Documents of the Regional Administrative Radio Conference for the planning of VHF/UHF television broadcasting in the African Broadcasting Area and neighbouring countries (1st session) (RARC AFBC(1))

(Nairobi, 1986)

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AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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22 September 1986
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PLENARY MEETING

Note by the Secretary-General

DRAFT
CONFERENCE STRUCTURE

FIRST SESSION OF THE REGIONAL ADMINISTRATIVE RADIO CONFERENCE FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES - AFBC (Nairobi, 1986)

The agenda of the Conference appears in Resolution 914 (amended) which was adopted by the Administrative Council at its 39th Session (Geneva, 1984) and amended on the basis of consultations conducted in 1985 and 1986.

Bearing in mind Nos. 464 to 479 inclusive of the International Telecommunication Convention, Nairobi, 1982, the following committees with their terms of reference are suggested. These terms of reference have been drawn up within the framework of the Convention, the Conference Agenda and in the light of experience at previous conferences.

Committee 1 - Steering Committee

Terms of Reference :

To coordinate all matters connected with the smooth execution of work and to plan the order and number of meetings, avoiding overlapping wherever possible in view of the limited number of members of some delegations (Nos. 468 and 469 of the International Telecommunication Convention, Nairobi, 1982).

Committee 2 - Credentials Committee

Terms of Reference :

To verify the credentials of delegations and to report on its conclusions to the Plenary Meeting within the time specified by the latter (Nos. 390 and 471 of the International Telecommunication Convention, Nairobi, 1982).

Committee 3 - Budget Control Committee

Terms of Reference :

To determine the organization and the facilities available to the delegates, to examine and approve the accounts of expenditure incurred throughout the duration of the First Session of the Conference and to report to the Plenary Meeting the estimated total expenditure of the First Session as well as the estimated costs entailed by the execution of the decisions of the First Session of the Conference (Nos. 476 to 479 inclusive of the International Telecommunication Convention, Nairobi, 1982 and Nairobi Resolution 48).

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Committee 4 - Technical Committee

Terms of Reference :

To prepare the technical bases for the establishment of the frequency assignment plans for the television broadcasting service at the Second Session of the Conference, taking account of the parameters indicated in the following list, which is not exhaustive:

- propagation characteristics and methods of forecasting field-strength values in the VHF and UHF bands and of calculating the service areas of television broadcasting stations (agenda item 1.1);
- optimum channel spacings, channel distribution (agenda item 1.2);
- modulation standards, emission bandwidth (agenda item 1.3);
- RF protection ratios (agenda item 1.4);
- minimum wanted field-strength values, field strength values to be protected (agenda item 1.5);
- maximum radiated power (agenda item 1.6);
- basic characteristics of transmitting and receiving antennae, polarization (agenda item 1.7);
- receiver characteristics essential for planning (agenda item 1.8).

Technical bases prepared by the CCIR in accordance with Resolution 509 of WARC-79 are to be taken into account.

Committee 5 - Planning Criteria and Methods Committee

Terms of Reference :

To define the planning principles and methods to be used by the Second Session of the Conference for the elaboration of the frequency assignment plans (agenda item 1.9).

To determine the manner in which frequency assignment requirements shall be presented by administrations and the final date by which these requirements should reach the IFRB (agenda item 2).

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Ad Hoc Working Group of the Plenary

Terms of Reference :

To establish a draft agenda for the Second Session of the Conference, to be submitted to the Administrative Council (agenda item 3).

Committee 6 - Editorial Committee

Terms of Reference :

To perfect the form of the texts prepared in the various committees of the First Session of the Conference, without altering the sense, for submission to the Plenary Meeting (Nos. 473 and 474 of the International Telecommunication Convention, Nairobi, 1982).

R.E. BUTLER
Secretary-General

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

Document DT/2-E
20 September 1986

DRAFT

AGENDA

OF THE

FIRST PLENARY MEETING

Monday, 22 September 1986, at 1530 hrs

(Amphitheatre)

		Document No.
1.	Approval of the agenda	-
2.	Opening of the Conference	-
3.	Election of the Chairman of the Conference	-
4.	Election of the Vice-Chairmen of the Conference	-
5.	Address by the Secretary-General	-
6.	Conference Structure	DT/1
7.	Election of the Chairmen and Vice-Chairmen of the Committees	-
8.	Composition of the Conference Secretariat	-
9.	Allocation of documents to Committees	DT/3
10.	Participation requests submitted by international organizations	17
11.	Date by which the Credentials Committee must submit its conclusions	-
12.	Working hours of the meetings of the Conference	-
13.	Financial responsabilities of administrative conferences	13
14.	Other business	

R.E. BUTLER
Secretary-General

AFBC

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS
CARR CHARGÉE DE LA PLANIFICATION DE LA RADIODIFFUSION TÉLÉVISUELLE EN ONDES MÉTRIQUES ET DÉCIMÉTRIQUES DANS LA ZONE AFRICAINE DE RADIODIFFUSION ET PAYS VOISINS
PREMIÈRE SESSION, NAIROBI Septembre-Octobre 1986

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PROJET / DRAFT / PROYECTO

Note du Secrétaire général / Note by the Secretary-General
Nota del Secretario General

ATTRIBUTION DES DOCUMENTS / ALLOCATION OF DOCUMENTS
ATRIBUCION DE LOS DOCUMENTOS

Séance plénière Plenary Meeting Sesión Plenaria	:	1(Rev. 1), 11, 13, 17, 19
C2 - Pouvoirs Credentials Credenciales	:	2
C3 - Budgétaire Budget Presupuesto	:	12, 14, 15, 19
C4 - Technique Technical Técnica	:	3, 4, 7, 9, 10, 20, 21*)
C5 - Planification Planning Planificación	:	3, 4, 5, 6, 7, 8, 9, 10, 20, 21*)

R.E. BUTLER
Secrétaire général

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*) Document en préparation (propositions de l'Espagne)
Document being prepared (proposals from Spain)
Documento en preparación (proposiciones de España)

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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COMMITTEE 5

Note by the Chairman of Committee 5

Extract from the Table of Frequency Allocations (bands 47 - 68 MHz, 174 - 223 MHz, 223 - 230 MHz, 470 - 790 MHz, 790 - 862 MHz, 862 - 890 MHz, 890 - 942 MHz and 942 - 960 MHz).

E. KAMDEN-KANGA
Chairman of Committee 5

Annex: 1

ANNEX

REGION 1 (MHz)		REGION 3 (MHz)	
47 - 68	**BROADCASTING**	47 - 50	FIXED MOBILE BROADCASTING
		50 - 54	AMATEUR

553 *Additional allocation:* in Hungary, Kenya, Mongolia, Czechoslovakia and the U.S.S.R., the bands 47 — 48.5 MHz and 56.5 — 58 MHz are also allocated to the fixed and land mobile services on a secondary basis.

554 *Additional allocation:* in Albania, the Federal Republic of Germany, Austria, Belgium, Bulgaria, Denmark, Finland, France, Gabon, Greece, Israel, Italy, the Lebanon, Liechtenstein, Luxembourg, Mali, Malta, Morocco, Nigeria, Norway, the Netherlands, Poland, the German Democratic Republic, the United Kingdom, Senegal, Sweden, Switzerland, Tunisia, Turkey and Yugoslavia, the band 47 — 68 MHz, and in Roumania, the band 47 — 58 MHz, are also allocated to the land mobile service on a permitted basis. However, stations of the land mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in connection with the band.

555 *Additional allocation:* in Angola, Cameroon, the Congo, Madagascar, Mozambique, Somalia, Sudan, Tanzania, Chad and Yemen (P.D.R. of), the band 47 — 68 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a permitted basis.

557 *Alternative allocation:* in Afghanistan, Bangladesh, Brunei, India, Indonesia, Iran, Malaysia, Pakistan, Singapore and Thailand, the band 50 — 54 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis.

559 *Alternative allocation:* in Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe, the band 50 — 54 MHz is allocated to the amateur service on a primary basis.

		54 - 68	FIXED MOBILE BROADCASTING

561 *Additional allocation:* in Botswana, Burundi, Lesotho, Malawi, Mali, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe, the band 54 — 68 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

174 - 223	**BROADCASTING**	174 - 223	FIXED MOBILE BROADCASTING

621 *Additional allocation:* in the Federal Republic of Germany, Austria, Belgium, Denmark, Finland, France, Italy, Liechtenstein, Monaco, Norway, the Netherlands, the United Kingdom, Sweden, Switzerland and Yemen (P.D.R. of), the band 174 — 223 MHz is also allocated to the land mobile service on a permitted basis. However, the stations of the land mobile service shall not cause harmful interference to, nor claim protection from, broadcasting stations, existing or planned, in countries other than those listed in this footnote.

623 *Additional allocation:* in the Congo, Ethiopia, Gambia, Guinea, Kenya, Libya, Malawi, Mali, Uganda, Senegal, Sierra Leone, Somalia, Tanzania and Zimbabwe, the band 174 — 223 MHz is also allocated to the fixed and mobile services on a secondary basis.

624 *Additional allocation:* in Bangladesh, India, Pakistan and the Philippines, the band 200 — 216 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

626 *Additional allocation:* in China, India and Thailand, the band 216 — 223 MHz is also allocated to the aeronautical radionavigation service on a primary basis and to the radiolocation service on a secondary basis.

628 *Additional allocation:* in Somalia, the band 216 — 225 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to not causing harmful interference to existing or planned broadcasting services in other countries.

629 *Additional allocation:* in Oman, the United Kingdom and Turkey, the band 216 — 235 MHz is also allocated to the radiolocation service on a secondary basis.

223 - 230 BROADCASTING - FIXED - MOBILE	223 - 230 FIXED MOBILE BROADCASTING AERONAUTICAL RADIONAVIGATION Radiolocation

622 *Different category of service:* in the Federal Republic of Germany, Austria, Belgium, Denmark, Spain, Finland, France, Israel, Italy, Liechtenstein, Luxembourg, Monaco, Norway, the Netherlands, Portugal, the United Kingdom, Sweden, Switzerland and Yemen (P.D.R. of), the band 223 — 230 MHz is allocated to the land mobile service on a permitted basis (see No. 425). However, the stations of the land mobile service shall not cause harmful interference to, nor claim protection from, broadcasting stations, existing or planned, in countries other than those listed in this footnote.

628 *Additional allocation:* in Somalia, the band 216 — 225 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to not causing harmful interference to existing or planned broadcasting services in other countries.

629 *Additional allocation:* in Oman, the United Kingdom and Turkey, the band 216 — 235 MHz is also allocated to the radiolocation service on a secondary basis.

631 *Different category of service:* in Spain and Portugal, the band 223 — 230 MHz is allocated to the fixed service on a permitted basis (see No. 425). Stations of this service shall not cause harmful interference to, or claim protection from, broadcasting stations of other countries, whether existing or planned, that operate in accordance with the Table.

632 *Additional allocation:* in Saudi Arabia, Bahrain, the United Arab Emirates, Israel, Jordan, Oman, Qatar and Syria, the band 223 — 235 MHz is also allocated to the aeronautical radionavigation service on a permitted basis.

633 *Additional allocation:* in Spain and Portugal, the band 223 — 235 MHz is also allocated to the aeronautical radionavigation service on a permitted basis until 1 January 1990, subject to not causing harmful interference to existing or planned broadcasting stations in other countries.

634 *Additional allocation:* in Sweden, the band 223 — 235 MHz is also allocated to the aeronautical radionavigation service on a permitted basis until 1 January 1990, subject to agreement obtained under the procedure set forth in Article 14, and on condition that no harmful interference is caused to existing and planned broadcasting stations in other countries.

635 *Alternative allocation:* in Botswana, Lesotho, Namibia, South Africa, Swaziland and Zambia, the bands 223 — 238 MHz and 246 — 254 MHz are allocated to the broadcasting service on a primary basis subject to agreement obtained under the procedure set forth in Article 14.

470 - 790 BROADCASTING	470 - 585 FIXED MOBILE BROADCASTING 585 - 610 FIXED MOBILE BROADCASTING RADIONAVIGATION

676 *Additional allocation:* in Burundi, Cameroon, the Congo, Ethiopia, Israel, Kenya, Libya, Senegal, Sudan, Syria, and Yemen (P.D.R. of), the band 470 — 582 MHz is also allocated to the fixed service on a secondary basis.

680 *Additional allocation:* in the United Kingdom, the following bands are also allocated to the aeronautical radionavigation service on a primary basis: 582 — 590 MHz until 31 December 1987; 598 — 606 MHz until 31 December 1994. All new assignments to stations in the aeronautical radionavigation service in these bands are subject to the agreement of the Administrations of the following countries: the Federal Republic of Germany, Belgium, Denmark, Spain, France, Ireland, Luxembourg, Morocco, Norway and the Netherlands.

681 *Additional allocation:* in Belgium, the band 582 — 606 MHz is also allocated to the radionavigation service on a primary basis until 31 December 1984.

682 *Additional allocation:* in France and Italy, the band 582 — 606 MHz is also allocated to the radionavigation service on a permitted basis until 1 January 1990.

683 *Additional allocation:* in Oman, the band 582 — 606 MHz is also allocated to the radionavigation service on a secondary basis.

684 *Additional allocation:* in Israel, Libya, Syria and Sudan, the band 582 — 790 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a secondary basis.

685 *Additional allocation:* in Denmark and Kuwait, the band 590 — 598 MHz is also allocated to the aeronautical radionavigation service on a primary basis until 1 January 1995.

686 *Additional allocation:* in the United Kingdom, the band 590 — 598 MHz is also allocated to the aeronautical radionavigation service on a primary basis. All new assignments to stations in the aeronautical radionavigation service, including those transferred from the adjacent bands, shall be subject to coordination with the Administrations of the following countries: the Federal Republic of Germany, Belgium, Denmark, Spain, France, Ireland, Luxembourg, Morocco, Norway and the Netherlands.

687 *Additional allocation:* in the African Broadcasting Area (see Nos. 400 to 403), the band 606 — 614 MHz is also allocated to the radio astronomy service on a permitted basis.

688 *Additional allocation:* in China, the band 606 — 614 MHz is also allocated to the radio astronomy service on a primary basis.

689 In Region 1, except in the African Broadcasting Area (see Nos. 400 to 403), and in Region 3, the band 608 — 614 MHz is also allocated to the radio astronomy service on a secondary basis. In making assignments to stations of other services to which the band is allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 343 and 344 and Article 36).

693 Within the frequency band 620 — 790 MHz, assignments may be made to television stations using frequency modulation in the broadcasting-satellite service subject to agreement between the administrations concerned and those having services, operating in accordance with the Table, which may be affected (see Resolutions 33 and 507). Such stations shall not produce a power flux-density in excess of the value − 129 dB (W/m^2) for angles of arrival less than 20° (see Recommendation 705) within the territories of other countries without the consent of the administrations of those countries.

694 *Additional allocation:* in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 645 — 862 MHz is also allocated to the aeronautical radionavigation service on a permitted basis.

790 - 862	FIXED - BROADCASTING

694 *Additional allocation:* in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 645 — 862 MHz is also allocated to the aeronautical radionavigation service on a permitted basis.

695 *Alternative allocation:* in Spain and France, the band 790 — 830 MHz is allocated to the broadcasting service on a primary basis.

696 *Alternative allocation:* in Greece, Italy, Morocco and Tunisia, the band 790 — 838 MHz is allocated to the broadcasting service on a primary basis.

697 *Additional allocation:* in the Federal Republic of Germany, Denmark, Finland, Israel, Liechtenstein, Norway, the Netherlands, Sweden, Switzerland and Yugoslavia, the band 790 — 830 MHz, and in these same countries and in Spain and France, the band 830 — 862 MHz are also allocated to the mobile, except aeronautical mobile, service on a primary basis. However, stations of the mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, stations of services operating in accordance with the Table in countries other than those mentioned in connection with the band.

698 *Additional allocation:* in Austria, the band 790 — 862 MHz is also allocated to the mobile, except aeronautical mobile, service on a secondary basis.

699 *Additional allocation:* in Norway and Sweden, the bands 806 — 890 MHz and 942 — 960 MHz are also allocated to the mobile-satellite, except aeronautical mobile-satellite, service on a primary basis. The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

702 *Alternative allocation:* in Italy, the band 838 — 854 MHz is allocated to the broadcasting service on a primary basis as from 1 January 1995.

862 - 890	FIXED - MOBILE (Except Aeronautical Mobile) BROADCASTING 703

703 In Region 1, in the band 862 — 960 MHz, stations of the broadcasting service shall be operated only in the African Broadcasting Area (see Nos. 400 to 403) excluding Algeria, Egypt, Libya and Morocco. Such operations shall be in accordance with the Final Acts of the African VHF/UHF Broadcasting Conference, Geneva, 1963.

699 *Additional allocation:* in Norway and Sweden, the bands 806 — 890 MHz and 942 — 960 MHz are also allocated to the mobile-satellite, except aeronautical mobile-satellite, service on a primary basis. The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

704 *Additional allocation:* in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 862 — 960 MHz is also allocated to the aeronautical radionavigation service on a permitted basis until 1 January 1998. Up to this date, the aeronautical radionavigation service may use the band, subject to agreement obtained under the procedure set forth in Article 14. After this date, the aeronautical radionavigation service may continue to operate on a secondary basis.

610 - 890	FIXED MOBILE BROADCASTING

693 Within the frequency band 620 — 790 MHz, assignments may be made to television stations using frequency modulation in the broadcasting-satellite service subject to agreement between the administrations concerned and those having services, operating in accordance with the Table, which may be affected (see Resolutions 33 and 507). Such stations shall not produce a power flux-density in excess of the value – 129 dB (W/m^2) for angles of arrival less than 20° (see Recommendation 705) within the territories of other countries without the consent of the administrations of those countries.

701 *Additional allocation:* in Region 3, the bands 806 — 890 MHz and 942 — 960 MHz are also allocated to the mobile-satellite, except aeronautical mobile-satellite, service on a primary basis. The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

890 - 942	FIXED - MOBILE (Except Aeronautical Mobile) BROADCASTING 703 - Radiolocation

703 In Region 1, in the band 862 — 960 MHz, stations of the broadcasting service shall be operated only in the African Broadcasting Area (see Nos. 400 to 403) excluding Algeria, Egypt, Libya and Morocco. Such operations shall be in accordance with the Final Acts of the African VHF/UHF Broadcasting Conference, Geneva, 1963.

704 *Additional allocation:* in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 862 — 960 MHz is also allocated to the aeronautical radionavigation service on a permitted basis until 1 January 1998. Up to this date, the aeronautical radionavigation service may use the band, subject to agreement obtained under the procedure set forth in Article 14. After this date, the aeronautical radionavigation service may continue to operate on a secondary basis.

890 - 942	FIXED MOBILE BROADCASTING Radiolocation

942 - 960	**FIXED - MOBILE (Except Aeronautical Mobile) BROADCASTING 703**

703 In Region 1, in the band 862 — 960 MHz, stations of the broadcasting service shall be operated only in the African Broadcasting Area (see Nos. 400 to 403) excluding Algeria, Egypt, Libya and Morocco. Such operations shall be in accordance with the Final Acts of the African VHF/UHF Broadcasting Conference, Geneva, 1963.

699 *Additional allocation:* in Norway and Sweden, the bands 806 — 890 MHz and 942 — 960 MHz are also allocated to the mobile-satellite, except aeronautical mobile-satellite, service on a primary basis. The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

704 *Additional allocation:* in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 862 — 960 MHz is also allocated to the aeronautical radionavigation service on a permitted basis until 1 January 1998. Up to this date, the aeronautical radionavigation service may use the band, subject to agreement obtained under the procedure set forth in Article 14. After this date, the aeronautical radionavigation service may continue to operate on a secondary basis.

942 - 960	FIXED MOBILE BROADCASTING

701 *Additional allocation:* in Region 3, the bands 806 — 890 MHz and 942 — 960 MHz are also allocated to the mobile-satellite, except aeronautical mobile-satellite, service on a primary basis. The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

AFBC
INTERNATIONAL TELECOMMUNICATION UNION
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FIRST SESSION, NAIROBI September-October 1986

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COMMITTEE 4

Note by the Chairman of Committee 4

ORGANIZATION OF THE WORK OF COMMITTEE 4

It is proposed that two Working Groups should be established:

Working Group 4-A: Propagation

Terms of reference:

propagation characteristics and methods of forecasting field strength values in the VHF and UHF bands and of calculating the service areas of television broadcasting stations, conference (agenda item 1.1, Document 1).

Working Group 4-B: Technical criteria for planning

Terms of reference:

- optimum channel spacings, channel distribution (conference agenda item 1.2);
- modulation standards, emission bandwidth (conference agenda item 1.3);
- RF protection ratios (conference agenda item 1.4);
- minimum wanted field strength values, field strength values to be protected (conference agenda item 1.5);
- maximum radiated power (conference agenda item 1.6);
- basic characteristics of transmitting and receiving antennas, polarization (conference agenda item 1.7);
- receiver characteristics essential for planning (conference agenda item 1.8);

Technical bases prepared by the CCIR in accordance with Resolution No. 509 of WARC-79 are to be taken into account.

M. NDIONGUE
Chairman of Committee 4

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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WORKING GROUP 5A

Bands for planning

A table showing the allocation to various services of the VHF/UHF bands intended to be planned for television broadcasting in the African Broadcasting Area and the neighbouring countries is annexed for the information of Working Group 5A.

J.M.B. SEKETE
Chairman of Working Group 5A

Annex: 1

47 - 68 MHz

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Broadcasting	47 - 50	All planning area	Primary	TABLE	
	50 - 54	Planning area except; BOT, BDI, LSO, MWI, NMB, RRW, AFS, SWZ, ZAI, ZMB	Permitted	557 559	
	54 - 68	All planning area	Primary	TABLE	
Fixed	47 - 68	IRN	Primary	556	
		AGL, CME, COG, MDG, MOZ, SOM, SDN, TZA	Permitted	555	
	54 - 68	BOT, BDI, LSO, MWI, MLI, NMB, RRW, AFS, SWZ, ZAI, ZMB, ZWE	Primary	561	
	47 - 48.5	KEN	Secondary	553	
	56.5 - 58	KEN	Secondary	553	
MOBILE	47 - 68	IRN	Primary	TABLE	
Mobile except Aeronautical Mobile	47 - 68	AGL, CME, COG, MDG, MOZ, SOM, SDN, TZA	Permitted	555	
	54 - 68	BOT, BDI, LSO, MWI, MLI, NMB, RRW, AFS, SWZ, ZAI, ZMB, ZWE	Primary	561	

47 - 68 MHz

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
LAND MOBILE	47 - 68	GAB, MLI, MRC, NIG, SEN, TUN	Permitted	554	Shall not cause harmful interference to or claim protection from existing or planned stations of countries other than those mentioned
	47 - 48.5 56.5 - 58	KEN	Secondary	553	
Amateur	50 - 54	BOT, BDI, LSO, MWI, NMB, RRW, AFS, SWZ, ZAI, ZMB, ZWE	Primary	559	

174 - 230 MHz

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Broadcasting	174 - 223	All planning area	Primary	Table	
	223 - 230	Planning area except: BOT, LSO, NMB, AFS, SWZ, ZMB	Primary	Table 635	
	223 - 230	BOT, LSO, NMB, AFS, SWZ, ZMB	Primary	635	Subject to agreement obtained under procedure set forth in Article 14
Fixed	174 - 230	IRN	Primary	Table	
	174 - 223	COG, ETH, GMB, GUI, KEN, LBY, MWI, MLI, UGA, SEN, SRL, SOM, TZA, ZWE	Secondary	623	
	223 - 230	Region 1	Secondary	Table	
Mobile	174 - 230	IRN	Primary	Table	
	174 - 223	COG, ETH, GMB, GUI, KEN, LBY, MWI, MLI, UGA, SEN, SRL, SOM, TZA, ZWE	Secondary	623	
	223 - 230	Region 1	Secondary	Table	

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Aeronautical radionavigation	216 - 225	SOM	Primary	628	Subject to not causing harmful interference to existing and planned broadcasting service in other countries
	223 - 230	IRN	Primary	Table	
	223 - 230	ARS, BHR, UAE, OMA, QAT	Permitted	632	
Radiolocation	216 - 230	OMA	Secondary	629	
	223 - 230	IRN	Secondary	Table	

470 - 862 MHz

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Broadcasting	470 - 862	All planning areas	Primary	Table	
Fixed	470 - 790	IRN	Primary	Table	
	470 - 582	BDI, CME, COG, ETH, KEN, LBY, SEN, SDN	Secondary	676	
	582 - 790	LBY, SDN	Secondary	684	
	790 - 860	Planning area (except MRC and TUN) and IRN	Primary	Table 696	
Mobile	470 - 862	IRN	Primary	Table	
Mobile except Aeronautical Mobile	582 - 790	LBY, SDN	Secondary	684	
Radionavigation	582 - 606	OMA	Secondary	683	
	585 - 862	IRN	Primary	Table	
Aeronautical radionavigation	590 - 598	KWT	Primary	685	Until 1 January 1995
Broadcasting-satellite	620 - 790	All planning areas		693	Assignments may be made to television stations using frequency modulation subject to agreement between administrations concerned and those having services, operating in accordance with the Table, which may be affected.

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Radioastronomy	606 - 614	African Broadcasting Area	Permitted	687	
	608 - 614	ARS, BHR, IRQ, KWT, OMA, QAT, UAE, IRN	Secondary	689	
Mobile-satellite except aeronautical mobile-satellite	806 - 862	IRN	Primary	701	The use of this service is limited to operation within national boundaries and is subject to agreements obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

862 - 960 MHz

Service	Band (MHz)	Area of Allocation	Category of service	Table/ Footnote No.	Remarks
Broadcasting	862 - 960	African Broadcasting Area (excluding Algeria, Egypt, Libya and Morocco), Iran	Primary	Table 703	
Fixed	862 - 960	All planning area	Primary	Table	
MOBILE	862 - 960	IRN	Primary	Table	
Mobile except aeronautical mobile	862 - 960	All planning area excluding Iran	Primary	Table	
Radiolocation	890 - 942	All planning area	Secondary	Table	
Mobile-satellite except aeronautical mobile-satellite	862 - 890 942 - 960	IRN	Primary	701	The use of this service is limited to operation within national boundaries and subject to agreement obtained under the procedure set forth in Article 14. This service shall not cause harmful interference to services operating in accordance with the Table.

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INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

Document DT/7-E
23 September 1986
Original: English

WORKING GROUP 5-A

Note by the Chairman of Working Group 5-A

PLANNING PRINCIPLES

The following is a consolidation of the proposals relating to principles as they appear in Conference documents.

1. Existing stations

BOT/LSO/MOZ/SWZ/ZWE/4/7 [New text to be submitted]

BOT/LSO/MOZ/SWZ/ZWE/4/8 The existing stations in Bands I, III, IV and V which are in accordance with GE 63, which are in operation and are included in the list of requirements by the country concerned shall be protected during the planning by the second session.

KEN/9/12 Existing stations in the planning area operating in accordance with the provisions contained in the Geneva Agreement 1963, be included in the Plan which is to be drawn up by the second session.

SEN/10/14 The principles must guarantee the administrations equitable access to television broadcasting, whilst guaranteeing quality for existing usages and those schedules for implementation before the entry into force of the Plan which will be drawn up by the two sessions of the Conference.

ALG/20/8 The Plan should take account of existing stations.

E/21/25 The planning procedures adopted shall take due consideration of, and ensure adequate protection for, the television stations currently in service and already notified for recording in the International Frequency Register before the end of the first session.

2. Coverage

KEN/9/13 [New text to be submitted]

SEN/10/15 For coverage of one area, the minimum number of frequencies should be used.

ALG/20/9 The Plan should secure the same number of national equivalent coverages for each country.

E/21/26 In planning their television stations, administrations shall ensure that the coverage areas do not overlap into territories of other countries.

3. Low power stations

BOT/LSO/MOZ/SWZ/ZWE/4/11 Low power stations i.e. those having an effective radiated power of 500 W or less, shall not be listed in the Plan nor included in the planning process. Any eventual cases of harmful interference arising from such stations shall be resolved by mutual consultation between the administrations concerned.

E/21/27 Stations with a power below 100 W shall not be taken into account during the planning process unless they are already in service; they shall nevertheless be included in the Plan once they have been coordinated.

4. Concordance with Geneva 1984 Plan

ALG/20/10 The Plan should take account of the sites already designated in the Geneva 1984 Plan.

5. Relation with Stockholm 1961

RES 509-2 resolves

that a regional conference be convened as soon as possible preferably by 1984, to review and revise the provisions of the existing Television Broadcasting VHF/UHF Plan (Geneva, 1963) for the African Broadcasting Area, taking into account the assignments contained in the Stockholm Plan, 1961.

ALG/20/11 The Plan should allow for constraints affecting countries that belong to more than one planning area.

6. National planning

E/21/24 Administrations are free to plan their television stations within the borders of their own countries, using the planning procedure they prefer.

J.M.B. SEKETE
Chairman of Working Group 5-A

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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WORKING GROUP 4-A

Note by the Chairman of Working Group 4-A

PROPAGATION

At the first meeting of Working Group 4-A held on Tuesday, 23 September 1986, a number of delegations requested the CCIR to issue, as an addendum to Document 3, the texts adopted at the XVIth CCIR Plenary Assembly (Dubrovnik, 1986) concerning particular propagation conditions.

However, since Document 3 constitutes a report of Interim Working Parties 5/5 and 11/5, it has proved impossible to publish these texts as an addendum to Document 3, for the reason that Interim Working Parties 5/5 and 11/5 are alone competent to modify their report. I have therefore decided to publish the relevant texts as an annex hereto in the form of a working document (DT).

