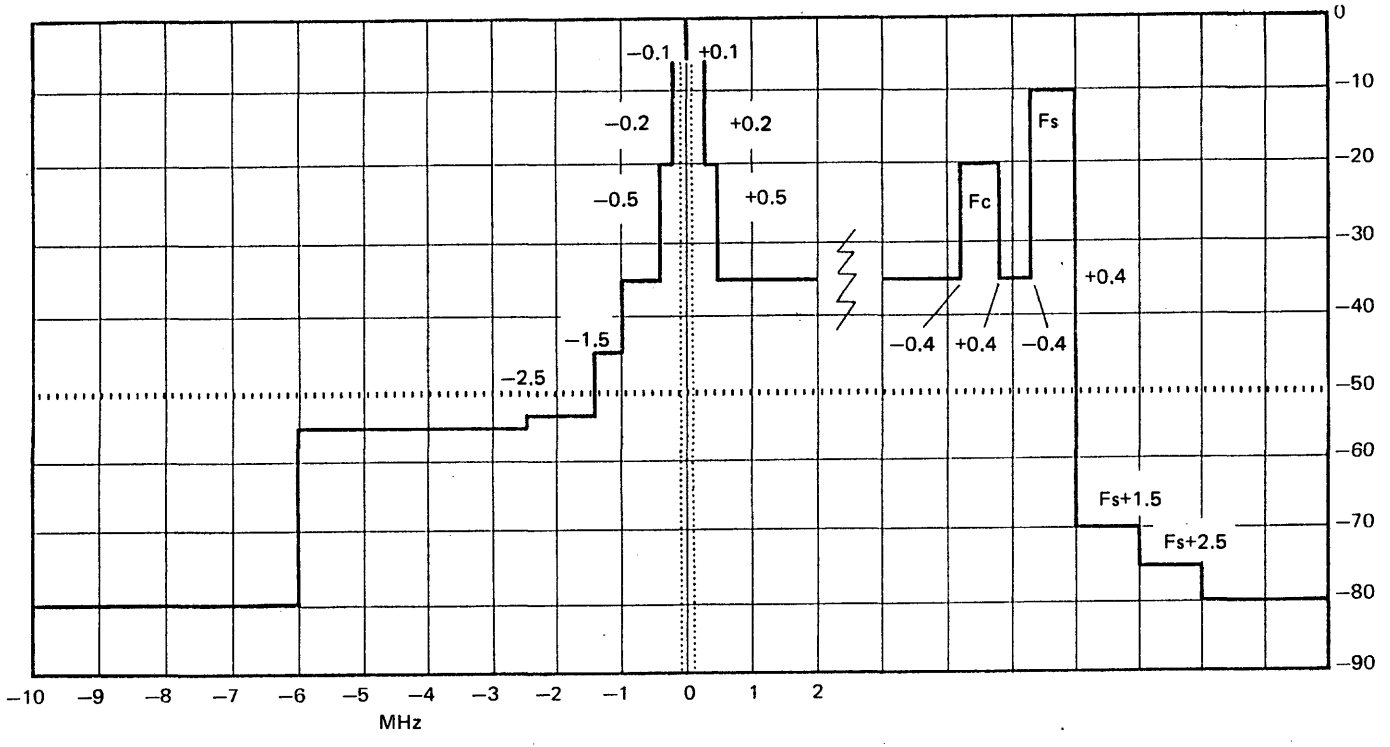
The value of the interfering field strength from the television transmitter at the site of the fixed stations, FS_{limit}, above which the assignment of the fixed service is likely to be affected is given by:

$$FS_{limit} = -2 - RPR \text{ dB}(\mu V/m)$$

where

RPR is the relative protection ratio taken from Figure 1.

The field strength shall be calculated from 10% of the time and 50% of the locations in accordance with Chapter 2 of Annex 2.



Fc Colour sub-carrier frequency
Fs Sound sub-carrier frequency

FIGURE 1 – *Relative protection ratio in the RF range as a function of the carrier separation*

CHAPTER 3

Limits Relating to the Protection of the Mobile Service from Modifications to the Plan

In applying section 4.2.4 of Article 4, the following criteria shall be used to determine whether an assignment to a station of the mobile service of another administration is likely to be affected by a proposed modification to the Plan.The assignment to a station of the mobile service is likely to be affected if the value of the interfering field strength at the site of the station is greater than the appropriate value in the table below:

Frequency band (MHz)	Limit value dB (μV/m)
47 - 68	9
174 - 254	11
470 - 582	14
582 - 862	28

The field strength shall be calculated for 10% of the time and 50% of the locations in accordance with Chapter 2 of Annex 2.

CHAPTER 4

Limits Relating to the Protection of the Plan from Assignments to Stations of the Fixed and Mobile Services

In applying section 5.2.2 of Article 5, the agreement of another administration is required before an assignment is notified to a station of the fixed or mobile service if the value of the interfering field strength at the site of a television broadcasting station using an overlapping frequency band is greater than the limit value:

$$E_{lim} = E_{min} - Pr - RPR$$

where

E_{min} is the appropriate minimum usable field strength value to be protected

47 - 68 MHz: 46 dB(μV/m) at 10 metres above ground level

174 - 254 MHz: 49 dB(μV/m) at 10 metres above ground level

470 - 582 MHz: 53 dB(μV/m) at 10 metres above ground level

582 - 862 MHz: 58 dB(μV/m) at 10 metres above ground level.

Pr is the maximum protection ratio when the frequency of the station of the fixed or mobile service is equal to the vision carrier frequency of the television channel: Pr = 58 dB.

RPR is the relative protection ratio given in Figure 2.

The field strength shall be calculated for 1% of the time and 50% of the locations in accordance with Chapter 2 of Annex 2.

