Documents of the Regional Administrative Conference for FM Sound Broadcasting in the VHF band (Region 1 and certain countries concerned in Region 3) (1st session) (Geneva, 1982)

To reduce download time, the ITU Library and Archives Service has divided the conference documents into sections.

- This PDF includes Document DT No. 1 - 41.
- The complete set of conference documents includes Document No. 1 - 169, DL No. 1 - 24, DT No. 1 - 41.

Please note: The DL documents are incomplete. To view the missing documents, please consult the [French / Spanish] version.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/1-E
19 August 1982
Original : English

HEADS OF DELEGATIONS
(PL-1)

DRAFT AGENDA

OF THE

FIRST PLENARY MEETING

Monday, 23 August 1982, at 1430 hrs

CICG - ROOM II

		Document No.
1.	Opening by the Dean of the Conference	-
2.	Election of the Chairman of the Conference	-
3.	Election of the Vice-Chairman of the Conference	-
4.	Addresses by : the Secretary-General of the ITU	-
	the Chairman of the IFRB	-
	the Director of the CCIR	-
5.	Conference structure and organization of the work of the Conference	DT/2
6.	Election of the Committee Chairmen and Vice-Chairmen	-
7.	Composition of the Conference Secretariat	-
8.	Allocation of documents to Committees	DT/4
9.	Convening of the Conference	23
10.	Invitations to the Conference	24
11.	Participation of international organizations in the work of the Conference	25
12.	Date by which the Credentials Committee must submit its conclusions	-
13.	Working hours of the Conference	-
14.	Other business	-

M. MILI
Secretary-General

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/2-E
9 August 1982
Original : English

PLENARY MEETING

Note by the Secretary-General

DRAFT
CONFERENCE STRUCTURE

In the context of the agenda appearing in Administrative Council Resolution No. 852, amended by the Council at its 37th Session, the suggestions made below were arrived at in accordance with the provisions of Resolution No. 17 of the World Administrative Radio Conference, Geneva, 1979.

Committee 1 - Steering Committee

Terms of Reference :

To coordinate the work of the Committees, fix the timetable of meetings, etc.

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 (No. 369 of the International Telecommunication Convention, Malaga-Torremolinos, 1973).

Committee 3 - Budget Control Committee

Terms of Reference :

To determine the organization and the facilities available to the delegates and to examine and approve the accounts of expenditure incurred throughout the duration of the First Session of the Conference (No. 442 of the International Telecommunication Convention, Malaga-Torremolinos, 1973).

Committee 4 - Technical Criteria Committee

Terms of Reference :

To establish the technical criteria for the basis of the preparation, by the Second Session of the Conference, of the Frequency Assignment Plan for FM Sound Broadcasting in the VHF Band (87.5 - 108 MHz) in Region 1 and in the parts of Afghanistan and Iran adjacent to that Region, taking into account the following non-exhaustive list of items (items 1.1 to 1.9 of the agenda) :

- propagation characteristics and methods used to forecast field strength values in the VHF band and to calculate the service areas of sound broadcasting stations;
- optimum channel spacing, channel distribution;
- modulation standards, emitting bandwidths (including stereophony and other systems having additional sub-carriers);
- radio frequency protection ratios;
- minimum wanted field strength values; field strengths to be protected;
- maximum radiated power;
- basic characteristics of transmitting and receiving antennae, polarization;
- receiver sensitivity and selectivity;
- criteria for the compatibility of the FM Sound Broadcasting Service with :
  - the Television Broadcasting Service,
  - the Fixed Service,
  - the Aeronautical Radionavigation Service,
  - the Mobile Service,

  in the same frequency band or in adjacent bands, taking into account the results of CCIR studies.*

---

* Note : In accordance with the Administrative Council Resolution No. 852, the CCIR has prepared a more general report to the Conference, Document No. 14, in regard to technical bases in conformity with Resolution No. 510 of the World Administrative Radio Conference, 1979.

Committee 5 - Planning Methods Committee

Terms of Reference :

To establish the planning principles and methods for the basis for the preparation, by the Second Session of the Conference, of the Frequency Assignment Plan for FM Sound Broadcasting in the VHF Band (87.5 - 108 MHz) in Region 1 and in the parts of Afghanistan and Iran adjacent to that Region (item 1.10 of the agenda);

to specify the form in which requirements for inclusion in the Frequency Assignment Plan should be submitted to the IFRB, and to fix a date by which they should be submitted (item 2 of the agenda);

to adopt any recommendation which the First Session of the may consider useful for the Second Session of the Conference.

Committee 6 - Editorial Committee

Terms of Reference :

To perfect the form of the approved texts of the First Session of the Conference without altering the sense (No. 527 of the International Telecommunication Convention, Malaga-Torremolinos, 1973).

M. MILI
Secretary-General

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/3-E
4 August 1982
Original : English

IFRB

DRAFT FORM FOR USE IN SUBMITTING REQUIREMENTS TO THE IFRB

In accordance with item 2 of the Conference Agenda (Document No. 1), the Conference has to determine the Form in which Administrations should submit their requirements for frequency assignments.

The Conference may wish to consider the attached draft form (and the instructions for filling it out) which has been prepared by the IFRB.

F.G. Perrin
Chairman

Annex : 1

PAGE INTENTIONALLY LEFT BLANK

PAGE LAISSEE EN BLANC INTENTIONNELLEMENT

REGIONAL ADMINISTRATIVE RADIO CONFERENCE FOR VHF BROADCASTING

SECOND SESSION (31 OCTOBER – 12 DECEMBER 1984)

FORM FOR SUBMISSION OF REQUIREMENT FOR A BROADCASTING STATION IN THE BAND 87.5 – 108 MHz

(01) **ADMINISTRATION** ____ **ADMIN SERIAL No.** ____ (00) **IFRB SERIAL No.** ____

(02) NAME OF TRANSMITTING STATION

(03) COUNTRY

(04)

LONGITUDE			LATITUDE		
DEGREES	E/W	MIN.	DEGS.	N/S	MIN.

(05) MAXIMUM EFFECTIVE RADIATED POWER — dBW

(06)

AZIMUTH OF MAXIMUM RADIATION	
ND	DEGREES

(07) EFFECTIVE ANTENNA HEIGHT IN AZIMUTH OF MAXIMUM RADIATION — ± ____ m

(08) POLARIZATION

(09) VERTICAL PLANE — EFF. RADIATED POWER — dBW

(10) HORIZONTAL PLANE — EFF. RADIATED POWER — dBW

(11) SYSTEM

(12) RADIATION CHARACTERISTICS
(To be provided ONLY if box 31 cannot be completed)

AZIMUTH	ERP	LOBE WIDTH	EFFECTIVE ANTENNA HEIGHT
Degrees	± dBW	Degrees	± Meters

(13)

ANTENNA CHARACTERISTICS	
ANNEX	DIAGRAM

(21) SUPPLEMENTARY INFORMATION

(14) DESIRED FREQUENCY — MHz

(15)

IN USE	
YES	NO

(16) THIS REQUIREMENT REPLACES FOLLOWING ASSIGNMENT

ST 61	GE 63	MIFR
FREQUENCY	FREQUENCY	FREQUENCY
MHz	MHz	MHz

ANTENNA CHARACTERISTICS IN THE HORIZONTAL PLANE

(31)

AZIMUTH (degrees)	0	10	20	30	40	50	60	70	80	90	100	110
Attenuation with respect to maximum gain (dB)												
Effective antenna height (meters)												
AZIMUTH (degrees)	120	130	140	150	160	170	180	190	200	210	220	230
Attenuation with respect to maximum gain (dB)												
Effective antenna height (meters)												
AZIMUTH (degrees)	240	250	260	270	280	290	300	310	320	330	340	350
Attenuation with respect to maximum gain (dB)												
Effective antenna height (meters)												

ANNEX

INSTRUCTIONS FOR FILLING OUT THE FORM

The instructions for filling out the form refer to boxes 01 to 16, box 21 and box 31. The box 00 is for the use of the IFRB and should be left blank. Provision has been made on the form for an administration to enter its reference number in the box entitled ADMIN SERIAL No.

Box No.

01 Administration

Indicate the country symbol designating the Administration on whose behalf the requirement of the frequency assignment is being submitted. Use a symbol from Table No. 1 of the Preface to the International Frequency List.

02 Name of transmitting station

Give the name of the locality by which the station is (or will be) known or in which it is (or will be) situated.

Limit the number of letters and numerals to a total of 20.

Insert each letter or number in a separate space, starting from the first space on the left. In the case of compound names, one space should be left blank between each part of the name.

03 Country

Indicate, by symbol, the country or geographical area in which the station is intended to be located. Use a symbol from Table No. 1 of the Preface to the International Frequency List.

04 Longitude and Latitude of the transmitting site

Give the geographical coordinates, in degrees and minutes of the transmitting site. From the symbols E or W, N or S, indicate those which apply.

05 Maximum Effective Radiated Power

Indicate, in dBW, the effective radiated power (see No. 156 of the Radio Regulations). In the case of a directive antenna, this shall correspond to the direction of the maximum radiation.

06 Azimuth of Maximum Radiation

If a directive transmitting antenna is used, indicate the azimuth of maximum radiation of the antenna in degrees (clockwise) from True North.

If a transmitting antenna with non-directional characteristics is used, insert "ND".

07 Effective Antenna Height in Azimuth of Maximum Radiation

Indicate the effective height of transmitting antenna, in metres, in the azimuth of maximum radiation. This height is defined as the height over the average level of the ground between distances of 3 and 15 km from the transmitter in the direction of the receiver (see CCIR Recommendation No. 370-3). The minus sign should be indicated when the value of the effective antenna height arrived at in the above manner is negative.

Box No.

08 Polarization

Indicate the polarization of radiation by using the following symbols:

01 Horizontal

02 Vertical

03 Mixed

09 Effective Radiated Power in the Vertical Plane

In the case of mixed polarization, indicate in dBW the effective radiated power in the vertical plane. In the case where the polarization is either horizontal or vertical, this box should be left blank.

10 Effective Radiated Power in the Horizontal Plane

In the case of mixed polarization, indicate in dBW the effective radiated power in the horizontal plane. In the case where the polarization is either horizontal or vertical, this box should be left blank.

11 System

Indicate the system of transmission by using the following symbols:

01 Monophonic (maximum frequency deviation ± 75 kHz)

02 Monophonic (maximum frequency deviation ± 50 kHz)

03 Stereophonic, polar modulation system (maximum frequency deviation ± 50 kHz)

04 Stereophonic, pilot-tone system (maximum frequency deviation ± 75 kHz)

05 Stereophonic, pilot-tone system (maximum frequency deviation ± 50 kHz)

12 Radiation Characteristics in case of a Directive Antenna

The information in this box is to be provided ONLY IF the information required in the Annex (box 31) is not available.

In the case of a directive antenna, for each of the maxima of radiation, indicate:

- azimuth in degrees, clockwise from True North;
- effective radiated power in dBW;
- lobewidth (3 dB points) in degrees;
- effective antenna height in metres.

13 Antenna Characteristics

Indicate by an X in appropriate box when:

- the information required in the Annex (box 31) has been provided;
- the antenna radiation pattern, in the horizontal plane, has been furnished.

Box No.

14 Desired Frequency

Indicate, if appropriate, the frequency desired for assignment to the station mentioned in box 02 above. If there is no preference for a specified frequency, boxes 14 and 15 may be left blank.

15 In USE

In case a frequency has been mentioned in box 14, indicate by inserting an X, whether or not this frequency is presently in use.

16 Indicate, if appropriate, the frequency assignment in one of the Plans and/or in the Master Register which is intended to be replaced by the present requirement.

21 Supplementary Information

Indicate any additional, pertinent information, regarding this requirement which may be of use in planning. If necessary, attach additional sheet.

31 Annex: Antenna Characteristics in the Horizontal Plane

Indicate, for each azimuth shown:

- for a directive antenna, the attenuation with respect to the maximum gain;
- effective antenna height in metres.

Administrations should endeavour to provide the information required in this box. When box 31 is completed, the box 12 may be left blank.

UNION INTERNATIONALE DES TELECOMMUNICATIONS

CONFERENCE REGIONALE DE RADIODIFFUSION

(PREMIERE SESSION) GENEVE, 1982

Document N° DT/4-F/E/S
13 août 1982

SEANCE PLENIERE
PLENARY MEETING
SESIÓN PLENARIA

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

PROJET / DRAFT / PROYECTO

ATTRIBUTION DES DOCUMENTS /
ALLOCATION OF DOCUMENTS /
ATRIBUCIÓN DE LOS DOCUMENTOS

Plénière / Plenary / Plenaria	:	1 + Corr.1 23, 24, 25
C.2 - Pouvoirs / Credentials / Credenciales	:	2
C.3 - Budget / Presupuesto	:	3, 15
C.4 - Critères techniques / Technical Criteria / Criterios técnicos	:	4, 6, 7, 10, 11, 12, 13, 14, 16, 17, 19, 21, 22, 26, DT/3,
C.5 - Méthodes de planification / Planning Methods / Métodos de planificación	:	4, 5, 8, 9, 10, 11, 14, 16, 17, 18, 20, 22, 27, DT/3,

M. MILI

Secrétaire général

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/5-E
18 August 1982

LIST OF DOCUMENTS
(No. 1 to 27)

No.	Origin	Title	Destination
1 + Corr.1	SG	Agenda of the Conference	
2	SG	Credentials of delegations	
3	SG	Budget of the Conference	
4	G	Proposals for the work of the Conference	
5	NOR	Interference caused by the oscillators in FM Broadcasting receivers	
6	NOR	Circular or elliptical polarization for FM Broadcasting	
7	D	Proposals for the work of the Conference - Technical bases	
8	D	Proposals for the work of the Conference - Planning methods	
9	D	Proposals for the work of the Conference - Planning principles	
10	D	Proposals for the work of the Conference	
11	URS	Proposals for the work of the Conference	
12	BEL	Study of compatibility between the Broadcasting Service in the band 100-108 MHz and the Aeronautical Radiocommunication Services in the band 108-136 MHz	
13	F	Compatibility between the Broadcasting Service in the band 87,5-108 MHz and the Aeronautical Radionavigation and Aeronautical Mobile (R) Services in the band 108-136 MHz	
14	SG	Report of the CCIR	
15	SG	Contributions of non-exempt Recognized Private Operating Agencies and International Organizations	

No.	Origin	Title	Destination
16	DDR	Proposals and remarks concerning the work of the Conference	
17	AUT	Proposals for the work of the Conference - Requirement form (Agenda item 2)	
18	AUT	Proposals for the work of the Confernece - Planning principles (Agenda item 1.10)	
19	HOL	Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Services in the bands 108-136 MHz	
20	S	Low power stations	
21	GRC	Item 1.9 of the Agenda - Compatibility of the FM Broadcasting Service with the Aeronautical Radionavigation Service	
22	YUG	Proposals for the work of the Conference	
23	SG	Convening of the Conference	
24	SG	Invitations	
25	SG	Notification of International Organizations	
26	SG	Primary and permitting Services in the band 87.5-108 MHz in Region 1	
27	HOL	Characteristics of portable and mobile receivers	

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/6-E
23 August 1982
Original : English

COMMITTEE 4

IFRB

TECHNICAL CRITERIA AND PLANNING PRINCIPLES FOR SOUND BROADCASTING IN THE BAND 87.5 - 108 MHz

(A tabulation of CCIR Recommendations and Reports and Proposals from administrations)

In the attached table the technical criteria and planning principles in CCIR Reports and Recommendations, including the CCIR Report to the First Session of the Conference, and in the proposals from administrations, relating to the various items of the Conference Agenda, are summarized.