C.T. NDIONGUE
Chairman of Working Group 4-A

Annex: 1

ANNEX

Report 563-2 (MOD F) (Document 5/1017)

Radiometeorological data

2.5.2.3 *Duct occurrence in hot sea climates*

Ducts are particularly common over warm bodies of water and may extend to great distances. The penetration of ducts inland depends on the strength and direction of the wind and on the coastal topography. These ducts may change as one moves inland from the sea, generally diminishing in height and in magnitude.

During the summer, ducts have been observed [Badr. 1983, 1984] continuously throughout the day in the area from Shatt El-Arab to the Gulf of Oman. Along the western coast surface ducts were found to exceed 240 m in thickness for 1% of the time and 120 m for 50% of the time. Mean refractivity gradients within the surface ducts of less than -800 *N*/km were observed for 1% of the time and -275 *N*/km for 50% of the time.

Elevated ducts during summer were only slightly less intense than surface ducts on a statistical basis. Multiple surface and elevated ducts were frequently observed. These multiple ducts were sometimes found to be contained within a larger region over which the average refractivity gradient was less than -157 *N*/km.

During the autumn, ducts were thinner and more frequently elevated than surface-based.

During winter the ducts were considerably thinner and were either surface-based or elevated and were at times entirely absent.

Report 718-1 (MOD F) (Document 5/1018)

Effects of tropospheric refraction on radio wave propagation

3.2 *Losses in duct propagation*

Normally, in free-space propagation the energy spreads out in the two directions orthogonal to the direction of propagation: hence, the inverse-square distance dependence of free-space transmission. In the case of duct propagation the spread of energy in the vertical direction is eliminated and exhibits the inverse-distance dependency. That is, over a distance d' within the duct, the basic transmission loss L_b is related to that for free space L_{bf} by:

$$L_b = L_{bf} - 10 \log d' + A \qquad (14)$$

Such low transmission losses have been observed over water. Of course, this significant improvement over free-space propagation is normally off-set by the term A for various attenuation mechanisms including, for example, leakage losses due to duct irregularities or losses due to ground reflection, etc. However, it has been observed that at frequencies between about 0.8 and 3 GHz, the received field after propagation above water is well in excess of the free space value at 370 km and approximately equal to the free-space value at 1000 km. These events are unusual but not rare; they may persist for several hours and at some locations even for several days, corresponding to occurrences of from 0.1% to 0.01% of an average year.One year of measurements at a frequency of 791.2 MHz, limited each day to the 18.00 24.00 hour period, in a hot sea climate (see Report 563, § 2.5.2.3) on a 414 km over-sea path have been carried out. They show for example, that from April to November the signal exceeds the free space level during 1% of the measurement time [CCIR, 1982-86b]. Other results obtained in the same climate on various hops, the lengths of which range from 131 to 936 km, can be found in [CCIR, 1982-86c; Badr, 1983].

There are also additional losses attributable to duct characteristics and other atmospheric conditions:

- the frequency and time-dependent absorption by the gaseous atmosphere (Report 719);
- the leakage of energy from non-uniform ducts (i.e. ducts whose characteristics vary horizontally). Propagation measurements carried out in the area from Shatt El Arab to the Gulf of Oman have shown that non uniform ducts regularly exist [CCIR, 1982-86d].

In addition, there are losses associated with the coupling of radio wave energy into and out of ducts. These are sensitive to the vertical limits of the ducts relative to the positions of radio system terminal antennas. Elevated layers have a horizontally cyclical (wave like) variation in their characteristics that affect the coupling losses into and out of the elevated duct [Crane, 1981; Dougherty and Hart, 1979].

6.2 Prediction of the minimum value of k_e

A procedure for the calculation of the minimum value of k_e has been proposed [Mojoli, 1980; CCIR, 1982-86g]. The steps of this procedure are the following:

a) Obtain the distribution of the point refractive index vertical gradient G_0 for the location of interest and evaluate its mean and standard deviation μ_0, σ_0.

The value of σ_0 is estimated from the distribution of G_0 above the median value. Although the distribution of G_0 is not in general a normal distribution σ_0 will be estimated assuming a normal distribution.

Bearing in mind that the positive refractivity gradients giving rise to obstruction fading occur in the low atmosphere, the distribution for the ground based 100 m layer should be used.

b) The point distribution of G_0 is assumed to be the same along the whole path. To take into account the fact that the instantaneous behaviour of G_0 at two points can be different an "effective gradient" G_e is considered. From G_e, k_e can be obtained by:

$$k_e = \frac{157}{157 + G_e} \tag{26}$$

c) The effective gradient G_e can be shown to be the average of G_0 gradients along the hop. It can also be shown that:

- the distribution of G_e tends to a normal distribution as the length d (km) of the path increases;
- the mean μ_e and standard deviation σ_e of G_e can be given by the following empirical expressions:

$$\mu_e \simeq \mu_0$$

$$\sigma_e \simeq \frac{\sigma_0}{\sqrt{1 + d/d_0}} \tag{27}$$

Simultaneous measurements of the radio refractive index gradient at two points along a path in a northern European climate confirmed the results of the statistical model and the value of $d_0 \simeq 13.5$ km.

d) Once μ_ϵ and σ_ϵ are found then the values of G_ϵ, and therefore of k_ϵ with equation (26), exceeded for any percentage of time can be found. For example, we obtain:

$$G_\epsilon \simeq \mu_\epsilon + 3.1\ \sigma_\epsilon$$

for probability 99.9%, and:

$$G_\epsilon \simeq \mu_\epsilon + 3.7\ \sigma_\epsilon$$

for probability 99.99%.

e) The above procedure is suggested for path lengths d greater than about 20 km. Short hops with length less than 20 km are conservatively designed by directly using the point vertical gradient statistics G_0. That is $\mu_\epsilon \simeq \mu_0$ and $\sigma_\epsilon \simeq \sigma_0$.

This procedure has been applied [CCIR, 1982-86g] to three locations. For one location, i.e. Trappes in France, the computed curve representing the minimum value of k_e versus the path length for 99.99% of the time is in good agreement with the curve, based on purely radio measurements, represented in Fig. 2 in Report 338, which refers to 99.9% of time.

Another application of this procedure undertaken for eight other locations gives the following conclusions. In general, if the worst month data were used and a conservative estimate of the standard deviation of refractivity gradient were employed (e.g. using the 99.9% value) the method mentioned above would give a good indication of the effective k-factor for a particular area. The method should not be generally used for percentages greater than 99.9% of the month. Also, the method is not applicable to areas where the median refractivity gradient is lower than approximately -100 N/km.

This procedure is provisional. Further comparisons between the application of this procedure and measurements of obstruction fading must be carried out in various climates. The value of d_0, in equation (27), has been estimated from brief measurements carried out in Finland. Very different values of d_0 could probably be obtained with data from countries at low latitudes.

Other techniques for estimating the statistics of k_ϵ or other parameters relevant during sub-refractive conditions have also been employed for limited geographic regions [Schiavone, 1981; Kalinin, 1979].

Some statistical results on k values lower than unity in various countries can be found in Report 563, § 2.4.2, for the area from Shatt El Arab to the Gulf of Oman, see [CCIR, 1982-86h].

Report 722-1 (MOD F) (Document 5/1023)

Cross-polarization due to the atmosphere

6.1.2 *Influence of the cross-polarized patterns of the antennas*

All of these mechanisms will occur to some extent, but the available evidence suggests that one or two are dominant during extreme reductions in *XPD*. In all cases the most severe reductions in *XPD* are associated with multipath fading of the co-polarized signal. On the basis of measurements with two or more receiving antennas with different cross-polarized patterns [Martin and Casanova, 1974; Valentin, 1974; Rooryck and Martin, 1977; Sakagami and Morita, 1979; Morita *et al.*, 1979], the dominant cross-polarization mechanisms appear to be the two multipath mechanisms (atmospheric or surface) that interact with the cross-polarized patterns of both the transmitting and receiving antennas. Which of these is the most significant is not clear, and may be different for overland and overwater paths. Moreover, these mechanisms may have an approximately equal role on some paths and interaction between the surface and an atmospheric layer (a ground-based duct in the extreme case) may be significant. One set of trans-horizon measurements on a 484 km path in the area of the Shatt El-Arab to the Gulf of Oman [Badr, 1983] showed a relatively constant cross-polar signal level even during intensive ducting conditions, indicating that antenna characteristics are important during deterioration of *XPD*. It has been suggested [Olsen, 1981c] that because of the peculiar side-lobe structure of the cross-polarized patterns on some antennas, the surface-reflected wave may affect the cross-polarized signal more than it does the co-polarized signal.

Early work [Ghobrial and Watson, 1973] demonstrated the importance of the absolute side-lobe levels of the cross-polarized antenna patterns. Several other investigators suggested that a relatively flat cross-polarized antenna pattern is also important for minimizing cross-polarization during clear-weather conditions [Martin and Casanova, 1974; Sakagami and Morita, 1979]. It has recently been suggested that the phase-shift pattern between the co- and cross-polarized channels is also significant and that the overall requirement for minimizing cross-polarization during multipath fading is for cross-polarized amplitude and phase patterns to be similar to the co-polarized patterns within the angle-of-arrival range of the multipath rays [Morita *et al.*, 1979; Olsen, 1981c]*.

RECOMMENDATION 370-4 (MOD F)

(Document 5/1027)

VHF and UHF propagation curves for the frequency range from 30 MHz to 1000 MHz

RECOMMENDS

1. that the curves given in Annex I be adopted for provisional use with the following conditions:

1.1 The field strengths have been adjusted to correspond to a power of 1 kW radiated from a half-wave dipole.

1.2 The curves are based upon measurement data mainly relating to temperate climates containing "cold" and "warm" seas, e.g. the North Sea and the Mediterranean Sea. Recent extensive studies reveal that propagation conditions in certain areas of super-refractivity bounded by "hot" seas are substantially different. Interim proposals for dealing with this situation are contained in § 3.6 of Report 239.

1.3 The height of the transmitting antenna is defined as its height over the average level of the ground between distances of 3 and 15 km from the transmitter in the direction of the receiver.

Annex 1

2. VHF bands

2.3 In areas subject to pronounced superrefraction phenomena, account may be taken of the information contained in § 3.6 of Report 239.

3. UHF bands

3.3 In areas subject to pronounced superrefraction phenomena, account may be taken of the information contained in § 3.6 of Report 239.

Report 239-5 (MOD F) (Document 5/1029)

Propagation statistics required for broadcasting services using the frequency range 30 to 1 000 MHz

3.6 *Areas affected by marked* super-refraction phenomena

Measurement campaigns have been undertaken by Gulfvision [CCIR, 1982-86a], Islamic Republic of Iran and the State of Israel [CCIR, 1982-86b] to study VHF and UHF propagation in superrefractive climatic conditions. Measurements in the area from the Shatt-al-Arab to the Gulf of Oman [Murray, 1972; Gough, 1958] have also been given in [CCIR, 1982-86c]. The first results obtained, in the area between the Shatt-al-Arab and the Gulf of Oman on the one hand, and in the Mediterranean east of the 30° E meridian on the other, show that the 50% of the locations, 10% of the time and especially 1% of the time oversea curves differ considerably from those given in Recommendation 370 for warm sea. For oversea paths up to 500 km and at frequencies around 100 MHz, the 1% of the time curves are very similar to the free-space propagation curve.

The field strengths measured during periods of duct propagation at frequencies above 150 MHz are in general agreement with values predicted by equation (3) in Report 569 using appropriate values for the parameters A_r and γ, although this Report is primarily intended for frequencies above 500 MHz.

For overland paths remote from coastal areas, there are still not enough data available; measurement campaigns (being planned) in Africa might shortly provide useful information.

With regard to the 50% of the locations, 50% of the time curves, the differences with respect to the curves in Recommendation 370 are only slight, particularly for short distances. Results are still insufficient to define these differences, since the curves are used mainly to determine coverage i.e. for short distances, it is unlikely that any significant errors would result from using the curves in Recommendation 370, even for areas affected by super-refraction phenomena.

Pending fuller analysis and appraisal of the experimental data from the propagation measurement campaigns, the areas where superrefraction conditions are very likely to be frequent can be identified by comparing their climatic conditions with those of the areas in which propagation measurements have been carried out.

These areas probably include:

- the west coast of Africa between the Equator and the Tropic of Cancer,
- the Straits of Gibraltar;
- the Red Sea;
- the sea areas of Central America, the Gulf of Mexico and California;
- the Arabian Sea;
- the Bay of Bengal.

The need for clarification of this aspect of radio propagation is emphasized by reports which have emerged from the extensive research programme conducted by Gulfvision [CCIR, 1982-86d]. This opens up new questions concerning the estimation of coverage and interference. For example, contrary to previous conclusions it suggests that in such areas use of 50% time curves may be inadequate because of significant differences between levels at 50% and 99% time for relatively long distances. With respect to interference calculations, and to the extensive reports of long-range reception at 100 MHz already mentioned above /see also CCIR, 1982-86e/, the Gulfvision measurements reveal field strengths at long distances in Bands III, IV and V in excess of free space on oversea paths for low percentages of the time. Means of estimating the extent of this propagation have been proposed, which require information describing the topography and radiometeorology of the area concerned. The technique involves a definition of the boundaries of coastal land areas for paths crossing such areas. This requires an adjustment of the attenuation factor γ (dB/km) related to ducting, which turns out to be a function of the perpendicular distance from the coast. The boundary of the zone is determined by equating the value of γ resulting from ducting to the corresponding variable of the diffraction mechanism.

The work reported in the previous paragraph, and the relationship with results obtained using existing techniques described in Recommendation 370, require urgent study. Until such time as this work is completed propagation curves for meeting the requirements of planning in superrefractive areas have been proposed [CCIR, 1982-86f].

Report 569-2 (MOD F) (Document 5/1045)

The evaluation of propagation factors in interference problems between stations on the surface of the Earth at frequencies above about 0.5 GHz

3.2.4 *Experimental measurements*

The values of coefficients γ_d and A_c quoted in Tables III and IV are mainly based on experimental data relating to a large number of circuits within Europe, the North Sea and the Baltic Sea, as well as the Mediterranean. These data include measurements made below and around 1 GHz, and also initial results from experiments at frequencies up to 12 GHz [Neessen and de Haas, 1981; Hewitt and Adams, 1980; CCIR, 1978-82a]. These measurements have all shown a large yearly variation in basic transmission loss and the values given are therefore provisional especially for frequencies above 10 GHz.

The data provided refer to typical path geometries and some adjustment to predicted levels may be required for situations where the path geometry is atypical. Measurements made at 1.8 GHz in Japan [Tsuzuki *et al.*, 1980] with negative horizon elevation angles show evidence of lower basic transmission loss.

Measurements made at 11.4 GHz in the UK [Hewitt and Adams, 1980] show that, for land, sea and coastal paths, the percentage of time appertaining to a defined transmission loss will be the sum of a relatively small number of events whose durations extend from a few minutes to many hours.

Measurements made over several paths in the area from the Shatt-al-Arab to the Gulf of Oman indicate that sea surface ducts exist for relatively large time percentages. Preliminary results indicate that for the range 0.5 to 0.8 GHz very low values of γ_d may be encountered for 1% of the time. It was shown that with increasing antenna height, interference levels may decrease as coupling with the surface duct becomes less efficient. A method was developed for the estimation of interference on mixed paths for this area. This method assumes γ_d in the coastal strip to increase linearly with the distance from the coastline, until it reaches the value for zone A2 [Badr, 1983].

Long-term 3 GHz measurements in the Chinese Yellow Sea area have shown that for 1% of the time duct propagation extends over distances in excess of 537 km. Measurements made in the USSR indicate that signal levels over the Arctic seas are much lower than those over seas with temperate climates [Troitsky, 1984].

Diurnal variability of trans-horizon signals in the band 1-20 GHz has been studied in the UK [CCIR, 1982-86b]. For land paths, the maximum occurrence of enhanced signal levels was at about 0400 UTC. For sea paths, the diurnal pattern depended on the threshold level selected, showing a maximum occurrence at about 0400 UTC for the highest signals (within about 25 dB of free space) but with a maximum at about 1800 UTC for weaker signals – within 45 dB of free space. A mixed land-sea path, with 138 km of land and 160 km of sea, showed a pattern similar to that for an all-land path.

It has been shown [Doble, 1981] that, because of the similarity of the atmospheric processes involved, there may be some correlation between the incidences of multipath fading of the wanted signal and ducting or superrefractive enhancements of the interfering signal.

In the area from the Shatt-al-Arab to the Gulf of Oman, γ_d values may be less than the above for 1% of the time (see § 3.2.3.1).

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INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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WORKING GROUP 4-B

Summary of the proposals to be considered by Working Group 4-B (Part 1)

The following points of agreement and divergence have been established to date.

1. Basic characteristics of transmitting and receiving antenna polarization

1.1 Polarization

1.1.1 VHF

1.1.1.1 Orthogonal polarization to be used.

1.1.1.2 Preference should be given to horizontal polarization; vertical polarization to be used when protection so requires.

1.1.1.3 Circular polarization to be investigated.

1.1.2 UHF

1.1.2.1 Polarization at the main stations should normally be horizontal; vertical may be used at fill-ins.

1.1.2.2 Orthogonal polarization to be used.

1.1.2.3 Preference should be given to horizontal polarization; vertical polarization to be used when protection so requires.

1.1.3 General

1.1.3.1 Same polarization at one Tx site.

1.1.3.2 Other polarization at fill-ins.

1.2 Directivity

1.2.1 Receiving antenna

1.2.1.1 Use non-directional pattern for planning purposes.

1.2.1.2 Use Figure 2.10 of Document 3 whenever required for international coordination procedures.

1.2.2 Transmitting antenna

1.2.2.1 Use directional patterns.

2. Maximum radiated power

2.1 Band I

100 kW limit proposed.

2.2 Band III

2.2.1 200 kW limit proposed.

2.2.2 300 kW limit proposed.

2.3 Band IV/V

2.3.1 500 kW limit proposed.

2.3.2 1 000 kW limit proposed.

2.4 No limits should be set on maximum radiated power, provided the coverage areas do not overlap into neighbouring countries; no objection to the adoption of the following values:

Band I: 100 kW

Band III: 200 kW

Bands IV/V: 500 kW

3. Minimum wanted field strength values, field strength values to be protected

3.1 Urban

3.1.1 Median field strengths to be used for planning against interference

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

3.1.2 Satisfactory picture quality in the absence of interference and man-made noise is given by:

Band	I	III	IV	V
dB(μV/m)	+47	+53	+62	+67

3.1.3 Investigations should be carried out to determine the effects of super-refractivity on the values in 3.1.1 and 3.1.2.

3.2 Rural

3.2.1 Median field strength to be used for planning against interference

Band	I	III	IV	V
dB(μV/m)	+46	+49	+58	+64

3.2.2 Satisfactory picture quality in the absence of interference and man-made noise is given by:

Band	I	III	IV	V
dB(μV/m)	+40	+43	+52	+58

3.2.3 Investigations should be carried out to determine the effects of super-refractivity on the values in 3.2.1 and 3.2.2.

S.H. CHALLO
Chairman of Working Group 4-B

AFBC
INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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WORKING GROUP 4-A

DRAFT RECOMMENDATION [COM4/1]

Need for certain propagation studies relevant to the use of the VHF/UHF band in the African Continent and neighbouring countries

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986)

considering

a) that the World Administrative Radio Conference, Geneva, 1979, in Resolution No. 509 requested the CCIR to study, as a matter of urgency, the necessary technical bases required for this present Conference;

b) that the CCIR in response provided a report on such necessary technical bases that included, inter alia, a chapter on propagation, and that this chapter has been adopted subject to the necessity for obtaining further information on the subjects referred to hereunder;

c) that the World Administrative Radio Conference, Geneva, 1979, likewise adopted Resolution No. 5 and Recommendation No. 68 which deal respectively with technical cooperation with the developing countries in the study of propagation in tropical areas, and with studies and prediction of radio propagation and radio noise;

d) that further information on propagation in Africa, as well as in neighbouring countries in particular relating to ducting propagation in all areas thought to be particularly subject to this phenomenon is considered to be necessary;

e) that verification is likewise necessary, relative to the whole planning area, of the data indicating that radio propagation characteristics over land and over sea are identical under certain circumstances;

requests the CCIR

1. to undertake, as a matter of urgency, further studies on propagation and radiometeorological conditions relevant to the African Continent and other parts of the planning area as defined by this Conference;

2. to continue studying the relationship between propagation over land and over sea for 50%, 10% and 1% of the time;

3. to prepare a further report, on the results of these studies, in good time for the Second Session of the Conference;

instructs the Secretary-General

to take measures to expand the ongoing measurements campaigns in collaboration with administrations concerned as well as with regional organizations;

invites

the administrations of developed and developing countries as well as the operating and scientific entities and industrial organizations to actively participate and assist the measurements campaign(s) on propagation being undertaken by the Union;

recommends that African Administrations and administrations of neighbouring countries

collaborate with the CCIR as a matter of urgency and within the limits of their possibilities, by sending it contributions relating to the aforementioned activities;

requests the Second Session of the Conference

to reconsider the relevant paragraphs and figures of the Report of the First Session in the light of this further CCIR report and also to consider, if it sees fit the establishment for planning purposes, of separate curves for propagation conditions in Africa as well as in neighbouring countries.

C.T. NDIONGUE
Chairman of Working Group 4-A

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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WORKING GROUP 4-A

DRAFT RECOMMENDATION [COM4/1]

Need for certain propagation studies relevant to the use of the VHF/UHF band in the African Continent

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986)

considering

a) that the World Administrative Radio Conference, Geneva, 1979, in Resolution No. 509 requested the CCIR to study, as a matter of urgency, the necessary technical bases required for this present Conference;

b) that the CCIR in response provided a report on such necessary technical bases that included, inter alia, a chapter on propagation, and that this chapter has been adopted subject to the necessity for obtaining further information on the subjects referred to hereunder;

c) that the World Administrative Radio Conference, Geneva, 1979, likewise adopted Resolution No. 5 and Recommendation No. 68 which deal respectively with technical cooperation with the developing countries in the study of propagation in tropical areas, and with studies and prediction of radio propagation and radio noise;

d) that further information on propagation in Africa, in particular relating to ducting propagation in all areas thought to be particularly subject to this phenomenon is considered to be necessary;

e) that verification is likewise necessary, relative to Africa, of the data indicating that radio propagation characteristics over land and over sea are identical under certain circumstances;

requests the CCIR

1. to undertake, as a matter of urgency, all propagation and radiometeorological measurements that can be made in and around the African Continent;

2. to continue studying the relationship between propagation over land and over sea for 50%, 10% and 1% of the time;

3. to prepare a further report, based on such measurements and on these studies, in good time for the Second Session of the Conference;

recommends that African Administrations

collaborate with the CCIR as a matter of urgency and within the limits of their possibilities, by sending it contributions relating to the aforementioned activities;

requests the Second Session of the Conference

to reconsider the relevant paragraphs and figures of the Report of the present First Session in the light of this further report of the CCIR and also to consider, if it sees fit, the production, for planning purposes, of separate propagation curves for African conditions;

and invites the regional telecommunication and broadcasting organizations in Africa,

as a matter of urgency, within the limit of possibilities to participate in the above-mentioned studies.

C.T. NDIONGUE
Chairman of Working Group 4-A

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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WORKING GROUP 4-A

Note by the Chairman of Working Group 4-A

DRAFT CHAPTER 2

PROPAGATION IN THE VHF/UHF BANDS

[## 2.1 Propagation curves for the VHF/UHF television broadcasting service]

2.1.1 General considerations

The propagation curves contained in this chapter are based on the relevant CCIR Recommendations and reports, on certain data already used for the African Broadcasting Conference, Geneva 1963 and on the most recent work of Interim Working Party 5/5 of CCIR Study Group 5 and of Interim Working Party 6/8 of CCIR Study Group 6.

The propagation curves shown in Figures 2.1 to 2.32 are intended for the planning of the television broadcasting service. They give, from statistics of measurement results relying also on theoretical considerations, the value of field strength exceeded for 50% of locations for time percentages of 50, 10, 5 and 1%. Since propagation conditions are tied to the refractive index of the medium in which radio waves propagate and that in the troposphere, this index depends on climatic and meteorological conditions, different curves are available corresponding to the geographic zones where they are to be applied.

[The section containing general considerations on areas subject to pronounced super-refraction is to be developed.]

[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 will be disregarded for planning purposes.]

2.1.2 Geographic division of Africa into propagation zones

Conclusions drawn from various sources are summarized in the map of Figure 2.33, in which four continental zones can be distinguished, numbered 1 to 4 (instead of 6 in 1963), three maritime zones, of which one has the same characteristics as Zone 4, the two others distinguished by the letters A and B, [and one other zone to be defined].

The classification proposed is based mainly on radio characteristics, but **although these characteristics are tied** to meteorological factors, **they do not correspond exactly to a meteorological classification. The various zones are characterized** and shown on the map in Figure 2.33*.

Zone 1 : Temperate and sub-tropical (continental) regions, exhibiting propagation conditions found over land in Europe and North America;

* The map is being prepared.

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

Zone 3 : Equatorial regions, exhibiting propagation conditions found in hot and humid climates;

Zone 4 : Maritime regions, representing warm seas and terrestrial zones of low altitude bordering warm seas, where super-refraction conditions occasionally exist (all the seas around the African continent are Zone 4 except Zones A and B designated below);

Zone A : Maritime zones at low latitudes frequently displaying super-refractivity and where the mean annual value of ΔN is 70;

Zone B : Maritime zones at low latitudes frequently displaying super-refractivity and where the mean annual value of ΔN is 60.

Zone C: Pronounced super-refractivity zone to be defined.

2.1.3 Pronounced super-refractivity zones

Text to be developed.

2.1.4 Application of curves

2.1.4.1 Propagation curves

The propagation curves represented in Figures 2.1 to 2.32 establish a relation between the field and the path length; 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 receiver. The curves give the field exceeded at 50% of locations and each figure corresponds to time percentages of 50, 10, 5 and 1% for one of the geographic zones defined in Section 2.1.2.

The curve for 50% of the time will be used to determine coverage areas and that for 1% of the time to calculate interference.

The curves in Figures 2.1 to 2.32 correspond to the 4 zones (1 to 4) defined in Section 2.1.2 above. In the case of a path passing above maritime Zone A or B, the curves applicable to Zone 4 will be used, with the addition of a correction of 10 dB or 5 dB, respectively, to the values derived from these curves. This correction is subject to the condition that the value obtained does not exceed the free-space value by more than 6 dB.

2.1.4.2 Correction for the effective transmitting antenna height

The curves are given for effective transmitting antenna heights between 37.5 and 1,200 m, each value given of the effective height being twice that of the previous one. For different values of effective height, at distances where the field depends strongly on this height, one can interpolate; for the distance concerned, the most accurate procedure is to draw a curve giving the field as a function of effective height; nevertheless by referring directly to the figures which give the field as a function of distance, and performing a linear interpolation between the two curves corresponding to effective heights immediately above and below the true value, the corresponding error will not exceed 1.5 dB in the worst case.

For effective transmitting antenna heights less than 37.5 m, the values for 37.5 m are used.

For effective transmitting antenna heights h_1 exceeding 1200 m, the field at a distance x km from the transmitter is taken as the same as that given by the curve for an effective height of 300 m at a distance of $(x + 70 - 4.1\sqrt{h_1})$ km. Since this extrapolation is only applicable for transhorizon distances, its use is limited to distances greater than $x = (4.1\sqrt{h_1} + 70)$ km. For distances between 100 km and $(4.1\sqrt{h_1} + 70)$ km, it is assumed that the field exceeds the value corresponding to an effective transmitting antenna height of 1,200 m by the same amount as at $x = (4.1\sqrt{h_1} + 70)$ km, calculated in accordance with the above procedure. For smaller distances, this increment is determined by linear interpolation between 0 dB at 20 km and a value depending on the height h_1 at a distance of 100 km. The extrapolation is subject to the condition that the value obtained does not exceed the free-space value by more than 6 dB.

2.1.4.3 Correction for terrain irregularities

Data which would allow terrain irregularities to be taken into account are in general not known with sufficient precision to be valuable in the development of a plan. Correction for terrain irregularities will be disregarded for planning purposes and interference calculations.

2.1.4.4 Variations as a function of the percentage of locations

The curves referred to correspond to 50% of locations, the percentage to be used for the purposes of planning.

2.1.4.5 Calculations for mixed paths

When propagation 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.

$E_{i,t}$: 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,

d_T : length of total path.

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

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

This method is also used for mixed land-sea paths for the VHF and for the UHF bands.

Annexes: Figures 2.1 to 2.32
(For reasons of economy, Figures 2.1 to 2.32 are not reproduced. They correspond to Figures 3.1 to 3.32 on pages 3.5 to 3.36 of Document 3).

C.T. NDIONGUE
Chairman of Working Group 4-A

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AD HOC WORKING GROUP 4-A

Note by the Chairman of ad hoc Working Group 4-A

Arising from discussions of Document DT/8 at the meeting of the ad hoc Working Group on Wednesday, 24 September 1986, a request was made to identify those parts of the document specifically addressing propagation in regions prone to super-refraction.

Accordingly, extracts of Document DT/8, for possible use in considerations of planning are reproduced below.

H. BERTHOD
Chairman of ad hoc Working Group 4-A

1. General considerations on super-refractivity

RECOMMENDATION 370-4 (MOD F)

(Document 5/1027)

VHF and UHF propagation curves for the frequency range from 30 MHz to 1000 MHz

recommends

1.2 The curves are based upon measurement data mainly relating to temperate climates containing "cold" and "warm" seas, e.g. the North Sea and the Mediterranean Sea. Recent extensive studies reveal that propagation conditions in certain areas of super-refractivity bounded by "hot" seas are substantially different. Interim proposals for dealing with this situation are contained in § 3.6 of Report 239.

and contains in Annex 1 the following information:

2. VHF bands

2.3 In areas subject to pronounced superrefraction phenomena, account may be taken of the information contained in § 3.6 of Report 239.