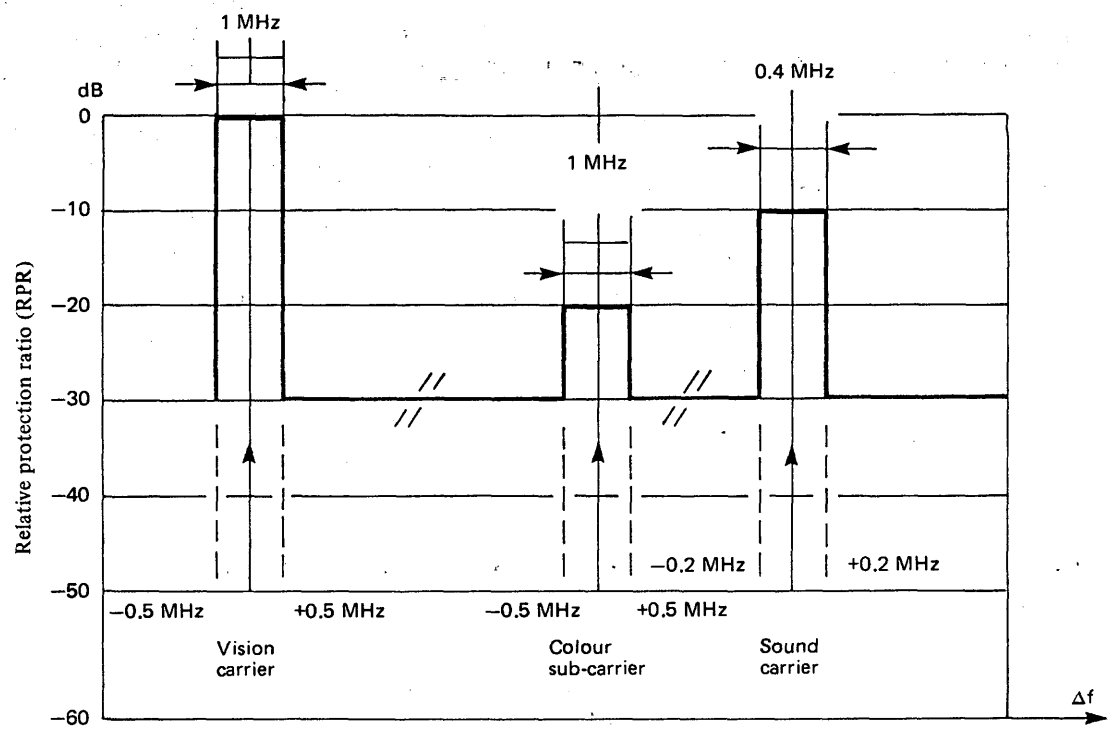


FIGURE 2 – *Relative values of the radio frequency protection ratio as a function of the carrier frequency separation*

ANNEX 5

Additional technical data which may be used for coordination between administrations

CHAPTER 1

Precision offset

1.1 *Co-channel interference*

In this section the protection ratios between two television signals apply only for interference due to the modulated vision carrier of the unwanted signal.

For precision-offset transmitters, the values in Table 3.C.I shall be used instead of those given in Table 3.II.

TABLE 3.C.I – *Protection ratio*

Offset in multiples of 1/12 line-frequency		0	1	2	3	4	5	6	7	8	9	10	11	12
Precision offset	Tropospheric interference	32	34	30	26	22	22	24	22	22	26	30	34	38
(Transmitter stability ± 1 Hz)	Continuous interference	36	38	34	30	27	27	30	27	27	30	34	38	42

1.2 *Overlapping channel interference*

Tables 3.C.II and 3.C.III give protection ratios to be applied when a CW signal lies within the vision channel of the wanted transmission, the wanted vision signal being negatively modulated.

For precision-offset transmitters, these tables shall be used instead of Tables 3.VI and 3.VII.

TABLE 3.C.II – *Tropospheric interference*
(precision offset)

Offset in multiples of 1/12 line-frequency	Frequency difference (MHz) (separation between wanted and unwanted carriers)											
	Luminance range								PAL***		SECAM***	
	– 1.25*	– 1.25**	– 0.5	0.0	0.5	1.0	2.0	3.0	3.6-4.8	5.7-6.0	3.6-4.8	5.7-6.0
0	23	11	32	34	40	40	37	31	28	15	33	18
1	23	11	33	36	39	39	36	31	31	16	33	18
2	21	9	29	32	35	35	33	29	34	17	33	18
3	19	7	25	28	31	31	29	26	35	18	33	18
4	17	5	22	24	26	26	25	24	34	17	33	18
5	17	5	22	24	26	26	25	24	31	16	33	18
6	17	5	24	26	28	28	26	24	28	15	33	18
7	17	5	22	24	26	26	25	24	28	15	33	18
8	17	5	22	24	26	26	25	24	31	16	33	18
9	19	7	25	28	31	31	29	26	34	17	33	18
10	21	9	29	32	35	35	33	29	31	16	33	18
11	23	11	33	36	39	39	35	31	28	15	33	18
12	23	11	32	40	40	40	37	31	28	15	33	18
Protection ratio (dB)												

* H, I, K1 television systems.
** B, G television systems.
*** B, G television systems: the separation is 5.3 and 6.0 MHz.

TABLE 3.C.III – *Continuous interference*
(precision offset)

Offset in multiples of 1/12 line-frequency	Frequency difference (MHz) (separation between wanted and unwanted carriers)											
	Luminance range								PAL***		SECAM***	
	– 1.25*	– 1.25**	– 0.5	0.0	0.5	1.0	2.0	3.0	3.6-4.8	5.7-6.0	3.6-4.8	5.7-6.0
0	30	22	37	38	44	44	42	36	34	21	37	21
1	29	22	38	40	42	42	41	36	36	22	37	21
2	27	20	34	36	38	38	37	34	39	24	37	21
3	24	17	30	32	34	34	33	31	40	26	37	21
4	22	15	27	29	31	31	31	30	39	24	37	21
5	22	15	27	29	31	31	31	30	36	22	37	21
6	23	16	29	32	33	33	32	30	34	21	37	21
7	22	15	27	29	31	31	31	30	34	21	37	21
8	22	15	27	29	31	31	31	30	36	22	37	21
9	24	17	30	32	34	34	33	31	39	24	37	21
10	27	20	34	36	38	38	37	34	36	22	37	21
11	29	22	38	40	42	42	41	36	34	21	37	21
12	30	22	37	44	44	44	42	36	34	21	37	21
Protection ratio (dB)												

* H, I, K1 television systems.

** B, G television systems.

*** B, G television systems: the separation is 5.3 and 6.0 MHz.

1.3 *Calculation of frequencies for precision offset*

Frequencies for precision offset

Table 3.C.IV lists the possible frequencies for precision offset, in the vicinity of each twelfth of line frequency (f_{line}). For the luminance range, the frequencies shown in Table 3.C.IV end with 25 Hz up to 6/12 f_{line} and with 100 Hz beyond this frequency. Two possibilities are shown for 6/12 f_{line} (7 800 and 7 825 Hz) because at this point the spectral lines are symmetrical and thus of the same amplitude. The offset frequencies are expressed in twelfths of line frequency.

Alternative frequencies in the vicinity of each offset position, which differ by integer multiples of 50 Hz and by integer multiples of 15 625 Hz from the values given, are possible. The term "precision offset" always refers to a difference between the carrier frequencies of the wanted and unwanted transmitters, and not to an offset of a transmitter from its nominal carrier frequency.

If the frequency difference between wanted and unwanted carrier exceeds the normalized range specified in Table 3.C.IV, integer multiples of 15 625 Hz have to be subtracted. For computer calculations, formulae are given below for all precision offset frequency differences in the luminance and in the chrominance range, for 625-line systems.