In addition, the technical criteria adopted at the Stockholm 1961 and the Geneva 1963 Conferences are shown.

The following observations are pertinent.

1.1 Propagation

There would seem to be a general view that the propagation curves to be used should be those of Figs. 3.1 - 3.9 (based on Recommendation 370-3 (MOD F)) of the CCIR Report to the First Session, that the wanted signal should be that provided for 50% of the time at 50% of the locations and the tropospheric interfering signal that occurring for 1% of the time at 50% of the locations.

1.2 Channel Spacing

CCIR Recommendation 412-2 (MOD I) specifies a channel spacing of 100 kHz for both monophonic and stereophonic with the carrier frequencies at integral multiples of 100 kHz. This channel spacing is proposed by several administrations.

1.3 Modulation Standards

The standards in Recommendation 450 (MOD I), namely a maximum deviation of ± 75 kHz or 50 kHz and a pre-emphasis of 50 µs or 75 µs, are generally agreed and for stereophony the pilot tone system is preferred.

1.4 Protection Ratios

For systems using ± 75 kHz deviation, the protection ratios given in Recommendation 412-2 are proposed. Some administrations using ± 50 kHz deviation have put forward new figures for stereophonic broadcasting.

1.5 Minimum Usable Field Strengths

Values of 48 dB µV/m and 54 dB µV/m, derived from Recommendation 412-2, for monophonic and stereophonic broadcasting respectively are supported with the former proposed for planning purposes. Two administrations propose a higher figure, namely 60 dB, for planning purposes.

1.6 Maximum Radiated Power

There is no CCIR Recommendation but administrations have made differing proposals - e.g. 60 kW, 100 kW, no limit.

1.7 Transmitting and Receiving Antennae, Polarization

Recommendation AN/10 proposes that a front-to-back ratio of 12 dB (stereo) and 6 dB (mono) for receiving antennas be assumed for planning purposes and these figures are proposed by some administrations. Others propose 12 dB (stereo) and 0 dB (mono).

It is generally agreed that linear polarization should be assumed for planning purposes and in some instances horizontal polarization is specified. Two administrations propose that polarization discrimination should not be assumed for planning purposes while one administration suggests an allowance of 10 dB should be applied where appropriate.

1.8 Selectivity, Sensitivity

No numerical information is available in CCIR documentation.

1.9 Compatibility with other services

The CCIR Report to the First Session in section 2.2.2.2 and Report AM/10 provide information on the protection required by FM sound broadcasting interfered by television broadcasting (D/SECAM). Chapter 5 of the CCIR, Report to the First Session and Report 306-3 (MOD F) deal with the protection required by television (D/SECAM) interfered by FM sound broadcasting.

The CCIR Report to the First Session in Chapter 6 considers the protection required between FM sound broadcasting and fixed and mobile services and between FM sound broadcasting and aeronautical radio-navigation services.

Some administrations have presented useful technical studies related to this item.

1.10 Planning Principles

While the Conference relates to the planning of sound broadcasting in the band 87.5-108 MHz several administrations propose that planning is restricted to the band 100-108 MHz.

The use of theoretical network planning is generally supported as is the simplified multiplication method for assessing multiple interferences.

Several administrations propose restrictions on frequency assignments for various reasons - e.g. to enable the use of a common transmitting antenna for several programmes.

Annex : 1

ANNEX

No. AGENDA ITEM	CCIR RECOMMENDATIONS REPORTS		ST 61	GE 63	D Doc. 9	G Doc. 4	DDR Doc. 16	URS Doc. 11	AUT Doc. 18	HOL Doc. 19
1.1 PROPAGATION	Rec. 370-3 (MOD F)	Propagation curves for field prediction	Rec. 312	Propagation curves divided to 6 climatic zones	Rec. 370-3 (MOD F)	Rec. 370-3 (MOD F)	Rec. 370-3 (MOD F)	Rec. 370-3 (MOD F)		
		E_w (50, 50) for wanted signal	E_w (50, 50)	E_w (50, 50)	E_w (50, 50)	E_w (50, 50)	E_w (50, 50)	E_w (50, 50)		
		E_i (1, 50) / E_i (5, 50) / E_i (10, 50) for interfering signals	E_i (1, 50) E_i (10, 50)	E_i (1, 50) E_i (10, 50)	E_i (1, 50)	E_i (1, 50)	E_i (1, 50)	E_i (1, 50)		
	Rep. 239-4 (MOD F)	Propagation statistics - parameter Δh				Δh should not be used.			Δh not to be applied for interfering signals.	
1.2 CHANNEL SPACING	Rec. 412-2 (MOD I)	100 kHz	100 kHz (Annex II to ST 61)	86 kHz	100 kHz	100 kHz	100 kHz	100 kHz		
1.3 MODULATION STANDARDS	Rec. 450 (MOD I)	Frequency deviation D = 75 (50) kHz	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz	Rec. 450 (MOD I)		
	Rep. 300-4 (MOD I)	Pre-emphasis	50 µs	50 µs	50 µs		50 µs			
	Rep. 418-1 Rep. 293-4 (MOD I)	Necessary bandwidth B_N = 2M + 2DK (K = 1)			(S) 300 kHz		180 kHz			
1.4 PROTECTION RATIOS	Rec. 412-2 (MOD I)	Stereophonic broadcasting D = 75 kHz	D (M) 75 50 kHz	D (M) 75 kHz	Rec. 412-2 (MOD I)	Rec. 412-2 (MOD I)	D (S) 50 kHz	D (S) 50 kHz		
		Protection for 99% of time co-ch. 37 dB adj-ch. 25 dB	co-ch. 28 31 adj-ch. 12 12	co-ch. 28 dB adj-ch. 12 dB			co-ch. 41 dB adj-ch. 25 dB	co-ch. 41 dB adj-ch. 25 dB		
1.5 MINIMUM USABLE FIELD-STRENGTH	Rec. 412-2 (MOD I)	Stereophonic service (S) E_{min} = 54 dB (µV/m)			(S) 54 dB (µV/m)	(S) E_{ref} = 54 dB (µV/m) for planning	Rec. 412-2 (MOD I)	Rec. 412-2 (MOD I)		
	Rec. 450	Monophonic service (M) E_{min} = 48 dB (µV/m)	(M) 48 dB (µV/m)	(M) 48 dB (µV/m)	(M) 48 dB (µV/m)		(S) E_{nom} = 60 dB (µV/m) for planning	(S) E_{nom} = 60 dB (µV/m) for planning		
1.6 e.r.p. max.	CCIR Rep. to the 1st session	No limit value is recommended	No limit value e.r.p. in the plan max. 375 kW	No limit value e.r.p. in the plan max. 500 kW	100 kW	No need for particular power limit	60 kW	No proposal		
1.7 Tx, Rx ANTENNAS, POLARIZATION	Rec. 419 (MOD F) Rec. AN/10 Rep. 617-1 (MOD F) Rep. 464-2 (MOD I) Rep. 122-2 (MOD F)	Receiving antenna front-to-back ratio (S) 12 dB (M) 6 dB	(M) 0 dB	(M) 6 dB	(S) 12 dB (M) 0 dB	Rec. AN/10	Rec. 419	Rec. AN/10	(S) 12 dB (M) 0 dB	
		Polarization Orthogonal polarization discrimination	Linear Rep. 122-2 ST 61 (Annex I)	Linear Rep. 122-2	Orthogonal not to be envisaged for planning	Linear for planning. Polarization discrimination of 10 dB to be applied where appropriate	Horizontal as a basis for planning	Horizontal should be used wherever possible	No polarization discrimination to be assumed for interference calculation	
1.8 SELECTIVITY SENSITIVITY	CCIR Rep. to the 1st session	No numerical data available			Taken care of by proposed RF protection ratios		Low pass filter should be used after demodulation	Recommendations of IEC should be followed		

No. AGENDA ITEM		CCIR RECOMMENDATIONS REPORTS	ST 61	SE 43	D Doc. 9	G Doc. 4	DDR Doc. 16	URS Doc. 11	AUT Doc. 18	HOL Doc. 19
1.9 COMPATIBILITY WITH OTHER SERVICES	Rec. 468-2 (MOD I) Rep. 796 (MOD I) Rep. AM/10	FM-BC(S)/D-SECAM TV RF protection ratio for steady interference co-ch. 45 dB, -50 kHz 50 dB, -100 kHz 35 dB	FM-BC(M)/D-SECAM co-ch. 32 dB		Rep. AM/10					
	Rep. 659	FM-BC(S)/LAND MOB RF protection ratio co-ch. 28 dB, -50 kHz 47 dB, -100 kHz 30 dB								
	Rec. 417-2 Rep. 306-3 (MOD F)	D-SECAM TV/FM-BC E_{min} = 54 dB (µV/m), protection 50 dB (0-1 MHz)	50 dB (0-1 MHz)	50 dB (0-1 MHz)	Rep. 306-3 (MOD-F)			Rep. 306-3 (MOD F)		
	Rec. 478-2 Rep. 659 Rep. 358-3 (MOD I)	LAND MOB/FM-BC E_{min} = 17 dB (µV/m), protection co-ch. 20 dB			Rep. 659	Freq. separation between MOB and BC stations should be > 0.5 MHz	Rep. 659 Rep. 358-3 (MOD I)	Rep. 659 Rep. 358-3 (MOD I)		
	CCIR Rep. to the 1st session	FIXED/FM-BC E_{min} = 20 dB (µV/m), protection co-ch. 10 dB			Not to be considered in FM-BC planning					
	Rec. CD/8 Rep. AZ/8 Rep. AD/8 (MOD F) Rep. BA/8 (MOD F)	AERON./FM-BC Protection ratio co-ch. 20-30 dB Simple values are not established at this stage			Rep. AD/8 (MOD F)	Rep. AZ/8 Rep. BA/8 (MOD F) ILS co-ch. 14 dB	Rec. CD/8 Rep. BA/8 (MOD F)			ILS prot'n 20 dB VOR 20 dB Aeronautical Mobile (R) 15 dB
1.10 PLANNING PRINCIPLES	Rep. AJ/10	Theoretical network planning * linear * non-linear * non systematic	No theoretical channel distribution	Theoretical planning model * 144 channels * 46 ch. lattice * 3 frequencies for station	In the 87.5 - 108 MHz 5-6 nat. progr. - Linear method 80 ch. lattice - LPS-reserved channels	Planning 100 - 108 MHz only for stereo serv. - No power limits for LPC	Planning 100 - 108 MHz - 3 networks 26 ch. lattice * ERP = 30 kW * E_{ref} = 60dB(µV/m) * heff = 250 m	Planning 100 - 108 MHz - 3 networks 26 ch. lattice - E_{ref} = 60 dB (µV/m)	Planning 100 - 108 MHz only No extra channels for LPS Ref. for interference * ERP = 1 kW * heff = 37.5 m	
	Rep. AH/10	Methods for assessment of multiple interferences * integral * log-normal * multiplication * simplified multiplication * power sum	Simplified multiplication	Simplified multiplication	Simplified multiplication		Simplified multiplication		Simplified multiplication	
	Rep. AF/10	Planning constraints * freq. separation (10.7 ± 0.2) MHz * common antenna freq. separation > 2 MHz * separate antenna freq. separation < 1 MHz may be feasible		- Oscillator radiation - Certain FM ch's to be avoided to protect TV reception	- Freq. separation (10.7 ± 0.2) MHz - Common antenna freq. separation >1.8 MHz - Separate antenna freq. spacing not less than 0.8 MHz - Freq. spacing of 4.6 MHz and 10 MHz should be avoided	- Common antenna freq. separation should be equal	- Freq. separation (10.7 ± 0.2) MHz - Common antenna freq. separation should not be less than 1.8 MHz			

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/7-E
23 August 1982
Original : English/
French/
Spanish

COMMITTEE 4

PROPOSALS FOR CONSIDERATION OF THE COMMITTEE

The Annex to this document contains a compilation of the proposals of administrations relating to the following topics :

1. Propagation characteristics
2. Channel Spacing
3. Modulation standards
4. Radio frequency protection ratios
5. Minimum usable field strength
6. Maximum radiated power
7. Characteristics of transmitting and receiving antennas; polarization
8. Receiver sensitivity and selectivity
9. Compatibility with other services.

In the preparation of the Annex, all documents up to and including No. 22 have been taken into account.

H. GÖTZE
Chairman of Committee 4

Annex : 1

1. PROPAGATION CHARACTERISTICS

doc 4 (G)

Propagation aspects would in general be based on CCIR Recommendation 370-3 (Mod. F).

Propagation Curves: The United Kingdom proposes the use of the field strength curves contained in Chapter 3 of the Report of CCIR IWP 10/4 for reception at antenna heights of 10 metres above ground level. These curves were derived from CCIR Recommendation 370-3 (Mod F).

Should there be a requirement for transmitters with effective antenna heights in excess of 1200 metres, it will be necessary to extend the series of propagation curves accordingly. Provision for such extension, at least for trans-horizon distances relevant to interference predictions, is contained in Section 2.1.1 of CCIR Report 239-4 (Mod F).

% Time for Interference: The United Kingdom proposes that planning should be undertaken on the basis of protection for all but 1% of time.

Mixed paths: The United Kingdom proposes the use of the linear interpolation method, contained in CCIR Report 239-4 (Mod F).

Location Variability: The United Kingdom proposes the continued use of 50% locations for planning.

Terrain clearance angle at the receiver: The United Kingdom considers that the use of this concept would complicate the planning procedure in the absence of a uniform terrain data base throughout Region 1. Moreover, since the correction applies to specific small receiving areas its use would be incompatible with the planning criteria referred to above and thus the UK proposes that it should not be taken into account.

Δh: The United Kingdom proposes that the terrain irregularity correction factor given in Figure 7 of CCIR Recommendation 370-3 (Mod F) should not be used since there is difficulty in producing and applying the required data for the Conference and its applicability for long trans-horizon paths is questionable.

doc 7 (D)

When assigning frequencies to sound broadcasting transmitters in the VHF band, the resulting usable field strengths are to be determined by using the propagation curves given in CCIR Recommendation 370-3 (MOD F), in particular the F (50,50) curves (50 % of the locations, 50 % of the time) for the wanted transmitter and, in the case of steady interference, also for the unwanted transmitter, and the F (50,1) curves (50 % of the locations, 1 % of the time) for the unwanted transmitter in the normal situation of tropospheric interference. Intermediate values of the field strength for effective antenna heights which are not included in the curves are determined by means of logarithmic interpolation. Values of the effective antenna heights which are lower than 37.5 m or higher than 1 200 m are equated with one or the other of these two extreme values. The effective heights of the transmitting antennae are to be considered for 36 directions (from 10° to 10°, starting at 0°); the same applies to the Δh values for assessment of the attenuation correction factor accounting for terrain irregularity.

doc 11 (URS)

The propagation characteristics and methods used to forecast field strength values in the VHF band and to calculate the service areas of sound broadcasting stations should be in accordance with draft Recommendation 370-3 (MOD F) of the CCIR.