3. UHF bands

3.3 In areas subject to pronounced superrefraction phenomena, account may be taken of the information contained in § 3.6 of Report 239.

The corresponding section in Report 239-5 (MOD F) (Document 5/1029), Propagation statistics required for broadcasting services using the frequency range 30 to 1 000 MHz, is as follows:

3.6 *Areas affected by marked* super-refraction phenomena

Measurement campaigns have been undertaken by Gulfvision [CCIR, 1982-86a], Islamic Republic of Iran and the State of Israel [CCIR, 1982-86b] to study VHF and UHF propagation in superrefractive climatic conditions. Measurements in the area from the Shatt-al-Arab to the Gulf of Oman [Murray, 1972; Gough, 1958] have also been given in [CCIR, 1982-86c]. The first results obtained, in the area between the Shatt-al-Arab and the Gulf of Oman on the one hand, and in the Mediterranean east of the 30° E meridian on the other, show that the 50% of the locations, 10% of the time and especially 1% of the time oversea curves differ considerably from those given in Recommendation 370 for warm sea. For oversea paths up to 500 km and at frequencies around 100 MHz, the 1% of the time curves are very similar to the free-space propagation curve.

The field strengths measured during periods of duct propagation at frequencies above 150 MHz are in general agreement with values predicted by equation (3) in Report 569 using appropriate values for the parameters A_c and γ, although this Report is primarily intended for frequencies above 500 MHz.

For overland paths remote from coastal areas, there are still not enough data available; measurement campaigns (being planned) in Africa might shortly provide useful information.

With regard to the 50% of the locations, 50% of the time curves, the differences with respect to the curves in Recommendation 370 are only slight, particularly for short distances. Results are still insufficient to define these differences, since the curves are used mainly to determine coverage i.e. for short distances, it is unlikely that any significant errors would result from using the curves in Recommendation 370, even for areas affected by super-refraction phenomena.

Pending fuller analysis and appraisal of the experimental data from the propagation measurement campaigns, the areas where superrefraction conditions are very likely to be frequent can be identified by comparing their climatic conditions with those of the areas in which propagation measurements have been carried out.

These areas probably include:

- the west coast of Africa between the Equator and the Tropic of Cancer,
- the Straits of Gibraltar;
- the Red Sea;
- the sea areas of Central America, the Gulf of Mexico and California;
- the Arabian Sea;
- the Bay of Bengal.

The need for clarification of this aspect of radio propagation is emphasized by reports which have emerged from the extensive research programme conducted by Gulfvision [CCIR, 1982-86d]. This opens up new questions concerning the estimation of coverage and interference. For example, contrary to previous conclusions it suggests that in such areas use of 50% time curves may be inadequate because of significant differences between levels at 50% and 99% time for relatively long distances. With respect to interference calculations, and to the extensive reports of long-range reception at 100 MHz already mentioned above /see also CCIR, 1982-86e/, the Gulfvision measurements reveal field strengths at long distances in Bands III, IV and V in excess of free space on oversea paths for low percentages of the time. Means of estimating the extent of this propagation have been proposed, which require information describing the topography and radiometeorology of the area concerned. The technique involves a definition of the boundaries of coastal land areas for paths crossing such areas. This requires an adjustment of the attenuation factor γ (dB/km) related to ducting, which turns out to be a function of the perpendicular distance from the coast. The boundary of the zone is determined by equating the value of γ resulting from ducting to the corresponding variable of the diffraction mechanism.

The work reported in the previous paragraph, and the relationship with results obtained using existing techniques described in Recommendation 370, require urgent study. Until such time as this work is completed propagation curves for meeting the requirements of planning in superrefractive areas have been proposed [CCIR, 1982-86f].

2. Radiometeorological data

Relevant information is provided in Reports 563 and 718 as follows:

Report 563-2 (MOD F) (Document 5/1017)

Radiometeorological data

2.5.2.3 ***Duct occurrence in hot sea climates***

Ducts are particularly common over warm bodies of water and may extend to great distances. The penetration of ducts inland depends on the strength and direction of the wind and on the coastal topography. These ducts may change as one moves inland from the sea, generally diminishing in height and in magnitude.

During the summer, ducts have been observed [Badr. 1983, 1984] continuously throughout the day in the area from Shatt El-Arab to the Gulf of Oman. Along the western coast surface ducts were found to exceed 240 m in thickness for 1% of the time and 120 m for 50% of the time. Mean refractivity gradients within the surface ducts of less than -800 *N*/km were observed for 1% of the time and -275 *N*/km for 50% of the time.

Elevated ducts during summer were only slightly less intense than surface ducts on a statistical basis. Multiple surface and elevated ducts were frequently observed. These multiple ducts were sometimes found to be contained within a larger region over which the average refractivity gradient was less than -157 *N*/km.

During the autumn, ducts were thinner and more frequently elevated than surface-based.

During winter the ducts were considerably thinner and were either surface-based or elevated and were at times entirely absent.

Report 718-1 (MOD F) (Document 5/1018)

Effects of tropospheric refraction on radio wave propagation

3.2 ***Losses in duct propagation***

Normally, in free-space propagation the energy spreads out in the two directions orthogonal to the direction of propagation: hence, the inverse-square distance dependence of free-space transmission. In the case of duct propagation the spread of energy in the vertical direction is eliminated and exhibits the inverse-distance dependency. That is, over a distance d' within the duct, the basic transmission loss L_b is related to that for free space L_{bf} by:

$$L_b = L_{bf} - 10 \log d' + A \qquad (14)$$

Such low transmission losses have been observed over water. Of course, this significant improvement over free-space propagation is normally off-set by the term A for various attenuation mechanisms including, for example, leakage losses due to duct irregularities or losses due to ground reflection, etc. However, it has been observed that at frequencies between about 0.8 and 3 GHz, the received field after propagation above water is well in excess of the free space value at 370 km and approximately equal to the free-space value at 1000 km. These events are unusual but not rare; they may persist for several hours and at some locations even for several days, corresponding to occurrences of from 0.1% to 0.01% of an average year.One year of measurements at a frequency of 791.2 MHz, limited each day to the 18.00 24.00 hour period, in a hot sea climate (see Report 563, § 2.5.2.3) on a 414 km over-sea path have been carried out. They show for example, that from April to November the signal exceeds the free space level during 1% of the measurement time [CCIR, 1982-86b]. Other results obtained in the same climate on various hops, the lengths of which range from 131 to 936 km, can be found in [CCIR, 1982-86c; Badr, 1983].

There are also additional losses attributable to duct characteristics and other atmospheric conditions.

3. Considerations in interference assessment

Relevant information is provided in Report 569 as follows:

Report 569-2 (MOD F) (Document 5/1045)

The evaluation of propagation factors in interference problems between stations on the surface of the Earth at frequencies above about 0.5 GHz

3.2.4 ***Experimental measurements***

Measurements made over several paths in the area from the Shatt-al-Arab to the Gulf of Oman indicate that sea surface ducts exist for relatively large time percentages. Preliminary results indicate that for the range 0.5 to 0.8 GHz very low values of γ_d may be encountered for 1% of the time. It was shown that with increasing antenna height, interference levels may decrease as coupling with the surface duct becomes less efficient. A method was developed for the estimation of interference on mixed paths for this area. This method assumes γ_d in the coastal strip to increase linearly with the distance from the coastline, until it reaches the value for zone A2 [Badr, 1983].

In the area from the Shatt-al-Arab to the Gulf of Oman, γ_d values may be less than values specified in this report for other zones for 1% of the time (see § 3.2.3.1).

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WORKING GROUP 4-B

Summary of the proposals to be considered by Working Group 4-B (Part 2)

The following points of agreement and divergence have been established to date.

4. Modulation standards, emission bandwidth

4.1 Uniform 10/1 vision-to-sound ratio

4.2 2 sound channels, additional BC services

4.3 Sound: F3E
Vision: C3F Neg.

4.4 Bands I and III: Standard B

4.5 Band IV/V: Standard G

4.6 Table 2.1 of Document 3 (page 2.2)

5. Receiver characteristics (2.2.7 of Document 3)

5.1 Receiver characteristics for type A

5.2 Receiver characteristics for type A and/or type B

5.3 Receiver noise

5.3.1 VHF: 8 dB

5.3.2 UHF: 12 dB/7 dB

5.4 Receiver selectivity

5.5 Intermediate frequencies

6. RF protection ratios (2.2.4 of Document 3)

6.1 Co-channel interference (Table 2.III)

6.2 Adjacent-channel interference

6.2.1 Lower adjacent-channel

6.2.1.1 VHF: all systems: -6 dB

6.2.1.2 UHF: Table 2.IV

6.2.2 Upper adjacent-channel: all systems: -12 dB

6.3 Image channel interference: Table 2.V

6.4 Overlapping channel interference

6.4.1 Tropospheric interference: Table 2.VII

6.4.2 Continuous interference: Table 2.VIII

6.4.3 Correction values: Table 2.VI

6.5 Data signals: Table 2.IX

6.6 Sound signals: Table 2.X

6.7 Off-sets

6.7.1 Non-controlled

6.7.2 Non-precision

6.7.3 Precision

6.8 Increase PR values by X dB in super-refraction zones

7. Optimum channel spacings, channel distribution

7.1 Band I

7.1.1 7 MHz spacing

7.1.2 8 MHz spacing

7.2 Band III

7.2.1 7 MHz spacing

7.2.2 8 MHz spacing

7.3 Band IV

7.3.1 8 MHz spacing.

S.M. CHALLO
Chairman of Working Group 4-B

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UNIÓN INTERNACIONAL DE TELECOMUNICACIONES
CARR PARA LA PLANIFICACIÓN DE LA RADIODIFUSIÓN DE TELEVISIÓN EN ONDAS MÉTRICAS/ DECIMÉTRICAS EN LA ZONA AFRICANA DE RADIODIFUSIÓN Y PAÍSES VECINOS
PRIMERA REUNIÓN, NAIROBI Septiembre-Octubre de 1986

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WORKING GROUP 5-A

PLANNING PRINCIPLES

1. Combine items 1 and 2 as follows:

The Plan to be established by the Second Session of the Conference is intended to replace the Plan annexed to the Agreement of Geneva 1963 insofar as the African Broadcasting Area is concerned. It shall contain existing assignments and planned assignments to stations in the African Broadcasting Area and in the following countries: ARS, BHR, IRN, IRQ, KWT, OMA, QAT, UAE.

2. Introduce for ARS the following footnote:

Note 1 - The Administration of Saudi Arabia started the application of the procedure for accession to the Stockholm Agreement, 1961, with respect to the part of its territory situated in the European Broadcasting Area. Should the procedure result in its accession to the above Agreement, the planning area for ARS will be limited to the part of its territory which is not situated in the European Broadcasting Area.

3. Modify item 8 as follows:

8. In planning their television stations, administrations shall, in application of RR 2666, endeavour to minimize the part of the coverage area overlapping to territories of other countries.

4. Introduce the following Note 2 to item 10:

Note 2 - See Note 1; should the Administration of Saudi Arabia access to the Stockholm Agreement, its assignments to stations in the European Broadcasting Area shall be taken into account at the date of accession, if this date is after 31 October 1987.

5. As a result of the discussions with delegations on the problem of low-power stations the following text is proposed for item 9. This text implies that some steps as described below are included in the planning method.

9. The planning process shall not take account of planned low power assignments. Existing low power assignments shall be taken into account only when the stations are within a coordination distance and they are modified in such a way that they become compatible with the planned stations. Once the Plan is adopted, planned low-power stations may be entered in the Plan after appropriate coordination. The steps to appear in the planning method to apply this principle are as follows:

a) in a first step the channels will be assigned to stations without taking into account the existing low-power stations;

b) only existing low-power stations which are within a given distance from the border of a neighbouring country will be considered;

c) they will be examined to assess their compatibility with the assigned channel and shall be entered in the Plan if they are compatible;

d) if they are not compatible their frequency shall be modified with the view to obtain the compatibility;

e) if it is not possible to obtain this compatibility, they will be indicated as being the subject of further coordination.

6. The following definitions of coverage area and service area are extracted from Document 3 (CCIR Report).

Coverage area

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

Service area

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

7. Proposal from Nigeria

Add the following sub-paragraph to Paragraph 4:

Assignment of countries parties to the Geneva Agreement, 1963, which are not in conformity with GE63, but in operation and had been notified by 31 October 1987, shall be protected.

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WORKING GROUP 5-A

PLANNING PRINCIPLES

1. The Plan shall contain "existing" and "planned" assignments to stations in the planned area.

2. The planning area includes the African Broadcasting Area as defined in RR400 to RR403 and the following countries: ARS, BHR, IRN, IRQ, KWT, OMA, QAT, UAE.

3. The planning process shall take account of existing assignments to stations in the planning area.

4. The existing assignments are:

- assignments in conformity with GE63 agreement notified to the IFRB by [...];
- assignments to stations in planned area notified at [.....] to the IFRB by countries not party to the Geneva 63 Agreement.

5. Assignments in conformity with GE63 Agreement not notified to the IFRB by [.....] shall be treated as new requirements.

6. The planning must guarantee the administrations the equitable access to television broadcasting by securing the same number of national equivalent coverages for each country.

7. The planning should use for each national coverage a minimum number of channels.

8. In planning their television stations, administrations shall minimize the part of the coverage area overlapping territories of other countries.

Note: There is a need to adopt definitions for coverage area and service area.

9. The planning process shall not take account of planned low power stations. Existing low power stations shall be taken into account in the planning process and may be entered in the Plan. Once the plan is adopted, planned low power station may be entered in the Plan after appropriate coordination.

Note: There a need to adopt a definition for low power station.

10. In accordance with Resolution 509 of WARC-1979, the planning process shall take into account the assignments in conformity with the Stockholm Agreement 1961.

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WORKING GROUP 5-A

Note by the Chairman of Working Group 5-A

PLANNING METHODS

The following is a consolidation of the proposals relating to planning methods as they appear in the Conference documents.

1. Band 47 - 68 MHz

BOT/LSO/MOZ/SWZ/ZWE/4/10 The application of lattice planning methods in bands I and III is not considered appropriate. In reaching this conclusion, among other factors, account was taken of the provisions of Radio Regulation No. 635 which provide an extended band for broadcasting. This means that the planning approach for band III by the countries mentioned in RR 635 may be significantly different from the approach of other countries of the African Broadcasting Area. Further, the small number of channels generally available in band III does not lend itself to the lattice planning approach.

SEN/10/13 For band I, maximum distances, since this band accommodates a maximum of three channels and it becomes impossible to cover a vast region with the uniform network theory.

ALG/20/13 The Conference should arrange the planning of band I on the basis of a spatial distribution (use of the same channel according to geographical separation).

2. Band 174 - 230 MHz

BOT/LSO/MOZ/SWZ/ZWE/4/10 The application of lattice planning methods in bands I and III is not considered appropriate. In reaching this conclusion, among other factors, account was taken of the provisions of Radio Regulation No. 635 which provide an extended band for broadcasting. This means that the planning approach for band III by the countries mentioned in RR 635 may be significantly different from the approach of other countries of the African Broadcasting Area. Further, the small number of channels generally available in band III does not lend itself to the lattice planning approach.

SEN/10/13 For bands III, IV and V, the uniform network theory.

ALG/20/14 For band III, the Conference should adopt a plan of regular lattices of 8-channel rhombuses.

Band 470 - [862] MHz

BOT/LSO/MOZ/SWZ/ZWE/4/9 The lattice distribution approach shall be adopted in planning of bands IV and V, the upper limit of the planned band shall be 854 MHz. No planning of broadcasting service (TV stations) shall be made in the band 854 MHz to 960 MHz. Details of the 48-channel lattice distribution which is proposed are submitted separately in (Document 5).

SEN/10/13 For bands III, IV and V, the uniform network theory.

ALG/20/15 The Conference should plan bands IV and V in regular 49-channel lattices.

Other proposals

The application of the uniform transmitter network principle with a view to developing a planning method for television stations in the VHF/UHF bands is considered by our Administration to provide an acceptable solution for the African Broadcasting Area and neighbouring countries (planning area).

It should, however, be noted that the study of theoretical networks in section 4.3 of the CCIR document is very abstract and difficult to put to practical use. It should be made more accessible to a wide majority of readers.

CTI/25/8 The Ivorian Administration would welcome the inclusion in the first session's report of a practical method which takes into account the actual characteristics of the planning area (geometry, propagation, population density, size of countries, etc.).

ALG/20/16 The Conference should endeavour to choose the rhombus origin that was adopted in the Geneva 1984 Plan.

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WORKING GROUP 4-B

Note by the Chairman of Working Group 4-B

POLARIZATION

The following points concerning the use of polarization were discussed and/or agreed:

1. Linear polarization, i.e. horizontal or vertical, is the mode of polarization to be used, in general, in bands I, III and IV/V. Investigations as to the feasibility or desirability of using circular polarization may be recommended upon further deliberation.

2. Insofar as polarization discrimination is concerned, it is considered to be a useful tool to reduce interference in individual cases, for example, in international coordination procedures.

However, polarization discrimination should not be taken into account for planning purposes.

3. Although each administration is free to choose the mode of polarization it uses, it was felt that the horizontal mode was to be preferred in general.

4. It was agreed that only one mode of polarization should be used for all TV transmissions emanating from any given transmitter site.

5. It was agreed that for fill-in stations the "other" mode of polarization should be used, e.g. if the mode of polarization is horizontal at the main transmitting site, then vertical polarization (i.e. the "other" mode) should be used at the fill-in stations associated with the main site.

6. The following texts, taken from the Final Acts of the Regional Administrative Conference for the Planning of VHF Sound Broadcasting (Region 1 and part of Region 3) Geneva, 1984 (item 3.8.8 of Annex 2) and from the Report to the Second Session of the Regional Administrative Conference for FM Sound Broadcasting in the VHF Band (Region 1 and certain countries concerned in Region 3), Geneva, 1982 (items 3.6.3 and 3.6.3.1 of Chapter 3), may be of use in our diliberations:

"3.8.3 ***Polarization***

Administrations were free to choose the polarization to be used in their countries[1].

Polarization discrimination was not taken into account in the planning procedure, except in specific cases with the agreement of affected administrations. In such cases, a value of 10 dB was used for orthogonal polarization discrimination."

"3.6.3 Polarization

Administrations shall be free to choose which polarizations are to be used in their countries.

3.6.3.1 Polarization discrimination

Polarization discrimination shall not be taken into account in the planning procedure except in specific cases with the agreement of affected administrations. In such cases a value of 10 dB for orthogonal polarization discrimination may be used."

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WORKING GROUP 5-B

NOTE BY THE CHAIRMAN OF WORKING GROUP 5-B

In order to facilitate the work of Working Group 5-B, and taking account of the experience acquired at recent planning conferences, the following list of essential characteristics of transmitting stations to be provided by administrations when they submit their requirements to the IFRB is proposed to the Working Group:

1. Administration's serial number
2. Desired frequency/picture (MHz)
3. Offset
4. Desired frequency/sound (MHz)
5. Offset
6. Symbol designating the country
7. Name of the transmitting station
8. Symbol designating the geographical area in which the station is located (see Table 1 of the Preface to the International Frequency List)
9. Geographical coordinates of the transmitting antenna site in degrees and minutes
10. Height of the transmitting antenna site above sea level (m)
11. Height of the antenna above ground level (m)
12. Effective radiated power, picture (dBW) [H]
13. Effective radiated power, picture (dBW) [V]

[14. Total power ratio (picture/sound)]

15. Maximum effective antenna height (m)
16. Maximum effective antenna height in different azimuths (every 30°)
17. Effective radiated power of the horizontal component in the vertical plane (dBW) in different azimuths, every [...°]
18. Effective radiated power (dBW) of the vertical component in the horizontal plane in different azimuths, every [...°]
19. Colour system
20. TV system

M. DERRAGUI
Chairman of Working Group 5-B

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RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

Corrigendum 1 to
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26 September 1986
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WORKING GROUP 5-A

PLANNING METHOD

A) Replace paragraph 1 ii) by the following:

ii) communicate to the IFRB the requirements so identified together with existing low power stations within the coordination distance;.

B) Replace paragraph 1 iii) by the following:

iii) preparation of a draft plan as indicated in paragraph ...

C) Delete paragraph 1 iv).

D) Add the following paragraph 4:

The fourth solution would consist in using the lattice GE84, subdividing into three each side of the rhombus formed by the rearrangement of four adjacent rhombuses. The number of rhombuses would thus be multipled by 9/4, corresponding to a separation distance of 320 km. This distance is comparable to that proposed in Document 5.

E) Add the following at the end of paragraph 6:

Figure 4 shows the rhombic lattice used for the preparation of the Geneva 1984 Plan. Each number represents an apex number used for reference purposes during planning. Figure 5 shows one of the possible channel distribution using a linear distribution of 49 channels.

J.M.B. SEKETE
Chairman of Working Group 5-A

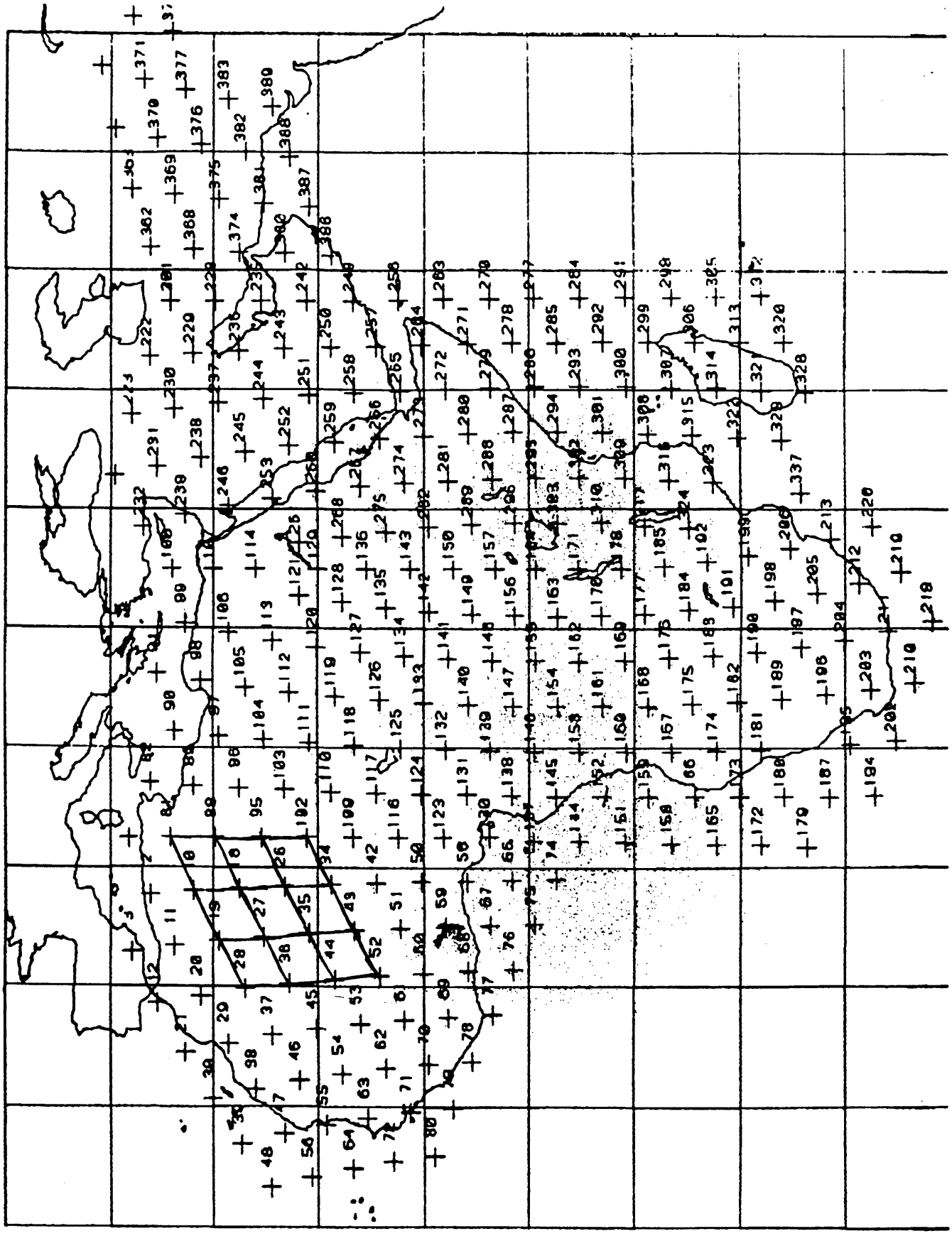

FIGURE 4

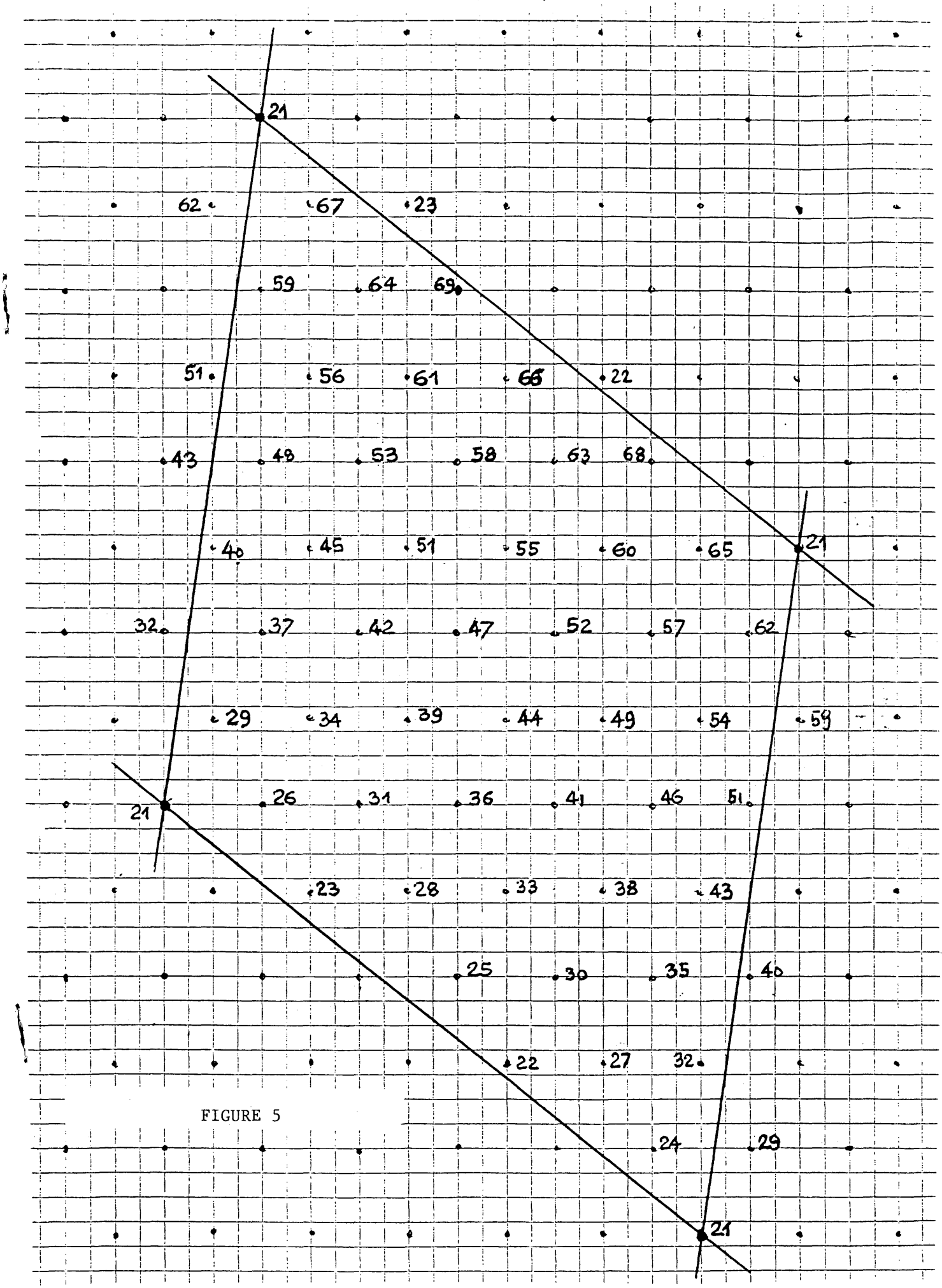
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FIGURE 5

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WORKING GROUP 5-A

PLANNING METHOD

1. Planning will be a complex procedure involving a number of steps. Among these the following four steps are essential:

i) the use by the administrations of a lattice to select appropriate frequencies for assignment to given stations; this lattice(s) shall be prepared by the IFRB;

ii) communication to the IFRB of the requirements as identified;

iii) preparation of a draft plan excluding low power assignments;

iv) the inclusion of low-power stations in, and the refinement of, the draft plan;

v) Note - The Group should consider any further steps in the planning, such as, a second computer run after adjustment of requirements by administrations.

2. After establishment of the plan, a full evaluation of the interference and protection conditions may be considered necessary by the Second Session in order to provide reference values to be used for subsequent modifications and/or additions to the plan.

3. In the case of a planned band 470 - 862 MHz and if an 8 MHz channel separation is adopted, it will result in a total of 49 channels. The First Session has to decide on the number of channels per site that shall be used for planning. Studies are required to evaluate for each band the number of channels per site (number of programs) that can be achieved. It is not possible to carry out these studies in due time. It appears from Document 5 that it would be possible to assign 4 channels per site. The Group has to consider:

- either to adopt a 4 channel per site approach with the understanding that in the absence of the precise evaluation of the capacity of the band this may lead to unknown difficulties;

- or to adopt a 3 channel per site approach which would avoid any potential difficulty and permit more flexibility in the modifications to the plan and the use of the band by other services.