TABLE 3.C.IV – *Normalized precision offset between 0/12 and 12/12 of line frequency for all 625-line systems*

Offset in multiples of 1/12 line-frequency	Precision offset frequency difference (Hz)		
	Luminance range	Chrominance range	
		PAL	SECAM
0	25	5	0
1	1 325	1 305	1 302
2	2 625	2 605	2 604
3	3 925	3 905	3 906
4	5 225	5 205	5 208
5	6 525	6 505	6 510
6	7 800 or 7 825	7 810	7 812
7	9 100	9 115	9 115
8	10 400	10 420	10 417
9	11 700	11 720	11 719
10	13 000	13 020	13 021
11	14 300	14 320	14 323
12	15 600	15 630	15 625

Luminance range: $f_p = m \times 15\,625 \pm (2n+1) \times 25$

$m \leq 192, n \leq 156$

Chrominance range:

PAL systems: $f_p = m \times 15\,625 \pm (2n+1) \times 25 + k$

$m \geq 216$ and

$k = -20$ for $0 \leq n \leq 143$

$k = -15$ for $143 \leq n \leq 169$

$k = -5$ for $169 \leq n \leq 299$

$k = +5$ for $299 \leq n \leq 312$

SECAM systems: $f_p = m \times 15\,625 + 2n \times \left(25 + \frac{25}{624}\right)$

with m, n, k integers.

Computation of operational precision offset frequencies in a network with transmitter triplets

Precision offset techniques are usually employed to provide solutions to particular interference problems between two co-channel transmitters. In operational television networks co-channel transmitters are situated at the corner of a triangle. A typical line offset (non-precision offset) situation for such a transmitter triplet is: nominal vision carrier frequency $-2/3\,f_{line}$, $\pm\ 0\,f_{line}$, $\pm\ 2/3\,f_{line}$ of the line frequency, or in twelfths: 8M, 0, 8P. A transmitter triplet A-B-C consists of three transmitter pairs A-B, A-C and B-C. Introduction of precision offset for the above-mentioned example means a possible reduction of interference for all three pairs of the transmitter triplet. In practice only 35% of all theoretical possible transmitter triplets have full improvement for all three pairs, the residual 65% triplets have one or two pairs in non-precision offset.

Table 3.C.V shows a complete and normalized list of these 35% possible cases within the range between 0 and 12P which secure improved interference situation for all three transmitter pairs within a triplet, when precision offset is used.

Precision offset frequencies for transmitter triplets can be determined using a simple rule. All transmitter triplets which cannot be translated to the normalized cases of Table 3.C.V contain one pair at least without precision offset.

TABLE 3.C.V – *Possible offset combinations allowing precision offset for all transmitter pairs in transmitter triplets*

Case	Offset	Frequency (Hz) (625-line systems)		
1	0 – 0P – 6P	0	25	7 800
2	0 – 0P – 6P	0	25	7 825
3	0 – 1P – 6P	0	1 325	7 800
4	0 – 1P – 7P	0	1 325	9 100
5	0 – 2P – 6P	0	2 625	7 800
6	0 – 2P – 7P	0	2 625	9 100
7	0 – 2P – 8P	0	2 625	10 400
8	0 – 3P – 6P	0	3 925	7 800
9	0 – 3P – 7P	0	3 925	9 100
10	0 – 3P – 8P	0	3 925	10 400
11	0 – 3P – 9P	0	3 925	11 700
12	0 – 4P – 6P	0	5 225	7 800
13	0 – 4P – 7P	0	5 225	9 100
14	0 – 4P – 8P	0	5 225	10 400
15	0 – 4P – 9P	0	5 225	11 700
16	0 – 4P – 10P	0	5 225	13 000
17	0 – 5P – 6P	0	6 525	7 800
18	0 – 5P – 7P	0	6 525	9 100
19	0 – 5P – 8P	0	6 525	10 400
20	0 – 5P – 9P	0	6 525	11 700
21	0 – 5P – 10P	0	6 525	13 000
22	0 – 5P – 11P	0	6 525	14 300
23	0 – 6P – 6P	0	7 800	7 825
24	0 – 6P – 7P	0	7 825	9 100
25	0 – 6P – 8P	0	7 825	10 400
26	0 – 6P – 9P	0	7 825	11 700
27	0 – 6P – 10P	0	7 825	13 000
28	0 – 6P – 11P	0	7 825	14 300
29	0 – 6P – 12P	0	7 800	15 600
30	0 – 6P – 12P	0	7 825	15 600

Example

The aim of this calculation is to transform all three offset positions into the range between 0P and 12P (see Table 3.C.V). Each single transmitter carrier frequency can be moved by multiples of line frequency, i.e. by multiples of 12/12 (see Step 2). Moving of any twelfths is allowed, provided that all transmitter carrier frequencies are moved by the same number of twelfths (see Step 1).

Given: Transmitter triplet	A	B	C
Line offset position	18M	8P	2P
Step 1			
Set one transmitter to zero by linear translation:	+18	+18	+18
Result:	0	26P	20P
Step 2			
Translation of transmitters B and C into the range between 0 and 12P by subtracting or adding a multiple of the line frequency:		–24	–12
Result:	0	2P	8P
Step 3			
Selection of precision offset frequencies from Table 3.C.V:	0	2 625 Hz	10 400 Hz
Step 4			
Step 2 has to be compensated:		+31 250 Hz	+15 625 Hz
Result:	0	+33 875 Hz	+26 025 Hz
Step 5			
Step 1 has to be compensated:	–23 400 Hz	–23 400 Hz	–23 400 Hz
Result:	–23 400 Hz	+10 475 Hz	+2 625 Hz
equivalent to	18M	8P*	2P

* To reduce the sound interference between transmitters B and C, an offset position of 20P = 26 100 Hz (enlarged by 12P = 15 625 Hz) would be preferable. In this case picture interference is unchanged.

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FINAL PROTOCOL*

At the time of signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the undersigned delegates take note of the following statements made by signatory delegations.

No. 1

Original: English

For the Republic of Zimbabwe:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Republic of Zimbabwe states the intention of its Administration to comply with the provisions of this Agreement and the associated Annexes adopted at this Conference.

The Government of the Republic of Zimbabwe, however, reserves its sovereign right to take any measures it deems necessary to safeguard and protect broadcasting services and other telecommunication services, in the event that any Member of the Union causes harmful interference to the said services, by failing to comply with this Agreement through expressed reservations or otherwise.

No. 2

Original: English

For the Republic of Botswana, the Republic of Kenya, the Federal Republic of Nigeria, the Kingdom of Swaziland, the Republic of Zambia and the Republic of Zimbabwe:

The Delegation of the above-mentioned countries

noting

that the Plan contained in the Final Acts includes assignments in the name of the Republic of South Africa,

hereby declare

that the signing of the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), by the Delegations of the above-mentioned countries does not imply recognition of the apartheid policies of that country which we consider as abhorrent, inhuman and unacceptable and accordingly reject.

No. 3

Original: English

For the Kingdom of Swaziland:

The Delegation of the Kingdom of Swaziland 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 laid down in the Regional Agreement and associated frequency assignment Plan for television broadcasting (Geneva, 1989) or in the Annexes or the Protocols attached thereto, or should reservations by any countries prove prejudicial to the proper functioning of its television broadcasting contained in the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989).

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

No. 4

Original: English

For the Republic of Kenya:

In signing the Final Acts, the Delegation of the Republic of Kenya to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) reserves the right of the Government of the Republic of Kenya to take any action it deems necessary to safeguard its interests in the event of any Member country failing, in any way, to comply with the provisions, Resolutions or Recommendations contained in the Final Acts of this Conference or in the event of any reservations made by other countries jeopardizing the implementation or operation of the provisions contained therein.