It is proposed that the curve in Fig. 1 of draft Recommendation 370-3 (MOD F) (50 % of the locations, 50 % of the time) should be used to determine the service area of broadcasting transmitters, and the curve in Fig. 4a (50 % of the locations, 1 % of the time) to determine the field strength of interference from transmitters.

doc 16 (DDR)

The Recommendations and Reports of the CCIR summarized in the document of the CCIR 10/279 form a good and satisfactory basis for planning and should be applied.
1 % is proposed as permissible percentage-of-time interference.

2. CHANNEL SPACING

doc 4 (G)

The United Kingdom proposes that the frequency assignment plan should be drawn up using 100 kHz channel spacing with nominal carrier frequencies on integral multiples of 100 kHz.

This proposal supports Section 3 of CCIR Recommendation 412-2 (Mod. F).

doc 7 (D)

In the whole planning area the channel spacing should uniformly be 100 kHz and the nominal frequencies should be integral multiples of this channel spacing.

doc 11 (URS)

It is proposed that a channel spacing of 100 kHz should be adopted in the frequency band 87.5 - 108 MHz, which would correspond to the channel spacing adopted at the European VHF/UHF Broadcasting Conference (Stockholm, 1961).

doc 16 (DDR)

The channel spacing of the frequency assignments for the monophonic and stereophonic FM-broadcasting shall uniformly amount to 100 kHz.

The carrier frequencies determining the position of the radio channels shall be integral multiples of 100 kHz.

3. MODULATION STANDARDS

doc 4(G)

The United Kingdom supports the use of the pilot-tone system for stereophonic broadcasting and proposes a maximum frequency deviation of ±75 kHz, as specified in CCIR Recommendation 450 (Mod. F).

DATA SIGNALS

Data signals may be used for purposes varying from network operations to the control of the listener's receiver. One possibility is to use subcarriers at 57 kHz and 76 kHz each with a deviation of about ±3 kHz. This would require the programme signal deviation to be reduced by about 1 dB.

QUADRAPHONIC SOUND

Various methods have been considered for transmitting quadraphony but there is as yet no general agreement on either its desirability or the best method of implementing it. For the present purposes it is sufficient to assume that the programme signal deviation would have to be reduced by about 1 dB to accommodate quadraphony.

SUPPLEMENTARY SOUND CHANNELS

Reports 300-4 (Mod. F) and 463-2 (Mod. F) detail various systems designed to give one or more additional sound channels. Again, a reduction of about 1 dB in the programme signal deviation would be required.

doc 7(D)

- type of modulation	:	frequency modulation (FM)
- maximum deviation	:	± 75 kHz
- pre-emphasis	:	50 µs
- modulation system	:	FM stereophony, pilot-tone system
- necessary bandwidth	:	300 kHz (stereo)

doc 11(URS)

The maximum frequency deviation should be chosen in accordance with draft Recommendation 450 (MOD F) of the CCIR. The emitting bandwidth should be chosen on the basis of the maximum frequency deviation in accordance with Appendix 5 of the Radio Regulations.

-

doc 16(DDR)

The radio frequency signal shall consist of a carrier frequency modulated with the sound signal with a maximum deviation of 75 kHz. The pre-emphasis of the sound signal amounts to 50 µs.

For stereophonic transmission the German Democratic Republic applies the pilot tone system. The applied bandwidth amounts to :

2 x 15 kHz + 2 x 75 kHz = 180 kHz

according to Appendix 6, part B, to the Radio Regulations.

4. RADIO FREQUENCY PROTECTION RATIOS

doc 4 (G)

The United Kingdom proposes that the present values of protection ratio given in CCIR Recommendation 412-2 (Mod. F) should be retained for stereophonic transmissions, including systems using additional sub-carriers that are designed to limit the total deviation to ±75 kHz.

doc 7 (D)

Mutual interference between FM sound broadcasting transmitters is to be considered according to the protection ratio curves given in CCIR Recommendation 412-2 (MOD F).

If a distinction is to be made between steady interference and tropospheric interference (see CCIR Recommendation 412-2 (MOD F)), the protection ratio is applicable which, together with the respective propagation curve, leads to stronger interference (steady interference F(50,50); tropospheric interference: F(50,1)).

doc 11 (URS)

It is proposed that the standard protection ratios for stereophonic sound broadcasting should be those contained in draft Recommendation 412-2 (MOD F) of the CCIR. These standards apply to the pilot-tone system and to networks with a maximum frequency deviation of ± 75 kHz.

For stereophonic networks using the pilot-tone system with a maximum frequency deviation of ± 50 kHz we propose the standard protection ratios given in the table below :

Frequency spacing (kHz)	0	100	200	300
Predominant nature of the disturbance	Tropospheric		Diffractory	
Radio-frequency protection ratios (dB)	41	25	7	- 7

Because of the technical similarity between the pilot-tone and polar-modulation systems for stereophonic broadcasting, there should be no appreciable difference between the standard protection ratios for the two systems with the same maximum frequency deviation.

doc 16 (DDR)

Against transmitting stations of the FM sound broadcasting, protection ratios are recommended ensuring for 99% of the time a good reception:

Frequency spacing (kHz)	Protection ratio (dB)			
	Mono		Stereo	
	permanent interference	troposph. interfer.	permanent interference	tropospheric interference
0	36	28	45	37(41+)
100	12	12	33	25
200	6	6	7	7
300	-7	-7	-7	-7
400	-20	-20	-20	-20

+ for co-channel interference with a frequency deviation of ± 50 kHz

Between the television system D/Secam and FM-broadcasting the protection ratios given in CCIR-Doc. 10/280 can be applied.

5. MINIMUM USABLE FIELD-STRENGTH

doc 4 (G)

The United Kingdom proposes that in preparation of the Plan the reference usable field strength for stereophonic services should be 54 dB (μV/m) ($\frac{1}{2}$ mV/m) at 10m above ground level*. Planning should be on the basis of providing protection for 99% of the time.

* In the case of mixed-polarized transmissions this will be either the horizontally polarized or the vertically polarized component of field strength.

CONSIDERATIONS RELATING TO THE CHOICE OF MINIMUM WANTED FIELD STRENGTHS AND FIELD STRENGTHS TO BE PROTECTED

It is recognised that this value of E_{ref} equates to the values now quoted for E_{min} in Recommendation 412-2 (Mod F). This is considered acceptable since planning at and after the Stockholm Conference has been based on a usable field strength of 48 dB (μV/m) for monophonic reception and hence 54 dB(μV/m) for stereophonic reception.

Whilst recognising that the frequency Plan should allow for both monophonic and stereophonic reception, the United Kingdom considers that planning should be on the basis of the latter, as representing the more stringent planning requirement. Nevertheless, this should not preclude the possibility of the planning in part of Region 1 being for monophonic services, should this be the requirement of Administrations. However it should be noted that the standards for monophonic reception in Rec. 412-2 (Mod F) relate to reception with a fixed antenna at 10m above ground level and no standards are approved by the CCIR for other reception conditions.

doc 7 (D)

In principle, a minimum usable field strength of

48 dB (μV/m) for monophony and
54 dB (μV/m) for stereophony

is regarded as sufficient (see CCIR Recommendation 412-2 (MOD F)).

doc 11 (URS)

It is proposed that the minimum wanted field strength should be chosen in accordance with draft Recommendation 412-2 (MOD F) of the CCIR.

It is proposed that in drawing up the frequency assignment plan for FM sound broadcasting in the 100 - 108 MHz band a nominal field strength of 1.0 mV/m should be used.

doc 16 (DDR)

As minimum usable field strengths, measured 10 m above ground level at which satisfactory reception quality is reached, taking into account natural and man made noise, but without effects of interfering stations the following values are recommended :

for stereophonic broadcasting	54 dB in rural areas, 66 dB in urban areas, 74 dB in large cities;
for monophonic broadcasting	48 dB in rural areas, 60 dB in urban areas, 70 dB in large cities.

If a directional antenna is used and in the absence of man made noise a field strength of

48 dB

is considered to be just acceptable also in stereophonic broadcasting.

doc 22 (YUG)

The concepts of the minimum usable field strength and of the usable field strength should be followed during the drawing-up of the plan. There is no need to introduce other field strength values (for instance nominal usable field strength, or reference usable field strength) because such new concepts do not improve the plan itself.

The minimum usable field strengths given in CCIR Recommendation 412-3 (mono: 48 dB (/uV/m); stereo: 54 dB (/uV/m), should be regarded as limits to which the usable field strengths should tend. However, this tendency should be primarily respected for transmitters intended to cover larger areas (high power and/or high effective antenna height).

6. MAXIMUM RADIATED POWER

doc 4 (G)

The United Kingdom proposes that, subject to the proviso that countries should not use powers in excess of those necessary to achieve the required coverages, there is no need to specify particular power limits.

Discussion

The United Kingdom sees no particular advantage in imposing a power limit over and above that implied for all transmitters under the terms of RR 2666.

The acceptance of a power restriction to the United Kingdom would depend greatly upon the level chosen and its relation to the effective height of the transmitter antenna and, in particular, the use of total power or the power in each plane of polarization. Whilst an exclusion permitting powers to be increased to levels registered in the Stockholm Plan would resolve this problem for existing transmitters, additional networks might be required to be registered at comparable powers in a new Plan above 100 MHz.

It would seem difficult, on technical grounds, to defend the imposition of power levels in a general way since it has been demonstrated that use of high powers and high effective antenna heights represents efficient use of spectrum in studies based on the propagation curves of CCIR Rec. 370.

doc 7 (D)

The effective radiated power of the individual transmitters in the VHF sound broadcasting transmitter network shall be adequately adapted to the service envisaged whilst taking due account of the effective height of the transmitting antenna. According to the experience with the existing transmitter networks in the VHF band an upper limit of the effective radiated power of 100 kW can, in general, be regarded as being sufficient.

doc 16 (DDR)

The effective radiated power should never be greater than necessary under the given local conditions in order to reach the required coverage, and should as far as possible not exceed the value of 60 kW.

When determining the effective radiated power it is to be regarded that no unsuited differences between the field strengths of the transmitters already realized and newly planned are resulting for the participants.

doc 22 (YUG)

With regard to the radiated power, the Conference should recognize all stations which are capable to produce potential interference. The referenced field strength taken should be that produced by 1 kW transmitter with effective antenna height of 37,5m, at a distance of 200 km, for 50% of locations and 1% of time, on entirely land path, without Δ h correction. All transmitters capable to produce field strengths equal to or greater than this referenced field strength (19 dB (/uV/m) of 200 km) should be obligatory introduced in the plan.

However, countries wishing to introduce in the plan stations with interference potential lower than the referenced one, should be enabled to do so. A developed local radio system, based on low power transmitters already has been operating in the SFR of Yugoslavia. That broadcasting system is intended to fulfil the requirements for local information in every commune of the country, as a basic socio-political community in which people materialize, on a self-management basis, their right to be informed on all matters of common interest. The planning of such a system should not be disabled.

7. TRANSMITTING AND RECEIVING ANTENNAE POLARIZATION

doc 4 (G) RECEIVING ANTENNAE

The United Kingdom proposes the use of the directivity curve given in CCIR Recommendation [AD/10] for stereophonic sound services.

Results of measurements which support the use of this curve are given in Annex A.

TRANSMITTING ANTENNAE AND POLARIZATION

The United Kingdom proposes that the characteristics of each emission should be defined in terms of the effective radiated powers in the horizontally-polarized and vertically-polarized components. (See Annex B).

It is proposed therefore that effective radiated powers of transmissions shall be defined as follows:

(a) Effective radiated powers shall be stated separately for the horizontally-polarized and the vertically-polarized components.

(b) Where the transmitting antenna is directional, radiation patterns shall be defined for both components of polarization.

(c) Where the transmitting antenna is intended to radiate only one component and the cross-polarized component is known to be more than 20 dB below the wanted component then the power radiated in the unwanted component need not be stated.

(d) Where there are significant powers in both horizontally-polarized and vertically-polarized components the phase angle between them has no effect on co- or adjacent-channel interference and need not be defined. The term mixed polarization may be used for all such cases.

Some Administrations may wish to adopt mixed polarization as a means of improving coverage for car radios and portable receivers. The United Kingdom considers that where this is done, planning should still be based on the assumption of stereophonic reception with fixed horizontally polarized or vertically polarized antennae at 10m above ground level. In this case the E_{ref} relates to the horizontally polarized or vertically polarized component of the composite field strength.

4 To assess the effect of interference from mixed-polarized to linearly polarized transmissions, the horizontally-polarized and vertically polarized components should be treated separately with a polarization discrimination of 10 dB being applied where appropriate.

5 To assess the effect of interference from linearly-polarized to mixed-polarized transmissions no polarization discrimination shall be applied in respect of fixed receiving antennae since these may be either horizontal or vertical.

POLARIZATION DISCRIMINATION

Assuming planning to be on the basis of fixed receiving antennae at 10 m above ground level, it is proposed that a polarization discrimination of 10 dB be applied where appropriate, this being assumed to be additional to any receiving antenna directivity. For situations involving mixed-polarized transmissions, the interference should be assessed as indicated in paragraphs 4 and 5 of the United Kingdom proposals under Agenda Item 1.5.

doc 6 (NOR)

The possibility of using circular or elliptical polarization in FM broadcasting should be stated in the plan. The power sum of the vertical and the horizontal components may then have the same limit as the power given for linear polarization.

It may also be mentioned that by using the discrimination between right hand and left hand polarization, the coverage area may be extended when interference is the limiting factor.

doc 7 (D)

TRANSMITTING ANTENNA

In accordance with the Radio Regulations of 1982 (Appendix 1, Section A, Column 9) the azimuth values of maximum radiation (Column 9a) and the values of the angular width of radiation main lobe (Column 9c) (angle between 6 dB points) are to be indicated.

In addition, the values of the effective radiated power for all azimuths (from 10° to 10°, starting at 0°) should be known for planning purposes.

RECEIVING ANTENNA

Depending on the transmission system the following antennae are to be used for planning:

- an omnidirectional antenna for monophony
- a directional antenna with a front-to-back ratio of 12 dB for stereophony (in accordance with CCIR Recommendation AN/10).

Polarization

Coverage by VHF sound broadcasting is to be based mainly on horizontal polarization. Mixed polarization is also to be admitted for the solution of special coverage problems. In this case the components with horizontal and vertical polarization must, however, be proportioned in such a way that the notified maximum effective radiated power of the respective transmitter will not be exceeded. In the case of broadcasting transmitters with orthogonal polarization no (0 dB) receiving antenna discrimination is to be assumed for planning as the polarization of the receiving antenna will not always be identical with the polarization of the wave emitted by the wanted transmitter.

For the same reason systematic use of orthogonal polarization is not to be envisaged for planning.

doc 11 (URS)

For the reception of stereophonic programmes we propose the use of directional receiving antennas with directivity characteristics in accordance with draft Recommendation AN/10 of the CCIR.

It is proposed that the transmitting antenna should have an almost circular directivity pattern in the horizontal plane making it possible to attenuate radiation in any direction.

It is proposed that, wherever possible, horizontal polarization should be used.

doc 16 (DDR)

The G.D.R. intends to apply horizontal polarization and proposes to take it as a basis for planning. If other polarizations are wished to be applied polarization discrimination should not be included in planning.