4. In order to permit any easy understanding of the regular lattice planning the map in Figure 1 is extracted from the Geneva, 1963 Agreement. In this map, the side of a rhombic is equal to or greater than the co-channel separation required to obtain the agreed protection ratio. It is not practically possible to draw this map during this session. It has necessarily to be done by the IFRB. There are three possible solutions.

- The first would consist in drawing a lattice having indicated to the IFRB the starting points, the orientation and the size of the rhombics. Such a task would require a significant effort. The

proposal ALG/20/16 favours the use of the rhombic origin that was adopted in the Geneva, 1984 Plan.

- The second would consist of using the rhombic lattice that was prepared for the Geneva, 1984 Conference and consisting in a separation distance of 480 km which will permit a greater protection but may be considered an inefficient planning system.

- The third would consist in using the same rhombic lattice and subdivide each side of the rhombics by 2, thus multiplying the number of rhombic by 4 corresponding to a separation distance of 240 km.

5. Let us consider a set of rhombics from the rhombic lattice as indicated in Figure 2. A method of obtaining a better use of the spectrum consists in assigning to a group of channels (for example those of the rhombic x), carriers which differ from the corresponding carriers of another rhombic (for example rhombic ...) by a fraction of the line-frequency. The Group has to decide if the offset is to be used, and if so, request Committee 4 to consider the offset to be used.

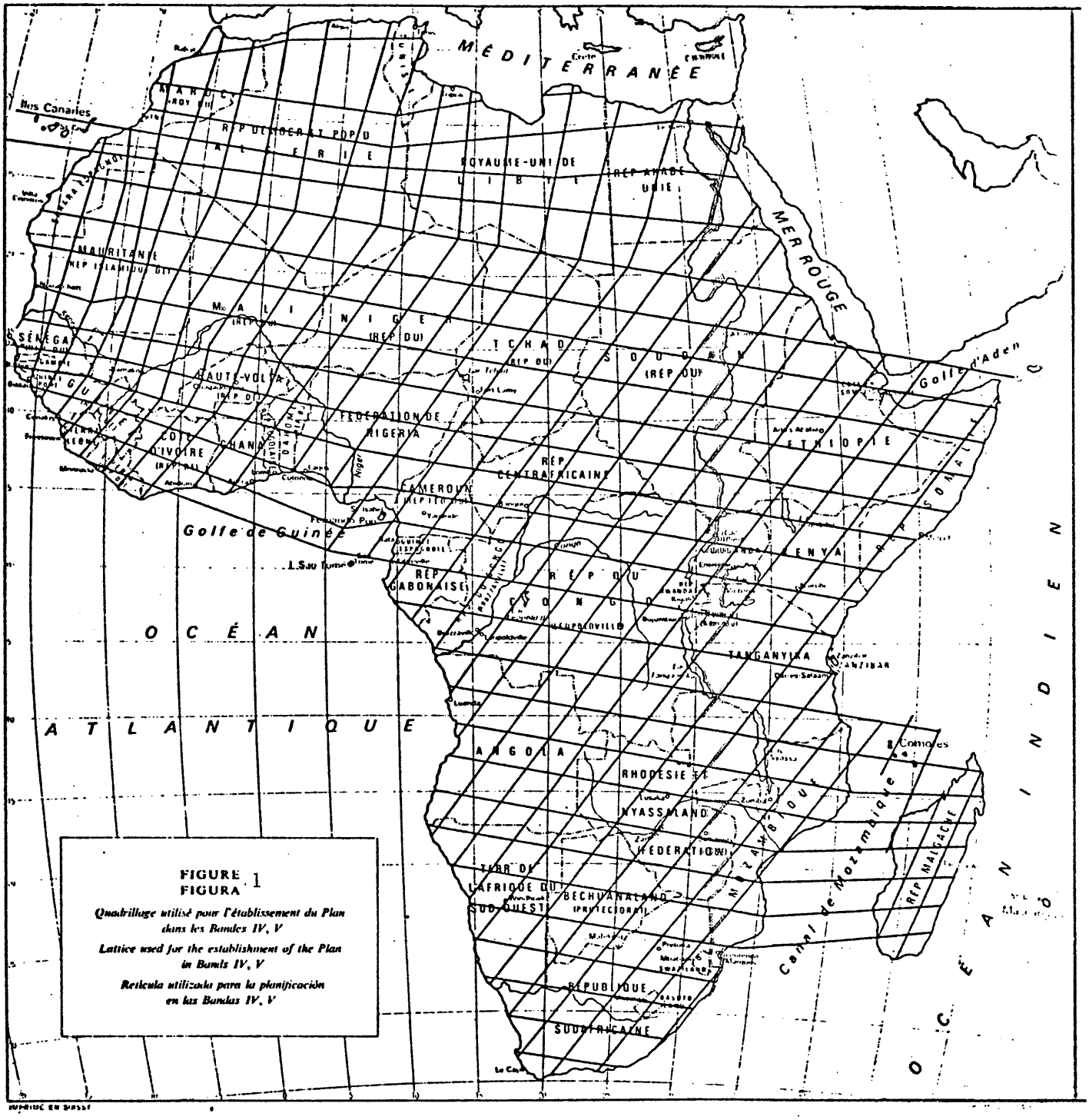

FIGURE 1
FIGURA

Quadrillage utilisé pour l'établissement du Plan dans les Bandes IV, V

Lattice used for the establishment of the Plan in Bands IV, V

Retícula utilizada para la planificación en las Bandas IV, V

FIGURE 1

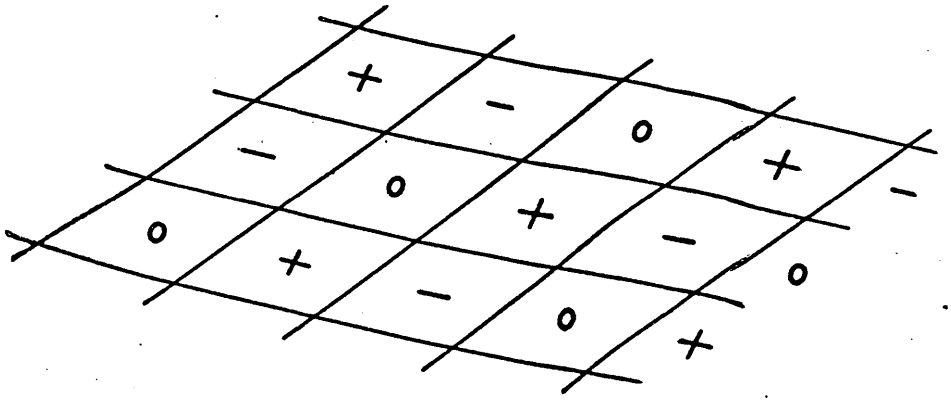

FIGURE 2

6. Let us now consider one rhombic from the lattice (Figure 3). The channels available for planning are distributed in a regular way within the rhombic in lattice points. In each lattice point we may have one channel or a group of channels. For example, with a total of 48 channels and a distribution of 4 channels per point, the number of lattice points will be 12. In the case of 49 channels, the number of channels per site being 4, each rhombic should have 49 lattice points (one channel per point). This last case shall be used for planning. This distribution appears to be feasible according to CCIR Report 944. However, a more detailed study is required in order to check constraints relating to image frequency, local oscillator, etc... These potential difficulties may lead to adopt a different distribution. For this reason it is suggested to give the IFRB the flexibility to select the most appropriate lattice point distribution.

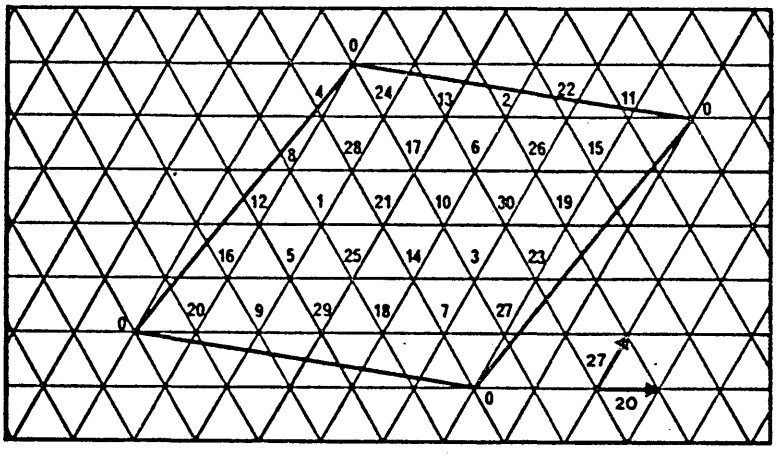

FIGURE 3 - *Example of an optimum regular lattice for 31 channels*

In conclusion, in order to permit the IFRB to apply the planning method described above, decisions on the following items are required:

- the lattice to be used;
- the number of channels per [site] [lattice point].

J.M.B. SEKETE
Chairman of Working Group 5-A

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INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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WORKING GROUP 4-A

Note from the Chairman of Working Group 4-A

DRAFT CHAPTER 2 - PROPAGATION

2.2 Propagation curves for other services

2.2.1 Compatibiilty with other services in the shared bands

In order to study the problems of compatibility between the broadcasting service and the mobile services and the fixed service in the bands shared by these services, field strengths are determined using the methods specified below.

To calculate unwanted broadcasting service signals, field strengths are derived from the curves described in Section 2.1.4, taking account as appropriate of the height gain values given in Section 1 of Annex 2.E and the variations as a function of percentages of locations given in Annex 2.C.

2.2.2 Mobile and radionavigation services

In the case of the land mobile service, the interfering field strength values are derived from Annex 2.E, using Figures 2.E.1 and 2.E.2 for urban areas, and Figures 2.E.3 to 2.E.5 for rural areas. The height gain values to be used are also given in the same Annex.

The propagation curves for the aeronautical mobile and radionavigation services are given in Figure 2.E.6 of Annex 2.E.

2.2.3 Fixed service

To predict the propagation of interfering signals from a station in the fixed service operating at frequencies above 500 MHz, use is made of the methods described in CCIR Report 569. For frequencies below 500 MHz, use is made of the appropriate curves for the broadcasting service described in Section 2.1.4.

C.T. NDIONGUE
Chairman of Working Group 4-A

ANNEX 2.E

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

1. Height gain data for the calculation of unwanted broadcasting service signals

a) VHF, Bands I and III

The following reduction in the median field-strength values may be expected by changing the receiving antenna height from 10 m to 3 m above ground: in Band I, 9 dB in hilly or flat terrain for both urban and rural areas; in Band III, 7 dB for flat terrain in rural areas and 11 dB for urban or hilly terrain. These values apply for distances up to 50 km. For distances in excess of 100 km the values should be halved, with linear interpolation of the values in decibels for intermediate distances.

b) UHF, Bands IV and V

The following reduction in the median field-strength values for Bands IV and V may be expected by changing the receiver antenna height from 10 m to 3 m above ground. In rural areas, the median value may be taken as 6 dB, in suburban areas as 7 dB, and in urban areas as 14 dB. These values apply for distances up to 50 km. For distances in excess of 100 km the values should be halved, with linear interpolation of the values in decibels for intermediate distances.

2. Height gain data for the calculation of unwanted mobile service signals

Table I indicates the increase in the median field strength that may be expected by changing the receiver antenna height from 3 m to 10 m.

TABLE I - Height gain factors, 3 m to 10 m

Zone	Band I	Band III	Bands IV, V
Rural (dB)	9	7	6
Urban (dB)	9	11	14

Figures 2.D.1 and 2.D.2 give propagation curves for UHF for a mobile antenna height of 1.5 m in an urban environment. The increase in the median field strength that may be expected by changing the antenna height from 1.5 m to 3 m may be taken as 3 dB in an urban environment.

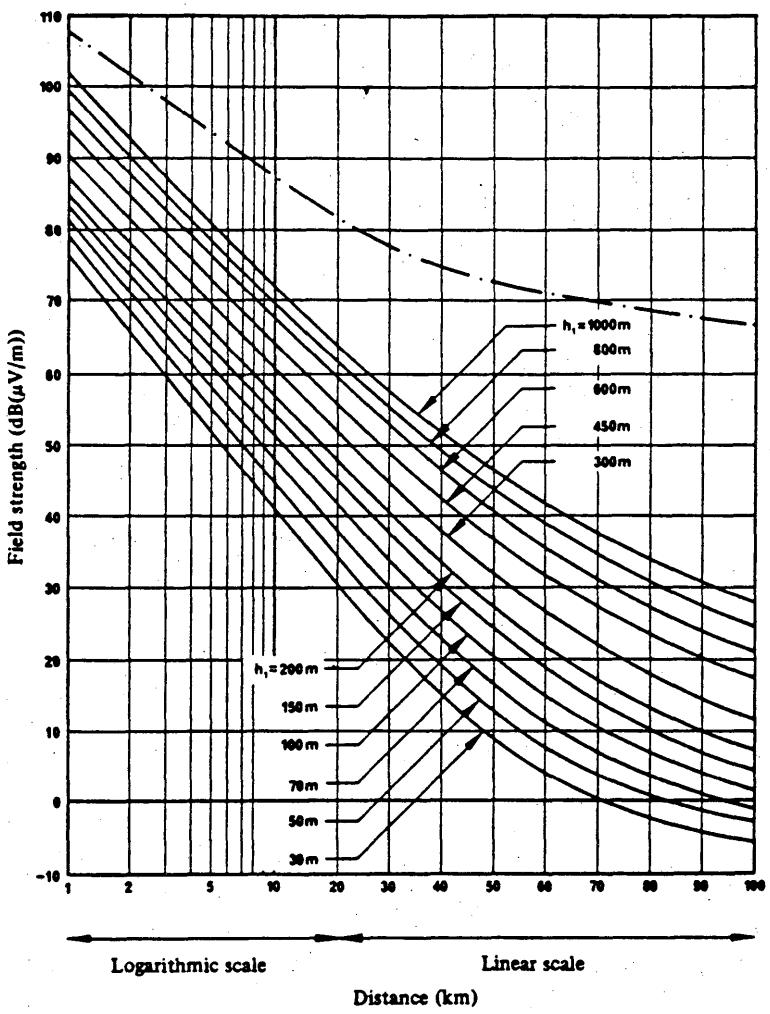

FIGURE 2.E.1 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Band IV, urban area, 50% of the time; 50% of the locations;
h_2 = 1.5 m

-.-.-.-.-.-.- Free space

Propagation curves for the land mobile service

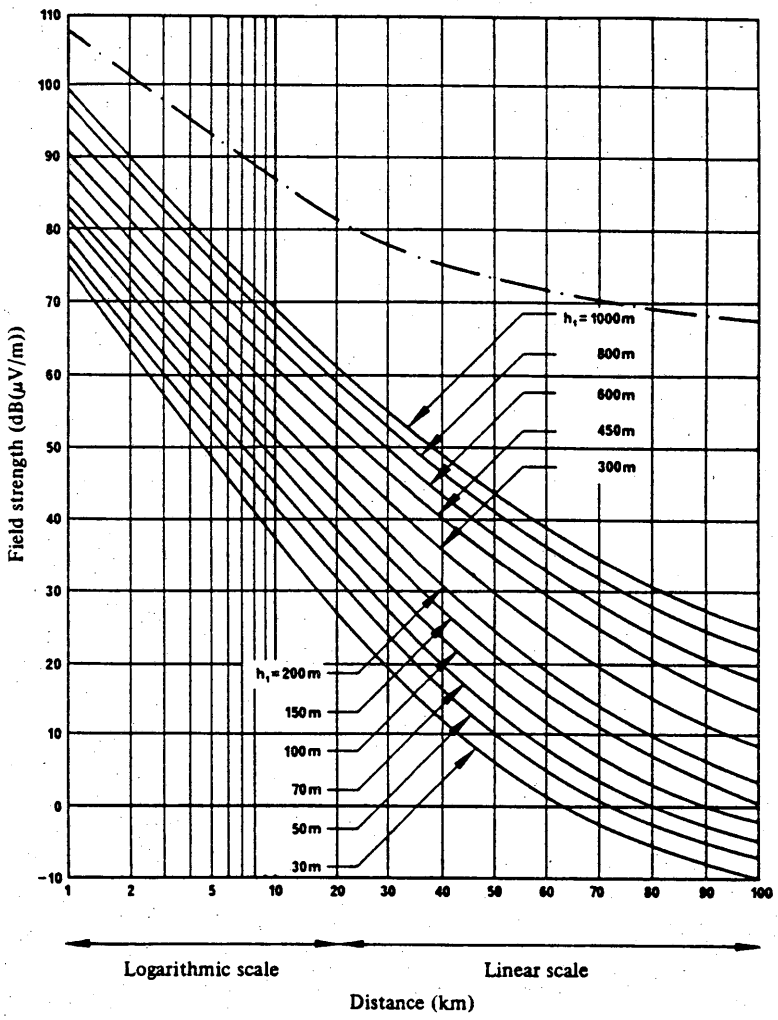

FIGURE 2.E.2 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Band V, urban area 50% of the time; 50% of the locations;
h_2 = 1.5 m

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Propagation curves for the land mobile service

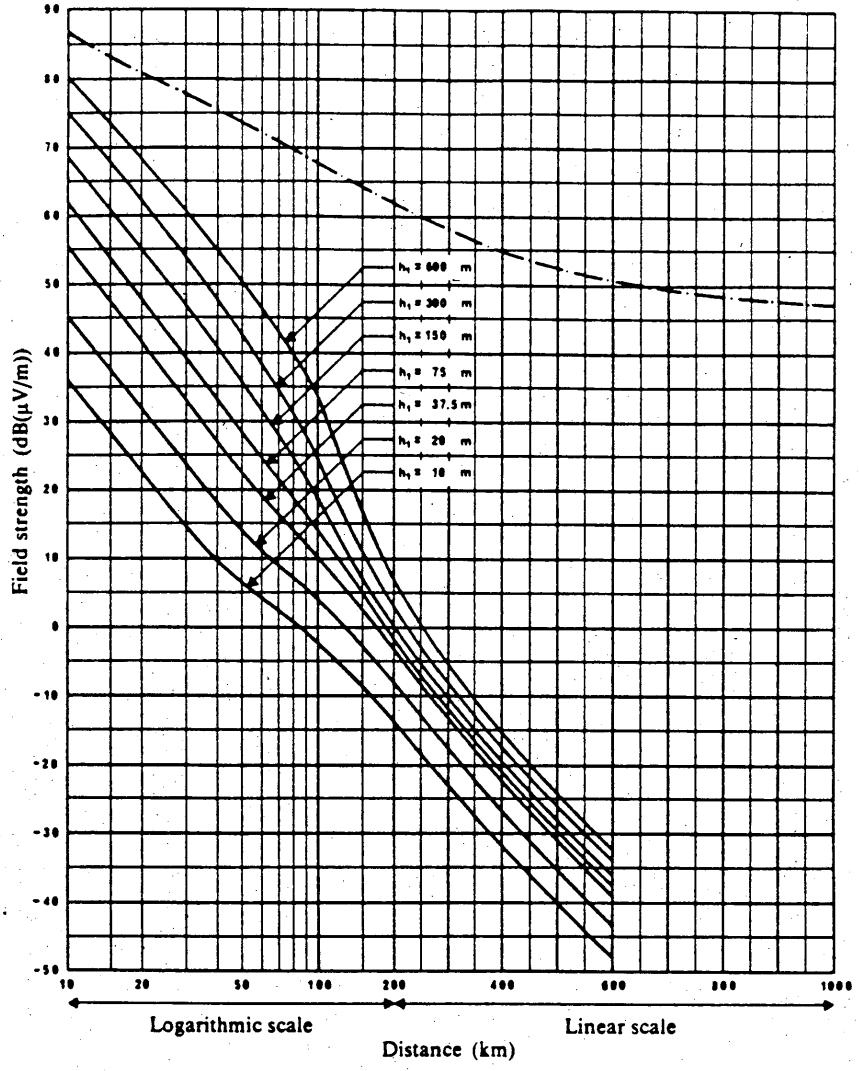


FIGURE 2.E.3 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Bands I and III, land, rural, 50% of the time; 50% of the locations; h_2 = 3m

-.-.-.-.-.-.- Free space

Propagation curves for the land mobile service

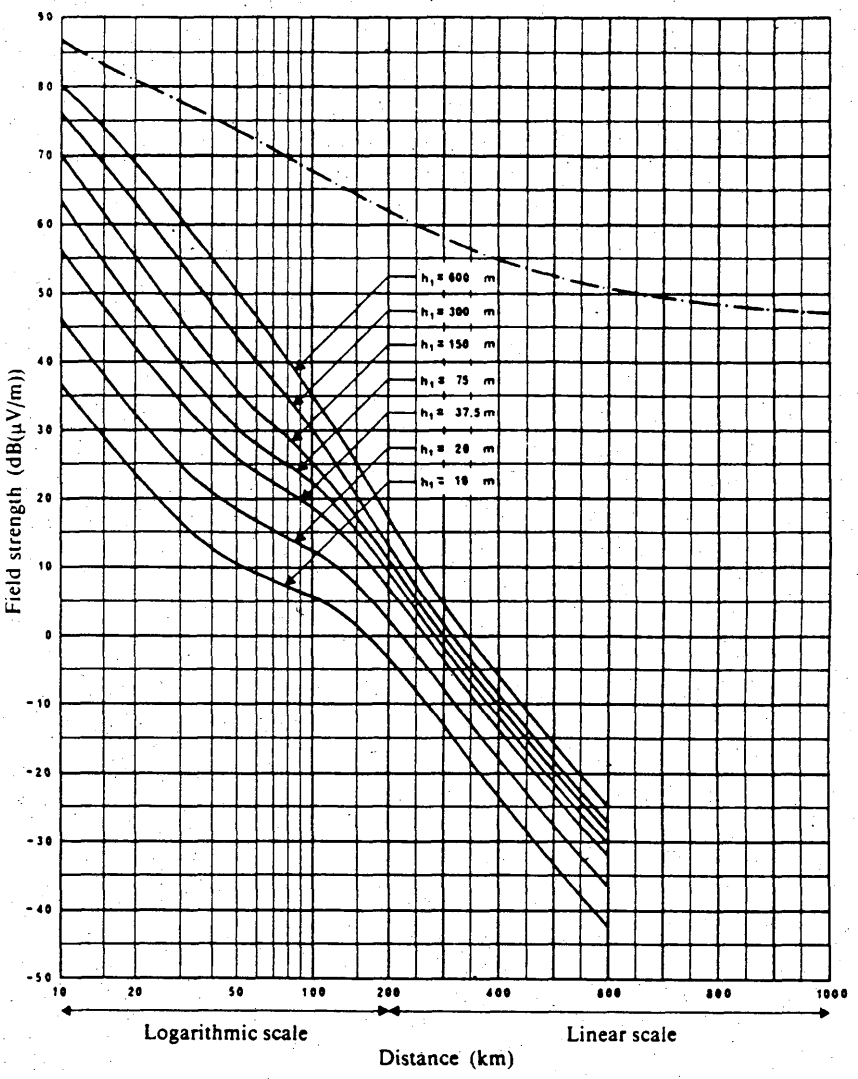


FIGURE 2.E.4 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Bands I and III, land, rural, 10% of the time; 50% of the locations; h_2 = 3 m

-.-.-.-.-.-.- Free space

Propagation curves for the land mobile service

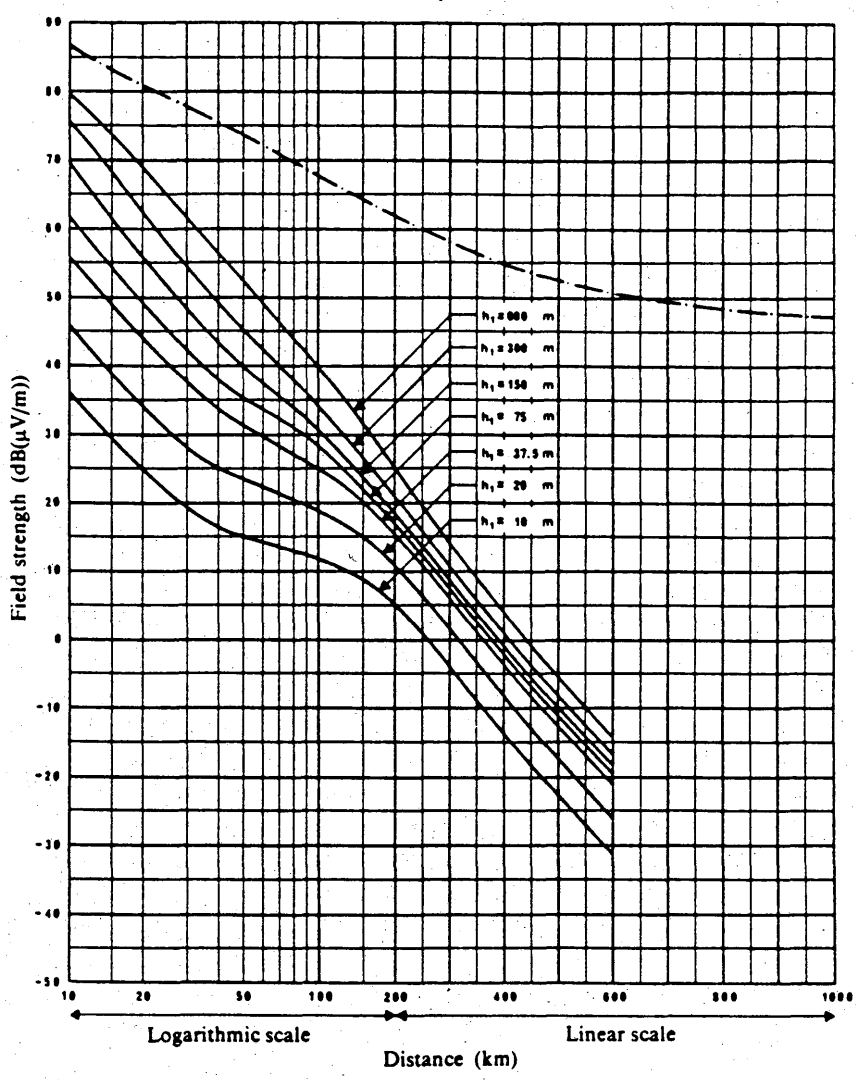
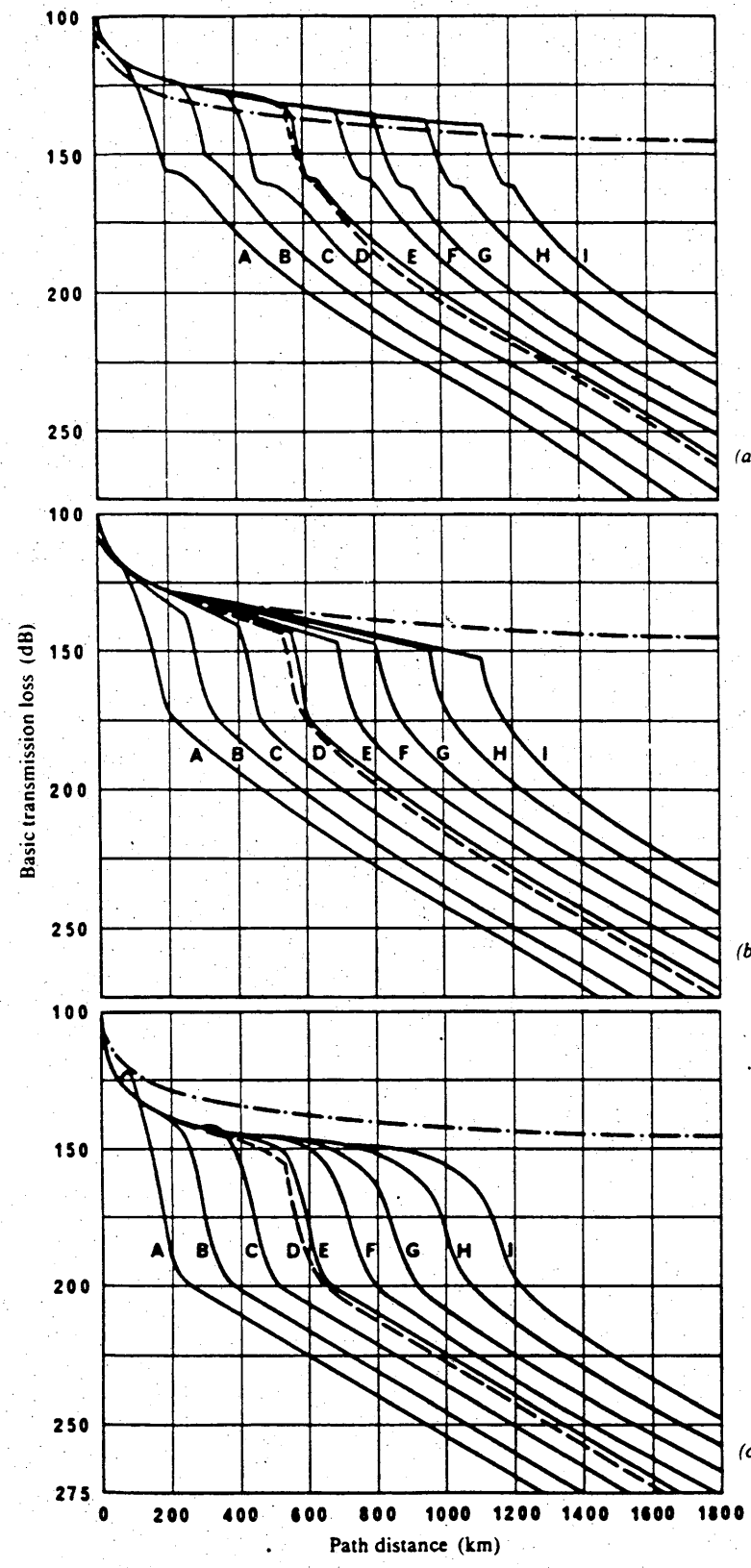


FIGURE 2.E.5 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Bands I and III, land, rural, 1% of the time; 50% of the locations; h_2 = 3 m

-.-.-.-.-.-.- Free space

Propagation curves for the land mobile service



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.E.6 - Basic transmission loss for Band III for 5%, 50% and 95% of the time

-.-.-.-.-.-.- Free space

Propagation curves for determining compatibility with the aeronautical services

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RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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26 September 1986
Original : English

WORKING GROUP 4-B

Note by the Chairman of Ad Hoc Working Group 4-B-1

DRAFT RESOLUTION [COM4/1]

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring countries (First Session, Nairobi, 1986)

considering

a) that transmissions using circular polarization are already in use and are being implemented increasingly in some countries as a means of improving television reception, particularly for portable television receivers and in areas subject to multipath propagation;

b) that the technique is well established in some countries for VHF sound broadcasting as a means of improving reception on portable receivers, including those housed in vehicles, by reducing multipath effects (see CCIR Report 464);

c) that for the same effective radiated power for horizontal and vertical components the interference potential of circularly polarized transmission is expected to be no greater than that of linearly polarized transmissions, either vertical or horizontal, and thus no additional account of circular polarization can be taken into account in planning;

d) that further technical information is needed on the advantages and disadvantages of using circular polarization.

resolves

1. that the Plan to be prepared by AFBC based on the emission and propagation of linearly polarized waves need take no special account of the use of circular polarization;

2. that administrations in implementing an assignment in the Plan may use circular polarization at their own discretion, subject to no increase of interference to assignments of other countries included in the Plan.

requests the CCIR

1. to study the technical characteristics, performance in various conditions, advantages and disadvantages if any, of the use of circularly polarized emission for television broadcasting, including any relevant interference protection or discrimination factors. As far as possible these studies should be carried out in the regular work programme of the CCIR, without incurring additional expenses to the ITU.