The Delegation of the Republic of Kenya further reserves the right of its Government to adhere to all or some of the provisions contained in the Final Acts and any Annexes thereto of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989).

No. 5

Original: French

For the People's Republic of the Congo:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the People's Republic of the Congo reserves for its Government the right to take any action it may deem necessary to safeguard its interests.

Furthermore, in connection with the proper management and operation of the Plan, the Delegation of the People's Republic of the Congo hopes that the IFRB will lend its assistance to those of the neighbouring countries which are not represented at this Conference, with a view to ensuring the sound operation of the Plan in the regional sector concerned.

No. 6

Original: French

For the Republic of Côte d'Ivoire:

The Delegation of the Republic of Côte d'Ivoire, in signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), declares that it reserves for its Government the right to approve the resulting Agreement and either to accept or to reject the consequences of any reservations entered by other Governments which might affect its television broadcasting services.

No. 7

Original: English

For the Sultanate of Oman:

On behalf of the Government of the Sultanate of Oman, the Omani Delegation declared that it reserves the right to take any appropriate measures it deems necessary to protect its national interest should any other State fail to comply with the provisions of the Agreement and the Plan adopted at this Conference.

No. 8

Original: English

For the United Arab Emirates:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the United Arab Emirates reserves the right of its Government to take such steps as it may deem necessary to protect its national interests should Abu Musa Island be shown or claimed to be territory other than ours, by reservation or claim entered by the Islamic Republic of Iran in the Final Acts, its Annexes or Protocols.

Furthermore our Administration totally rejects any frequency assignment entered by the Islamic Republic of Iran in the AFBC(2) Plan or its Annexes being shown as Abu Musa Island or any other part of the United Arab Emirates territory.

No. 9

Original: French

For the Republic of Chad:

In signing these Final Acts, the Delegation of Chad reserves for its Government the right to take any action it may deem necessary to safeguard its interests in respect of all or any of the stations appearing in the Plan and bearing the symbol of another country although, according to their geographical coordinates, they are situated in Chad's territory. Reference is made in particular to:

1 - F	003610	175.250	021 E 49 - 20 N 04
2 - YEDRI	003161	189.250	017 E 30 - 22 N 10
3 - Aozou	003630	191.250	017 E 25 - 21 N 50
4 - D	003632	191.250	019 E 11 - 20 N 46
5 - E	003631	191.250	020 E 37 - 20 N 21
6 - URI	002936	203.250	019 E 15 - 21 N 35
7 - Bodai	003166	575.250	017 E 15 - 21 N 40
8 - Aozou	003723	607.250	017 E 25 - 21 N 50
9 - Uzu	002959	607.250	017 E 24 - 21 N 49
10 - ERBI	003158	703.250	017 E 30 - 22 N 00
11 - Aozou	003788	775.250	017 E 25 - 21 N 50
12 - MEZAFEH	003794	783.250	015 E 16 - 23 N 05
13 - Aozou	003801	799.250	017 E 25 - 21 N 50
14 - Aozou	003781	751.250	017 E 25 - 21 N 50
15 - Aozou	003714	583.250	

Libya's claims with regard to the Aozou strip are well known.

Until proved otherwise, the Aozou strip is an integral part of the territory of Chad, the northern latitude of which is 23° N 27', as borne out by the map of Chad deposited with the United Nations, OAU and all the international organizations. Accordingly, we do not recognize the authority of Libya to have the above-mentioned stations entered in the Frequency Assignment Plan.

No. 10

Original: English

For the United Arab Emirates:

Concerning the United Arab Emirates' existing operating stations with valid MIFR entries being:

Dubai channel 2, Dubai channel 10, Dubai channel 33, Jebel Hatta channel 41,

the Administration of the United Arab Emirates at Nairobi AFBC(1), at inter-conference meetings and throughout this AFBC(2) Conference, has maintained that a priority status be accorded to existing operating stations and this was formulated in the Report to the Second Session.

Noting that this Conference has not accorded such a priority status;

noting that the IFRB declined any role in estimation of terrain obstacle loss for any path;

noting that coordination time with some administrations was severely curtailed and consequently the extent of technical consideration,

this Administration declares that where specific agreements were made with other administrations in coordination directly, in compliance with the Plan as regards nuisance field strength in specific locations, mutually estimated obstacle losses due to terrain on specific paths and transmitting antennas directional attenuations in specific sector directions, these agreements will be respected.

Other than the above undertaking, the channels first above-written shall continue in service, operating with their present characteristics.

No. 11

Original: French

For the Republic of Senegal:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Republic of Senegal declares, on behalf of its Government, that it reserves the right to take any action it may deem necessary to safeguard its interests should some Members fail to comply with the provisions of these Final Acts or of the Annexes or Protocols thereto, or should the reservations entered by other countries cause harmful interference and jeopardize the operation of its telecommunication services, particularly the television broadcasting service.

No. 12

Original: English

For the State of Kuwait:

Considering

a) the work done by the IFRB for the planning of VHF/UHF television broadcasting in the African broadcasting area and neighbouring countries;

b) the severe propagation conditions in the Gulf area;

c) the results of the AFBC(2),

our Administration would like to declare that if the hereunder items were taken into consideration in the development of the software used for the calculation of interference levels among the concerned administrations in this critical area, the Plan would have been more fruitful and more realistic:

1) topography of land and propagation characteristics as measured in the territories of these administrations;

2) ducting phenomena over the sea and the coastal land area;

3) coverage area of the wanted transmitter and not the Tx site;

4) correlated increase in the field strength of the wanted Tx during the 1% period of time used for calculating the interference level;

5) receiving antenna directivity;

6) giving consideration to the existing operational channels with exact definition of "Existing Operational channels".

In this respect, the Administration of Kuwait declares that it shall take all the steps to maintain its national rights as deemed necessary.

No. 13

Original: French

For Burkina Faso:

In signing the Final Acts of this Conference, the Delegation of Burkina Faso reserves for its Government the right to take any action it may deem necessary to safeguard its interests should any Member fail to comply with the provisions of this Agreement.

No. 14

Original: French

For the Republic of Mali:

Mali reserves the right to take any necessary action should its legitimate interests be threatened by any other country's failure to comply with the present provisions.

No. 15

Original: English

For the Socialist People's Libyan Arab Jamahiriya:

In signing the Final Acts of this Conference the Libyan Delegation does not recognize the authority of the Delegation of the Republic of Chad to enter in the Plan or its Appendix any assignment to stations having the following coordinates since they are in the Libyan territory:

1.	Station	F	021 E 49	20 N 04
2.	Station	Aozou	017 E 25	21 N 50
3.	Station	D	019 E 11	20 N 46
4.	Station	E	020 E 37	20 N 21
5.	Station	Aozou	017 E 25	21 N 30
6.	Station	Mezafeh	015 E 16	23 N 05

The Libyan Administration shall proceed on the assumption that it has the full right to enter in the Plan of these Final Acts to install and to operate transmitting stations including those appearing in the Final Acts, Plan and its Appendix, in accordance with the Libyan political and geographical national map including those coordinates mentioned above.