Directional transmitting antennae can be used in order to provide the required field strength in good accordance with the wanted coverage area.
For planning, a directional receiving antenna can be used according to CCIR-Recommendation Nr. 419.

8. RECEIVER SENSITIVITY AND SELECTIVITY

doc 7 (D)

Receiver sensitivity and selectivity are sufficiently well taken into account by the minimum usable field strength (see item 5) and the radio frequency protection ratios (see item 4).

doc 11 (URS)

In matters of receiver sensitivity and selectivity the Soviet Administration considers that the recommendations of the IEC can be followed.

doc 16 (DDR)

It is provided that in the stereophonic receiver a low-pass filter is used following the demodulator in order to reduce intermodulation interferences at frequencies greater than 53 kHz.

9. COMPATIBILITY WITH OTHER SERVICES

TV BS - D·SECAM

doc 7 (D) Compatibility between VHF sound broadcasting and television broadcasting in band 8 (VHF) is guaranteed if the radio frequency protection ratios which are laid down internationally by the CCIR are considered (see CCIR Reports AM/10 and 306-3 (MOD F)).

doc 11 (URS) It is proposed that the problem of protecting the reception of TV channels from FM sound signals should be dealt with by using the protection ratio curve for the SECAM system, which reflects the results of experimental research (draft Report 306-3 (MOD F), Fig. 7).

The Soviet Administration considers it necessary for any approach to the problem of compatibility with other services to be based on the provisions of the Radio Regulations and CCIR documents (Report 659, draft Report 583-1 (MOD I), draft Recommendation CD/8, draft Report BA/8, and others).

FIXED

doc. 7(D) On account of their status the fixed services in the band 104 to 108 MHz will not be considered in planning.

MOBILE

doc 4 (G) The United Kingdom proposes that in Region I at the lower band edge (87.5 MHz) a minimum carrier frequency spacing of 0.5 MHz be maintained between broadcasting and mobile services in the same geographical area to protect broadcast reception.

doc 7 (D) On account of their status the mobile services in the band 87.5 to 108 MHz will not be considered in planning. As regards the compatibility with the radio services operating below 87.5 MHz the protection ratios which are laid down internationally by the CCIR are to be taken into account (see CCIR Report 659).

doc 16 (DDR) For solving the questions of compatibility with other services the Administration of the German Democratic Republic considers it to be necessary to proceed from the Radio Regulations and from the CCIR Documents (Report 659, Draft Report ~~583-1~~ 358-3 (MOD I), Draft Recommendation CD/8, Draft Report BA/8 and others).

AERONAUTICAL RADIONAVIGATION

doc 4 (G) The United Kingdom attaches considerable importance to the problem of the protection of the Aeronautical Radionavigation Service in the band 108 to 118 MHz, and in particular to the operation of the Instrument Landing System in the sub-band 108 to 112 MHz. Bench Studies of the interference mechanisms have been carried out /See Appendix/ and the further work of analysis of the operational environment is continuing. From the early conclusions of this work and the material in CCIR Report /BA/8/ the United Kingdom recommends adoption of the following planning principles and measures:

ILS SYSTEM CONSIDERATIONS

cognizance be taken of the identified interference modes described in CCIR Report /BA/8/.

the ILS service areas over which protection is required and the corresponding minimum field strengths should be as Attachment (reproduced from ICAO Annex 10 Vol. 1, Clause 3.1.3.3 and Fig. C-7).

interference threshold criteria should be established and agreed internationally, based on the material in CCIR Reports /BA/8/ and /AZ/8/.

The conversion of field strength of a wanted signal in dB(μV/m) to receiver input power in dBm should be made by subtracting 121 dB, which includes an allowance for system loss.

an airborne antenna system loss characteristic of 1 dB/MHz for broadcast frequencies below 108 MHz.

The protection ratios against the effects of both radiated and receiver-generated intermodulation products at various frequency separations would need to be established for future receivers.

protection ratios against the effects of radiated intermodulation products for current receivers are as follows:

at carrier coincidence	-	+ 11 dB
50 kHz away	-	+ 7 dB
100 kHz away	-	+ 2 dB
150 kHz away	-	+ 0 dB
200 kHz away	-	- 3 dB
250 kHz away	-	- 18 dB

doc 7 (D) The aeronautical radionavigation service in the band 108 to 117,975 MHz is to be considered according to the international criteria for protection which are specified in CCIR Report AD/8 (and Doc. 10/278).

doc 12 (BEL)

Following the decision taken at the World Administrative Radio Conference held in Geneva in 1979 to extend the broadcasting service in Region 1 beyond 100 MHz (Resolution No. 510), it was found necessary to study the risks of interference which frequency-modulation sound broadcast transmitters might cause to the aeronautical radiocommunication services operating in the frequency band immediately above (108 - 136 MHz). The WARC also called for this kind of study in Recommendation No. 704, particularly in view of the interference problems which had already occurred between these services in the regions of the world where the band 100 - 108 MHz had been used for a long time for broadcasting purposes.

doc 13 (F)

In planning the sound broadcasting band 87.5 - 108 MHz it should be borne in mind that the band 108 - 136 MHz is used by a number of air-navigation radio aids designed to facilitate aircraft landing.

- From 108 to 112 MHz the ILS (course line alignment controls) and VORs (radio-beacons) alternate with a 50 kHz interval.
- From 112 to 118 MHz there are only long-range VORs.
- Between 118 and 136 MHz there are 720 radiotelephone channels, with a 25 kHz interval, for air-to-ground links.

This contribution discusses the various measurements required to determine the interference criteria, first for ILS equipment and then for two other types of navigation aid. In each case it proposes a presentation of results leading to a simple computer calculation process liable to prove genuinely useful in planning broadcasting transmitter frequencies.

doc 19 (HOL)

To avoid problems in the actual assigning of frequencies to FM broadcasting stations in the band concerned, it seems wise to take into account in the planning procedure those elements of intereference which can clearly be foreseen.

One of these elements is the unwanted emission by the broadcasting transmitter in the operational channel of the aeronautical equipment. For this, no rejection of the unwanted signal is possible in the aeronautical receiving systems.

Suppression at source, and/or distance separation are the only effective cures. This contribution deals exclusively with these aspects. All the calculations and assumptions have been made for the worst case situation.

Types of aeronautical equipment involved

In the adjacent aeronautical bands the following systems are in use :

ILS-localizers	108 - 112 MHz
VOR	108 - 117.975 MHz
Aeronautical Mobile (R)	117.975 - 136 MHz

doc 21 (GRC)

The band 108 - 117.975 MHz is used by the following radionavigation systems :

- ILS (instrument landing and localizer systems) which use the band 108 - 112 MHz with 100 (or 50) kHz spacing;

- VOR (VHF omnidirectional radio range) which uses all of the band 108 - 117.975 MHz with 50 kHz spacing.

The technical specifications of the above systems are given in Chapter 3 of Annex 10 to the Convention on International Civil Aviation, Volume I. The following table gives the minimum usable field strength and the protection ratio for each system.

	Minimum usable field strength	Protection ratio	Maximum admissable level of the interfering signal
ILS-LLZ in general	40 μV/m (32 dBμV/m) (-114 dBW/m^2) (-86 dBm)	20 dB	4 μV/m (12 dBμV/m) (-134 dBW/m^2) (-106 dBm)
ILS-LLZ Category I	90 μV/m (39 dBμV/m) (-107 dBW/m^2) (-79 dBm)	20 dB	9 μV/m (19 dBμV/m) (-127 dBW/m^2) (-99 dBm)
ILS-LLZ Category II-III	100 μV/m (40 dBμV/m) (-106 dBW/m^2) (-78 dBm)	20 dB	10 μV/m (20 dBμV/m) (-126 dBW/m^2) (-98 dBm)
VOR	90 μV/m (39 dBμV/m) (-107 dBW/m^2) (-79 dBm)	20 dB	9 μV/m (19 dBμV/m) (-127 dBW/m^2) (-99 dBm)

Note : The relations between dBμV/m, dBW/m^2 and dBm are as follows :

$W(dBW/m^2) = E(dB\mu V/m) - 146$

$P(dBm) = E(dB\mu V/m) - 118$ (antenna gain : unit)

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/8-E
23 August 1982
Original : English

COMMITTEE 4

Note by the Chairman of Committee 4

Taking into account the terms of reference of Committee 4 contained in Document No. DT/2 and approved by the first Plenary Meeting, it is necessary to form Working Groups, with the following tasks :

Working Group 4.1 - Propagation

Terms of Reference :

- Propagation characteristics and methods used to forecast field strength values in the VHF band and to calculate the service areas of sound broadcasting stations.

Related documents : Nos. 4, 7, 11, 14, 16

Working Group 4.2 - Technical characteristics

Terms of Reference :

- Optimum channel spacing, channel distribution
- Modulation standards, emitting bandwidths (including stereophony and other systems having additional sub-carriers)
- Radio frequency protection ratios
- Minimum wanted field strength values; field strengths to be protected
- Maximum radiated power
- Basic characteristics of transmitting and receiving antennas, polarization
- Receiver sensitivity and selectivity

Related documents : Nos. 4, 6, 7, 10, 11, 14, 16, 17, 22, 27, DT/3

Working Group 4.3 - Criteria for the compatibility of the broadcasting service with other services

Terms of reference :

- Criteria for the compatibility of the FM sound broadcasting service with :
  - the television broadcasting service,
  - the fixed service,

- the aeronautical radionavigation service,
- the mobile service,

in the same frequency band or in adjacent bands, taking into account the results of CCIR studies.

Related documents : Nos. 4, 7, 11, 12, 13, 14, 16, 19, 21, 26.

H. GÖTZE
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/9-E
23 August 1982
Original : English/
French/
Spanish

COMMITTEE 5

PROPOSALS FOR CONSIDERATION OF THE COMMITTEE

The Annex to this document contains a compilation of the proposals relating to the following topics :

1. Planning principles (general)
2. Consideration of existing assignments in the band 87.5 - 100 kHz
3. Low power limit
4. Low power channels
5. Planning constraints
6. Planning methods
7. Analyzing the Plan
8. Organizational approach.

In the preparation of the Annex, all documents up to and including No. 22 have been taken into account.

K. ARASTEH
Chairman

Annex : 1

1. PLANNING PRINCIPLES
(GENERAL)

doc 4(G)

All requirements should le processed in the same manner according to the technical evaluation procedure adopted by the Conference. The definition of a requirement should use the concept of providing broadcasting services to the required service area.

Planning should be based primarily on retention of the Stockholm Plan for the band 87.5 - 100 MHz, and unconditional planning of the band 100-108 MHz.

Note: Since comparatively few Administrations have implemented the 1963 Geneva Plan for the African Broadcasting Area to any significant extent there may be advantages in a new plan for th area using a channel spacing of 100 kHz throughout the band 87.5 - 108 MHz. However, in the resolution of this matter, the United Kingdom approach would be largely influenced by the views of the countries primarily affected.

Planning to be based on stereo reception (including recognition of the need to carry sub-carrier services) to fixed receivers. Whilst the need to provide services to mobile receivers is recognised, it is considered that the technical difficulties of incorporating the requirements of mobile receivers can be contained if a satisfactory standard is maintained to fixed receivers.

doc 9(D)

All countries have the right that their frequency requirements are taken into account if they conform to the principles of an efficient use of the spectrum, i.e. if these requirements are intended to provide, in the band 87.5 to 108 MHz, full coverage by about 5 to 6 national programmes or possibly by a somewhat smaller number of regional or local programmes. If full coverage is not intended, a somewhat larger number of programmes may be transmitted.

The establishment of a new plan for the whole band or part thereof may be described as follows:

- When establishing a new plan for the whole band, a frequency taken from the whole band 87.5 to 108 MHz will, in principle, be assigned to all transmitters. If a frequency already in use before the Conference is assigned anew to a transmitter, this is, in general, done purely by chance but it may also be intended in exceptional cases.

- When establishing a new plan for part of the band, a frequency taken only from the upper part of the band, i.e. 100 to 108 MHz, will, in principle, be assigned to those transmitters for which a valid plan does not comprise any frequency assignment in the band 87.5 to 100 MHz. Nor does this exclude basic characteristics - including the frequency - of individual transmitters, which are or may be operated on a frequency below 100 MHz according to the plan, from being changed within the scope of the technical requirements or from new transmitters being added or existing transmitters being abandoned.

As it is technically feasible in the majority of cases to transmit or to receive any frequencies within the band 87.5 to 108 MHz by means of the transmitting and receiving installations including their antennae, the establishment of a new plan for the whole band could be taken into consideration. This may be desirable when the bases of the plans presently in use have undergone substantial changes since their establishment. This will be necessary if, for example, the frequency spacing is changed.

- Within the European Broadcasting Area the establishment of a new plan for the whole band will hardly be considered in those countries which have a common border with countries in which this band is used for television. Especially in these countries the establishment of a new plan for the upper part of the band only will therefore be envisaged.

doc 11 (URS)

It is proposed that a frequency assignment plan in the 100 - 108 MHz band should be prepared for the organization of FM broadcasting in Region 1 and certain countries concerned in Region 3. This planning process should be based on WARC (1979) Resolution No. 510 relating to the Convening of a Planning Conference for Sound Broadcasting in the Band 87.5 - 108 MHz for Region 1 and Certain Countries Concerned in Region 3, which states "that this new plan should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm, 1961" and also "that this new plan in the band 87.5 - 100 MHz should not result in the deterioration of the service areas of those existing sound-broadcasting stations operating in accordance with the Regional Agreement, Stockholm, 1961, which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961".

It is proposed that the following planning principles should be used :

- the locations of transmitters should, wherever possible, be determined with a view to the co-siting of television and FM radio broadcasting stations;

- the transmitter density, transmitters' effective radiated power and also the effective height of antennas should be chosen in such a way that practically the entire territory of a country is covered by the nominal field strength;

doc 16 (DDR)

The German Democratic Republic intends to use the range 100 - 108 MHz for stereophonic FM broadcasting too and to apply the same transmission system.

In the frequency range 100 - 108 MHz 3 further full area coverages are to be realized with stereophonic broadcasting.

doc 18 (AUT)

The freedom of new planning in a great part of the European Broadcasting Area appears to be severely restricted. For example in drawing up a new plan for the band 87.5 - 100 MHz different interpretations of the terms "affected" and "deteriorated" may cause serious disagreements. This situation is given only in the European Broadcasting Area.

It is therefore proposed that in the European Broadcasting Area new planning should be done for the band 100 - 108 MHz, whereas in the band 87.5 - 100 MHz the existing Stockholm Plan should only be modified in cases where it is necessary or where improvements are possible.

The final plan shall provide for all countries in the planning area equally effective use of the spectrum available for operating their sound broadcasting transmitters. However, different service requirements of the various types of programmes (e.g. national, regional, local programmes) may lead to different configurations of the respective transmitter networks, resulting in area coverage of a few percent only on the one extreme and more than 100 percent of the other.

If there is a need to describe technically the basic "equality of rights", this could perhaps best be done by the equality of the number of "equivalent national coverages", the term "equivalent national coverage" being defined as the number of programmes multiplied by the resulting area coverage (one "equivalent national coverage" is achieved by 100 % area coverage for one programme or by 50 % area coverage for two programmes, etc.).