2. to report the results of these studies to the second session of the AFBC.

F.L. LETELE
Chairman of ad hoc Working Group 4-B-1

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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Corrigendum 1 to
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30 September 1986
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WORKING GROUP 4B

Note by the Chairman of Working Group 4B

1. Modify item 3.1.1 as follows:

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 band IV/V.

2. Modify item 3.1.2.1 as follows:

3.1.2.1 Channel numbering in band I (47 - 68 MHz)

In the 7 MHz channel spacing scheme the frequency band 47 - 68 MHz is divided into three channels each 7 MHz wide numbered 1A, 2A and 3A in accordance with the following table. In the 8 MHz channel spacing scheme the frequency band 47 - 68 MHz is divided into two channels each 8 MHz wide numbered 1B and 2B in accordance with the following table:

Channel number	Channel limits (MHz)	Nominal vision carrier frequency (MHz)
1A	47 - 54	48.25
2A	54 - 61	55.25
3A	61 - 68	62.25
1B	47 - 55	48.25
2B	55 - 63	56.25

3. Modify item 3.1.2.2 as follows:

3.1.2.2 Channel numbering in band III (174 - 230 MHz)

In the 7 MHz channel spacing scheme the frequency band 174 - 230 MHz is divided into eight channels each 7 MHz wide numbered from 4A to 11A in accordance with the following table. In the 8 MHz channel spacing scheme the frequency band 174 - 230 MHz is divided into seven channels each 8 MHz wide numbered from 3B to 9B in accordance with the following table:

Channel number	Channel limits (MHz)	Nominal vision carrier frequency (MHz)
4A	174 - 181	175.25
5A	181 - 188	182.25
6A	188 - 195	189.25
7A	195 - 202	196.25
8A	202 - 209	203.25
9A	209 - 216	210.25
10A	216 - 223	217.25
11A	223 - 230	224.25
3B	174 - 182	175.25
4B	182 - 190	183.25
5B	190 - 198	191.25
6B	198 - 206	199.25
7B	206 - 214	207.25
8B	214 - 222	215.25
9B	222 - 230	223.25

4. Insert in item 3.2, after Figure 3.1, the following text:

Some administrations or broadcasting organizations might wish to consider the provision of a television service with two or more associated sound signals or other additional broadcasting services. Such systems should meet the following requirements:

- compatibility with single sound systems;
- no increase in the bandwidth of a television channel;
- at least the same coverage area for the additional sound channel as that of the picture channel;
- should not cause more interference to the standard systems operated by other neighbouring administrations than indicated by the relevant protection ratios.

5. Modify item 3.6.1 as follows:

3.6.1 Transmitting antennas

Administrations shall be free to choose which polarizations are to be used in their countries.* Linear polarization, i.e. horizontal or vertical, is the mode of polarization to be used, in general, in bands I, III and IV/V. Investigations as to the feasibility or desirability of using circular polarization may be recommended upon further deliberation (see Resolution COM4/1).

Insofar as polarization discrimination is concerned, it is considered to be a useful tool to reduce interference in individual cases, for example, in international coordination procedures.

Polarization discrimination shall not be taken into account in the planning procedure except in specific cases with the agreement of affected administrations. In such cases a value of 16 dB for orthogonal polarization discrimination may be used.

---

* For further information see CCIR Report 464.

Although each administration is free to choose the mode of polarization it uses, it was felt that the horizontal mode was to be preferred in general.

It was agreed that only one mode of polarization should be used for all TV transmissions emanating from any given transmitter site.

It was agreed that for fill-in stations the "other" mode of polarization should be used, e.g. if the mode of polarization is horizontal at the main transmitting site, then vertical polarization (i.e. the "other" mode) should be used at the fill-in stations associated with the main site.

The radiation pattern of transmitting antennas should be taken into account in planning.

The maximum e.r.p and, in the case of directional antennas, the attenuation (dB) with respect to the maximum value of the effective radiated power shall be specified at [^{o}] intervals in a clockwise direction starting at true north.

[In the case of mixed transmissions the effective radiated powers and radiation patterns of the horizontally and vertically polarized components are to be specified separately.]

6. Delete items 3.6.3 and 3.6.3.1.

S.M. CHALLO
Chairman of Working Group 4B

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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WORKING GROUP 4-B

Note by the Chairman of Working Group 4-B

The following draft has been made on the basis of decisions and discussions taken by the Working Group 4-B.

CHAPTER 1 - DEFINITIONS

1.3 Minimum usable field strength*

Minimum value of the field strength necessary to guarantee satisfactory service quality (approximately grade 3 under CCIR Recommendation 500-3), 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 (approximately grade 3 under CCIR Recommendation 500-3), for at least 99% of the time, in the presence of natural and man-made noise and in the presence of interference from other transmitters.

---

* The term "minimum field strength to be protected" should not be used to refer to "minimum usable field strength".

CHAPTER 3 - TECHNICAL STANDARDS AND TRANSMISSION CHARACTERISTICS

3.1 Optimum channel spacings, channel distribution

3.1.1 Channel spacing

A uniform channel spacing of 8 MHz shall be used in principle for bands [I, III,] and IV/V.

3.1.2 Channel distribution

In each channel the nominal vision carrier frequency is situated at 1.25 Mc/s 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)

The frequency band 47 - 68 MHz is divided into 2 channels each 8 MHz wide numbered 1 and 2 in accordance with the following table:

Channel	Band limits	Nominal vision carrier frequency
1	47 - 55	48.25
2	55 - 63	56.25

3.1.2.2 Channel numbering in band III (174 - 230 MHz)

The frequency band 174 - 230 MHz is divided into 7 channels each 8 MHz wide numbered from 3 to 9 in accordance with the following table:

Channel	Band limits	Nominal vision carrier frequency
3	174 - 182	175.25
4	182 - 190	183.25
5	190 - 198	191.25
6	198 - 206	199.25
7	206 - 214	207.25
8	214 - 222	215.25
9	222 - 230	223.25

3.1.2.3 Channel numbering in band IV (Channels 21-34) and in band V (Channel 35)

The frequency band 470 to 960 Mc/s is divided into [ ] channels each 8 Mc/s wide numbered from 21 to [ ] in accordance with the following table:

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

3.2 Modulation standards, emission bandwidth

Planning shall be based on the transmission standards contained in Table 3.X.

TABLE 3.X

Characteristics of the radiated signals (monochrome and colour)

Item	Characteristics		B,G	H	I	K1
1	Frequency spacing (see Fig. 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 at 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 and sound [1]		10/1	10/1	10/1	10/1
13	Line frequency f_H and tolerance when operated non-synchronously (Hz) (8) (9)		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

[1] Stations already existing which have a ratio other than 10/1 will be protected in planning.

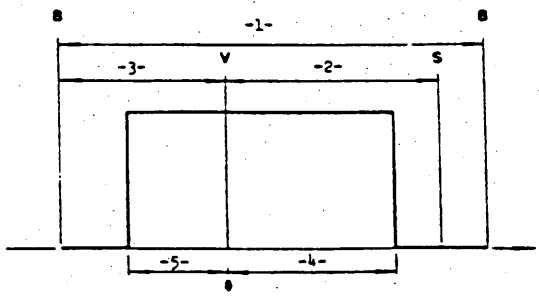


FIGURE 3.1

Significance of items 1 to 5 of Table 3.X

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

3.3 Protection ratios

Planning is to be carried out using protection ratios defined for tropospheric interference with transmissions using [/12] line non-precision offset. Information concerning the relevant values as well as additional information which may be of use for international negotiations is given in the following sections. Two (or more) sound channels and additional broadcasting services can be implemented as long as no contraint to planning is thereby introduced.

3.3.1 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. 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.

Non-controlled condition (carriers separated by less than 1 000 Hz)

Protection ratio for tropospheric interference: 45 dB

Carriers separated by multiples of twelfth 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.III - Protection ratio between 625-line systems

Offset in $\frac{f_{line}}{12}$		0	1	2	3	4	5	6	7	8	9	10	11	12
Non-precision offset transmitter stability ±500 Hz	Tropospheric interference	45	44	40	34	30	28	27	28	30	34	40	44	45
	Continuous interference	52	51	48	44	40	36	33	36	40	44	48	51	52
	Limit of perceptibility(1)	61	60	57	54	50	45	42	45	50	54	57	60	61
Precision offset transmitter stability ±1 Hz	Tropospheric interference	32	34	30	26	22	22	24	22	22	26	30	34	38
	Continuous interference	36	38	34	30	27	27	30	27	27	30	34	38	42
	Limit of perceptibility(1)	42	44	40	36	36	39	42	39	36	36	40	44	48

(1) For information only.

(Value in the first column is only valid for the 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).

Figure 3.6 gives examples of protection ratio curves for the three most important offset positions (0/12, 4/12 and 6/12 f_{line}). The curves in each graph relate to tropospheric interference, continuous interference and the limit of perceptibility.

The white and black points indicate the positions for non-precision and precision offset respectively. The reference points for tropospheric and continuous interference are also indicated in Fig. 3.6.

When operating TV transmitter networks with synchronized as well as phase-locked carriers, the protection ratio values are slightly reduced.

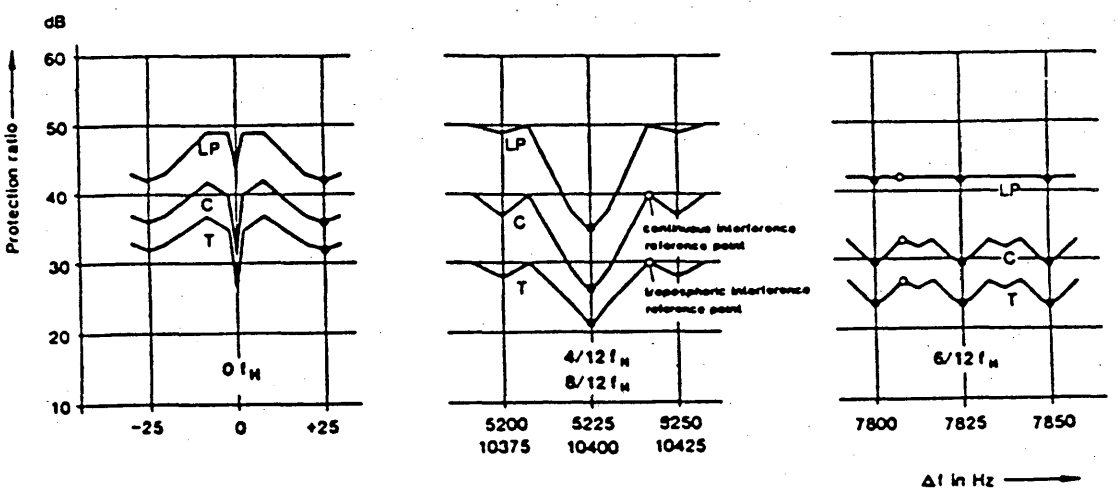


FIGURE 3.6 - Precise structure of the protection ratio curves for different offset positions

Δf: frequency difference between the wanted and the unwanted carrier

o: non-precision offset
●: precision offset

Curves T: tropospheric interference
C: continuous interference
LP: limit of perceptibility

3.3.2 Adjacent-channel interference

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

Adjacent-channel protection ratios cannot be determined directly from the overlapping channel protection ratio curves shown in Figures 3.7 and 3.8, because for certain systems the values may be affected by special measures in the receiver; e.g. sound traps.

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. However, some improvement in protection is achieved if the unwanted sound carrier and the wanted vision carrier are separated by an effective offset in the vicinity of an odd multiple of 1/2 line frequency. This is particularly noticeable during periods without sound modulation when the improvement can be as much as 10 dB; with modulation the improvement is only 2-3 dB.

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

VHF bands:

The figures below relate 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 7 dB. [10 dB]

Protection ratio: all systems: -6 dB [-3 dB]

UHF bands:

For the various 625-line systems for use in 8 MHz channels in the UHF bands, Table 3.IV gives the protection required by a signal of any system against a lower adjacent-channel signal of the same or any other standards, assuming a vision-to-sound power ratio of 7 dB for unwanted signals of standards G, H and I and 10 dB for standard K1. A correction must be made for different vision-to-sound power ratios. [10 dB]

TABLE 3.IV - Protection ratio from lower adjacent-channel interference (UHF bands)

Wanted signal \ Unwanted signal	Protection ratio (dB)			
	G	H	I	K1
G	-6	-6	-6	-9
H	-6	-6	-6	+13
I	-6	-6	-6	+13
K1	-6	-6	-6	-9

[

-9	-9	-9	-9
-9	-9	-9	+13
-9	-9	-9	+13
-9	-9	-9	-9

]

Upper adjacent-channel interference - VHF and UHF bands

Protection ratio: all systems: -12 dB

3.3.3 Image channel interference

The protection ratio required will depend on the intermediate frequency and image-channel rejection of the receiver, and on the type of unwanted signal falling in the image channel. It can be determined by subtracting the image rejection figure from the required protection ratio for overlapping channels. Table 3.V shows this situation for the UHF bands. The wanted vision channel can be affected by the unwanted vision carrier, by the unwanted sound carrier or by both.

Image channel rejection:

System I: 50 dB

All other systems: 40 dB

TABLE 3.V - Protection ratio - image channel interference - 625-line systems (UHF bands)

Unwanted signal / Wanted signal	Protection ratio (dB)			Image channel	Remarks
	G,H	I	K1		
G	+2	-1	-11	n + 9	Interference from sound carrier
H	+2	-1	-9	n + 9	
I	-10	-7	-10	n + 9	
K1	0	+4	+5	n + 9	
	+17	+17	+17	n + 10	Interference from vision carrier

The image-channel protection ratios in Table 3.V apply to tropospheric interference, and are defined in terms of wanted and unwanted vision carrier levels assuming a vision-to-sound power ratio of 7 dB for unwanted signals of standards G, H and I and 10 dB for standard K1. A correction must be made for different vision-to-sound ratios. For continuous interference the values should be increased by 10 dB. [10 dB]

3.3.4 Overlapping channel interference

All Figures and 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.

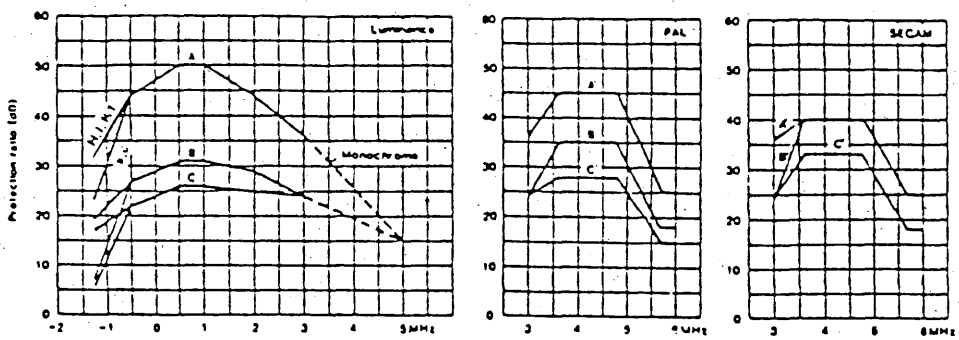
Corrections to be made for other types of potentially interfering signals are as given in Table 3.VI. When the interfering signal is a television signal, two calculations of protection ratio are necessary: one for the interfering vision carrier and one for the interfering TV sound carrier.

The protection ratios shown for unwanted frequency-modulated sound carrier do not apply to non-precision and precision offset conditions. Nevertheless, a reduction of 2 dB relative to the non-controlled condition is achieved for non-precision offsets between 3/12 and 9/12 of the line frequency.

TABLE 3.VI - Correction values for different wanted and unwanted signals

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

Figures 3.7 and 3.8 and Tables 3.VII and 3.VIII 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.

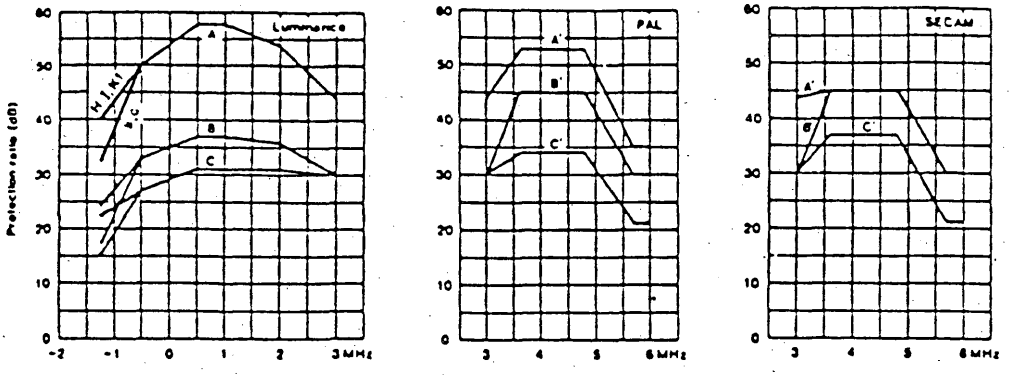


Offset (multiples of 1/12 line-frequency)		Curve	Frequency difference (MHz) (separation between wanted and unwanted carriers)											
			Luminance range								PAL ***		SECAM ***	
			-1.25	-1.25*	-0.5	0.0	0.5	1.0	2.0	3.0	3.6-4.8	5.7-6.0	3.6-4.8	5.7-6.0
0	NO	A	32	23	44	47	50	50	44	36	35	18	40	25
	PO		23	11	32	34	40	40	37	31	28	15	33	18
1	NO		31	20	43	46	49	49	42	34	39	20	40	25
	PO		23	11	33	36	39	39	36	31	31	16	33	18
2	NO		28	17	39	42	45	45	39	32	42	22	40	25
	PO		21	9	29	32	35	35	33	29	34	17	33	18
3	NO		25	13	34	36	39	39	35	29	45	25	40	25
	PO		19	7	25	28	31	31	29	26	35	18	33	18
4	NO		22	10	30	32	35	35	32	27	42	22	40	25
	PO	C	17	5	22	24	26	26	25	24	34	17	33	18
5	NO		20	8	28	30	32	32	30	25	39	20	40	25
	PO	C	17	5	22	24	26	26	25	24	31	16	33	18
6	NO	B	19	7	27	29	31	31	29	24	35	18	40	25
	PO		17	5	24	26	28	28	26	24	28	15	33	18
7	NO		20	8	28	30	32	32	30	25	35	18	40	25
	PO	C	17	5	22	24	26	26	25	24	28	15	33	18
8	NO		22	10	30	32	35	35	32	27	39	20	40	25
	PO	C	17	5	22	24	26	26	25	24	31	16	33	18
9	NO		25	13	34	36	39	39	35	29	42	22	40	25
	PO		19	7	25	28	31	31	29	26	34	17	33	18
10	NO		28	17	39	42	45	45	39	32	39	20	40	25
	PO		21	9	29	32	35	35	33	29	31	16	33	18
11	NO		31	20	43	46	49	49	42	34	35	18	40	25
	PO		23	11	33	36	39	39	35	31	28	15	33	18
12	NO	A	32	23	44	47	50	50	44	36	35	18	40	25
	PO		23	11	32	40	40	40	37	31	28	15	33	18
Protection ratio (dB)														

FIGURE 3.7 and TABLE 3.VII - 625-line systems - tropospheric interference

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

NO: non-precision offset
PO: precision offset



Offset (multiples of 1/12 line-frequency)		Curve	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	NO	A	40	32	50	54	58	58	54	44	45	30	45	30
	PO		30	22	39	40	44	44	42	36	34	21	37	21
1	NO		38	30	49	53	57	57	53	43	48	32	45	30
	PO		29	22	38	40	42	42	41	36	36	22	37	21
2	NO		34	27	46	50	55	55	51	41	51	33	45	30
	PO		27	20	34	36	38	38	37	34	39	24	37	21
3	NO		30	23	42	46	50	50	46	38	53	35	45	30
	PO		24	17	30	32	34	34	33	31	40	26	37	21
4	NO		28	21	38	42	45	45	42	35	51	33	45	30
	PO	C	22	15	27	29	31	31	31	30	39	24	37	21
5	NO		26	19	35	38	41	41	38	32	48	32	45	30
	PO	C	22	15	27	29	31	31	31	30	36	22	37	21
6	NO	B	24	17	33	35	37	37	36	30	45	30	45	30
	PO		23	16	29	31	33	33	32	30	34	21	37	21
7	NO		26	19	35	38	41	41	38	32	45	30	45	30
	PO	C	22	15	27	29	31	31	31	30	34	21	37	21
8	NO		28	21	38	42	45	45	42	35	48	32	45	30
	PO	C	22	15	27	29	31	31	31	30	36	22	37	21
9	NO		30	23	42	46	50	50	46	38	51	33	45	30
	PO		24	17	30	32	34	34	33	31	39	24	37	21
10	NO	-	34	27	46	50	55	55	51	41	48	32	45	30
	PO		27	20	34	36	38	38	37	34	36	22	37	21
11	NO		38	30	49	53	57	57	53	43	45	30	45	30
	PO		29	22	38	40	42	42	41	36	34	21	37	21
12	NO	A	40	32	50	54	58	58	54	44	45	30	45	30
	PO		30	22	39	44	44	44	42	36	34	21	37	21
Protection ratio (dB)														

FIGURE 3.8 and TABLE 3.VIII - 625-line systems - continuous interference

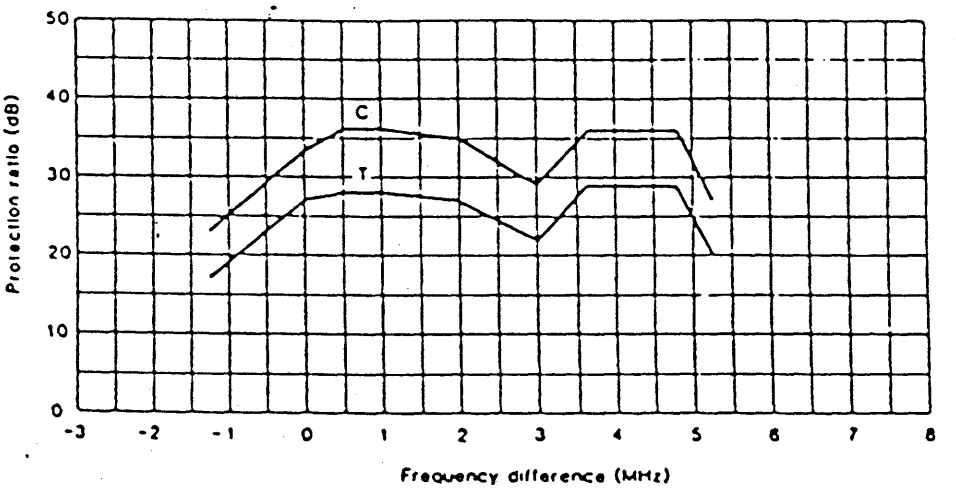
* H,I,K1 television systems
** B,G television systems
*** B,G television systems: the range is 5.3-6.0 MHz

NO: non-precision offset
PO: precision offset

The curves shown in Figs. 3.7 and 3.8 are examples that can be derived directly from the associated Tables. They illustrate the full range of protection ratio possibilities from the worst case of non-controlled condition (curve A and A') to the best achievable using either non-precision offset (curve B and B') or precision offset (curve C and C'). The curves A, B and C are related to the luminance range, the curves A', B' and C' to the chrominance range for the PAL and SECAM systems. For frequency differences below -1.25 MHz or above 6 MHz the protection ratio may be derived by linear extrapolation to the channel limit.

3.3.5 Television signal affected by data signals

The inclusion of digital data such as teletext in the field blanking interval has no effect on required protection ratios. However, full improvement resulting from non-precision or precision offset operation is not achievable when the unwanted signal carries a full-field data signal. In this case, Fig. 3.9 and Table 3.IX show minimum values for all offset and non-offset conditions. The curves in Fig. 3.9 apply to full-field data signals with pulse amplitude at 66% of the peak white-to-blanking level. The values should be increased linearly for higher modulation levels.



Frequency difference (MHz)	-1.25	0.0	0.5	1.0	2.0	3.0	3.6	4.8	5.25
(T) Tropospheric interference	17	27	28	28	27	22	29	29	20
(C) Continuous interference	23	33	36	36	35	29	36	36	27

FIGURE 3.9 and TABLE 3.IX - 625-line systems - B/PAL and G/PAL protection from full-field data signals

3.3.6 Protection ratio for sound signals

Protection ratios for the wanted sound signal are given in Table 3.X for tropospheric and continuous interference. The values are quoted to refer to the level of the wanted sound carrier. In the case of two-sound-carrier transmission each sound carrier must be separately considered. Multiplex modulated sound signals require higher protection.

TABLE 3.X - 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	AM	FM	AM
0	32	40	39	50
15	30	40	35	50
50	22	10	24	15
250	-6	7	-6	12

Note. - For unwanted vision carrier subtract 2 dB.
For unwanted amplitude-modulated sound carrier add 2 dB.

The weighted signal-to-noise ratio will be improved by approximately 8 dB if 5/3 line offset is used instead of 2/3 line offset.

3.3.7 Calculation of frequencies for precision offset

Frequencies for precision offset

Table 3.XI lists the possible frequencies for precision offset, in the vicinity of each twelfth of line frequency. For the luminance range, the frequencies shown in Table 3.XI 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_H (7 800 and 7 825 Hz) because at this point the spectral lines are symmetrical and thus of the sample 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 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.XI, one has to subtract integer multiples of 15 625 Hz. For computer calculations, formulas are given below for all precision offset frequency differences in the luminance and in the chrominance range, for 625-line systems.

TABLE 3.XI - Normalized precision offset between 0/12 and 12/12 of line frequency for all 625-line systems

Offset in multiples of $\frac{f_{line}}{12}$	Precision offset frequency (Hz)		
	Luminance range	Chrominance range	
		PAL	SECAM
0	25	5	0
1	1325	1305	1302
2	2625	2605	2604
3	3925	3905	3906
4	5225	5205	5208
5	6525	6505	6510
6	7800 or 7825	7810	7812
7	9100	9120	9115
8	10400	10420	10417
9	11700	11720	11719
10	13000	13020	13021
11	14300	14320	14323
12	15600	15630	15625

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: $f_p = m \times 15\,625 + 2n \times (25 + \frac{25}{624})$
with m, n, k integers

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

Precision offset techniques are usually introduced 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}, ±0 f_{line}, ±2/3 f_{line} of the line frequency, or in twelfth: 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.XII 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.

With a simple rule determination of precision offset frequencies for transmitter triplets is possible. All transmitter triplets which cannot be translated to the normalized cases of Table 3.XII contain one pair at least without precision offset.

TABLE 3.XII - 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	7800
2	0 - 0P - 6P	0	25	7825
3	0 - 1P - 6P	0	1325	7800
4	0 - 1P - 7P	0	1325	9100
5	0 - 2P - 6P	0	2625	7800
6	0 - 2P - 7P	0	2625	9100
7	0 - 2P - 8P	0	2625	10400
8	0 - 3P - 6P	0	3925	7800
9	0 - 3P - 7P	0	3925	9100
10	0 - 3P - 8P	0	3925	10400
11	0 - 3P - 9P	0	3925	11700
12	0 - 4P - 6P	0	5225	7800
13	0 - 4P - 7P	0	5225	9100
14	0 - 4P - 8P	0	5225	10400
15	0 - 4P - 9P	0	5225	11700
16	0 - 4P - 10P	0	5225	13000
17	0 - 5P - 6P	0	6525	7800
18	0 - 5P - 7P	0	6525	9100
19	0 - 5P - 8P	0	6525	10400
20	0 - 5P - 9P	0	6525	11700
21	0 - 5P - 10P	0	6525	13000
22	0 - 5P - 11P	0	6525	14300
23	0 - 6P - 6P	0	7800	7825
24	0 - 6P - 7P	0	7825	9100
25	0 - 6P - 8P	0	7825	10400
26	0 - 6P - 9P	0	7825	11700
27	0 - 6P - 10P	0	7825	13000
28	0 - 6P - 11P	0	7825	14300
29	0 - 6P - 12P	0	7800	15600
30	0 - 6P - 12P	0	7825	15600

Example

The aim of this calculation is the transformation of all three offset positions into the range between 0P and 12P (see Table 3.XII). Each single transmitter can be moved by multiples of line frequency, that means by multiples of 12/12 (see Step 2). Moving of any twelfths is allowed, when all transmitters 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 transmitter 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 2.XII:		0	2 625	10 400 Hz
Step 4				
Step 2 has to be compensated			+31 250	+15 625 Hz
	Result:	0	+33 875	+26 025 Hz
Step 5				
Step 1 has to be compensated		-23 400	-23 400	-23 400 Hz
	Result:	-23 400	+10 475	+2 625 Hz
equivalent to		18M	$8P^3$	2P

3.3.8 Calculation of nuisance field

To apply the protection-ratio curves it is necessary to determine whether, in the particular circumstances, the interference is to be regarded as steady or tropospheric*). A suitable criterion for this is provided by the concept of "nuisance field" which is the field strength of the interfering transmitter (at its pertinent e.r.p.) enlarged by the relevant protection ratio.