No. 16

Original: English

For the Socialist People's Libyan Arab Jamahiriya:

In signing the Final Acts, the above Delegation reserves the right of the Socialist People's Libyan Arab Jamahiriya to take any steps it may consider necessary to safeguard the interests of its broadcasting and telecommunication services, should other countries fail to comply with the relevant provisions of this Agreement and its Annexes and jeopardize the proper operation of its broadcasting and telecommunication services.

No. 17

Original: Spanish

For Spain:

The Spanish Government reiterates its view that the decolonization of the Western Sahara should be brought about by means of a referendum on the self-determination of the territory, held under the supervision of the United Nations.

Consequently, Spain's coordination of television stations in the Western Sahara and its signature of the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) do not imply any change in the Spanish Government's position on this issue or prejudge the final settlement of the matter in the light of the results of the above-mentioned referendum.

No. 18

Original: Spanish

For Spain:

The Spanish Delegation to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) declares that in Spain the band 830 - 862 MHz is used exclusively for the fixed and mobile (except aeronautical mobile) services and that, in the case of the latter service, account will be taken of the provisions of No. **697** of the Radio Regulations.

No. 19

Original: French

For the Islamic Republic of Mauritania:

The Mauritanian Delegation to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) reserves its Government's right to take any measures necessary to safeguard its interests should any Members fail in any way to comply with the provisions of this Regional Agreement (Geneva, 1989), or should reservations entered by other Members jeopardize the operation of its telecommunication services or lead to an increase in its contributory share of the Union's expenditure.

No. 20

Original: English

For the United Arab Emirates:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), this Administration declares that it reserves its position as concerns the following:

- paragraphs 2.1 and 2.2 of Article 2;
- paragraph 11.2 of Article 11;
- Recommendation No. 4.

These reservations completely reserve our position in these respects.

No. 21

Original: French

For the Rwandese Republic:

The Delegation of Rwanda reserves its Government's right to take such action as it may deem necessary to protect its interests should Members of the Union fail in any way to comply with the provisions of the Agreement or should reservations by other administrations jeopardize the operation of its television broadcasting services.

Moreover, while Rwanda has based the planning of its requirements on the B/G PAL standard, it reserves the right to use any other standard compatible with the Plan when introducing television into the country.

The Rwandese Republic also reserves the right, when necessary, to broadcast in a second language by using an extra sub-carrier.

No. 22

Original: French

For the Republic of Cameroon:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of Cameroon, following its Government's consistent policy of contributing to international cooperation by all the means available to it, in a spirit of peace and reciprocal respect, undertakes to meet its commitments under the present Agreement. It nevertheless reserves the right to take any necessary action to safeguard its interests should they be jeopardized by any failure to comply with the relevant provisions of the Agreement.

No. 23

Original: French

For the Gabonese Republic:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Gabonese Republic reserves for its Government the right:

1. to take any action it deems necessary in order to safeguard its interests should reservations entered by other Members of the Union jeopardize the smooth operation of its telecommunication services or should Members fail in any way to comply with the provisions of the International Telecommunication Convention in force at the time;

2. to accept or not to accept the possible financial consequences of such reservations liable to result in an increase in its contributory share to defraying Union expenses.

No. 24

Original: French

For the People's Democratic Republic of Algeria and the Islamic Republic of Mauritania:

The Delegations of the aforementioned countries wish to declare that the notices concerning the sound broadcasting stations in the Western Sahara submitted by the Kingdom of Morocco are null and void under international law. A decolonization process is currently under way on the territory of the Sahrawi Democratic Arab Republic in agreement with the two main parties concerned, the Kingdom of Morocco and the Polisario Front, with a view to enabling the Sahrawi people to determine its future freely and in sovereignty. This process is being conducted in conformity with various resolutions of and under the auspices of the United Nations and the Organization of African Unity.

There is therefore no question, at this stage, of prejudging the outcome of the ballot by endorsing the Kingdom of Morocco's claim to sovereignty over the territory of the Sahrawi Democratic Arab Republic.

No. 25

Original: French

For the Republic of Burundi:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Republic of Burundi reserves for its Government the right:

1. to take any action it may deem necessary to safeguard its interests, and in particular its telecommunication services, should any Member fail in any way to comply with the provisions of the present Agreement (Geneva, 1989) or the Annexes or Protocols thereto, or should reservations entered by other countries jeopardize its services;

2. to accept or not to accept any related measures which might entail an increase in its contributory share.

No. 26

Original: French

For the People's Republic of Benin:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the People's Republic of Benin undertakes to comply scrupulously with the provisions of the Regional Agreement and the associated Plan and reserves the right to protect its frequency assignments against any violations.

No. 27

Original: English

For the Arab Republic of Egypt:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Arab Republic of Egypt reserves the right for its Government to take such action as it may deem necessary to safeguard its interests should any administration fail in any way to comply with the provisions of the Final Acts of this Conference and the Annexes thereto, or should declarations by other administrations harm in any way its telecommunication or broadcasting services.

Further declares that it reserves its right concerning the following:

– paragraph 11.2 of Article 11;

– Resolution No 4.

No. 28

Original: French

For the Kingdom of Morocco:

In signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of the Kingdom of Morocco reserves for its Government the right to take any action it may deem necessary to safeguard its interests should any Member of the Union fail in any way to comply with the provisions of this Agreement and the associated Plan.

No. 29

Original: English

For the Kingdom of Saudi Arabia, the State of Bahrain, the United Arab Emirates, the Republic of Iraq, the State of Kuwait, the Sultanate of Oman, the State of Qatar and the Yemen Arab Republic:

The Delegations of the above-mentioned countries to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), declare that the only authorized definitions of the geographical Zones C and C1 are as follows:

Zone C: is the maritime zone of the Arabian Gulf within the area extending from the Shatt-Al-Arab up to and including the Gulf of Oman, which persistently displays extreme superrefractivity.

Zone C1: is the coastal land area of the Arabian Gulf surrounding Zone C, which frequently displays extreme superrefractivity and ducting.

No. 30

Original: English

For the Kingdom of Saudi Arabia, the State of Bahrain, the United Arab Emirates, the Republic of Iraq, the State of Kuwait, the Sultanate of Oman and the State of Qatar:

The Delegations of the above-mentioned countries to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), reserve for their Governments the right to take any steps they may consider necessary to safeguard the interests of their television broadcasting and other telecommunication services, should any Member fail to comply with the relevant provisions of this Agreement or through reservations or other measures jeopardize the satisfactory operation of the television and telecommunication services of the above-mentioned countries.

No. 31

Original: English

For the Islamic Republic of Iran:

In the Name of God, the Compassionate, the Merciful.