The maximum number of equivalent national coverages for which a plan is technically feasible is given by the capacity of the band 87.5 - 108 MHz. Indications for the capacity are given for the band 87.5 - 100 MHz by the Stockholm Plan in its present form and for the whole band by theoretical exercices.

It is therefore proposed that

- the new plan shall provide for all countries in the planning area an equal number of "equivalent national coverages" related to the bandwidth available for sound broadcasting;

- the capacity of the total band 87.5 - 108 MHz should be derived from the factual capacity of the band 87.5 - 100 MHz as shown by the Stockholm Plan in its present form;

- the requirements submitted by the administrations should be limited by the capacity of the band available for sound broadcasting in the respective country.

doc 22 (YUG)

1. Equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting

Justification : The band 87.5 - 108 MHz is allocated in Regions 1 and 3, by the WARC-79, to the broadcasting service on the primary basis. Countries wishing to use that band for broadcasting, in conformity with the Radio Regulations, should have equal rights in its use, and should be in no way constrained by non-broadcasting services.

2. Recognition of the sovereign right of every country to arrange the most suitable settlement of its broadcasting service, in conformity with the particularities of its socio-political system (multi-national and multi-lingual composition of its population, federalism, local information system, etc

Justification : There are different concepts with respect to the organization of the broadcasting service in different countries, due to the particularities in the socio-political systems. This is evident, for instance, in the actual use of the band 87.5 - 100 MHz by the broadcasting service. That band is used, in Region 1, for both the television and for VHF/FM broadcasting. Moreover, even the use of that band for the same type of the broadcasting service is subject to different settlements of the broadcasting systems. Some settlements are intended to ensure the coverage of the entire national territory with the same progamme; the other ones (for instance in countries with multi-national and multi-lingual composition of its population, or in countries having federal political systems), the broadcasting services are organized on the basis of ensuring the coverage of different parts of the national territory with different programmes. It should be, therefore, recognized the sovereign right of every country to settle the broadcasting service on its territory in conformity with the Radio Regulations, but, also in conformity with the particularities of its socio-political system.

The practical implication of the adoption of this principle means that the planning method, which will be chosen, should contain the possibility of fulfilling the requirements for both uniform and non-uniform transmitter distribution networks. To some extent it also postulates the characteristics of the method to be used for drawing-up the plan.

2. CONSIDERATION OF EXISTING ASSIGNMENTS IN THE BAND 87.5 MHz - 100 MHz

doc 4 (G)

Service area coverage of existing broadcasting stations should be retained to the maximum possible extent. Re-planning will inevitably lead to difficulties in defining service areas for existing and new services in congested areas.

Minimisation of the number and extent of changes to assignments at present in use, in order to reduce the costs of changes and to avoid unnecessary confusion for the public when the change-over occurs.

Endeavour to meet new requirements mindful of the limited spectrum available.

doc 9 (D)

The protection of the present service in Europe in the frequency band below 100 MHz (see 1.2.1 and 1.2.2) can be guaranteed in the easiest way if the status quo is maintained. However, a considerable number of frequencies in the band below 100 MHz which are not integral multiples of the frequency spacing should be adequately modified.

In countries in which the frequency band below 100 MHz is used for television broadcasting the coverage areas of the existing television transmitters may not be affected or may only be affected to an insignificant extent when the sound broadcasting transmitters in the other countries are changed over to the frequencies of the new plan. It is easy enough to meet this requirement if the status quo of the sound broadcasting transmitters is retained to a very large extent at least in the areas adjacent to those where the band is used for television.

When television transmitters are taken into account in countries in which the frequency band below 100 MHz is used for television, this shall not lead to the present state of coverage by sound broadcasting programmes being affected in this frequency band - in particular in the neighbouring countries. What matters in this case is not the coverage area of each single transmitter but the overall coverage by a specific programme. It is also easy to meet this condition if the status quo is retained to a very large extent in the areas concerned.

doc 16 (DDR)

The German Democratic Republic proposes to preserve in principle the frequency assignments to transmitting stations in the frequency range 87.5 - 100 MHz, used or planned, on the basis of the Regional Broadcasting Agreement, Stockholm, 1961, but considers it possible, however, that some frequency assignments could be changed, e.g. in connection with a uniform channel spacing, if this is in the mutual interest of the countries concerned.

doc 18 (AUT)

Resolution No. 510 of the WARC-79 states in its considerings f) and g) that :

- existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm, 1961, should in no way be affected by the new plan;

- the service areas of those existing sound broadcasting stations in the band 87.5 - 100 MHz operating in accordance with the Regional Agreement, Stockholm, 1961, which are situated in the coordination area with countries using this band for television, shall not be deteriorated.

Considering g) of Resolution No. 510 of the WARC-79 states that :

the new plan in the band 87.5 - 100 MHz should not result in the deterioration of the service areas of those existing sound-broadcasting stations operating in accordance with the Regional Agreement, Stockholm, 1961, which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961.

This provision is formally applicable also to existing low power stations situated in the coordination area. No similar provision exists for stations outside the coordination area. This fact may cause problems for existing low power stations operating in accordance with the Regional Agreement, Stockholm, 1961, and not being taken into account in the planning procedure because of their low interference potential.

It is therefore proposed that the Conference shall take care of the conservation of protection of all low power stations coordinated in accordance with the Regional Agreement, Stockholm, 1961.

This could technically best be achieved if within the European Broadcasting Area the existing Stockholm Plan in the band 87.5 - 100 MHz were only modified in cases where it is necessary or where improvements are possible.

3. LOW POWER LIMIT

doc 4 (G) There should be no lower power limit for stations within the plan. However, if a lower power limit is imposed it should be set at a total e.r.p of no more than 100 watts and it should not apply to existing frequency assignments.

doc 18 (AUT)

Since the introduction of VHF-FM sound broadcasting in Europe a large number of low power stations (ERP less than 1 kW) have been put into operation in order to complete coverage in hilly or mountainous regions or for local purposes. Because of the very large number of assignments to be treated by the Conference and because of the limited interference potential of most of the low power stations, it seems useful to restrict the number of low power stations to be recognized in the planning procedure at the Second Session of the Conference.

The Stockholm Conference 1961 only recognized transmitters with a minimum ERP of 1 kW irrespective of the effective antenna height. However, the interference potential is also strongly influenced by the effective antenna height.

It is therefore proposed that

- low power stations with a high interference potential should be recognized in the planning procedure;

- the limit should be given by the interference potential of a reference transmitter of 1 kW ERP and an effective antenna height of 37.5 m.

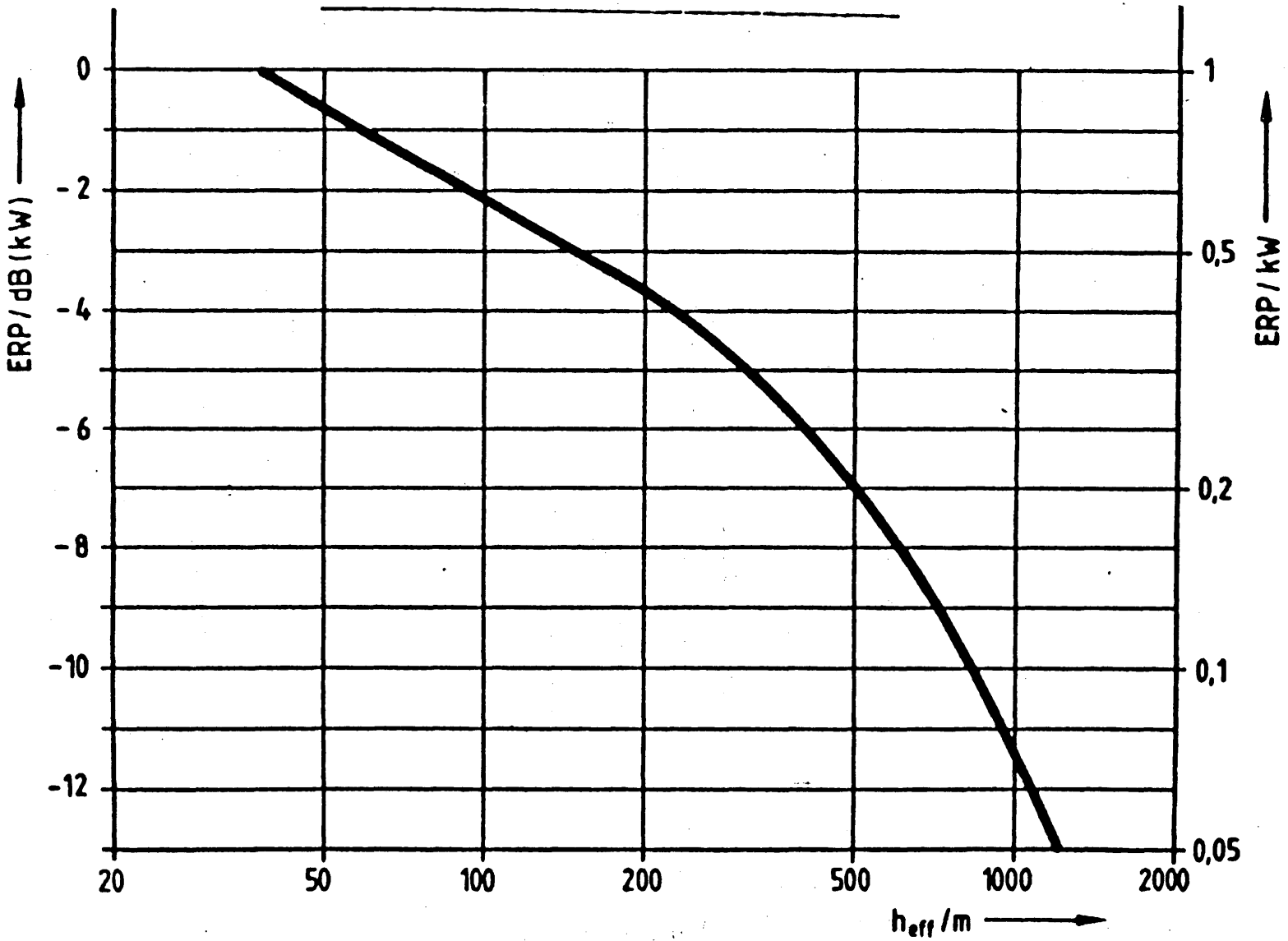
doc 20 (S)

To reach an agreed frequency plan in the band 100 - 108 MHz for sound broadcasting stations satisfying divergent needs in different countries there should not be lower power limit for stations within the plan. If for practical reasons a lower power limit is imposed it should be set at a total e.r.p. of no more than 100 watts.

doc 9 (D)

Only such transmitters should be considered in frequency planning which, on account of their radiated power, the effective height of their antenna and the nature of the terrain, must be expected to cause interference at larger distances (more than 200 km) from the transmitter, which cannot be ignored. A lower power limit would therefore have to be fixed as a function of the effective height of the antenna (Figure 1). Transmitters which have a radiated power below this limit should be integrated in the plan later in time and subsequent to coordination and be registered in a separate frequency list which is part of the plan.

Lower power limit
as a function of the effective height
of the antenna



4. LOW POWER CHANNELS

doc 9 (D)

Depending on the number of the frequency requirements which have been submitted for low power transmitters it may be useful to reserve a small number of channels for them. Channels at the upper (and/or lower) end of the band are possibly especially suited for this purpose because a certain protection of external services operating outside the broadcasting band can thus be achieved simultaneously.

It must, however, be taken into consideration that the use of low power channels will be affected by the assignments in the adjacent channels (with frequency spacings up to 400 kHz). The formation of groups of channels for low power transmitters would be a partial solution in this case; it is, however, inappropriate if frequencies are to be assigned to several low power transmitters installed at the same site.

doc 18 (AUT)

The LF/MF Conference, Geneva 1975, attributed 3 channels for exclusive use by low power transmitters. However, in the band 87.5 - 100 MHz experience shows that it has been possible to insert a high number of additional low power stations to the basic transmitter network as given by the Stockholm Plan 1961 without separation extra low power channels.

It is therefore proposed that on the assumption of a resulting overall transmitter density similar to that of the Stockholm Plan, in the planning procedure no extra channels be generally set aside for exclusive use by low power stations.

doc 22 (YUG)

The particular channels should not be set asside for exclusive use of low power stations, for such a use does not lead to more efficient use of the spectrum. If, however, such channels are to be set aside, they should be in consecutive order at the uper end of the band.

5. PLANNING CONSTRAINTS

doc 4 (G)

A further potential problem is that of local oscillator radiation from domestic receivers operating in Band II falling in the aeronautical radionavigation band.

Harmonic radiation from local oscillators in Band II receivers can also be a problem to television reception in Band III and cognisance of this interference mode may need to be taken into consideration in the preparation of the plan.

In the case of broadcast transmitting stations radiating more than two programmes, the number of intermodulation frequencies generated is minimised if equal frequency spacings are adopted.

doc 5 (NOR)

Due to the great number of FM broadcasting receivers in use, the multiple radiation of the oscillator frequencies in the coverage area of a FM transmitter may cause local interference from the lower part to the higher part of the FM band. This is also described in the Annex. In FM planning, the difference of 10.7 MHz (± 0.1 - 0.2 MHz) should be avoided in a coverage area.

doc 9 (D)

Inadmissible are:

- frequency spacings between 10.5 MHz and 10.9 MHz (interfering oscillator radiation). This applies also to transmitters which have mainly the same coverage areas but are installed at different sites;
- frequency spacings of less than 0.8 MHz.

Not wanted are:

- frequency spacings of less than 2 MHz (capability of the antenna combining unit);
- frequency spacings of 4.6 MHz and 10 MHz (duplex spacings of the land mobile service).

doc 16 (DDR)

For frequency planning the following constraints are to take into account :

- a frequency separation of the transmitting frequencies of 10.7 ± 0.2 MHz shall be avoided, as far as the receiving areas coincide;
- the frequency spacing of 2 transmitting frequencies at a single site should not be less than 1.8 MHz.

6. PLANNING METHODS

doc 4(G)

Where it is envisaged that comparable transmitter powers will be required within an extended area, planning may be based on a theoretical lattice. The employment of lattice planning should lead to the most efficient use of the limited spectrum available.

Other methods may be required where there is a substantial disparity in the transmitter powers to be used in neighbouring countries in the same part of the band.

doc 8(D)

Appropriate linear channel distributions are, in general, determined for geometrically regular networks. They are applied to practice by a suitable distortion of the regular network.

The type of channel distribution involves that all points of the network (before practical application) are equivalent as regards the interference to be expected with respect to its type (e.g. co-channel, adjacent channel), its angle of arrival and its strength if those points of the network are ignored to which channels at the frequency band limits have been allocated.

This regularity facilitates planning and reduces the possibilities of making mistakes.

Systematic planning using linear channel distributions is to be recommended particularly for the establishment of a new plan. The method loses its value if

- existing frequency assignments must be taken into account to a considerable extent,

- it cannot or may not be applied in the whole planning area.

The method is not suitable for modifying an existing plan which is not based on a linear channel distribution.

Non-linear channel distributions are also usually determined for geometrically regular networks and they are also applied to practice by a distortion of the regular network.

Compared with the linear channel distribution it is, however, not advantageous that the interference to be expected - apart from co-channel interference - will arrive from directions and with strengths which vary from one point of the network to the other. This complicates considerably the practical use of non-linear channel distributions when the network is distorted and reduces the reliability of the planning work.