*) For further information see Recommendation 412-3 of the CCIR.

Thus, the nuisance field for steady interference is given by the formula

$$E_t = P + E(50,50) + A_s$$

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,

and where indices s and t indicate steady or tropospheric interference respectively.

The protection-ratio curve for steady interference is applicable when the resulting nuisance field is stronger than that resulting from tropospheric interference.

i.e. $E_s \geqslant E_t$
This means that A_s should be used in all cases when :
$E(50,50) + A_s \geqslant E(50,T) + A_t$.

3.4 Minimum wanted field strength values, field strength values to be protected

The planning shall be based on the following median values of the minimum usable field strength (measured 10 m above ground level):

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

3.5 Maximum radiated power

The planning shall be based on the following maximum power limits (ERP):

BAND	I	III	IV/V
max power (kW)	100	200	500

Presently existing stations, in accord with the Geneva 1963 African Plan, are exempt from this limitation. Other exemptions can be made with the agreement of the affected administrations.

It should be noted that according to RR 2666 powers in excess of those necessary to provide the required quality of national service should not be used.

3.6 Basic characteristics of transmitting and receiving antennas - polarization

3.6.1 Transmitting antennas

Planning is to be based on the emission and propagation of linearly polarized waves, either vertical or horizontally polarized.

[Planning is to be based on the emission and propagation of linearly polarized waves.]

The radiation pattern of transmitting antennas should be taken into account in planning.

The maximum ERP and, in the case of directional antennas, the attentuation (dB) with respect to the maximum value of the effective radiated power shall be specified at [°] intervals in a clockwise direction starting at true north.

[In the case of mixed transmissions the effective radiated powers and radiation patterns of the horizontally and vertically polarized components are to be specified separately.]

3.6.2 Receiving antennas

Planning shall be based on the use of a non-directional receiving antenna.

In the case that special interference problems are to be treated on an individual basis (i.e. bi- or multi-laterally) the discrimination that can be obtained by the use of directional receiving antennas is given in Figure 3.Z.

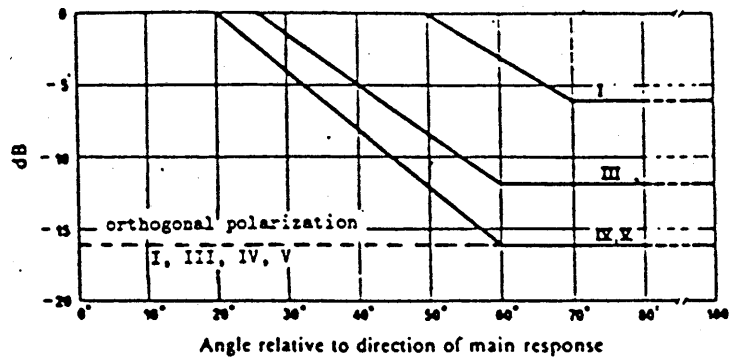


FIGURE 3.Z — Discrimination obtained by the use of directional receiving antennas in broadcasting

(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 will be obtained.

Note 2 : The curve in Figure 3.Z is valid for signals of vertical or horizontal polarization, when both the wanted and the unwanted signals have the same polarization.

3.6.3 Polarization

Administrations shall be free to choose which polarizations are to be used in their countries.*)

3.6.3.1 Polarization discrimination

Polarization discrimination shall not be taken into account in the planning procedure except in specific cases with the agreement of affected administrations. In such cases a value of 16 dB for orthogonal polarization discrimination may be used.

3.7 Receiver characteristics

Receiver characteristics (sensitivity and selectivity, etc.) are taken into account by the values of the minimum usable field strength, (see paragraph 3.4) and the radio frequency protection ratios (see paragraph 3.3).

S.M. CHALLO
Chairman of Working Group 4-B

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* For further information see CCIR Report 464.

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WORKING GROUP 4-B

Note by the Chairman of ad hoc Working Group 4-B-2

TECHNICAL CRITERIA FOR PLANNING: EMISSION BANDWIDTH

The ad hoc Working Group met to consider emissions bandwidth standard to be adopted.

Document 21 on this topic was discussed with particular reference to items E/21/12 and E/21/13.

Opinions expressed were that administrations could adopt an emission bandwidth i.e., standard consisted with their planning requirements and that some attention be made to the channel spacing in use since this may create technical problems with regards to ratios to be adopted.

The ad hoc Working Group noted, however, that existing installations should be recognized and accommodated in future planning.

K. HEROLD
Chairman of ad hoc Working Group 4-B-2

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WORKING GROUP 4-A

Note by the Chairman of Working Group 4-A

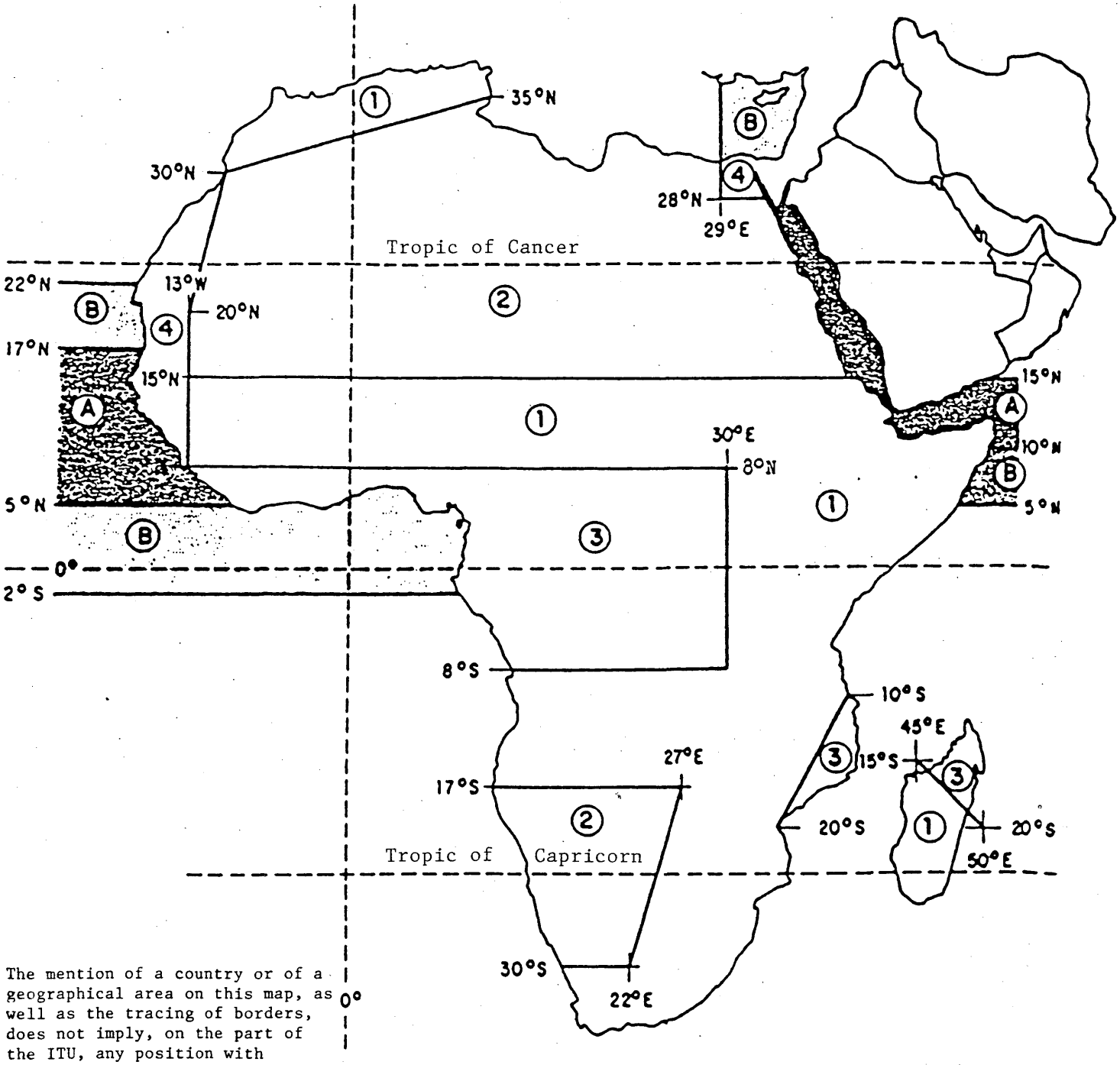
GEOGRAPHIC DIVISION OF THE PLANNING AREA AND SURROUNDING SEAS INTO PROPAGATION ZONES

Section 2.1.2 of Chapter 2 "Propagation in the VHF/UHF bands" (Document 45) adopted by Committee 4 refers to Figure 2.33, which is intended to portray the various propagation zones in the planning area. The map annexed hereto is taken from Document 3 by the CCIR (Technical bases) and has been extended to cover the planning area. Working Group 4-A will have to identify the additional propagation zone(s), on the basis of the results of ad hoc Working Group 4-A.

C.T. NDIONGUE
Chairman of Working Group 4-A

Annex: 1

ANNEX



The mention of a country or of a geographical area on this map, as well as the tracing of borders, does not imply, on the part of the ITU, any position with respect to the political status of such a country or geographical area, or official recognition of these borders.

FIGURE 2.33

Geographic division of the planning area and surrounding seas into propagation zones

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WORKING GROUP 4-A

Note by the Chairman of Working Group 4-A

DRAFT RECOMMENDATION [COM4/C]

Geographic division of the planning area into propagation zones

The Regional Administrative Radio Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (first session, Nairobi, 1986),

considering

a) that, in its Resolution No. 509, the World Administrative Radio Conference (Geneva, 1979) requested the CCIR to carry out the necessary technical studies for the present Conference;

b) that, in its Resolution No. 914 setting out the agenda of the present Conference, the Administrative Council invited the CCIR to prepare a report on the necessary technical bases;

c) that, in response to those requests, the CCIR drew up a report on the technical bases including, inter alia, a chapter on propagation containing a map showing a geographic division of Africa and the surrounding seas into propagation zones;

d) that the present Conference decided to extend this map to cover the whole planning area,

noting

that the division of the planning area into propagation zones is not always based on precise scientific data,

recommends that the administrations

collaborate with the CCIR, as a matter of urgency and to the extent of their possibilities, by submitting contributions on the above subject, bearing in mind the CCIR's work schedule,

requests the CCIR

1. to pursue its studies for the geographic division of the planning area into propagation zones in close collaboration with the administrations concerned;

2. to prepare, on the basis of those studies, a new report on the subject for the second session of the Conference;

3. to carry out those studies as part of the regular work of its Study Groups,

requests the second session of the Conference

to re-examine Figure 2.33 of Chapter 2 of the Report to the second session in the light of the data supplied by the administrations and the new CCIR report and to consider modifying the separations proposed in that figure, where necessary.

C.T. NDIONGUE
Chairman of Working Group 4-A

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INTERNATIONAL TELECOMMUNICATION UNION
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WORKING GROUP 4-C

Note by the Chairman of Working Group 4-C

DRAFT RECOMMENDATION [COM4/B]

Continuation of Studies on Sharing Criteria for Services Using the Band 790 - 862 MHz in the Planning Area

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986),

considering

a) that the World Administrative Radio Conference (Geneva, 1979), in its Resolution 509, invited the CCIR to carry out the necessary technical studies related to the present conference;

b) that the Administrative Council, in its Resolution 914 establishing the agenda for this Conference, invited the CCIR to prepare a report on the necessary technical bases;

c) that the CCIR, in response to those requests, has drawn up a report on the technical bases, which includes a chapter on compatibility with other services, and has recognized that the studies for determination of definitive values of sharing criteria between the broadcasting service and the other services are being undertaken;

d) that more accurate data are required or to confirm the values provisionally proposed in Chapter 4 of this report;

recommends that administrations

cooperate urgently and to the fullest extent possible with the CCIR by sending it contributions on the above-mentioned subject, taking account of the CCIR working schedule;

requests the CCIR

1. to continue its studies on sharing criteria for services using the band 790 - 862 MHz in the planning area;

2. to prepare a new report on this subject for the Second Session of the Conference on the basis of those studies;

3. to carry out these studies as part of the normal work of the CCIR Study Groups;

and requests the Second Session of the Conference

to reconsider the relevant parts of Chapter 4 of the Report to the Second Session in the light of data provided by administrations and the CCIR's new report and, if necessary, to consider modifying the values proposed in that Chapter.

E.B. OJEBA
Chairman of Working Group 4-C

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WORKING GROUP 5-A

PLANNING METHODS

5.3 Planning methods

5.3.1 Bands to be planned

a) The Plan to be established by the second session shall contain assignments to broadcasting stations (television) in the following bands:

- 47 - 68 MHz (in Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe, the Plan shall be limited to 54 - 68 MHz) (see paragraphs c) and e) below);

- 174 - 230 MHz (see paragraph b) below);

- 470 - 862 MHz (see paragraphs d) and e) below);

b) the Plan should also contain assignments to broadcasting stations in the bands indicated in RR 635 for the countries listed therein under the conditions specified for the protection of the other services to which these bands are allocated. The planning of these bands assumes that the agenda of the second session will refer to them;*

c) in accordance with RR 561, the band 54 - 68 MHz is allocated in Zambia to the broadcasting, the fixed and the mobile services, except the aeronautical mobile service, on a primary basis. This administration indicated its decision to use this band for the fixed service;

d) the band 790 - 862 MHz is allocated in Region 1 to the fixed and broadcasting services on a primary basis. The administrations of ARS, OMA, IRQ and KEN indicated their decision to use this band for the fixed service. The Administration of Mozambique also indicated its decision to use part of this band for the fixed service as indicated in Annex [A];

e) [when assigning channels to their stations in areas bordering the countries listed in paragraphs c) and d) above, administrations are requested to avoid assigning channels that may be incompatible with these services.]

5.3.2 Planning method for the band 470 - 862 MHz

5.3.2.1 The planning of the band 470 - 862 MHz shall be based on the use of the theoretical lattice planning method as described in the following paragraphs.

---

* The Administration of Zimbabwe indicated its intent to request a competent Administrative Radio Conference to modify RR 635 with the view to add in it the name of this administration.

5.3.2.2 The IFRB shall prepare an irregular lattice that takes account of the different propagation criteria adopted by the Conference. This lattice will be drawn starting from the propagation zones 1, 2 and 3 in Figure 2.33 of Document DT/23 where the rhombics will be derived from the theoretical lattice used by the Regional Administrative Conference for the Planning of VHF Sound Broadcasting (Region 1 and part of Region 3) Geneva, 1984. The 'lengt' of rhombic side will be of [320 km (corresponding to the 2/3 of lengths used for Geneva 1984)]. The rhombics for the remaining parts of the planned area shall be derived for each zone from the propagation criteria adopted for it on the basis of a standard ERP of [ ] kW and an antenna height of [ ].

5.3.2.3 The IFRB shall develop for each rhombic the channel distribution to be used based on 8 MHz channel separation.

5.3.2.4 Using this lattice, administrations should select the appropriate frequencies to be assigned to their existing and planned stations.

5.3.2.5 The administrations shall then communicate to the IFRB their requirements so identified together with the existing low-power stations within the coordination distance calculated in accordance with Annex [B].

5.3.2.6 The IFRB shall prepare a first draft Plan as follows:

a) in a first step the channels will be assigned to stations without taking into account the existing low-power stations;

b) only existing low-power stations which are within a coordination distance from the border of a neighbouring country will be considered;

c) the low-power stations will be examined to assess their compatibility in their assigned channel with the assignments already in the draft Plan and shall be entered in the draft Plan if they are compatible;

d) if they are not compatible their frequency shall be modified with the view to obtain the compatibility;

e) if it is not possible to obtain this compatibility, they will be indicated as being the subject of further coordination.

5.3.2.7 Administrations shall communicate to the IFRB the adjustments to the already communicated requirements (section 5.3.3.4) that they consider necessary in order to improve the Plan.

5.3.2.8 The IFRB shall prepare a new draft Plan to be communicated to administrations before the second session for consideration by the latter.

Note:

Power (kW) / Propagation zones	Rhombic sizes (km)		
	100	500	1000
1	320	350	385
2	235	295	320
3	260	305	340

5.3.3 Planning method for the band 174 - 230 MHz

[5.3.3.1 Taking account of the extensive use of the band 174 - 230 MHz in the planned area and considering that standard channel separation in this band would impose on a larger number of countries the modification of the frequencies assigned to their stations, it is not considered appropriate to use a theoretical lattice planning method in this band.]

[5.3.3.1 Despite the extensive use of the band 174 - 230 MHz in the planned area and the fact that standard channel separation in this band would impose on a larger number of countries the modification of the frequencies assigned to their stations, it is considered appropriate to use a theoretical lattice planned method in this band.]

5.3.3.2 The use of a standard channel separation of 8 or 7 MHz through all the planned region was studied in detail. It is considered preferable that this band be planned on the basis of the channel separation adopted by each country. Figure 1 indicates the channel separation used or intended to be used by the countries.

5.3.3.3 The planning will consist in protecting the existing uses and to include the planned uses in the Plan when they are compatible with these existing uses. However, there may be a need to evaluate the equity in the use of this band by indicating the approximate number of assignments possible for each; this can be done through a theoretical lattice that takes account of the different channel spacing used.*

5.3.3.4 See 5.3.2.6.

5.3.3.5 See 5.3.2.7.

5.3.3.6 See 5.3.2.8.

[5.3.4 Planning method for the band 47 - 68 MHz

Considering the small number of channels available in this band with 7 MHz separations, it is not considered appropriate to use a theoretical lattice planning method in this band.]

J.M.B. SEKETE
Chairman of Working Group 5-A

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* Figure [1] contains the indication of countries with 8 MHz and those with 7 MHz as derived from the Master International Frequency Register (MIFR) and from the statements made in Working Group 5-A.

FIGURE [1]

ANNEX [A]

Administrations shall take into account the band 806 to 960 MHz used by the Administration of Mozambique in the primary fixed service avoiding mutual interference. In this way, the Administration of Mozambique requires protection, in the planning process of the band V (790 to 862 MHz), of its frequency assignments indicated below. Additional particulars of these frequency assignments shall be submitted to the IFRB in time to be considered in the second session of this Conference.

Assigned Frequency (MHz)	Station (RX)	Geographical Coordinate	
811.46	Quelimane	36°E 54'	17°S 52'
826.46	Quelimane	36°E 54'	17°S 52'
834.22	Tete	33°E 40'	16°S 11'
838.34	Massinga	35°E 23'	23°S 19'
838.34	Quelimane	36°E 54'	17°S 52'
845.58	Tete	33°E 40'	16°S 11'
850.70	Massinga	35°E 23'	23°S 19'

Bandwidth: 1.35 MHz for each frequency carrier.".

ANNEX [B]

Coordination distance for the consideration of low-power stations

The following Tables are extracted from GE63 and are given as an example. When Working Group 5-A will adopt a definition of low-power station, Committee 4 will be requested to prepare a table based on the adopted definition and on the propagation criteria.

The new table will contain the following footnote:

---

* For geographic areas separated by sea, the propagation over mixed paths will be taken into account.

BAND III

Effective Radiated Power (E.R.P.)	Coordination distances in km for different effective antenna heights h					
	h = 75 m		h = 300 m		h = 1200 m	
	Land path (all areas)	Sea	Land path (all areas)	Sea	Land path (all areas)	Sea
1 kW	310	520	340	550	410	630
300 W	260	430	290	470	360	540
100	210	350	240	390	320	460
30	160	280	190	320	270	390
10	120	220	150	250	230	330
3	90	160	120	190	190	270
1	60	120	90	150	160	230

BANDS IV AND V

Effective Radiated Power (E.R.P.)		Coordination distances in km for different effective antenna heights h					
		h ≤ 75 m		75 m < h < 300 m		300 m < h ≤ 1200 m	
Band IV	Band V	Land path (all areas)	Sea	Land path (all areas)	Sea	Land path (all areas)	Sea
1 kW		185	650	220	700	290	755
300 W	1 kW	150	585	185	630	250	680
100	300 W	110	515	150	565	215	610
30	100	80	460	125	510	185	540
10	30	60	415	100	450	160	485
3	10	45	380	80	395	135	440
1	3	35	340	65	350	115	390
300 mW	1	25	320	50	325	100	345
100	300 mW	20	300	40	305	85	310
—	100	15	235	30	235	70	235

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WORKING GROUP 5-A

PLANNING METHODS

5.3 Planning methods

5.3.1 Bands to be planned

a) The Plan to be established by the second session shall contain assignments to broadcasting stations (television) in the following bands:

- 47 - 68 MHz (except in Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe in which the Plan shall be limited to 54 - 68 MHz);

- 174 - 230 MHz (see paragraph b) below);

- 470 - 862 MHz (see paragraph c) below);

b) the Plan shall also contain assignments to broadcasting stations in the bands indicated in RR 635 for the countries listed therein under the conditions specified for the protection of the other services to which these bands are allocated. The planning of these bands assumes that the agenda of the second session will refer to them;

c) some administrations indicated their wish to use all or part of the band 790 - 862 MHz for other services as follows:

when assigning channels to their stations in areas bordering these countries, administrations are requested to avoid assigning channels that may be incompatible with these services.

COUNTRY	BAND (MHz)	SERVICE
MOZ	- - -	fixed
ARS	790 - 862	fixed

5.3.2 Planning method for the band 470 - 862 MHz

5.3.2.1 The planning of the band 470 - 862 MHz shall be based on the use of the theoretical lattice planning method as described in the following paragraphs.

5.3.2.2 The IFRB shall prepare an irregular lattice that takes account of the different propagation criteria adopted by the Conference. This lattice will be drawn starting from the propagation zones 1, 2 and 3 in Figure 2.33 of Document DT/23 where the rhombics will be derived from the theoretical lattice used by the Regional Administrative Conference for the Planning of VHF Sound Broadcasting (Region 1 and part of Region 3) Geneva, 1984. The length of rhombic

side will be of 320 km (corresponding to the 2/3 of lengths used for Geneva 1984). The rhombics for the remaining parts of the planned area shall be derived for each zone from the propagation criteria adopted for it on the basis of a standard ERP of [ ] kW and an antenna height of [ ].

5.3.2.3 The IFRB shall develop for each rhombic the channel distribution to be used based on 8 MHz channel separation.

5.3.2.4 Using this lattice, administrations should select the appropriate frequencies to be assigned to their existing and planned stations.

5.3.2.5 The administrations shall then communicate to the IFRB their requirements so identified together with the existing low-power stations within the coordination distance.

Power (kW) / Propagation zones	Rhombic sizes (km)		
	100	500	1000
1	320	350	385
2	235	295	320
3	260	305	340

5.3.2.6 The IFRB shall prepare a first draft Plan as follows:

a) in a first step the channels will be assigned to stations without taking into account the existing low-power stations;

b) only existing low-power stations which are within a coordination distance from the border of a neighbouring country will be considered;

c) the low-power stations will be examined to assess their compatibility in their assigned channel with the assignments already in the draft Plan and shall be entered in the draft Plan if they are compatible;

d) if they are not compatible their frequency shall be modified with the view to obtain the compatibility;

e) if it is not possible to obtain this compatibility, they will be indicated as being the subject of further coordination.

5.3.2.7 Administrations shall communicate to the IFRB the adjustments to the already communicated requirements (section 5.3.3.4) that they consider necessary in order to improve the Plan.

5.3.2.8 The IFRB shall prepare a new draft Plan to be communicated to administrations before the second session for consideration by the latter.

5.3.3 Planning method for the band 174 - 230 MHz

5.3.3.1 Taking account of the extensive use of the band 174 - 230 MHz in the planned area and considering that standard channel separation in this band would impose on a larger number of countries to modify the frequencies assigned to their stations it is not considered appropriate to use a theoretical planning method in this band.

5.3.3.2 The use of a standard channel separation of 8 or 7 MHz through all the planned region was studied in detail. It is considered preferable that this band be planned on the basis of the channel separation adopted by each country. Figure 1 indicates the channel separation used or intended to be used by the countries.

5.3.3.3 The planning will consist in protecting the existing uses and to include the planned uses in the Plan when they are compatible with these existing uses. However, there may be a need to evaluate the equity in the use of this band by indicating the approximate number of assignments possible for each; this can be done through a theoretical lattice that takes account of the different channel spacing used.*

5.3.3.4 As for the band 470 - 862 MHz, administrations shall communicate their requirements including the low-power stations and the results of the first draft Plan prepared by the IFRB will be communicated to them. The IFRB will also prepare a second draft Plan to take account of the adjustments communicated by administrations.

5.3.4 Planning method for the band 47 - 68 MHz

Considering the small number of channels available in this band with 7 MHz separations, it will be planned in the same way as the band 174 - 230 MHz, except that no theoretical lattice will be drawn.

J.M.B. SEKETE
Chairman of Working Group 5-A

* Figure [1] contains the indication of countries with 8 MHz and those with 7 MHz as derived from the Master International Frequency Register (MIFR) and from the statements made in Working Group 5-A.

FIGURE [1]

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WORKING GROUP 4-B

Note by the Chairman of Working Group 4-B

The following is a draft annex to the Report describing the use of the simplified multiplication method.

ANNEX [ ]

How to use the simplified multiplication method for calculating usagle field strengths (Report 945, Annex I)

1. Introduction

It has been proposed, on an international level [CCIR, 1961], to determine the influence of interfering transmitters (co-channel, adjacent channel and image channel) by means of the simplified multiplication method, which was developed by the [USA, 1949; 1950] and is described in detail in [Grosskopf, 1952]. In the following, a step-by-step explanation of the method is given for the practical user without deeper theoretical justification.

2. The concept of the usable field strength

The usable field strength, E_u, is a quantity characterizing the coverage situation. To calculate the usable field strength, it is necessary to determine all those 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, so determined, the nuisance field, E_{si}, is:

$$E_{si} = P_i + E_{ni}(50,T) + A_i + B_i \qquad (4.AII.1)$$

where

$E_{ni}(50,T)$: field strength in dB(uV/m) of the unwanted signal normalized to 1 kW effective radiated power (e.r.p.) at 50% locations for T% time (from field-strength curves of Recommendation 370;

P_i: e.r.p. in dB(kW) of the interfering 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 according to the fomula:

$$p_c = \prod_{i=1}^{n} L(x_i) \text{ with } x_i = \frac{E_u - E_{si}}{\sigma_n \sqrt{2}} \qquad (4.AII.2)$$

in which:

p_c: the coverage probalbility to initiate the iterative process of calculating E_u a predetermined value, p_{cp}, of the coverage probability is given, 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:

$$L(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} [\exp(-t^2/2)]\, dt \qquad (4.AII.3)$$

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

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 according to the formula $\sigma_n = 9.5 + 0.405\ g$. The attenuation correction factor g (in dB) can be derived from Δh (see Recommendation 370).

3. Calculation of the probability integral

3.1 Tabular evaluation

The probability integral in the form:

$$\varphi(x) = \frac{2}{\sqrt{2\pi}} \int_{0}^{x} [\exp(-t^2/2)]\, dt \qquad (4.AII.4)$$

can be found evaluated in Table 4.AII.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:

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

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

3.2 Evaluation using Hastings approximation

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

$$x \geq 0 : L(x) = 1. - \frac{1}{(2\pi)^{1/2}} e^{-x^2/2} H(y) \qquad (4.AII.5)$$

$$x < 0 : L(x) = 1. - L(-x)$$

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

and: $y = \left[1. + 0.2316419|x|\right]^{-1}$

$C_5 = 1.330274429$

$C_4 = -1.821255978$

$C_3 = 1.781477937$

$C_2 = -0.356563782$

$C_1 = 0.319381530$

By means of equation (4.AII.5) the integration in equation (4.AII.3) and also the use of tables can be avoided when evaluating the probability integral. The error involved by using this approximation is less than 10^{-7}.