In signing this Regional Agreement (Geneva, 1989), the Delegation of the Islamic Republic of Iran reserves for its Government the right:

1. to take such action as it may consider necessary to safeguard its interests:

a) should any Member fail in any way to comply with the provisions of this Agreement or its Annexes or the Protocol attached thereto;

b) should reservations by other Members jeopardize telecommunication services particularly broadcasting services of the Islamic Republic of Iran;

2. to make such additional reservations and counter-reservations as may be necessary up to the time of approval of the Agreement;

3. not to accept arbitration as a means of settling disputes with respect to all cases related to this Agreement or its Annexes or the Protocol attached thereto;

4. to reject any dispute that has been or may be raised at any time by any Member of the Agreement concerning the territorial integrity and national sovereignty of the Islamic Republic of Iran over its national territory as a whole;

5. to maintain its reservation and not to consider itself bound by the provision of paragraph 2.3 of Article 2 of the Agreement.

No. 32

Original: English

For the Federal Republic of Nigeria:

The Delegation of the Federal Republic of Nigeria to the Second Session (Geneva, 1989) of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries reserves the right of the Federal Republic of Nigeria to take the necessary action it deems fit to safeguard its interests should any Member country fail to honour the provisions, Resolutions and Recommendations embodied in the Final Acts of this AFBC(2) Conference.

Also, the Delegation of the Federal Republic of Nigeria reserves the right of its Government to honour all or some of the provisions of the Final Acts and its Annexes which are in the best interests of Nigeria.

No. 33

Original: English

For Ghana:

With reference to the reservations made by a number of delegations and in signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989), the Delegation of Ghana reserves the right of its Government to take action and measures it deems necessary to safeguard and protect its national interests should any State fail to comply with the provisions of the Agreements and/or Acts in a manner detrimental to the operation of its telecommunications services, including television broadcasting services.

No. 34

Original: French

For the Kingdom of Morocco:

The Delegation of the Kingdom of Morocco was surprised to note the Declaration (No. 17) made by Spain and the joint Declaration (No. 24) made by the Delegations of the People's Democratic Republic of Algeria and the Islamic Republic of Mauritania concerning the frequency assignments allocated to the Kingdom of Morocco for the provision of television broadcasting to the Saharan provinces.

The Delegation of the Kingdom of Morocco points out that ITU conferences have always applied the criterion of administrative authority exercised in disputed territories. The United Nations accepts *de facto* Moroccan jurisdiction over the territory of the Sahara.

Consequently, the Delegation of the Kingdom of Morocco considers the aforementioned declarations to be null and void.

No. 35

Original: English

For the Islamic of Republic of Iran:

In the Name of God, the Compassionate, the Merciful.

The Delegation of the Islamic Republic of Iran to the Regional Conference (Geneva, 1989) having considered the declarations made by a number of Members in Document 127, would like to declare the following in its opinion on the work of this Conference.

The exercise through which this Plan developed and difficulties faced on a number of occasions, which went so far at times as to put the whole endeavour in jeopardy, proved, once again, the principle that the ITU should never be pressured to engage in matters beyond its mandate. In addition to having a workable document now, there has been a second very important result: a reiteration of the principle that no Member State should be permitted to meddle with, or deviate from, established UN terminology for any political reasons.

The Islamic Republic of Iran shall continue to abide by this principle as long as the other Members do likewise and shall only be prepared to consider any documentation or correspondence from the ITU and definitely so in relation to the present Plan.

No. 36

Original: English

For the Islamic Republic of Iran:

In the Name of God, the Compassionate, the Merciful.

The Delegation of the Islamic Republic of Iran to the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) having considered the declaration made by a number of Members in Document 127 (No. 29) declares that:

1. At the implementation stage, this Administration maintains its comments, views and reservations for any technical matters related to the entire area from "Arvand Roud" through the Persian Gulf and up to the Iran-Pakistan border.

After having considered Declaration No. 8, the Delegation of the Islamic Republic of Iran declares that:

2. The Abu Musa Island in the Persian Gulf Area is a definite integral part of the territory of the Islamic Republic of Iran, and it is the sovereign right of this Administration to establish any telecommunication and broadcasting services necessary for its nationals within this Island. This Administration rejects and does not recognize any reservation made by the United Arab Emirates.

No. 37

Original: French

For the Togolese Republic:

Having regard to the reservations entered by a number of delegations, and in signing the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989) , the Delegation of the Togolese Republic announces that its Administration intends to comply with the provisions of the present Agreement and associated Annexes adopted at the present Conference.

The Government of the Togolese Republic reserves the right to take, in all sovereignty, any action it deems appropriate in order to safeguard and protect the broadcasting services and other telecommunication services should any harmful interference be caused to them by a Member of the Union.

(The signatures follow)

(The signatures following the Final Protocol are those shown on pages 10-12)

RESOLUTIONS AND RECOMMENDATIONS

RESOLUTION No. 1

Application of Article 14 in the Bands and for the Administrations Covered by No. 635 of the Radio Regulations

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that the bands 230 - 238 and 246 - 254 MHz are allocated to the broadcasting service in certain countries under No. **635** of the Radio Regulations, subject to the application of the procedure of Article 14 of the Radio Regulations;

b) that the Conference included assignments in the Plan in these bands for the administrations listed in No. **635** with a Remark to the effect that these assignments have been included in the Plan subject to the successful application of Article 14 of the Radio Regulations;

c) that it was not possible to apply the procedure of Article 14 before including these assignments in the Plan,

resolves

1. that the IFRB shall consider the assignments in the Plan in these bands as having been communicated to the Board under No. **1612** of the Radio Regulations;

2. that the IFRB will apply the provisions of Article 14, starting with the publication as specified under No. **1615** of the Radio Regulations, for the assignments referred to in *resolves* 1;

3. that after successful application of the Article 14 procedure, the Board will remove the Remarks referred to in *considering b).*

RESOLUTION No. 2

Modifications to the Plan and Notification of Frequency Assignments Before the entry into Force of the Agreement

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that, in accordance with its agenda, it has adopted an Agreement and an associated Plan for Television Broadcasting in the bands 47 - 68, 174 - 230, 230 - 238, 246 -254 and 470 - 862 MHz in the planning area;

b) that administrations may wish to bring stations in conformity with the Plan into operation before the entry into force of the Agreement;

c) that administrations may need to modify the characteristics of the stations appearing in the Plan or to add new stations before the entry into force of the Agreement;

d) that these modifications should not cause an unacceptable deterioration of the situation resulting from the Plan for primary and permitted services;

e) that in this respect it would be advisable to apply provisionally the procedure described in Articles 4 and 5 of the Agreement and in the corresponding Annexes,

resolves

1. that, before the date of entry into force of the Agreement, an administration which proposes to modify the Plan or to bring into service an assignment in conformity with the Plan, the administrations whose services are likely to be affected and the IFRB shall apply the procedures in Articles 4 and 5 of the Agreement and the corresponding Annexes;

2. that, in addition to the publications made in accordance with the Articles referred to in *resolves* 1 above during the period preceding the date of entry into force of the Agreement, the IFRB shall at that date publish a recapitulatory list of the modifications to the Plan made in accordance with the present Resolution, indicating the names of the administrations whose agreement has been obtained, and shall update the Plan accordingly.