Non-linear channel distributions as compared to linear ones do not offer any substantial advantages. This is especially the case if the number of channels available for planning increases as it becomes more difficult to determine appropriate non-linear channel distributions. Therefore such non-linear channel distributions should not be used.

...

Because of the time required the "method of foremost priority" can only be used with the help of a computer in a more or less intensive dialogue with the computer. When this method is used, the computer determines, for each step, the transmitter for which the number of appropriate frequencies is smallest and then proposes the most favourable among these frequencies for assignment. This procedure is repeated until all transmitters have obtained a frequency. Each step considers, of course, the assignments made by the preceding steps.

The method is well suited for practice as long as the number of the transmitters is not getting too large (e.g. $\leqq$ 1000). With the number of the transmitters the time required increases, however, out of proportion.

2. Non-systematic methods

If systematic methods are not to be used or cannot be used, there is only the possibility of assigning frequencies on a discretionary basis. In this case the planner assigns successively the best suited frequency to each transmitter in the order which he thinks appropriate. In each individual case a frequency which appears to promise the greatest possible useful effect and the least possible interfering effect is usually chosen from those available (Trial and Error Method).

As can easily be imagined, this procedure takes up a great deal of time but facilitates, in comparison to the systematic methods, an individual treatment of the various transmitters. But it cannot be concluded from this that the resulting frequency plan would be better in any case than that obtained by using systematic methods, if only enough time were available.

It is possible to assign frequencies according to the Trial and Error Method with and without the help of a computer. A dialogue with the computer is advisable for the planning work. But, for time reasons, it can be useful to limit the dialogue to a greater or smaller extent. For the dialogue with the computer the (systematic) "method of foremost priority" described under 1.3 can be used. The consent of the planner to the proposal of the computer can either be obtained in the dialogue (computer stop) or be taken for granted.

The planning in the frequency band above 100 MHz (after the consolidation of the plan in the frequency band below 100 MHz) can possibly be simplified by repeating to a certain degree in the band above 100 MHz co-channel and adjacent channel configurations from the band below 100 MHz. The application of this method is subject to the condition that, in addition to the relation between frequencies, the basic characteristics of the transmitters are identical with the ones of the transmitters which are already operated below 100 MHz. Use of this method will be restricted when frequencies are required to a considerable extent for transmitters which have no assignments in the band below 100 MHz. This applies all the more if several frequencies must be assigned to such transmitters.

doc 11 (URS)

The transmitter network should be planned on the basis of a theoretical frequency channel distribution grid.

The Soviet Administration recommends using a grid with a capacity of 26 frequency channels to each programme.

Reasons : An analysis of theoretical grids with capacities of 25, 26 and 27 channels showed that the 26-channel grid was the best of the variants studied. With such a grid high-quality reception could be achieved with a probability of 0.45 and two reserve channels would be available.

doc 16 (DDR)

Then for the frequency distribution a theoretical network (lattice) can be used, as for instance shown for 26 channels in Figure 5 of CCIR Document 10/5044.

The following values are proposed as nominal parameters for a regular theoretical frequency network :

effective radiated power	30 kW
effective antenna height	250 m
nominal field strength	60 dB μ

doc 18 (AUT)

Former planning conferences took advantage of theoretical network planning, using regular lattices consisting of rhombii having the same channel distribution. However, in certain cases big difficulties were caused by the use of lattices with different channel distributions in adjacent parts on the planning area.

It is therefore proposed that in case of theoretical network planning a lattice with one and the same channel distribution be used throughout the whole planning area.

doc 22 (YUG)

Planning method to be adopted should have the following abilities :

- to fulfill the requirements for both uniform and non-uniform transmitter distribution network, i.e. the possibility for assigning different number of frequencies per transmitting site;
- to take into account the existing frequency assignments from the frequency band 87.5 - 100 MHz, i.e. the possibility of predetermined channel distribution;
- to take into account the relevant frequency planning constraints;
- to be reliable enough, in order to minimize the planning errors;
- to be simple enough, in order to make possible the planning procedure fast and efficacious;
- to be flexible enough, in order to make possible further refinements and modifications to the plan.

Justification : The above planning method requirements take into account the sovereign right of every country to plan its broadcasting network in the most adequate manner. They also take into account the considerings f) and g) of Resolution No. 510 of the WARC-79, as well as findings of the CIRR that some planning constraints should be introduced in order to eliminate the apparent incompatibilities between the relevant frequency assignments. It is evident that the regular theoretical planning methods (or systematic planning methods) do not fulfill the above-mentioned requirements. The application of regular theoretical planning methods (use of latices), for instance, is inappropriate, because it is based exactly on some opposite requirements (all transmitters are identical, with identical powers and antenna heights and with non-directional antennas, it is assumed that no frequency constraints are to be introduced, there are neither political nor natural boundaries). On the other hand, the network planning methods based on the real characteristics of each transmitter (or non-systematic methods) fulfill the quoted requirements.

The Administration of the Socialist Federal Republic of Yugoslavia proposes the use of the method "Trial and Error" for drawing-up the plan, or other planning method based on the real characteristics of each transmitter.

Justification : The method "Trial and Error" has been used very often in, insofar practice, because it makes possible the individual treatment of each particular transmitter. Although there is no objective optimization criterion for its application, the step-by-step procedure, involving the corrections on the basis of bilateral or multilateral negotiations, makes possible the refinement of the plan. However, other methods, more sophisticated (as for instance, the method "Worst transmitter/best choice"), could also be taken into consideration.

7. ANALYSIS OF THE PLAN
(ASSESSMENT OF MULTIPLE INTERFERENCES)

doc 8 (D)

The suitability of the assigned frequencies can be judged after each single assignment (e.g. in the dialogue) or after the completion of an entire plan by calculating the coverage to be expected in the presence of interference. For this purpose it is determined for each individual transmitter which of the remaining transmitters are likely to cause interference and how great their interfering effect is expected to be. The overall effect of all interference can then be determined by means of one of the following methods:

- the integration method,
- the log-normal method,
- the multiplication method,
- the simplified multiplication method,
- the power sum method.

The first three methods require excessive calculations. In the past the simplified multiplication method was mainly (if not exclusively) used for such problems; the use of this method during the preparation and for the duration of the Conference is to be recommended. Although the use of the power sum method requires less work than all the other methods, it does not permit to take appropriate account of the statistics of the local variations of the individual nuisance fields.

doc 16 (DDR)

For calculation of the usable field strengths and of the real coverage areas in 12 directions the simplified multiplication method should be applied.

doc 18 (AUT)

For calculation of the overall interference effect of a multiplicity of interference sources a number of mathematical methods are available. There exist a lot of arguments in favour or against the different methods.

However, it seems important that the new Plan can be compared directly with the existing Stockholm Plan, for which practical experience is available. The original Stockholm Plan has been drawn up by the European VHF/UHF Broadcasting Conference, Stockholm, 1961, by using the simplified multiplication method.

It is therefore proposed that for the calculation of multiple interference the simplified multiplication method be used.

Polarization discrimination

It is a well known fact that advantage from the use of orthogonal polarization can only be obtained when, in general, the polarization of the receiving antennas conforms to that of the wanted signal.

In cases where the polarization of the receiving antennas is random, i.e. for car reception and for portable receivers, no general advantage can be expected from making systematic use of orthogonal polarization and this may be detrimental to reception under those conditions.

It is therefore proposed that for interference calculations polarization discrimination should not be taken into account.

In field-strength calculations the parameter Δh is used to define the degree of terrain irregularity and to correct the field-strength values by subtracting the related terrain irregularity correction. However, this parameter may be of less relevance for propagation path greatly in excess of 50 km, which is mostly the case for interference calculations. Thus a risk of underestimation of interfering signal strength may exist.

It is therefore proposed that for interference calculations the terrain irregularity correction (according to Δh) be not applied to interfering signals.

8. ORGANIZATIONAL APPROACH

doc 8 (D) **Because of the limited time which will be available for the actual planning it may be useful to distribute the planning work among several planning groups. It may be advisable in this case to subdivide**

- the whole frequency band,

- the planning area or

- the frequency band and the planning area

in an appropriate way and to provide effective coordination at the interfaces (regionally or according to frequencies).

In the case of a subdivision according to frequencies the limit 100 MHz would be suitable. In the case of a more comprehensive subdivision 4 MHz steps, for example, may be advisable, i.e. limits at 92, 96, 100 and 104 MHz.

In the case of a regional subdivision it may be advisable to subdivide at least according to the two broadcasting areas - as defined in Article 8, No. 400 to No. 404 of the Radio Regulations of 1982 - and the remaining parts of the planning area.

doc 16 (DDR)

Concerning 3 aimed full-area coverages in the range of 100 - 108 MHz the German Democratic Republic considers it to be possible to split up this frequency range in 3 sub-bands with analogue frequency distribution.

doc 18 (AUT) Division of planning work

The Second Session of the Conference might wish to distribute the huge amount of planning work among several planning groups. The division could be geographically and/or in frequency. It seems important that a division be made in a way that no group will face the fact that different planning principles should be applied throughout their geographic area or frequency range (see item 1.1).

It is therefore proposed that a possible division of planning work should first be done by separating the European Broadcasting Area from the other parts of the whole planning area. In a second step for the European Broadcasting Area the whole frequency band should be divided into two sub-bands, namely 87.5 - 100 MHz and 100 - 108 MHz.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/10-E(Rev.1)
25 August 1982
Original : English

COMMITTEE 5

TERMS OF REFERENCE

Working Group 5A

1) To examine proposals concerning the planning principles and methods for the basis for the preparation of the Plan,

2) to prepare and propose to Committee 5 the related parts of the Report to be presented to the Second Session of the Conference,

3) to draft and propose to Committee 5 Resolutions and Recommendations relating to the items mentioned in 1) above

Working Group 5B

1) To examine proposals relating to establishment of a form in which requirements for inclusion in the frequency assignment plan should be submitted to the IFRB,

2) to identify the areas in which the decisions of Committee 4 are expected before the form could be finalized,

3) to develop the form along with the instructions for filling it and any appropriate explanatory texts,

4) to propose to Committee 5 the schedule for the preparation and submission of requirements to the IFRB,

5) to draft and propose to Committee 5 Resolutions and Recommendations relating to the item mentioned in 1) above.

K. ARASTEH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/10-E
24 August 1982
Original : English

COMMITTEE 5

TERMS OF REFERENCE

Working Group 5A

1) To examine proposals concerning the planning principles and methods for the basis for the preparation of the Plan,

2) to prepare and propose to Committee 5 the related parts of the Report to be presented to the Second Session of the Conference,

3) to draft and propose to Committee 5 Resolutions and Recommendations relating to the items mentioned in 1) above

Working Group 5B

1) To examine proposals relating to establishment of a form in which requirements for inclusion in the frequency assignment plan should be submitted to the IFRB,

2) to identify the areas in which the decisions of Committee 4 are expected before the form could be finalized,

3) to develop the form along with the instructions for filling it and any appropriate explanatory texts,

4) to draft and propose to Committee 5 Resolutions and Recommendations relating to the item mentioned in 1) above

K. ARASTEH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/11-E
25 August 1982
Original : English

SUB-WORKING GROUP 4C-3

SHARING CRITERIA BETWEEN THE FM SOUND BROADCASTING SERVICE WITH LAND MOBILE SERVICES IN THE BANDS 87.5 - 108 MHz

In the table of frequency allocations of the Radio Regulations the bands 87.5 to 100 and 100 to 108 MHz are allocated in Region 1 to Broadcasting on a primary basis and to the land mobile service :

a) in the band 87.5 to 88 MHz on a permitted basis and subject to agreement obtained under the procedures set forth in Article 14 of the Radio Regulations;

b) in the band 104 to 108 MHz, to the mobile, except aeronautical mobile (R) service, on a permitted basis until 31 December 1995;

c) in the band 97.6 to 102.1 MHz to the land mobile service on a permitted basis until 31 December 1989.

The sharing criteria for the protection of the land mobile service in the band 97.6 to 102.1 MHz is already the subject of an agreement amongst the administrations concerned and affected.

The sharing criteria for the protection of the land mobile service in the bands 87.5 to 88 MHz and 104 to 108 MHz shall be the following :

FIELD STRENGTH TO BE PROTECTED : 15 dB μV/m at 3 m height

PROTECTION RATIO :

Frequency separation between carriers of the two services (kHz)	Protection ratio for AM mobile services (dB)	Protection ratio for FM mobile services (dB)
0	18	8
25	16	6
50	4.5	- 5.5
75	- 7.5	-17.5
100	-17.5	-27.5

PROPAGATION DATA TO BE USED FOR SHARING CALCULATIONS	: CCIR Recommendation 370-4
PERCENTAGE LOCATIONS PROTECTED	: 50%
PERCENTAGE TIME PROTECTED	: 90%
POLARIZATION PROTECTION	: 18 dB Base Station 8 dB Mobile Station
HEIGHT GAIN FACTOR	: 9 dB $\leqslant$ 50 km $4\frac{1}{2}$ dB $\geqslant$ 100 km Linear interpolation > 50 km < 100 km

The sharing criteria to protect the broadcasting service from interference from the land mobile service within or immediately adjacent to the coverage area of the broadcasting transmitter should be the following :

MINIMUM CARRIER FREQUENCY SEPARATION REQUIRED IN SAME AREA	: 500 KHz

S.R. TEMPLE
Chairman of Sub-Working Group 4C-3

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/12-E
26 August 1982
Original : French

WORKING GROUP 5B

TERMS OF REFERENCE AND COMPOSITION OF SUB-WORKING GROUP 5B-1

Terms of Reference : To prepare, on the basis of the discussions within Working Group 5B, the form to be used for submitting requirements to the IFRB, together with instructions for completing the form and any explanatory text which might be necessary.

Composition :	Name	Country	No. of pigeon hole
Chairman :	W. Biermann	Federal Republic of Germany	41
	M. Derragui	Algeria	294
	M. Berger	Austria	144
	E. Martiney de Aragon	Spain	174
	H. Tabatabie	Iran	228
	S. Tarantino	Italy	249
	J. Finnie	United Kingdom	73
	I. Shindi	U.S.S.R.	31
	A. Berrada	IFRB	630
	J. Fonteyne	IFRB	648

C. TERZANI
Chairman of Working Group 5B

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/13-E
27 August 1982
Original : English

WORKING GROUP 5A

TERMS OF REFERENCE AND COMPOSITION OF SUB-WORKING GROUP 5A-1

Terms of reference :

To prepare, on the basis of the discussion within the Working Group 5A, a text on PLANNING METHODS for inclusion in the report of the First Session of the Conference.

Composition

Algeria	Iran
Federal Republic of Germany	Poland
Angola	German Democratic Republic
Saudi Arabia	United Kingdom
Cameroon	Czechoslovak Socialist Republic
United Arab Emirates	U.S.S.R.
Spain	Yugoslavia

The Sub-Working Group will be chaired by Mr. H. Eden of the Federal Republic of Germany.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/14-E
27 August 1982
Original : English/
French

WORKING GROUP 4A

CHAPTER 2

PROPAGATION

2.1 Propagation curves for Band II broadcasting in Region 1

2.1.1 General

The propagation curves represented in Figs. 2.1 to 2.9 based on Recommendation 370-3 are intended for use in the planning of broadcasting service. They relate field strength to path length with transmitting antenna height as a parameter for various percentages of time from 50% to 1% in various climatic regions. They represent the field strength exceeded at 50% of locations, and apply to both horizontal and vertical polarization.