4. Practical calculation procedures to determine the usable field strength

Since it is impossible to solve equation (4.AII.2) explicitly for E_u for a predetermined value p_{cp} (e.g. $p_{cp} = 0.5$) it must be solved iteratively. We begin with an initial value for E_u, which, according to experience, should be some 6 dB larger than the largest of the E_{si}, and determine, successively, for each E_{si}:

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

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

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

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

As for the standard deviation a value $\sigma_n = 8.3$ dB is assumed to apply for Bands I to III it seems appropriate to introduce Table 4.AII.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.AII.II may also be used once the Δ_i values have been corrected according to:

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

p_c is then determined by means of equation (4.AII.2). If p_c is different from p_{cp} (e.g. $p_{cp} = 0.5$), the value so 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:

$$\Delta E_u \approx \frac{p_{cp} - p_c}{0.05} \text{ dB}$$

TABLE 4.AII.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
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.AII.II

Δ	Lixl	-log Lixl	Δ	Lixl	-log Lixl	Δ	Lixl	-log Lixl	Δ	Lixl	-log Lixl	Δ	Lixl	-log Lixl
0	.50000	7.900	10.0	.80280	2.217	20.0	.95288	.457	30.0	.99478	.854	40.0	.99967	.003
1	.50340	6.932	10.1	.80523	2.188	20.1	.95429	.448	30.1	.99483	.852	40.1	.99968	.003
2	.50680	6.964	10.2	.80767	2.158	20.2	.95737	.440	30.2	.99496	.851	40.2	.99969	.003
3	.51020	6.996	10.3	.80989	2.129	20.3	.95813	.432	30.3	.99508	.850	40.3	.99970	.003
4	.51359	6.729	10.4	.81219	2.101	20.4	.95889	.424	30.4	.99520	.849	40.4	.99971	.003
5	.51699	6.663	10.5	.81448	2.072	20.5	.95964	.416	30.5	.99532	.847	40.5	.99972	.003
6	.52038	6.596	10.6	.81675	2.044	20.6	.96037	.408	30.6	.99543	.846	40.6	.99973	.003
7	.52378	6.531	10.7	.81900	2.016	20.7	.96109	.401	30.7	.99554	.845	40.7	.99974	.003
8	.52717	6.466	10.8	.82124	1.989	20.8	.96180	.393	30.8	.99565	.844	40.8	.99975	.003
9	.53056	6.401	10.9	.82345	1.962	20.9	.96251	.386	30.9	.99576	.843	40.9	.99975	.002
1.0	.53395	6.337	11.0	.82565	1.935	21.0	.96320	.379	31.0	.99587	.842	41.0	.99976	.002
1.1	.53733	6.273	11.1	.82784	1.908	21.1	.96388	.372	31.1	.99597	.841	41.1	.99977	.002
1.2	.54071	6.209	11.2	.83000	1.882	21.2	.96455	.365	31.2	.99607	.840	41.2	.99978	.002
1.3	.54409	6.147	11.3	.83215	1.856	21.3	.96521	.358	31.3	.99617	.839	41.3	.99978	.002
1.4	.54747	6.084	11.4	.83428	1.830	21.4	.96586	.351	31.4	.99626	.838	41.4	.99979	.002
1.5	.55084	6.022	11.5	.83639	1.804	21.5	.96650	.344	31.5	.99636	.837	41.5	.99980	.002
1.6	.55421	5.961	11.6	.83848	1.779	21.6	.96713	.338	31.6	.99645	.836	41.6	.99980	.002
1.7	.55758	5.899	11.7	.84056	1.754	21.7	.96775	.331	31.7	.99654	.835	41.7	.99981	.002
1.8	.56094	5.839	11.8	.84262	1.729	21.8	.96836	.325	31.8	.99663	.834	41.8	.99982	.002
1.9	.56433	5.778	11.9	.84466	1.705	21.9	.96896	.318	31.9	.99671	.833	41.9	.99982	.002
2.0	.56765	5.719	12.0	.84669	1.681	22.0	.96955	.312	32.0	.99680	.832	42.0	.99983	.002
2.1	.57099	5.659	12.1	.84869	1.657	22.1	.97013	.306	32.1	.99688	.832	42.1	.99983	.002
2.2	.57434	5.600	12.2	.85068	1.633	22.2	.97071	.300	32.2	.99696	.831	42.2	.99984	.002
2.3	.57767	5.542	12.3	.85265	1.610	22.3	.97127	.294	32.3	.99704	.830	42.3	.99984	.002
2.4	.58100	5.484	12.4	.85461	1.587	22.4	.97183	.289	32.4	.99711	.829	42.4	.99985	.002
2.5	.58433	5.426	12.5	.85654	1.564	22.5	.97237	.283	32.5	.99719	.828	42.5	.99985	.001
2.6	.58765	5.369	12.6	.85846	1.541	22.6	.97291	.277	32.6	.99726	.828	42.6	.99986	.001
2.7	.59096	5.313	12.7	.86036	1.519	22.7	.97344	.272	32.7	.99733	.827	42.7	.99986	.001
2.8	.59427	5.256	12.8	.86225	1.497	22.8	.97396	.266	32.8	.99740	.826	42.8	.99987	.001
2.9	.59757	5.200	12.9	.86412	1.475	22.9	.97447	.261	32.9	.99747	.826	42.9	.99987	.001
3.0	.60086	5.144	13.0	.86596	1.453	23.0	.97497	.256	33.0	.99753	.825	43.0	.99988	.001
3.1	.60415	5.089	13.1	.86780	1.432	23.1	.97546	.251	33.1	.99760	.824	43.1	.99988	.001
3.2	.60743	5.035	13.2	.86961	1.411	23.2	.97595	.246	33.2	.99766	.824	43.2	.99988	.001
3.3	.61070	4.980	13.3	.87141	1.390	23.3	.97643	.241	33.3	.99772	.823	43.3	.99989	.001
3.4	.61396	4.926	13.4	.87319	1.369	23.4	.97690	.236	33.4	.99778	.822	43.4	.99989	.001
3.5	.61722	4.873	13.5	.87495	1.349	23.5	.97736	.231	33.5	.99784	.822	43.5	.99989	.001
3.6	.62046	4.820	13.6	.87670	1.329	23.6	.97781	.227	33.6	.99790	.821	43.6	.99990	.001
3.7	.62370	4.768	13.7	.87843	1.309	23.7	.97826	.222	33.7	.99795	.821	43.7	.99990	.001
3.8	.62693	4.715	13.8	.88014	1.289	23.8	.97870	.217	33.8	.99801	.820	43.8	.99990	.001
3.9	.63015	4.664	13.9	.88183	1.270	23.9	.97913	.213	33.9	.99806	.820	43.9	.99991	.001
4.0	.63336	4.612	14.0	.88351	1.251	24.0	.97956	.209	34.0	.99811	.819	44.0	.99991	.001
4.1	.63657	4.561	14.1	.88517	1.232	24.1	.97997	.204	34.1	.99816	.819	44.1	.99991	.001
4.2	.63976	4.511	14.2	.88681	1.213	24.2	.98038	.200	34.2	.99821	.818	44.2	.99992	.001
4.3	.64294	4.461	14.3	.88844	1.195	24.3	.98078	.196	34.3	.99826	.818	44.3	.99992	.001
4.4	.64611	4.411	14.4	.89005	1.176	24.4	.98118	.192	34.4	.99831	.817	44.4	.99992	.001
4.5	.64928	4.362	14.5	.89164	1.158	24.5	.98157	.188	34.5	.99835	.817	44.5	.99992	.001
4.6	.65243	4.313	14.6	.89322	1.140	24.6	.98195	.184	34.6	.99840	.816	44.6	.99993	.001
4.7	.65557	4.264	14.7	.89478	1.123	24.7	.98232	.180	34.7	.99844	.816	44.7	.99993	.001
4.8	.65870	4.216	14.8	.89632	1.105	24.8	.98269	.176	34.8	.99849	.815	44.8	.99993	.001
4.9	.66182	4.168	14.9	.89785	1.088	24.9	.98305	.173	34.9	.99853	.815	44.9	.99993	.001
5.0	.66493	4.121	15.0	.89936	1.071	25.0	.98341	.169	35.0	.99857	.814	45.0	.99994	.001
5.1	.66803	4.074	15.1	.90085	1.054	25.1	.98376	.165	35.1	.99861	.814	45.1	.99994	.001
5.2	.67112	4.028	15.2	.90233	1.038	25.2	.98410	.162	35.2	.99864	.814	45.2	.99994	.001
5.3	.67419	3.981	15.3	.90379	1.022	25.3	.98443	.158	35.3	.99868	.813	45.3	.99994	.001
5.4	.67726	3.936	15.4	.90524	1.005	25.4	.98476	.155	35.4	.99872	.813	45.4	.99995	.001
5.5	.68031	3.890	15.5	.90667	.989	25.5	.98509	.152	35.5	.99875	.813	45.5	.99995	.001
5.6	.68335	3.845	15.6	.90808	.974	25.6	.98541	.148	35.6	.99879	.812	45.6	.99995	.001
5.7	.68638	3.801	15.7	.90948	.958	25.7	.98572	.145	35.7	.99882	.812	45.7	.99995	.000
5.8	.68939	3.756	15.8	.91086	.943	25.8	.98603	.142	35.8	.99886	.812	45.8	.99995	.000
5.9	.69239	3.712	15.9	.91222	.928	25.9	.98633	.139	35.9	.99889	.811	45.9	.99995	.000
6.0	.69538	3.669	16.0	.91357	.913	26.0	.98662	.136	36.0	.99892	.811	46.0	.99996	.000
6.1	.69836	3.626	16.1	.91491	.898	26.1	.98691	.133	36.1	.99895	.811	46.1	.99996	.000
6.2	.70132	3.583	16.2	.91623	.884	26.2	.98719	.130	36.2	.99898	.810	46.2	.99996	.000
6.3	.70427	3.541	16.3	.91753	.869	26.3	.98747	.127	36.3	.99901	.810	46.3	.99996	.000
6.4	.70721	3.499	16.4	.91882	.855	26.4	.98775	.125	36.4	.99904	.810	46.4	.99996	.000
6.5	.71013	3.457	16.5	.92009	.841	26.5	.98802	.122	36.5	.99906	.809	46.5	.99996	.000
6.6	.71304	3.416	16.6	.92135	.827	26.6	.98828	.119	36.6	.99909	.809	46.6	.99996	.000
6.7	.71593	3.375	16.7	.92259	.814	26.7	.98854	.116	36.7	.99912	.809	46.7	.99997	.000
6.8	.71881	3.334	16.8	.92382	.800	26.8	.98879	.114	36.8	.99914	.809	46.8	.99997	.000
6.9	.72168	3.294	16.9	.92503	.787	26.9	.98904	.111	36.9	.99917	.808	46.9	.99997	.000
7.0	.72453	3.254	17.0	.92623	.774	27.0	.98928	.109	37.0	.99919	.808	47.0	.99997	.000
7.1	.72737	3.215	17.1	.92742	.761	27.1	.98952	.106	37.1	.99921	.808	47.1	.99997	.000
7.2	.73019	3.176	17.2	.92858	.748	27.2	.98976	.104	37.2	.99924	.808	47.2	.99997	.000
7.3	.73300	3.137	17.3	.92974	.736	27.3	.98999	.102	37.3	.99926	.807	47.3	.99997	.000
7.4	.73579	3.098	17.4	.93088	.723	27.4	.99021	.099	37.4	.99928	.807	47.4	.99997	.000
7.5	.73857	3.060	17.5	.93200	.711	27.5	.99043	.097	37.5	.99930	.807	47.5	.99997	.000
7.6	.74134	3.023	17.6	.93312	.699	27.6	.99065	.095	37.6	.99932	.807	47.6	.99997	.000
7.7	.74408	2.985	17.7	.93421	.687	27.7	.99086	.093	37.7	.99934	.807	47.7	.99998	.000
7.8	.74682	2.948	17.8	.93530	.676	27.8	.99107	.091	37.8	.99936	.806	47.8	.99998	.000
7.9	.74954	2.912	17.9	.93637	.664	27.9	.99127	.089	37.9	.99938	.806	47.9	.99998	.000
8.0	.75224	2.875	18.0	.93742	.653	28.0	.99147	.087	38.0	.99940	.806	48.0	.99998	.000
8.1	.75492	2.839	18.1	.93846	.641	28.1	.99167	.085	38.1	.99941	.806	48.1	.99998	.000
8.2	.75760	2.804	18.2	.93949	.630	28.2	.99186	.083	38.2	.99943	.806	48.2	.99998	.000
8.3	.76025	2.768	18.3	.94051	.619	28.3	.99205	.081	38.3	.99945	.806	48.3	.99998	.000
8.4	.76289	2.733	18.4	.94151	.609	28.4	.99223	.079	38.4	.99946	.805	48.4	.99998	.000
8.5	.76551	2.699	18.5	.94250	.598	28.5	.99241	.077	38.5	.99948	.805	48.5	.99998	.000
8.6	.76812	2.664	18.6	.94347	.588	28.6	.99259	.075	38.6	.99950	.805	48.6	.99998	.000
8.7	.77071	2.630	18.7	.94443	.577	28.7	.99276	.073	38.7	.99951	.805	48.7	.99998	.000
8.8	.77328	2.597	18.8	.94538	.567	28.8	.99293	.072	38.8	.99953	.805	48.8	.99998	.000
8.9	.77584	2.563	18.9	.94632	.557	28.9	.99309	.070	38.9	.99954	.805	48.9	.99998	.000
9.0	.77838	2.530	19.0	.94724	.547	29.0	.99326	.068	39.0	.99955	.805	49.0	.99999	.000
9.1	.78091	2.497	19.1	.94815	.538	29.1	.99341	.067	39.1	.99957	.804	49.1	.99999	.000
9.2	.78342	2.465	19.2	.94905	.528	29.2	.99357	.065	39.2	.99958	.804	49.2	.99999	.000
9.3	.78591	2.433	19.3	.94994	.519	29.3	.99372	.064	39.3	.99959	.804	49.3	.99999	.000
9.4	.78838	2.401	19.4	.95081	.509	29.4	.99387	.062	39.4	.99961	.804	49.4	.99999	.000
9.5	.79084	2.370	19.5	.95167	.500	29.5	.99402	.061	39.5	.99962	.804	49.5	.99999	.000
9.6	.79329	2.339	19.6	.95252	.491	29.6	.99416	.059	39.6	.99963	.804	49.6	.99999	.000
9.7	.79571	2.308	19.7	.95336	.482	29.7	.99430	.058	39.7	.99964	.804	49.7	.99999	.000
9.8	.79811	2.277	19.8	.95418	.474	29.8	.99444	.056	39.8	.99965	.804	49.8	.99999	.000
9.9	.80050	2.247	19.9	.95500	.465	29.9	.99457	.055	39.9	.99966	.803	49.9	.99999	.000

Then the determination of E_u has to be continued by repeating, with the corrected E_u, the determination 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 is falling below the accuracy limit. Table 4.AII.III gives an example for the iterative determination of E_u in the presence of 5 nuisance fields (σ_n = 8.3 dB). The values of $L(x_i)$ are taken from Table 4.AII.II.

TABLE 4.AII.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.

The necessity to carry out numerous multiplications using at least four-digit numbers suggests a further simplification of the method consisting in substituting the $L(x_i)$ by the logarithms of their reciprocal value. This would reduce the computation work to a summation of the -log $L(x_i)$ values. To further facilitate the computation of ΔE_u it is appropriate to select a basis for these logarithms in such a way that ΔE_u immediately results from a comparison of the sum with -log p_{cp} (logarithm to the same basis) e.g. -log 0.5 (50%).

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

TABLE 4.AII.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(1)		5.685		6.748		6.969
-	-log 0.5(1)		-7.000		-7.000		-7.000
ΔE_u(dB)			≈-1.3		≈-0.25		≈-0.03

(1) 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.

In addition to the procedure described above a number of other approaches to making use of the simplified multiplication method exist and are contained in a more complete description of the method [EBU, 1984]. Which of the procedures will be preferred may depend on the computation facilities available to the user.

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CCIR Documents

[1978-82]: **a.** 10/237 (Germany, (Federal Republic of)): **b.** 10/240 (EBU).
[1982-86]: **a.** 10/16 (EBU); **b.** 10/54 (Germany (Federal Republic of)); **c.** 10/191 (Germany (Federal Republic of)); **d.** 10/206 (United Kingdom; **e.** 10/217 (Spain); **f.** 10/266 (EBU).

S.M. CHALLO
Chairman of Working Group 4-B

AFBC
INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

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WORKING GROUP 4-C

Note by the Chairman of Working Group 4-C

DRAFT CHAPTER 4

4. Compatibility with other services

4.1 Bands or services used on a shared basis

The first session of the Conference considered the band 790 - 862 MHz in which the following services have equal rights pursuant to the definition of primary services set out in RR 419 of the Radio Regulations:

- broadcasting;
- fixed;
- mobile;
- mobile satellite.

When planning the broadcasting service in this band, therefore, the rights of the broadcasting service will have to be protected with respect to the other services and vice versa.

4.2 Sharing possibilities

Studies on the possibilities for sharing between the different services sharing the same band with equal rights have been conducted by the CCIR. Three possible sharing methods were contemplated:

- time sharing: use of the same frequency band by different services at different times;
- band splitting: simultaneous use of different parts of the shared bands by different services;
- geographical sharing: simultaneous use of the same parts of the shared bands by different services, but in separate geographical areas.

The practical situation is often a combination of band splitting and geographical sharing.

In some countries a number of TV channels are allocated to another service. For the countries concerned, sharing is realized by using separate frequencies; for the other countries by geographical separation.

Although sharing might improve the spectrum utilization, it certainly reduces the flexibility for the further development of the broadcasting service. The addition of new broadcast stations and the reassignment of channels to existing stations or the introduction of new systems will become more difficult or even impossible, the more extensively the band is shared.

4.3 Sharing criteria

For determining interference, the following sharing criteria have to be established:

- minimum field strength to be protected;
- protection ratios;
- assessment of multiple interference;
- receiving antenna discrimination;
- propagation model (see Chapter 2).

4.3.1 Protection from fixed and mobile services

Interference assessments to the vision and sound channels should be made for several reception loactions within the service area of the television transmitter. These locations should be those which would seem to be most likely to suffer from interference. These locations depend on the actual situation. In some cases the reception locations of re-broadcast stations at relatively exposed sites may be the more critical. In other cases, areas with low field strength are more critical.

If the actual critical locations are not known then a higher standard of protection may be required.

The criteria depend on the service against which protection is required. Appropriate criteria are not yet available for all cases.

4.3.1.1 Minimum field strengths to be protected

The Conference adopted (see Chapter 3) the minimum (median) field strengths for which protection may be sought in planning a TV service. In practice these values are not always achieved. In many cases viewers are using improved antennas and pre-amplifiers to obtain an acceptable picture. In such instances it would be desirable, or even essential, to seek protection for lower values, the level being determined by the available field strength of the wanted signal and the degree of protection against interference already afforded. With respect to these requirements for protection, provisional values could be envisaged such as:

46 dB (μV/m)	Band I
49 dB (μV/m)	Band III
53 dB (μV/m)	Band IV
58 dB (μV/m)	Band V.

Studies to recommend final values are in progress (see Recommendation COM4/B).

4.3.1.2 Protection ratios

Protection ratios appropriate to tropospheric and continuous propagation are given in Chapter 3.

The protection ratios against interference from a CW or frequency-modulated signal with non-controlled frequency, are valid in the case of sharing. If the fixed or mobile service is amplitude-modulated the protection ratio has to be increased by 4 dB.

4.3.1.3 Assessment of multiple interference

Methods of assessment of multiple interference are described in Document DT/27. It is not known if these methods are appropriate for the calculation of large numbers of potential interfering stations to a TV service.

4.3.1.4 Receiving antenna discrimination

The antenna discrimination curves given in Chapter 3 apply to all types of unwanted signals including transmissions by fixed, base and mobile stations. The protection shown to be obtained from orthogonal polarization discrimination can also be expected to apply to fixed and base stations. However, it could be expected that this advantage would be significantly less in the case of mobile stations, and for planning purposes could be ignored.

4.3.2 Protection from BC services

At the time of writing this report no definite criteria had been established. Recommendation 4/B addresses this problem to the CCIR with the request that studies be completed in time to provide the necessary sharing information to the Second Session.

E.B. OJEBA
Chairman of Working Group 4-C

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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WORKING GROUP 5-B

DRAFT CHAPTER 6 - FREQUENCY REQUIREMENTS FROM ADMINISTRATIONS AND IFRB INTERSESSIONAL WORK

6.1 Requirements from administrations

6.1.1 Method to be used by administrations in submitting their frequency requirements in the bands (.....). (See Document 52.)

6.1.2 Requirements file and date of submission of requirements

Administrations shall be requested to indicate their requirements by a circular-letter which the IFRB shall send them before [1 June 1987]. The requirements file will be established and will comprise:

- the requirements submitted by administrations with the characteristics described in section 6.1;
- the data contained in the Master International Frequency Register (MIFR) and in the Geneva Plan, 1963, for administrations which fail to submit their requirements by a deadline fixed by the Conference [1 February 1987]; the IFRB shall take into account the following data:
- the requirements resulting from the application of the theoretical network by the IFRB for administrations having no assignments in the MIFR or in the Geneva Plan, 1963.

The deadline fixed for the submission of requirements is [1 February 1988].

6.2 Intersessional work

6.2.1 Processing of requirements by the IFRB

After receipt, the requirements will be validated and entered in the requirements file used as a basis for the draft Plan.

When the requirements correspond to an assignment which has been notified to the IFRB in accordance with the Radio Regulations or in conformity with the Geneva Plan, 1963, the status of this assignment will be inserted in the publication of the requirements file with different symbols (MIFR/GE63). The assignments in service in the Stockholm Plan (1961) of countries neighbouring the planning area or in conformity with that Plan will be taken into account up to [.....].

6.2.2 Dispatch of the requirements file

The IFRB shall send to each administration in duplicate, as soon as possible and not later than [1 May 1988], a printed list of the requirements of the administration concerned.

Administrations shall check the characteristics of their stations and shall communicate to the IFRB not later than [1 August 1988] any material errors they may have detected.

The IFRB shall check these corrections and draw up the final requirements file.

The IFRB shall decide on the form in which to publish the requirements file (microfiche or printed lists) according to the volume of requirements submitted and shall send it to the administrations on [1 November 1988].

6.2.3 Development of the software for preparation of the draft Plan

This will be the most important and complex intersessional activity. It may be summarized in simplified form by the following stages:

6.2.3.1 Study and preparation of the architecture of the global system according to the characteristics of the requirements, the planning approach(es) adopted by the First Session and the planning constraints.

6.2.3.2 Software for input, validation and publication of the requirements file.

6.2.3.3 Development of the lattice planning method with positioning of the theoretical networks on a sphere.

6.2.3.4 Development of the soft ware for the nine propagation zones.

[6.2.3.5 Study of the conditions for sharing with services other than television broadcasting.]

6.2.3.6 Design, development and testing of the software for preparation of the draft Plan.

6.2.3.7 Software to take account of multiple interference.

6.2.3.8 Software to take account of the requirements of countries which have submitted no requirements.

6.2.3.9 Software to establish the reference situation.

6.2.3.10 Software for publication of the calculation results.

6.2.4 Calculation of results - draft Plan

On the basis of the requirements file, the IFRB shall prepare the first draft Plan and send the results to administrations by [1 February 1989] at the latest. The requirements file and first draft Plan may be supplied to administrations on magnetic tape on request.

After examining the results of the first draft Plan, administrations may make any modifications to their requirements in order to reduce interference. Any modifications aimed at improving the Plan must be sent to the IFRB by [1 June 1989] at the latest.

On the basis of the modifications received, the IFRB shall prepare a second draft Plan which shall be sent to administrations by [1 September 1989] at the latest.

6.3 Assistance provided to administrations by the IFRB

(To be developed)

M. DERRAGUI
Chairman of Working Group 5-B

Annex 6.A: Timetable of intersessional work

ANNEX 6.A

Timetable of intersessional work

	ACTIVITY	ACTION	DATE
1.	End of First Session	-	October 1986
2.	IFRB sends circular-letter requesting administrations to submit their requirements	IFRB	1 June 1987
3.	Deadline for submission of requirements to IFRB by administrations	ADM.	1 February 1988
4.	Input and validation of requirements by IFRB. Publication and dispatch of requirements file	IFRB	1 May 1988
5.	Submission of corrections of material errors in the requirements file by administrations	ADM.	1 August 1988
6.	Publication of requirements file and dispatch to administrations	IFRB	1 November 1988
7.	First draft Plan prepared by IFRB and sent to administrations	IFRB	1 February 1989
8.	Dispatch of modifications to requirements to improve the first draft Plan	ADM.	1 June 1989
9.	Second draft Plan prepared by IFRB and sent to administrations	IFRB	1 September 1989
10.	Second Session of the Conference	-	Oct./Nov. 1989

UNIÓN INTERNACIONAL DE TELECOMUNICACIONES
CARR PARA LA PLANIFICACIÓN DE LA RADIODIFUSIÓN DE TELEVISIÓN EN ONDAS MÉTRICAS/DECIMÉTRICAS EN LA ZONA AFRICANA DE RADIODIFUSIÓN Y PAÍSES VECINOS
PRIMERA REUNIÓN, NAIROBI Septiembre-Octubre de 1986

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COMMITTEE 4

Draft Note by the Chairman of Committee 4

CHAPTER 2: PROPAGATION

Following the discussion and agreement reached among the administrations concerned, the paragraph 4, in the Document 63 has to be modified as follows:

- delete the fifth and last alinea of the paragraph 4;

- add the following text to the same paragraph 4.

The propagation curves to be used for Band III for 1% of the time shall be as follows.

For paths over the sea (Zone C), the VHF propagation curve for a transmitting antenna height of 150 m in Zone 4 (Figure 2.16) shall be used with the addition of a 15 dB correction factor appropriate for a region where the mean annual value of ΔN is 80. This correction is subject to the condition that the value obtained does not exceed the free space value.

For paths over land (Zones 1 and 2) the VHF propagation curve for a transmitting antenna height of 150 m in the appropriate zone (Zone 1 or 2) shall be used. For paths crossing the coastal land area (Zone C1), calculations shall be undertaken by considering, in turn, Zone C1 to be sea and land (Zone 1, 2), employing the appropriate propagation curves as defined above. The resultant field strength shall be the average of the two results obtained. For the case of mixed paths, linear interpolation shall be applied.

The propagation curves for 50% of the time for Bands III, IV and V shall be as follows.

For paths over the sea, the appropriate curves for Zone 4 shall be used with the addition of a 15 dB correction factor appropriate for a region whose mean annual value of ΔN is 80. This correction is subject to the condition that the value obtained does not exceed the free space value. For paths over land, the appropriate curves for Zone 1 or 2 shall be used. For the case of mixed paths, linear interpolation shall be applied.

C.T. NDIONGUE
Chairman of Committee 4

AFBC
INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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COMMITTEE 5

Note by the Chairman of Committee 5

DRAFT RESOLUTION [COM5/1]

concerning the assistance to be provided by the IFRB to the administrations of the planning area in the intersessional period

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986),

considering

a) the report of the First Session of the Conference to the Second Session;

b) in particular, the intersessional work programme of Chapter 6 of this report;

c) that the administrations of the planning area might require special assistance;

d) No. 999, Article 10, of the Radio Regulations concerning assistance to be given by the IFRB to administrations with regard to the use of the frequency spectrum, and particularly to administrations requiring special assistance;

e) No. 1003, Article 10, of the Radio Regulations concerning the role of the IFRB in the preparation and organization of radio conferences;

f) that, in its Resolution No. 914 containing the agenda of the First Session of the Conference, the Administrative Council invited the IFRB to provide technical assistance in the preparation of this Conference,

invites the IFRB

to provide its assistance, so far as possible, to administrations requesting it, during the intersessional period,

requests

administrations wishing to obtain the assistance of the IFRB to supply the necessary information relating to their request.

E. KAMDEM-KAMGA
Chairman of Committee 5

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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COMMITTEE 4

Draft note by the Chairman of Committee 4

Paragraph 3.4 of Document 77

It is proposed to replace the paragraph 3.4 of Document 77 by the following paragraph:

"3.4 Minimum usable field strength

The values given in Recommendation 417 for median field strengths should be used for planning against interference in Bands I, III, IV and V for the international planning case. These values are:

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

Values refer to the field strength at a height of 10 m above ground level. The percentage of time for which protection may be sought should lie between 90 and 99%.

For satisfactory picture quality in absence of interference and man-made noise the values are given in Note 1 of Recommendation 417. These values are:

Band	I	III	IV	V
dB(μV/m)	+47	+53	+62	+67

In arriving at these figures the receiver noise, cosmic noise, antenna gain and feeder loss have been taken into consideration.

These values are based on noise limits, giving satisfactory quality of the received picture (about grade 3 according to Recommendation 500-1) on an average receiver and antenna installation. In countries with high density of interference, the values of usable field strength will depend on interference and not on noise.

It should be stated that the values from Recommendation 417 are based on old measurements and it is believed that the noise figures of receivers have improved. This seems to be the reason for several countries reporting having a good service with much lower field strengths in the absence of interference and man-made noise."

C.T. NDIONGUE
Chairman of Committee 4

AFBC
INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

Corrigendum 2 to
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Replace Table II with the following:

TABLE IIa*

Band	Effective radiated power (W)	Zones			
		C**	C1		
			Antenna height (m)		
			75	300	1200
III	300	>1000	730	745	780
	100	890	550	565	600
	30	650	405	420	460
	10	540	330	345	385
	3	440	265	280	315
	1	360	210	225	260

TABLE IIb*

Band	Effective radiated power	Zones		
		C**	C1**	
			a)	b)
IV/V	500 W	>1000	330	1000
	300 W	>1000	320	900
	100 W	>1000	280	750
	30 W	1000	240	620
	10 W	750	200	500
	3 W	550	170	400
	1 W	400	140	300

* For geographic areas separated by sea, the propagation over mixed paths will be taken into account.