RESOLUTION No. 3

Interim Post-Conference Procedure

The Regional Administrative Conference for the Planing of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that all the assignments in the planning area appearing in the list of requirements as modified before and during the Conference have been included either in the Plan or in the Appendix to the Plan;

b) the limited time available during the Conference to complete coordination, with the result that some incompatibilities remain for frequency requirements which are included in the Appendix to the Plan;

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

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

resolves

1. to adopt the procedure described in annex to this Resolution for the resolution of incompatibilities, thus permitting the transfer of assignments from the Appendix to the Plan;

2. that this Resolution, including its Annex, shall enter into force upon the signing of the Final Acts of the Conference,

strongly urges administrations whose assignments appear in the Appendix to the Plan

to make every effort, taking into account the geographical conditions, to resolve the incompatibilities relating to their assignments as quickly as possible, and in any case before the date indicated in the Annex to this Resolution.

requests the IFRB

to give all the necessary assistance to administrations, particularly those of developing countries, in carrying out the procedures described in the annex 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.

ANNEX TO RESOLUTION No. 3

Continued Coordination of Frequency Requirements Appearing in the Appendix to the Plan

1. The frequency requirements which have not secured all the necessary agreements during the Conference are contained in the Appendix to the Plan. They will remain in the Appendix until 1 July 1997. Exceptionally, at the request of one or more of the administrations concerned, a frequency requirement may remain in the Appendix until 1 January 1999. A copy of this request shall be sent to the IFRB and the requests received by the IFRB will be published in the special section of its Weekly Circular.

2. Until the dates indicated in paragraph 1 above, these frequency requirements have the same status as the assignments in the Plan as regards the application of the provisions of Article 4.

3. Administrations shall continue coordination of these assignments, taking account of the geographical conditions and other relevant factors to the extent that the necessary data are available, and shall inform the IFRB of the agreements obtained.

4. When the IFRB finds that all the necessary agreements have been obtained, it shall publish the assignment concerned in the special section of its Weekly Circular and shall transfer it to the Plan.

RESOLUTION No. 4

Conformity with the Plan of Existing Assignments to Television Broadcasting Stations

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that the Agreement enters into force on 1 July 1992;

b) that the existing assignments to television broadcasting stations which are not in conformity with the Plan shall be modified accordingly on that date,

requests the IFRB

1. to inform the administrations, one year before the entry into force of the Agreement, of all their notified assignments to television broadcasting stations in the planning area which are not in conformity with the Plan, requesting them to notify the necessary modifications at the date of entry into force;

2. to review, two months after the entry into force of the Agreement, all assignments to television broadcasting stations, and:

- if the assignment is in conformity with the Plan, to indicate this in its findings;
- if the assignment is not in conformity with the Plan, to indicate that the assignment may only continue to operate under section 11.2 of Article 11, and on condition that it does not cause harmful interference to the assignments in conformity to the Plan,

resolves to urge the administrations

1. to approve the Agreement or accede to it as soon as possible;

2. to take the necessary steps, when receiving the information under *requests the IFRB* 1, to modify the assignments in order to bring them into conformity with the Plan;

3. to notify these modifications to the IFRB,

instructs the Secretary-General

to bring this Resolution to the attention of all the countries in the planning area.

RESOLUTION No. 5

Incompatibilities between the Plan and the Existing Primary Services, Other than Television Broadcasting

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that the frequency bands planned by this Conference are also allocated on a primary basis to the fixed, mobile, radionavigation, or aeronautical radionavigation services;

b) that the Conference was not able to take into account the existing assignments to stations of these services in the planning process,

requests the IFRB

1. to study the incompatibility between the Plan and the assignments to stations of the other primary services which were received by the Board for recording prior to 13 November 1989, using the criteria defined in this Agreement;

2. to send the results of this study to the administrations concerned before 31 December 1990,

resolves to urge administrations

1. when receiving the results of the study by the IFRB, to take the necessary steps to eliminate any interference;

2. to cooperate in resolving any interference caused by assignments to television stations in the Plan to assignments to stations of the other primary services.

RECOMMENDATION No. 1

Compatibility between the Broadcasting (Television) Stations and the Fixed Service in the Bands 47 - 68 MHz, 174 - 230 MHz, 230 - 238 MHz, 246 - 254 MHz and 470 - 862 MHz

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that this Conference has prepared a frequency plan for television broadcasting stations, in accordance with Resolution No. 509 of the World Administrative Radio Conference (Geneva, 1979) and Article 8 of the Radio Regulations;

b) that for this purpose the Conference has established protection criteria based on the Report of its First Session held in 1986, on recent CCIR studies and on proposals submitted by administrations to its Second Session;

c) that in some countries the fixed service is sharing the same bands with the broadcasting (television) service on a primary basis,

noting

that the Conference was unable to reach final conclusions on some of the criteria of compatibility between the fixed service and the broadcasting (television) stations and that refinements of these criteria would in some cases facilitate the implementation and modification of the Plan,

invites the CCIR

to continue to study compatibility between the fixed service and the broadcasting (television) stations in the bands concerned and to define in particular:

a) the value of the interfering field strength beyond which coordination is necessary;

b) the relevant system parameters that will have to be taken into account when determining protection;

c) a suitable calculation procedure to determine protection,

recommends

1. that administrations seeking agreement for coordination of assignments in the Plan with the fixed service should follow the procedure set out in the Annex to this Recommendation;

2. that administrations should notify their assignments to fixed services in accordance with Article 5 of the Agreement.

ANNEX TO RECOMMENDATION No. 1

Protection of the Fixed Service from the Broadcasting Service (Television)

1. *Minimum field strength value to be protected*

The value of the interfering field strength beyond which coordination is necessary is –2 dB(μV/M).

2. *Protection ratios*

The curve giving the relative protection ratios as a function of the frequency separation between the fixed service carrier and the television vision carrier is given in Figure 1.

3. *Initial calculations for protection*

Because of the nature of the fixed service (point-to-point links) and the related system parameters[1)], it is not easy to carry out the required calculations for the general case.

Therefore, as a first approximation, the approach established for the land mobile service (Chapter 5, section 5.4) should be used to determine whether more detailed calculations (see section 4 below) are necessary.

4. *Interfering field strength*

The maximum value of the interfering field strength FS_{limit} is given by:

$$FS_{limit} = -2 - RPR + g + RAD \text{ dB}(\mu\text{V/m})$$

1) For example, use of a high-gain, directional receiving antenna and screening by local terrain at the receiving site.

where

RPR is the relative protection ratio taken from Figure 1.

g is the attenuation correction factor determined for the specific propagation path and derived from Figures 2.A.2 and 2.A.3.

RAD is the receiving antenna discrimination factor (for the fixed service receiver) determined by the specific fixed service equipment in use and the relative angles between the direction of arrival of the wanted and interfering signals.