With respect to oversea paths the curves are presented in terms of cold sea and warm sea in order to allow for the different propagation characteristics encountered in these conditions. Over warm seas the phenomenon of ducting or extreme super-refractivity is more frequently encountered and hence trans-horizon interference is common, but propagation over both warm and cold seas show considerably less attenuation than does propagation over land for time percentages less than median. This is evident from the Figures. It will be appreciated that the definition of warm sea and cold sea has to be based on statistical data and so is to a certain extent arbitrary but experience indicates that the following definitions would be appropriate for the application of the curves set out in this Chapter :

Warm sea Seas, oceans and other substantial bodies of water (as a criterion, one that can encompass a circle of 100 km diameter), at latitudes less than 23.5 degrees N or S, but also including the entirety of the Mediterranean, the Black Sea, the Red Sea, and the area extending from the Shatt-al-Arab and including the Gulf of Oman (see also paragraph 3.2.1.2 below);

Cold sea Seas, oceans, and other substantial bodies of water (as a criterion, one that can encompass a circle of 100 km diamater), at latitudes greater than 23.5 degrees N or S, but excluding the Mediterranean, the Black Sea, and the area extending from the Shatt-al-Arab to the Gulf of Oman.

Existing paragraphs 2, 3, 4, and 5 to be deleted.

2.1.2 Super-refractivity and ducting areas

Although the area from the Shatt-al-Arab to the Gulf of Oman is included in the general classification of warm sea as defined above in paragraph 3.2.1.1 experience indicates that extreme super-refractivity (ducting) conditions may be encountered there on an even greater scale than in other warm seas. This may also be the case for the Red Sea and maritime areas of West Africa. The member organizations of Gulfvision are at present engaged in a systematic measurement programme with the participation of the ITU, investigating both atmospheric refractivity conditions and associated radio propagation to great distances with a view to arriving at a clear definition of the conditions prevailing in the area from the Shatt-al-Arab to the Gulf of Oman.

Although the measurement programme has been in progress since 1981, it is not yet concluded and so it has not been possible to propose modifications to the propagation data submitted to the First Session of the Conference. However, it is expected that definitive results will be available during 1983, and so it can be anticipated that Gulfvision will be in a position to contribute in this sense to the Second Session. It should therefore be understood that the above warm sea classification is tentative at this time, and may well need to be modified or sub-divided when the measurement results have been analyzed.

2.1.3 Application of the curves

The values of field strengths given in curves, Figs. 2.1 to 2.9, are those exceeded for 50%, 10%, 5% and 1% of the time. They are expressed in decibels relative to 1 μV/m and correspond to an effective radiated power of 1 kW.

The 50% time curve, Fig. 1, should be used for determination of coverage areas and the 1% time curves should be used for interference calculations. In the case of steady interference the 50% time curve should be used.

The effective height of the transmitting antenna is defined as its height over the average level of the ground between distances of 3 km and 15 km from the transmitter in the direction of the receiver. The height of the receiving antenna is assumed to be 10 m above local terrain.

The curves given in Figs. 2.1 to 2.9 are effective transmitter antenna heights from 37.5 - 1,200 metres. Additional curves for antenna heights of 20 m and 10 m may be derived from the 37.5 m curve by applying correction factors of -10 dB and -19.5 dB for distances up to 50 km and -4.5 dB and -9.5 dB for distances in excess of 100 km. To obtain field strength values corresponding to effective transmitter antenna heights (h_1) in excess of 1,200 m, the field strength at a distance of x km from the transmitter may be taken to be the same as the field strength given by the curve for a transmitting antenna height of 300 m at a distance of $(x + 70 - 4.1\sqrt{h_1})$ km.

2.1.3.1 Location variability

The curves given are representative of 50% locations which should be used for planning purposes. Corrections for other percentages of locations are given for further information in the Annex.

2.1.3.2 Terrain irregularity correction

The curves for propagation over land refer to the land or irregular rolling terrain found in many parts of Region 1 and for the purpose of the plan and interference calculations, no terrain irregularity correction should be made.

Such a correction factor is however described in the Annex.

2.1.3.3 Receiving antenna height correction

The propagation curves are for a receiving antenna height of 10 m above local terrain. If the receiving antenna height is reduced from 10 m to 3 m a 9 dB reduction in the field strength should be applied.

2.1.3.4 Mixed land/sea path calculations

When the propagation path is partially over land and partially over sea, the following method should be used for interpolation between the appropriate land and sea curves.

Let

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

$E_{S,\,t}$: field strength for sea path equal in length to the mixed path for t% of the time,

$E_{M,\,t}$: field strength for mixed path for t% of the time,

d_s : length of sea path,

d_t : length of total path.

The field strength for the mixed path ($E_{M,\,t}$) can be determined by using the formula :

$$E_{M,\,t} = E_{L,\,t} + \frac{d_S}{d_T}\left[E_{S,\,t} - E_{L,\,t}\right]$$

2.2 VHF propagation curves for the aeronautical mobile service

The curves in Fig.2.15 represent basic transmission loss as a function of distance for 5%, 50% and 95% of the time for a range of antenna heights at 125 MHz. The propagation model used is based on a considerable amount of experimental data and assumes horizontal polarization over a smooth earth with an effective earth-radius factor k or 4/3 with some compensation at high altitudes, and with fading characteristics representative of a temperature continental climate.

The following points are to be noted :

- the antenna heights shown vary from 15 m to 20,000 m covering both ground station and aircraft heights;

- for interpolation the following formula is proposed :

$$L_b = L_{b1} + \left[(L_{b2} - L_{b1}).\log(x/x_1) \right] / \log(x_2/x_1)$$

where L_b is the basic transmission loss to be calculated at height x and L_{b1}, L_{b2}, x_1 and x_2 and the corresponding losses and heights at the relevant distance on the curves between which interpolation is required;

- for conformity with the propagation curves for broadcasting service (Figs. 2.1 to 2.9) ordinate scale in terms of field strength for 1 kW radiated from a half-wave dipole has been added.

2.3 VHF propagation curves for the land mobile services

Propagation curves for land mobile services operating in the VHF bands taken from CCIR Report 567 are given in the Figs. 2.11, 2.12 and 2.13 and refer to a receiving antenna height of 3 m. They are derived from the curves given in CCIR Recommendation 370 with an appropriate correction for this lower receiving antenna height.

F. KRALIK
Chairman of Working Group 4A

Annex : 1

A N N E X

SUPPLEMENTARY PROPAGATION DATA

CORRECTION FACTORS

This Annex gives supplementary propagation data as well as the correction factors which can be applied to the basic curves to improve the accuracy of predictions.

For the planning conference these various factors should not be used although some administrations may wish to take them into account in particular cases in order to facilitate bilateral negotiations with the aim of achieving mutually satisfactory solutions.

1. Correction for various location percentages

The curves in Figures 2.1 to 2.9 are representative of 50% of locations. Figure 3.10 shows the correction (in dB) to be applied for other percentages of receiving locations.

2. Terrain irregularity correction

A parameter Δh is used to define the degree of terrain irregularity. It represents the difference between the altitudes exceeded by 10% and 90% of the terrain over propagation paths in the range of 10 kilometres to 50 kilometres from the transmitter (see Figure 2.14).

The curves for propagation over land refer to the kind of moderately rolling terrain found in Region 1 for which a value of Δh of 50 m is considered appropriate.

The Figure 2.15 gives corrections for other values of Δh.

3. Receiver terrain correction (terrain clearance angle)

The location correction in section 1 can be applied only on a statistical basis. If more precision is required for predicting the field strength in a specific small receiving area a correction may be based on a "terrain clearance angle". This angle θ should be representative of those angles in the reception area which are measured between the horizontal at the receiving antenna and the line which clears all obstacles within 16 km in the direction of the transmitter. The example in Figure 2.16 indicates the sign convention, which is negative if the line to the obstacles is above the horizontal. Figure 2.18 indicates the correction, as a function of the angle θ, to be applied to the prediction for 50% of locations. If this correction is applied, the location correction of section 1 (Figure 2.14) may no longer be applicable.

Corrections for terrain clearance angles outside the range -5° to 0.5°, are not given in Figure 2.18, because of the smaller number of paths concerned in the study. However, they may be obtained tentatively by linear interpolation between the curves of Figure 2.18 and limiting values of 30 dB at 1.5° and -40 dB at -15°, subject to the condition that the free-space field strength is not exceeded.

CCIR References (Volume V)

- Recommendation 370-4
- Report 239-5
- Recommendation 529
- Report 567-2
- Recommendation 528-1

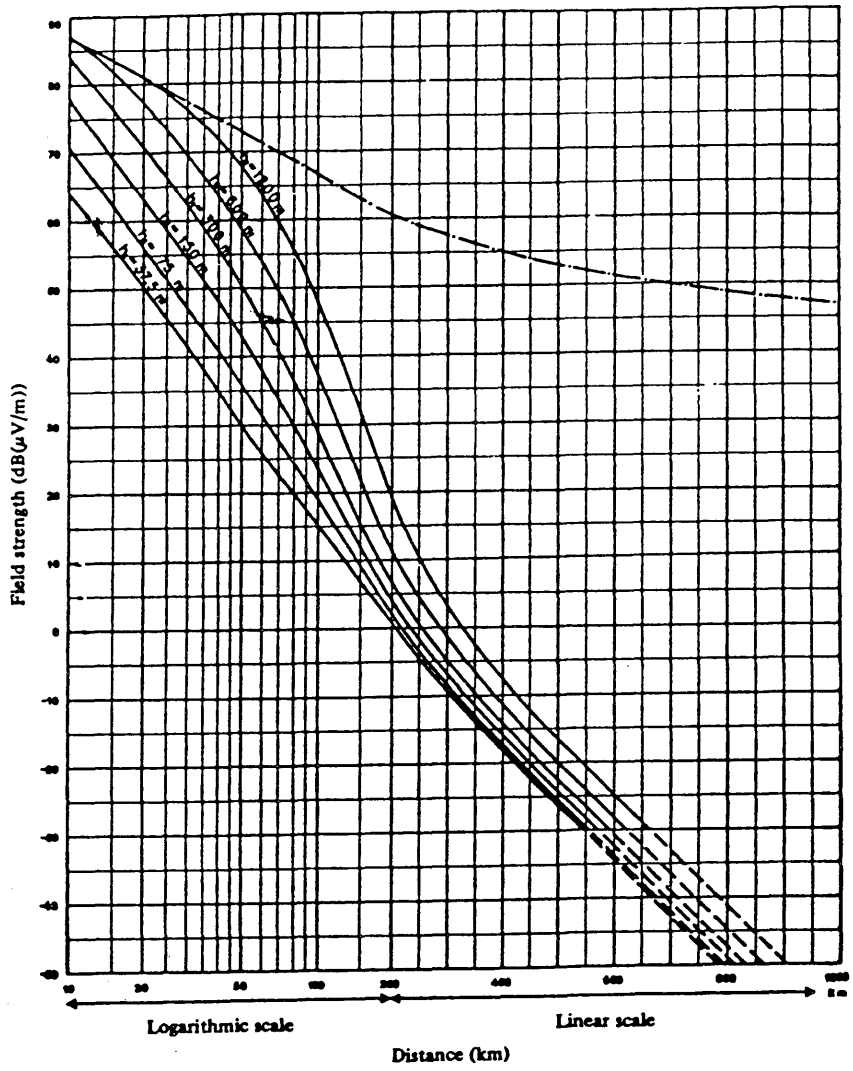


FIGURE 2.1 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*

Frequency: 30 to 250 MHz (Bands I, II and III); Land and sea
50 % of the time; 50 % of the locations; h_2 = 10 m

·—·—·—· Free space

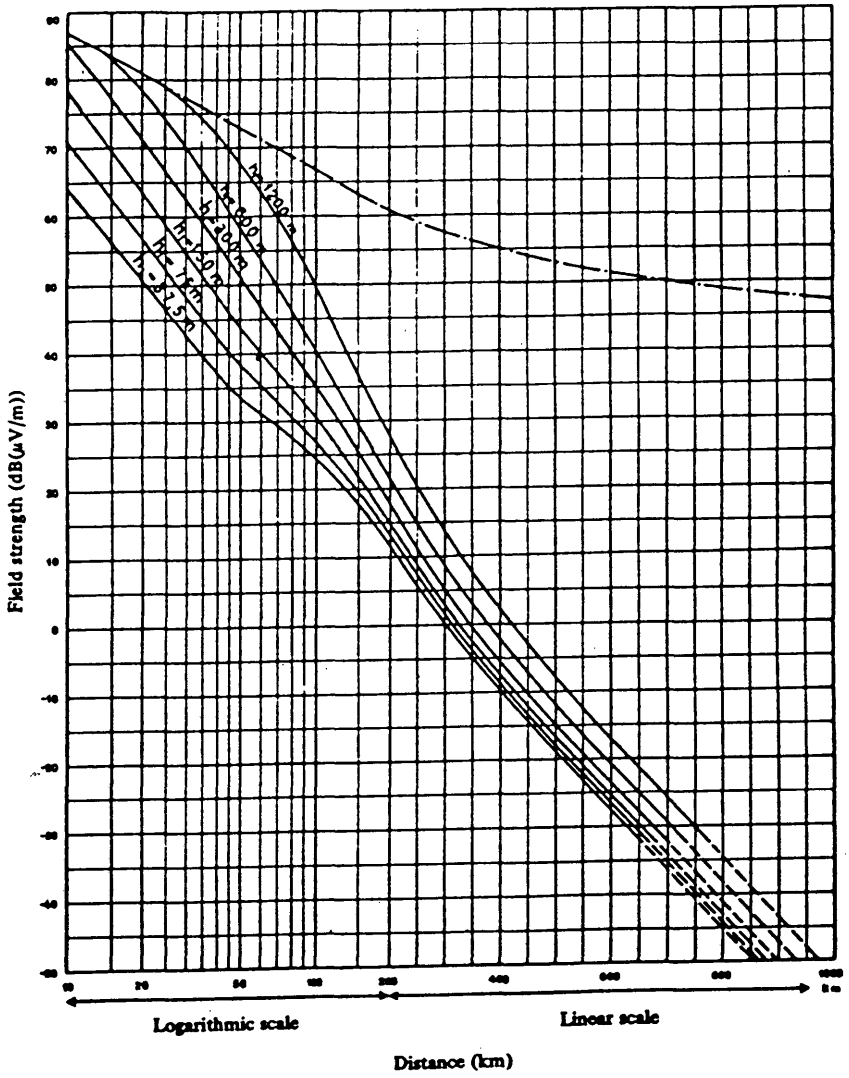


FIGURE 2.2 - *Field strength (dB(μV/m)) for 1 kW e.r.p.*

Frequency: 30 to 250 MHz (Bands I, II and III): Land and cold sea
10 % of the time; 50 % of the locations h_1 = 10 m