** Independent of effective antenna height.

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INTERNATIONAL TELECOMMUNICATION UNION
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COMMITTEE 4

Report of the ad hoc Working Group 4

COORDINATION DISTANCE FOR THE CONSIDERATION OF LOW POWER STATIONS

M. HUET
Chairman of ad hoc Working Group 4

ANNEX [5B]

(to Chapter 5)

Coordination distance for the consideration of low power stations

TABLE I*

Band	Effective radiated power	Antenna height (m)																	
		75						300						1200					
		Zones						Zones						Zones					
		1	2	3	4	A	B	1	2	3	4	A	B	1	2	3	4	A	B
I	100 W	270	180	210	550	900	700	310	210	260	600	1000	770	380	270	330	680	>1000	830
	30 W	220	150	170	450	700	550	260	180	220	480	770	600	330	240	300	570	830	680
	10 W	170	130	130	350	550	450	210	160	180	390	600	480	280	220	270	460	680	570
	3 W	130	110	110	270	450	350	160	140	150	320	480	380	240	190	240	380	570	460
	1 W	100	90	90	210	350	270	130	120	120	260	390	320	210	170	210	320	460	380
III	300 W	260	170	190	510	840	650	290	200	250	560	900	710	360	270	320	640	970	780
	100 W	210	140	150	420	650	510	240	170	210	460	710	560	320	240	280	530	780	640
	30 W	160	120	125	330	510	420	180	150	170	370	560	460	270	210	250	440	640	530
	10 W	120	100	100	260	420	330	150	130	140	300	460	370	230	190	225	360	530	440
	3 W	90	80	75	190	330	260	120	110	115	240	370	300	190	170	200	300	440	360
	1 W	60	60	60	130	260	190	90	90	90	180	300	240	160	150	175	250	360	300
IV/V	500 W	110	110	120	800	>1000	900	160	140	160	800	>1000	900	220	200	220	800	>1000	900
	300 W	100	100	110	750	1000	870	150	130	150	750	1000	870	200	190	210	750	1000	870
	100 W	80	80	80	650	870	750	125	110	125	650	870	750	180	170	180	650	870	750
	30 W	60	60	60	550	750	650	100	95	100	550	750	650	160	150	160	550	750	650
	10 W	45	45	45	450	650	550	80	80	80	450	650	550	140	130	140	450	650	550
	3 W	35	35	35	375	550	450	65	65	65	375	550	450	120	115	120	375	550	450
	1 W	25	25	25	300	450	375	50	50	50	300	450	375	100	100	100	300	450	375

* For geographic area separated by sea, the propagation over mixed paths will be taken into account.

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
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COMMITTEE 4

Report of the ad hoc Working Group 4

COORDINATION DISTANCE FOR THE CONSIDERATION OF LOW POWER STATIONS

M. HUET
Chairman of ad hoc Working Group 4

ANNEX [5B]

(to Chapter 5)

Coordination distance for the consideration of low power stations

TABLE I*

Band	Effective radiated power	Antenna height (m)																	
		75						300						1200					
		Zones						Zones						Zones					
		1	2	3	4	A	B	1	2	3	4	A	B	1	2	3	4	A	B
I	100 W	270	180	210	550	**	**	310	210	260	600	**	**	380	270	330	680	**	**
	30 W	220	150	170	450			260	180	220	480			330	240	300	570		
	10 W	170	130	130	350			210	160	180	390			280	220	270	460		
	3 W	130	110	110	270			160	140	150	320			240	190	240	380		
	1 W	100	90	70	210			130	120	120	260			210	170	210	320		
III	300 W	260	170	190	510	840	650	290	200	250	560	900	710	360	270	320	640	970	780
	100 W	210	140	150	420	650	510	240	170	210	460	710	560	320	240	280	530	780	640
	30 W	160	120	125	370	510	420	180	150	170	370	560	460	270	210	250	440	640	530
	10 W	120	100	100	260	420	330	150	130	140	300	460	370	230	190	225	360	530	440
	3 W	90	80	75	190	330	260	120	110	115	240	370	300	190	170	200	300	440	360
	1 W	60	60	60	130	260	190	90	90	90	180	300	240	160	150	175	250	360	300
IV/V	500 W	110	110	120	800	>1000	900	160	140	160	800	>1000	900	220	200	220	800	>1000	900
	300 W	100	100	110	750	1000	870	150	130	150	750	1000	870	200	190	210	750	1000	870
	100 W	80	80	80	650	870	750	125	110	125	650	870	750	180	170	180	650	870	750
	30 W	60	60	60	550	750	650	100	95	100	550	750	650	160	150	160	550	750	650
	10 W	45	45	45	450	650	550	80	80	80	450	650	550	140	130	140	450	650	550
	3 W	35	35	35	375	550	450	65	65	65	375	550	450	120	115	120	375	550	450
	1 W	25	25	25	300	450	375	50	50	50	300	450	375	100	100	100	300	450	375

* For geographic area separated by sea, the propagation over mixed paths will be taken into account.

** No data available.

TABLE II*

Band	Effective radiated power	Zones		
		C**	C1**	
			a)	b)
I	100 W	***	***	***
	30 W			
	10 W			
	3 W			
	1 W			
III	300 W	>1000	400	>1000
	100 W	>1000	350	>1000
	30 W	>1000	320	900
	10 W	>1000	275	750
	3 W	>1000	230	620
	1 W	>1000	200	500
IV/V	500 W	>1000	330	1000
	300 W	>1000	320	900
	100 W	>1000	280	750
	30 W	1000	240	620
	10 W	750	200	500
	3 W	550	170	400
	1 W	400	140	300

* For geographic areas separated by sea, the propagation over mixed paths will be taken into account.

** Independent of effective antenna height.

*** No data available.

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
RARC FOR THE PLANNING OF VHF/UHF TELEVISION BROADCASTING IN THE AFRICAN BROADCASTING AREA AND NEIGHBOURING COUNTRIES
FIRST SESSION, NAIROBI September-October 1986

Document DT/34-E
2 October 1986
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COMMITTEE 5

Planning principles

Following the request made to the IFRB to prepare texts intended to reflect, in the planning method, the principle embodied in paragraph 5.1.2, the following texts are proposed:

Add to paragraph 5.3.2.6:

"b') When the examination indicates an incompatibility between an existing and a planned station, the IFRB shall select an alternative compatible channel for the planned station to resolve the incompatibility and will include it provisionally in the draft Plan pending the acceptance by the administration concerned.

b") If such an alternative channel could not be found, the IFRB shall determine the appropriate changes to the technical characteristics of the planned stations, propose them to the administration concerned and enter them provisionally in the draft Plan."

E. KAMDEN-KAMGA
Chairman of Committee 5

AFBC

INTERNATIONAL TELECOMMUNICATION UNION
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3 October 1986
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AD HOC WORKING
GROUP OF THE PLENARY

Note by the Chairman of the ad hoc Working Group of the Plenary

The drafts of two Recommendations to be addressed by the AFBC(1) to the Administrative Council are enclosed for the consideration of the Group.

Draft Recommendation PLEN/A concerns the agenda and duration of the second session.

Draft Recommendation PLEN/B concerns the abrogation of the part of the Regional Agreement for the African Broadcasting Area (Geneva 1963), presently in force.

K.C. TIEMELE
Chairman, ad hoc Working Group of the Plenary

Enclosures: 2

DRAFT

RECOMMENDATION PLEN/A

Draft Agenda of the Second Session of the Conference

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986),

considering

a) Resolution No. 1 of the Plenipotentiary Conference, Nairobi, 1982, relating to the future conferences of the Union;

b) Resolution No. 509 of WARC 1979 resolving that a regional conference be convened to review and revise the provisions of the existing Television Broadcasting VHF/UHF Plan (Geneva, 1963) for the African Broadcasting Area, taking into account the assignments contained in the Stockholm Plan, 1961;

c) that under the programme of Conferences and Meetings for 1988 and 1989 as revised and adopted by the Administrative Council at its 41st Session, the second session should be held during the second half of 1989;

d) that the agenda for the first session contained in Resolution No. 914 of the Administrative Council as amended at the latter's 41st Session in 1986, provides for the establishment by the first session of a draft agenda for the second session of the Conference, to be submitted to the Administrative Council;

e) that the second session will need to consider:

1. the proposals from administrations;

2. the Report of the first session;

3. the preparatory work carried out by the permanent organs of the Union in the intersessional period on the basis of the decisions of the first session;

4. the relevant reports from the IFRB and the CCIR as a result of their studies and planning exercises performed in accordance with the Report of the first session to the second session;

5. the requirement for frequency assignments to be submitted by administrations;

6. the provisions to be established with respect to the other services sharing the same freqeuncy band(s) with the broadcasting services in the planning area;

recognizing

a) that the planning of the VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries should take account of uses of already existing and planned assignments to stations in the bordering areas and should consider the relevant propagation data applicable in those areas;

b) that the planning process should also take into account those frequency assignments which are in conformity with the Stockholm Agreement, 1961 (see Resolution No. 509 of WARC 1979);

recognizing further

a) that the VHF/UHF bands for planning television broadcasting are shared with other services either by allocations shown in the Table of Frequency Allocation (Article 8 of the Radio Regulations) or through the footnotes to that table;

b) that the rights of other primary and permitted services as allocated in accordance with the Radio Regulations shall be taken into account;

noting

the wish expressed by the countries listed in No. 635 of the Radio Regulations to plan the frequency bands listed therein;

recommends to the Administrative Council

1. to consider, by fully taking into account the preceding considering, recognizing, recognizing further and noting paragraphs, the following draft agenda for the second session which shall:

1.1 draw up an agreeement, according to the principles and methods established by the first session, which shall include regulatory procedures, technical data and standards, together with an associated frequency assignment Plan for use by television broadcasting in the planning area for the following VHF/UHF frequency bands:

47 - 68 MHz

(54 - 68 MHz) for Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe

174 - 230 MHz

470 - 862 MHz;

1.2 review and revise as necessary the relevant propagation data to be used for planning in the planning area in accordance with Recommendation 4A/1 of the first session;

1.3 establish regulatory procedures pertaining to the sharing of the above bands between broadcasting and other services to which these bands are also allocated;

1.4 include in the Plan the assignments to television stations in the bands 230 - 238 MHz and 246 - 254 MHz in the countries listed in No. 635 of Radio Regulations, subject to the application of the procedure of Article 14 of the Radio Regulations in respect to the other services to which the above-mentioned bands are allocated;

2. to consider providing a duration of three weeks for the second session of the Conference.

DRAFT

RECOMMENDATION (PLEN/B)

Convening of a Regional Administrative Conference of the Members of the Union in the African Broadcasting Area to Abrogate the Regional Agreement for the African Broadcasting Area (Geneva, 1963)

The Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (First Session, Nairobi, 1986),

considering

a) that the second session of the Conference shall draw up an Agreement and associated frequency plan for use by television broadcasting in the African Broadcasting Area and neighbouring countries in the VHF/UHF frequency bands;

b) that from the date of entry into force of the Agreement and associated frequency plan referred to in a) above, there would be incompatibilities between the latter Agreement and plan and the Regional Agreement (Geneva, 1963) and that therefore it is intended to abrogate the Regional Agreement (Geneva, 1963) and to replace it be the Agreement and associated frequency plan referred to in a) above;

c) that Article 7 of the Regional Agreement (Geneva, 1963) stipulates that no revision of the Agreement will be undertaken except by an "Administrative Conference of the Members of the Union in the African Broadcasting Area convened in accordance with the procedure laid down in the International Telecommunication Convention";

d) that certain parts of the Regional Agreement (Geneva, 1963) relating to the VHF/UHF Sound Broadcasting Stations have already been the subject of abrogation in the Geneva 1985 Regional Agreement adopted by the Members of the Union in the African Broadcasting Area;

e) that, under the programme of Conferences and Meetings for 1988 and 1989 as revised and adopted by the Administrative Council at its 41st Session, the second session of the present Conference should be held during the second half of 1989;

recommends to the Administrative Council

to take the necessary measures for convening [during the third week of], [immediately after], the second session of the Regional Administrative Radio Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries, a regional administrative conference of the Members of the Union in the African Broadcasting Area, for an expected duration of two days with the following agenda:

"to abrogate the parts of the Regional Agreement for the African Broadcasting Area (Geneva, 1963); which are still in force and relate to television broadcasting".

AFBC

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FIRST SESSION, NAIROBI September-October 1986

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COMMITTEE 2

DRAFT

REPORT OF COMMITTEE 2 TO THE PLENARY MEETING

(CREDENTIALS)

1. Terms of reference of the Committee

The terms of reference of the Committee are set out in Document 24.

2. Meetings

The Committee met twice, on 23 September and 6 October 1986.

At its first meeting, it set up a Working Group consisting of the Chairman and Vice-Chairman of the Committee and one delegate from Kenya to verify delegations' credentials in accordance with Article 67 of the International Telecommunication Convention, Nairobi (1982).

3. Conclusions

The conclusions reached by the Committee are reproduced in the Annex attached hereto and submitted to the Plenary Meeting for approval.

4. Final remark

The Committee recommends that the Plenary Meeting authorize the Chairman and the other members of the Working Group to verify the credentials received after the date of the present Report and to submit their conclusions to the Plenary Meeting on the matter.

F. GIROTH
Chairman of Committee 2

Annex : 1

ANNEX

1. Credentials found to be in order, deposited by the delegations of countries having the right to vote

(In French alphabetical order)

Algeria (People's Democratic Republic of)
Saudi Arabia (Kingdom of)
Bahrain (State of)
Benin (People's Republic of)
Botswana (Republic of)
Burkina Faso
Cameroon (Republic of)
Côte d'Ivoire (Republic of)
United Arab Emirates
Spain
Ethiopia
France
Kenya (Republic of)
Lesotho (Kingdom of)
Malawi
Mauritius
Nigeria (Federal Republic of)
Oman (Sultanate of)
Qatar (State of)
Rwandese Republic
Senegal (Republic of)
Somali Democratic Republic
Swaziland (Kingdom of)
Zambia (Republic of)
Zimbabwe (Republic of)

Conclusion : The delegations of these countries are entitled to vote.

2. Provisional credentials found to be in order, deposited by the delegation of a country having the right to vote (see No. 383 of the Convention)

Egypt (Arab Republic of)

Conclusion : The delegation of this country is entitled to vote.

3. Credentials found to be in order, deposited by the delegations of countries which do not have the right to vote (see Document 18)

Burundi (Republic of)
Comores (Islamic Federal Republic of the)
Congo (People's Republic of the)
Gabonese Republic
Ghana
Guinea (Republic of)

Equatorial Guinea (Republic of)
Iraq (Republic of)
Kuwait (State of)
Mali (Republic of)
Morocco (Kingdom of)
Mauritania (Islamic Republic of)
Mozambique (People's Republic of)
Niger (Republic of the)
Tanzania (United Republic of)
Togolese Republic

Conclusion : The delegations of these countries are not entitled to vote.

4. Delegations attending the Conference which have not deposited credentials

* Angola (People's Republic of)
* Djibouti (Republic of)
* Liberia (Republic of)
* Madagascar (Democratic Republic of)
* Zaire (Republic of)

Conclusion : The delegations of these countries are not entitled to vote.

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* Appears in the list of countries which have lost their right to vote (see Document 18).

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FIRST SESSION, NAIROBI September-October 1986

Addendum 2 to
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PLENARY MEETING

DRAFT REPORT OF THE BUDGET CONTROL COMMITTEE

ANNEX 7

Propagation measurement campaigns

Recommendation COM4/A recognizes the need to undertake propagation studies in connection with the use of the VHF and UHF bands in the African continent and neighbouring countries.

Accordingly, the Secretary-General is requested to expand the ongoing measurement campaigns in order to include those pertaining to broadcasting.

Given the urgency of carrying out these measurements, the result of which will have to be taken into consideration at the second session, and having regard to the fact that the ongoing campaigns are being conducted under the voluntary programme, the funding of which is both uncertain and inadequate, the need arises for the intersessional work programme to include the minimum credits required to speed up the measurements without relying too heavily on donations.

Provision also needs to be made for verifying the meteorological data which indicate, for the planning area, that propagation characteristics over land and over sea are identical.

In the hope that measurement equipment will be provided free of charge, the following overall estimate may be made:

Recruitment of experts Travel expenses and transport equip. Data analysis and processing	200,000 Swiss francs

Note - This estimate is based on the following assumptions:

1. Equipment will be provided free of charge (three field strength measurements in broadcasting band III), Rhode and Schwarz (field strength meters in the band 100 - 1 000 MHz).

2. The administrations concerned will provide local resources and bear the related costs.

3. Cooperation will be forthcoming from administrations and regional organizations.

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PLENARY MEETING

DRAFT REPORT FROM THE BUDGETARY CONTROL COMMITTEE

ANNEX 6

IFRB intersessional work

1. In Document 36, the Chairman of Committee 3 brought to the attention of the Chairmen of Committees 4 and 5 the provisions of Article 80 of the Convention and Resolution No. 48 of the Nairobi Plenipotentiary Conference. He recommended to these Committees, in the event that decisions are taken which may have budgetary implications, to send an information note to Committee 3 at the earliest opportunity, describing the nature of the decision and, if possible, providing an estimate of the cost of implementing it, calculated with the help of the permanent organs of the Union concerned.

2. The Board has followed closely the discussions in Committees 4 and 5 and in particular Document 75, "Draft Chapter 6 - Frequency requirements from administrations and IFRB intersessional work", as modified and adopted by Committee 5.

3. It appears that the IFRB intersessional activities may be divided in three categories:

3.1 Requirements data capture, validation and publication.

3.2 Software development for the preparation of the draft Plan.

3.3 Engineering studies to apply the Planning Methods, i.e.:

i) to generate adequate data for administrations which fail to submit their requirements;

ii) to find, when necessary, alternative frequencies for planned stations and existing low-power stations.

4. Although task 3.1 above is estimated to be significant, the Board will carry it out with existing resources, at no charge for the intersessional work.

5. The best estimates that the Board can prepare in such a short time are based on comparing the relative complexity of this software to other software that the Board has prepared recently. A more detailed study, including the extent to which some modules may be extracted from other existing systems and adapted to the Planning Methods, will be undertaken by the Board and a report will be prepared for the Administrative Council. The preliminary estimates for tasks 3.2 and 3.3 above, indicate the following required human resources for a period of 28 months starting 1 July 1987: one P.4/P.5 Supervising Engineer, two P.4 Engineer/Analyst, one P.3 Programmer Analyst and one G.6 Administrative Assistant. [Total cost Swiss francs from to]

6. The rental of the necessary computer resources (i.e., disk space, work stations) is estimated at [Swiss francs from to].

7. Other resources such as rental of office space and supplies are estimated at [Swiss francs from to].

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BUDGET CONTROL COMMITTEE

DRAFT REPORT OF THE BUDGET CONTROL COMMITTEE TO THE PLENARY MEETING

The Budget Control Committee held three meetings during the Conference and examined the various items of its terms of reference.

Pursuant to Nos. 475 to 479 of the International Telecommunication Convention, Nairobi, 1982, the terms of reference of the Budget Control Committee are as follows:

a) to approve the organization and the facilities available to delegates;

b) to examine and approve the accounts for expenditure incurred throughout the duration of the Conference;

c) to estimate the costs that implementation of the decisions taken by the Conference may entail.

1. Assessment of the organization and the facilities made available to delegates

In the absence of any comments in this regard from the delegations, Committee 3 found that the organization and the facilities made available to delegates were satisfactory.

2. Budget of the Conference

The Budget Control Committee examined the budget of the Conference approved by the Administrative Council at its 40th session, 1985, amounting to 1,070,000 Swiss francs.

The Committee further noted that the budget of the Conference had been adjusted in accordance with Administrative Council Resolution No. 647 to take account of changes in salaries and allowances in the common system of the United Nations and specialized agencies. The budget is set out in Annex 1 to this report.

3. Position of Conference expenditure

Under No. 478 of the Convention, the Budget Control Committee is required to present a report to the Plenary Meeting showing, as accurately as possible, the estimated total expenditure of the Conference.

Accordingly, Annex 2 hereto gives a statement of the Conference budget with a breakdown of credits for the various budgetary sub-heads and items and actual expenditure as at 6 October 1986. The statement also gives an indication of expenditure committed until that date and estimated expenditure up to the closing date of the Conference.

The statement reveals that total expenditure is estimated at 1,016,000 Swiss francs, thus leaving a surplus of 27,300 Swiss francs over the budget approved by the Administrative Council and adjusted in accordance with Resolution No. 647.

4. Recognized private operating agencies and international organizations participating in the work of the Conference

Under Article 16 of the Financial Regulations of the Union, the report of the Budget Control Committee to the Plenary Meeting must include a statement of recognized private operating agencies and international organizations required to contribute to defraying Conference expenditure, together with a list of the international organizations exempted from contributing under No. 617 of the Convention.

This statement is set out in Annex 4 hereto.

Since the budget of the Conference amounts to 1,043,300 Swiss francs and the total number of Members' contributory units is 97 1/4, the amount of the contributory unit for recognized private operating agencies and non-exempt international organizations is 10,728 Swiss francs.

5. Sharing of Conference expenditure

Since the present Conference is a regional conference within the meaning of No. 50 of Article 7 of the Nairobi Convention, 1982, the corresponding expenses shall be borne by all the Members of the African Broadcasting Area and neighbouring countries and Members of other regions which have participated in the Conference, in accordance with their unit classification, pursuant to No. 115 of Article 15 of the Convention. Annex 3 hereto gives a list of the Members concerned.

According to the statement of accounts in Annex 2, total expenditure is estimated at 1,016,000 Swiss francs. On the basis of the contributions from international organizations (see section 4 above) and the number of contributory units of the Members required to bear the cost of the Conference (Annex 3), the amount of the contributory unit may be estimated at 10,450 Swiss francs.

Under Article 28 of the Financial Regulations of the Union, interest is payable on regional conference accounts after a period of 60 days from the date of despatch. Since invoices can probably be sent to participants on 31 January 1987, they should be settled by 31 March 1987 at the latest. From 1 April 1987 they will be subject to interest at 3% for the first 180 days and 6% thereafter.

6. Agreement between the host Administration and the Secretary-General of the ITU concerning organization of the Conference

The Budget Control Committee also noted the Agreement between the Government of the Republic of Kenya and the Secretary-General of the International Telecommunication Union relating to the arrangements for the organization of the first session of the AFBC Conference (see Document 19).

The Agreement was considered and approved.

7. Documentation fee under the provisional rules for the attendance of regional administrative conferences by Members not belonging to the Region concerned, which entered into force on 1 January 1986

At its 41st session, the Administrative Council determined the method for calculating the documentation fee to be charged to Members of other regions which participate in a regional conference without the right to speak.

This charge is calculated on the basis of credits budgeted, by dividing document production costs plus 10% for other services by the number of sets of documents printed. The relevant fee for this Conference is 110 Swiss francs. Annex 5 hereto lists the administrations receiving the documents of the Conference.

8. Additional expenditure to be foreseen for implementation of the decisions of the Conference

No. 478 of the International Telecommunication Convention, Nairobi, 1982, provides that the report of the Budget Control Committee of the Plenary Meeting shall also indicate, as accurately as possible, the costs which may arise from implementation of the decisions taken by the Conference. Article 80 of the Convention relating to the financial responsibilities of administrative conferences lays down that before adopting proposals with financial implications, conferences shall take account of all the Union's budgetary provisions with a view to ensuring that the proposals will not result in expenses beyond the credits which the Administrative Council is empowered to authorize. Furthermore, Resolution No. 48 of the Nairobi Conference stipulates that:

"before adopting resolutions or taking decisions which are likely to result in additional and unforeseen demands upon the budgets of the Union, administrative conferences, having regard to the need for economy, shall:

1.1 prepare and take into account estimates of the additional demands made on the budgets of the Union;

1.2 where two or more proposals are involved, arrange them in an order of priority;

1.3 prepare and submit to the Administrative Council a statement of the estimated budgetary impact, together with a summary of the significance and benefit to the Union of financing the implementation of those decisions, and an indication of priorities where appropriate;".

The work to be performed by the CCIR will not entail any additional expenditure, since it will be covered by the ordinary budget as part of the CCIR's regular activities.

The work to be carried out by the IFRB, however, will have financial implications. The question of the expenditure which is likely to result from implementation of the decisions of the Conference is thus addressed in Annex 6 hereto.

Pursuant to No. 479 of the Convention, this report will be transmitted, together with the observations of the Plenary Meeting, to the Secretary-General for submission to the Administrative Council at its next annual session.

The Plenary Meeting is requested to approve this report.

M. OUHADJ
Chairman of the Budget Control Committee

Annexes: 6

ANNEX 1

Section 20.5 - Regional Administrative Conferences
AFBC (1)

Items		Budget 1986 Swiss Francs	Budget 1986 adjusted Swiss francs
Subhead I	Preparatory work		
20.511	IFRB preparatory work	100,000	100,000
20.512	CCIR preparatory work	p.m	p.m
		100,000	100,000
Subhead II	Staff expenses		
20.521	Salaries and related expenses of the Conference Secretariat staff	503,000	475,000
20.522	Salaries and related expenses of the translation, typing and reproduction services staff	228,000	229,300
20.523	Travel (recruitment)	50,000	50,000
20.524	Insurance	44,000	44,000
		825,000	798,300
Subhead III	Travel expenses		
20.531	Transport at the conference venue	-	-
20.532	Travel to and from the conference venue	-	-
20.533	Shipping of equipment to and from the confer.	-	-
		-	-
Subhead IV	Premises and equipment		
20.541	Premises, furniture, machines	35,000	35,000
20.542	Document production	20,000	20,000
20.543	Office supplies and overheads	20,000	20,000
20.544	Postage, telephone calls, telegrams	15,000	15,000
20.545	Technical installations	5,000	5,000
20.546	Sundry and unforeseen	10,000	10,000
		105,000	105,000
Subhead V	Other expenses		
20.551	Interest credited to the ordinary budget	20,000	20,000
Subhead VI	Final Acts		
20.561	Report to the Second Session	20,000	20,000
	Total, Section 20.5	1,070,000	1,043,300

ANNEX 2

This annex will contain the table from the document entitled "Position of Conference expenditure as at 6 October 1986".

ANNEX 3

Contributions from Members of the Union for defrayal of the expenses of the Regional Conference

Pursuant to No. 115 of the International Telecommunication Convention, Nairobi, 1982, expenses incurred by regional administrative conferences shall be borne by the Members of the regions concerned. These Members are as follows:

1. Members of the African Broadcasting Area

		Contributory units
1.	Algeria (People's Democratic Republic of)	1
2.	Angola (People's Republic of)	1/4
3.	Benin (People's Republic of)	1/4
4.	Botswana (Republic of)	1/2
5.	Burkina Faso	1/8
6.	Burundi (Rep. of)	1/8
7.	Cameroon (Rep. of)	1/2
8.	Cape Verde (Rep. of)	1/8
9.	Central African Republic	1/8
10.	Comoros (Fed. and Islamic Rep. of the)	1/8
11.	Congo (People's Rep. of the)	1/2
12.	Côte d'Ivoire (Republic of)	1
13.	Djibouti (Republic of)	1/8
14.	Egypt (Arab Republic of)	1
15.	Spain	3
16.	Ethiopia	1/8
17.	France	30
18.	Gabonese Republic	1/2
19.	Gambia (Republic of the)	1/8
20.	Ghana	1/4
21.	Guinea (Republic of)	1/8
22.	Guinea-Bissau (Republic of)	1/8
23.	Equatorial Guinea (Republic of)	1/8
24.	Kenya (Republic of)	1/4
25.	Lesotho (Kingdom of)	1/8
26.	Liberia (Republic of)	1/4
27.	Libya (Socialist People's Libyan Arab Jamahiriya)	1 ½
28.	Madagascar (Democratic Republic of)	1/4
29.	Malawi	1/8
30.	Mali (Republic of)	1/8
31.	Morocco (Kingdom of)	1
32.	Mauritius	1/4
33.	Mauritania (Islamic Republic of)	1/4
34.	Mozambique (People's Republic of)	1/4
35.	Namibia	-
36.	Niger (Republic of the)	1/8
37.	Nigeria (Federal Republic of)	2
38.	Uganda (Republic of)	1/8
39.	United Kingdom of Great Britain and Northern Ireland	30
40.	Rwandese Republic	1/8

		Contributory units
41.	Sao Tome and Principe (Democratic Republic of) ...	1/8
42.	Senegal (Republic of)	1
43.	Sierra Leone	1/8
44.	Somali Democratic Republic	1/8
45.	Sudan (Democratic Republic of the)	1/8
46.	South Africa (Republic of)	1
47.	Swaziland (Kingdom of)	1/4
48.	Tanzania (United Republic of)	1/8
49.	Chad (Republic of)	1/8
50.	Togolese Republic	1/4
51.	Yemen (People's Dem. Republic of)	1/8
52.	Zaire (Republic of)	1/2
53.	Zambia (Republic of)	1/4
54.	Zimbabwe (Republic of)	1/2
		81 1/2

2. Members "neighbouring countries" to the African Broadcasting Area

Saudi Arabia	10
Bahrain (State of).....	1/2
United Arab Emirates	1
Islamic Republic of Iran	1
Iraq (Republic of).....	1/4
Kuwait (State of).....	1
Oman (Sultanate of).....	1/2
Qatar (State of).....	1/2
	96 1/4

3. Other Members

Israel (State of)	1
Total	97 1/4

ANNEX 4

List of international organizations and recognized private operating agencies participating in the work of the Conference

		Contributory units
1.	INTERNATIONAL ORGANIZATIONS	
A.	United Nations, specialized agencies	
	. United Nations	
	. International Civil Aviation Organization (ICAO)	
	. United Nations Educational, Scientific and Cultural Organization (UNESCO)	
B.	Regional organizations	
	. Pan-African Telecommunications Union (PATU)	*)
C.	Other organizations	
	. Gulf Cooperation Council for Arab States (GCC)	*)
	. Gulfvision	*)
	. Union of National Radio and Television Organizations of Africa (URTNA)	*)
	. International Amateur Radio Union (IARU)	*)
2.	RECOGNIZED PRIVATE OPERATING AGENCIES	
	None.	

*) International organizations exempted from contributing in accordance with Resolution No. 925 (amended) of the Administrative Council.

ANNEX 5

List of Members paying the documentation fee

	Swiss francs
- Austria (1 set)	110.-
- Canada (2 sets)	220.-
- Tunisia (1 set)	110.-
	440.-

ANNEX 6

This annex will be constituted by the document entitled "IFRB intersessional work".