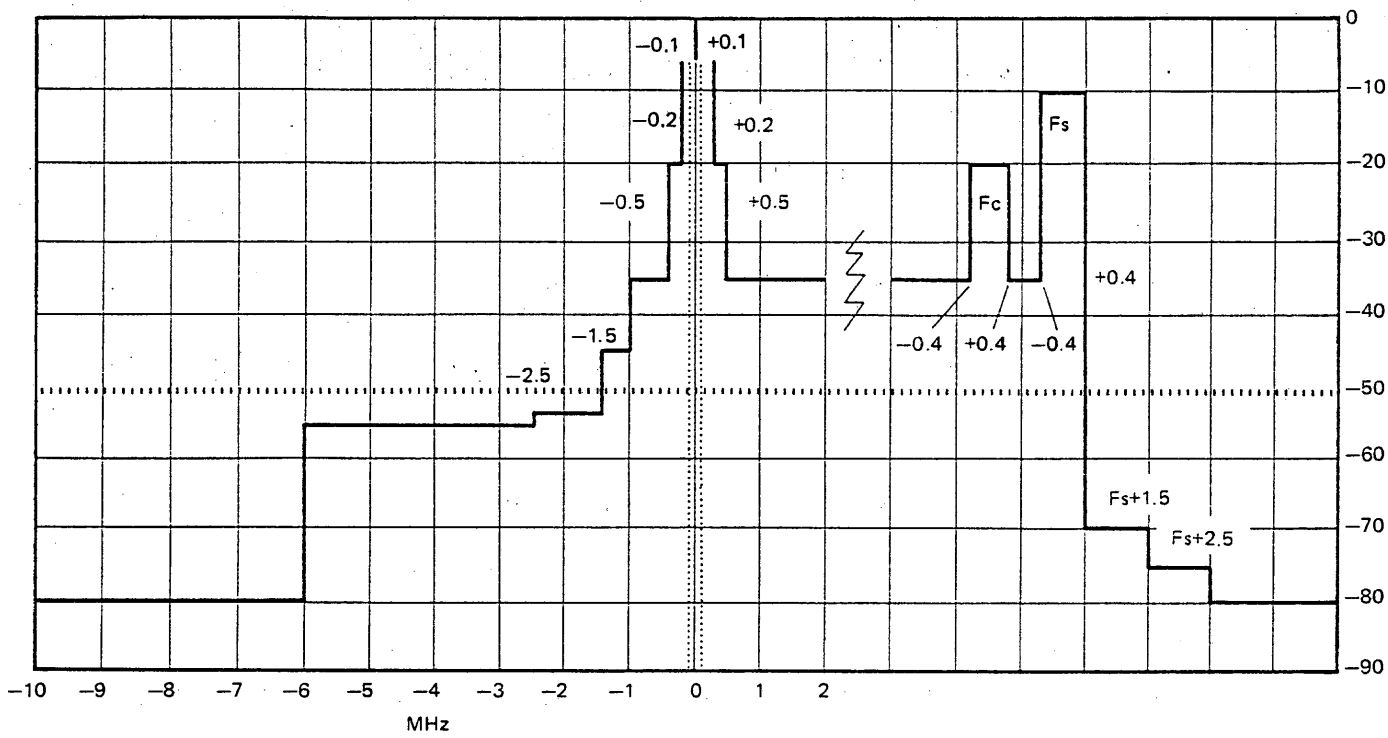

FIGURE 1 – *Relative protection ratio in the RF range as a function of the carrier separation*

RECOMMENDATION No. 2

Continuation of Propagation Studies Relevant to the Use of the VHF/UHF Bands in the Planning Area

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that the Conference has prepared a frequency plan for television broadcasting stations in accordance with Resolution No. 509 of the World Administrative Radio Conference (WARC-79) (Geneva, 1979) and Resolution No. 968 adopted by the Administrative Council;

b) that for these purposes the Conference has established field strength calculation criteria based on propagation data and methodologies developed by the CCIR in its Report to this Conference;

c) that WARC-79 likewise adopted Resolution No. 5 and Recommendation No. 68 dealing respectively with technical cooperation with the developing countries in the study of propagation in tropical areas, and with the study and prediction of radio propagation and radio noise;

d) that the XVIth CCIR Plenary Assembly (Dubrovnik, 1986) adopted Resolution 79-1 dealing, *inter alia*, with the need to encourage scientists and engineers from developing countries to carry out first hand studies on propagation topics;

e) that further information on propagation in the planning area, relating in particular to ducting propagation, would help in the implementation of the Plan,

invites the CCIR

to continue its studies of propagation and radiometeorological conditions relevant to the planning area as defined by this Conference, including propagation over land and over sea in the VHF and UHF bands, using data that become available,

invites the IFRB

to conduct an exercise with planned requirements on the basis of the data which become available and to communicate the results, for information, to interested administrations,

instructs the Secretary-General

to take the necessary steps to expand the ongoing measurement campaigns in the parts of the planning area where insufficient data are available in order to supplement them, particularly those pertaining to broadcasting, in collaboration with the administrations concerned as well as with regional organizations,

requests

the administrations of developed and developing countries as well as recognized private operating agencies and scientific or industrial organizations to take an active part in and assist the measurement campaign(s) on propagation being undertaken by the Union,

recommends that the Administrations of the countries in the planning area

should collaborate within the framework of the CCIR and within the limits of their capabilities, by submitting to the CCIR contributions relating to the aforementioned activities.

RECOMMENDATION No. 3

Use of Some of the Planned Bands by the Radioastronomy, Amateur, Radionavigation, or Aeronautical Radionavigation Services on Primary or Permitted Basis

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that some of the frequency bands planned by the Conference are also allocated on a primary or permitted basis to the radioastronomy, amateur, radionavigation, or aeronautical radionavigation services;

b) that the Conference was not able to develop the appropriate technical sharing criteria and the associated provisions which could be used for the sharing between television broadcasting and these services in these bands,

recommends

1. that administrations, when authorizing assignments to stations of these primary or permitted services, should also take into consideration the possible effect that such assignments may have on the Plan and also the effect that any television assignments in the Plan might have on the assignments to stations of these services, so as to minimize the possibility of any interference;

2. that in the event of interference between assignments to stations of these non-planned services and the assignments to television stations included in the Plan, administrations shall cooperate in resolving any such interference,

requests the CCIR

to continue the studies on sharing between television broadcasting and these services.

RECOMMENDATION No. 4

Mutual and Reciprocal Coordination Between Countries in the Planning Area and Countries Outside the Planning Area

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989),

considering

a) that it has adopted an Agreement and associated Plan for television broadcasting in the VHF and UHF bands in the planning area;

b) that assignments outside the planning area are likely to be affected by the television broadcasting assignments in the Plan and vice versa;

c) the differences between the technical criteria in this Agreement and other Agreements,

recommends

that the administrations concerned agree to conduct mutual and reciprocal coordination of the frequency assignments concerned irrespective of the status of their stations, whether operational or planned; this coordination will be carried out on the basis of equality of rights through bilateral or multilateral negotiations,

instructs the Secretary-General

to communicate this Recommendation to the countries neighbouring on the planning area.

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