——·—— Free space

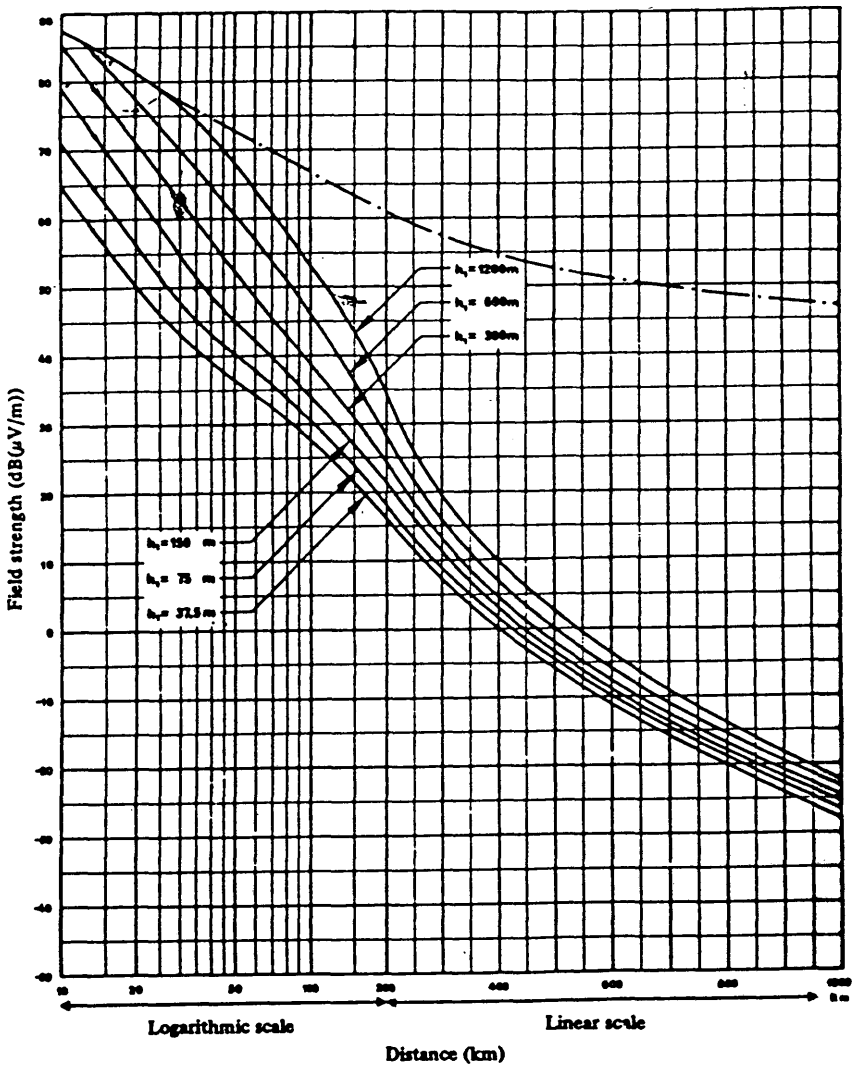


FIGURE 2.3 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*
Frequency: 30 to 250 MHz (bands I, II and III); Warm sea
10 % of the time; 50 % of the locations; h_2 = 10 m

Free space

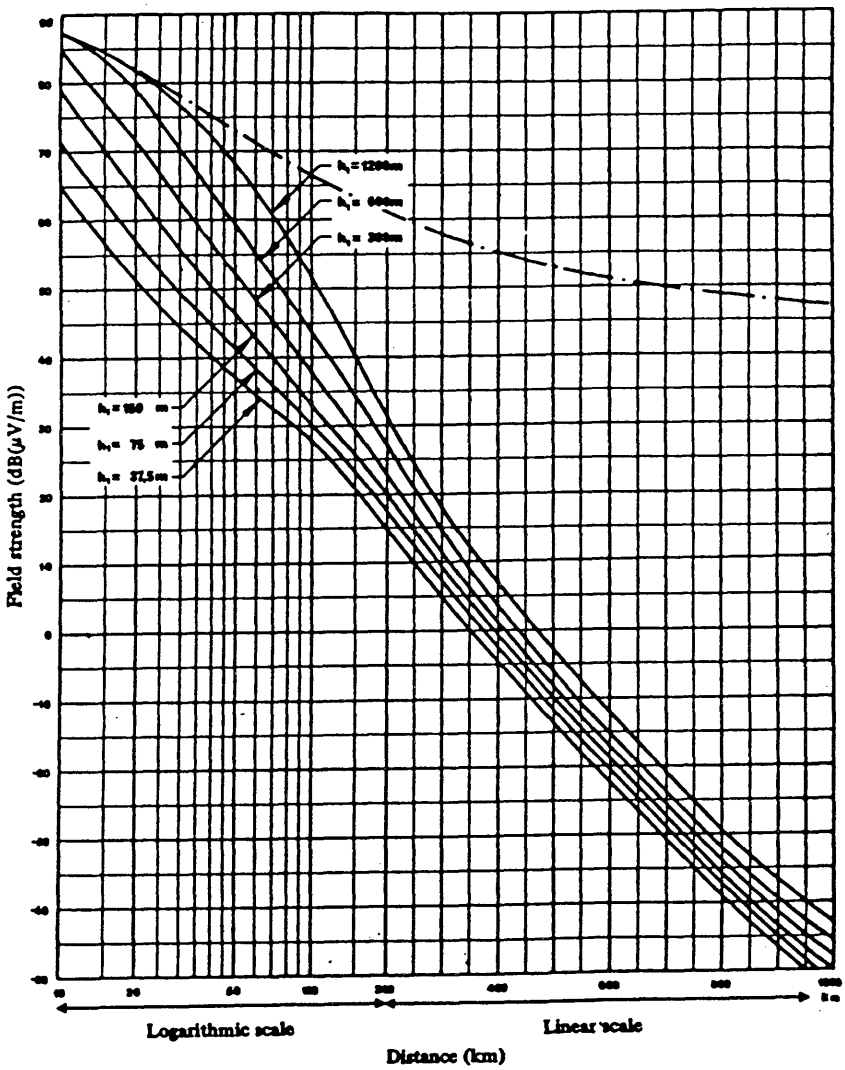


FIGURE 2.4 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*
Frequency: 30 to 250 MHz (Bands I, II and III); Cold sea
5% of the time, 50% of the locations; h_1 = 10 m

Free space

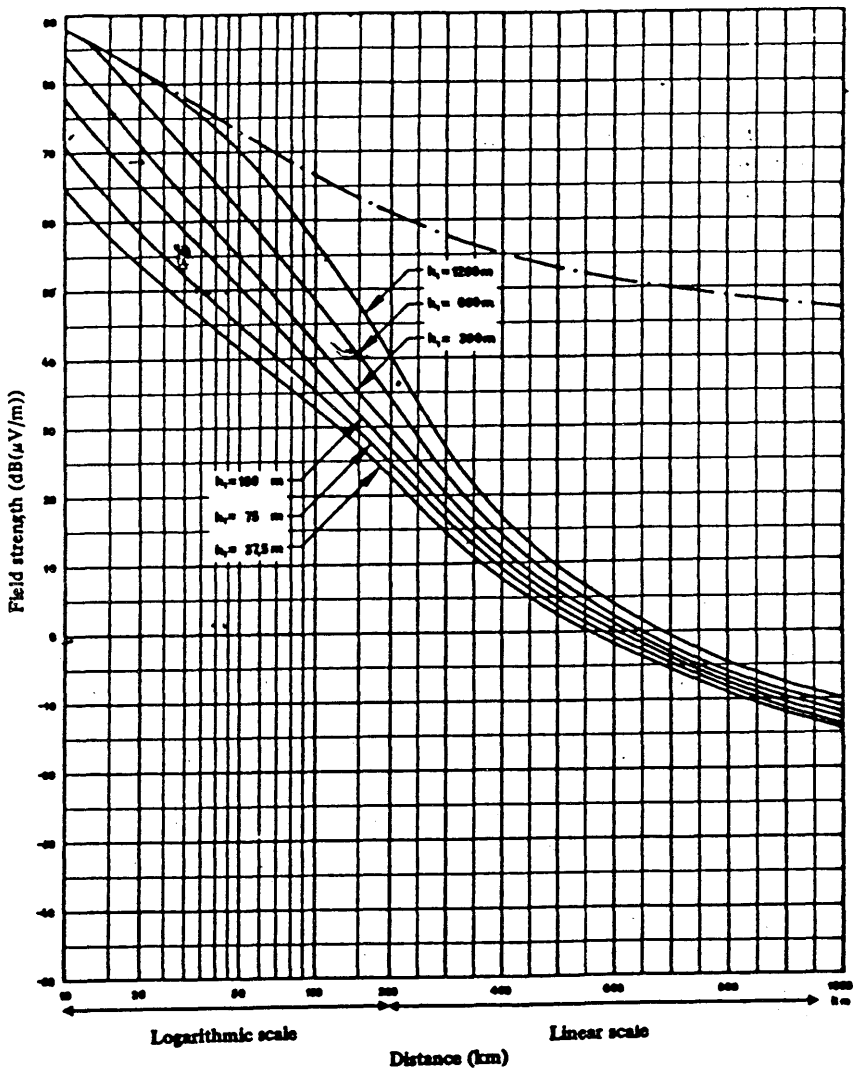


FIGURE 2.5 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*
Frequency: 30 to 250 MHz (Bands, I, II and III); Warm sea
5 % of the time; 50 % of the locations; h_s = 10 m

Free space

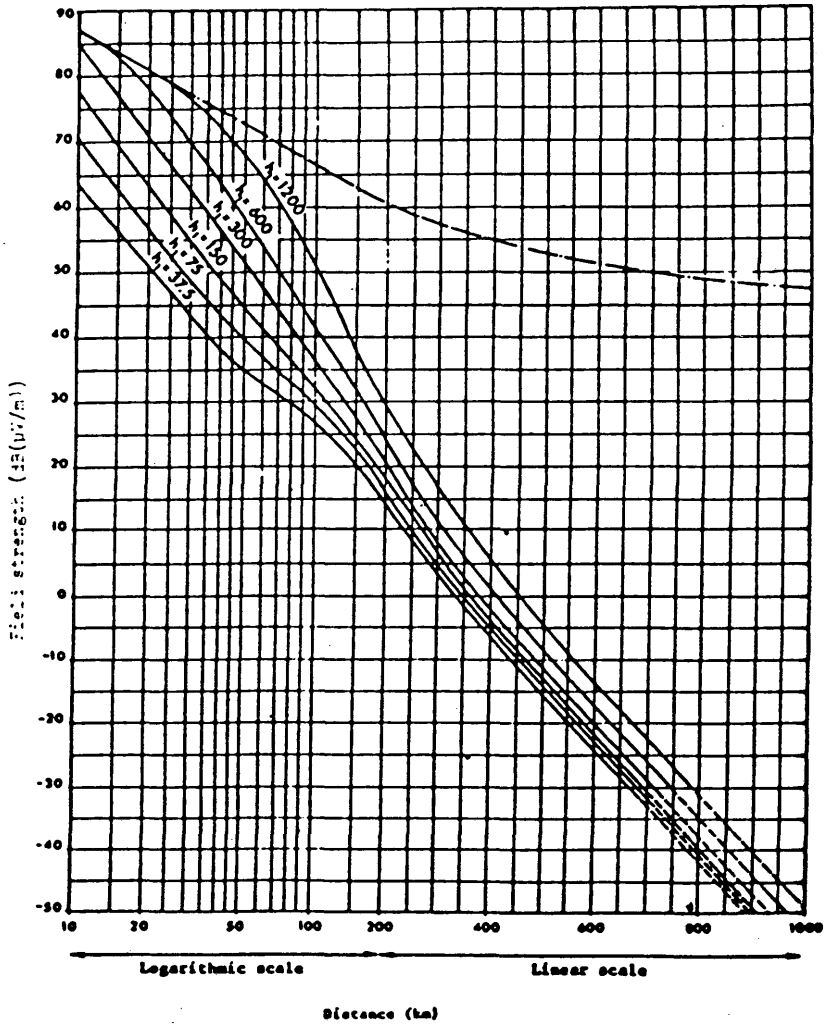


FIGURE 2.6 - Field strength (dB(μV/m) for 1 kW e.r.p.

Frequency: 30 to 250 MHz (Bands I, II and III); Land;
50% of the time; 50% of the locations; h_2 = 10 m

—·—·—·— Free space

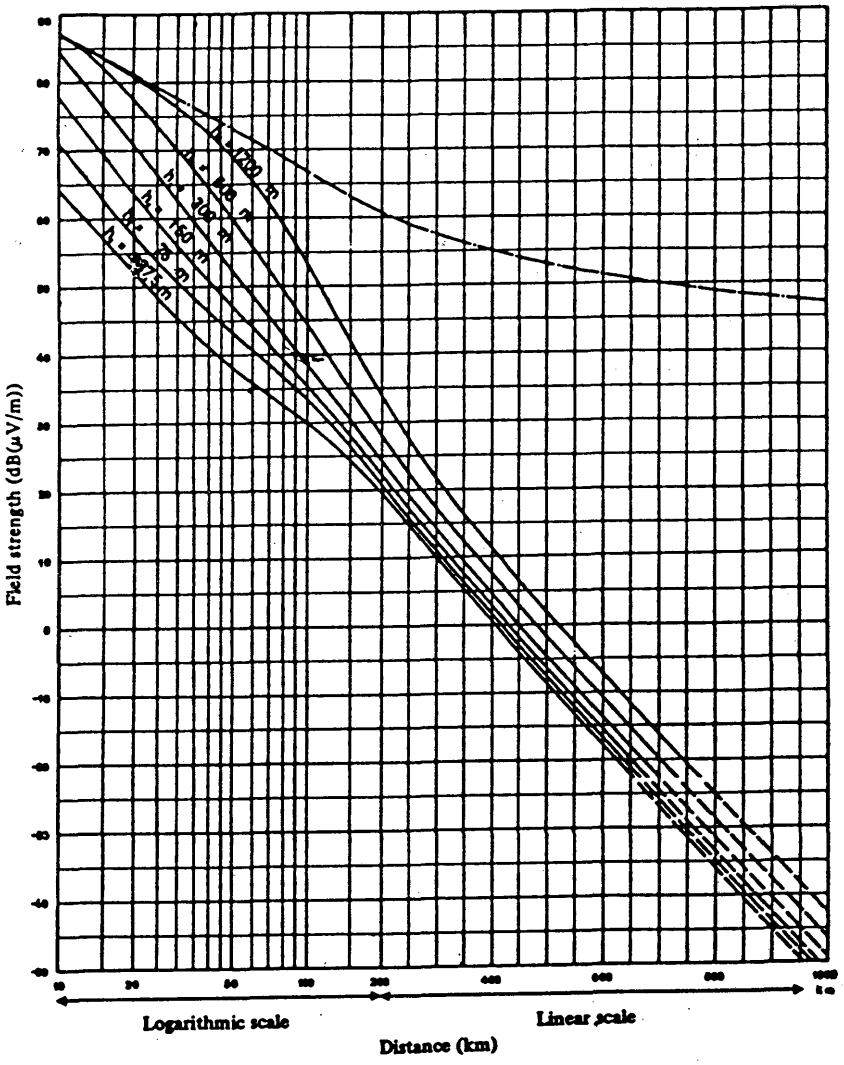


FIGURE 2.7 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*

Frequency: 30 to 250 MHz (Bands I, II and III); Land; 1% of the time; 50% of the locations; h_2 = 10 m

Free space

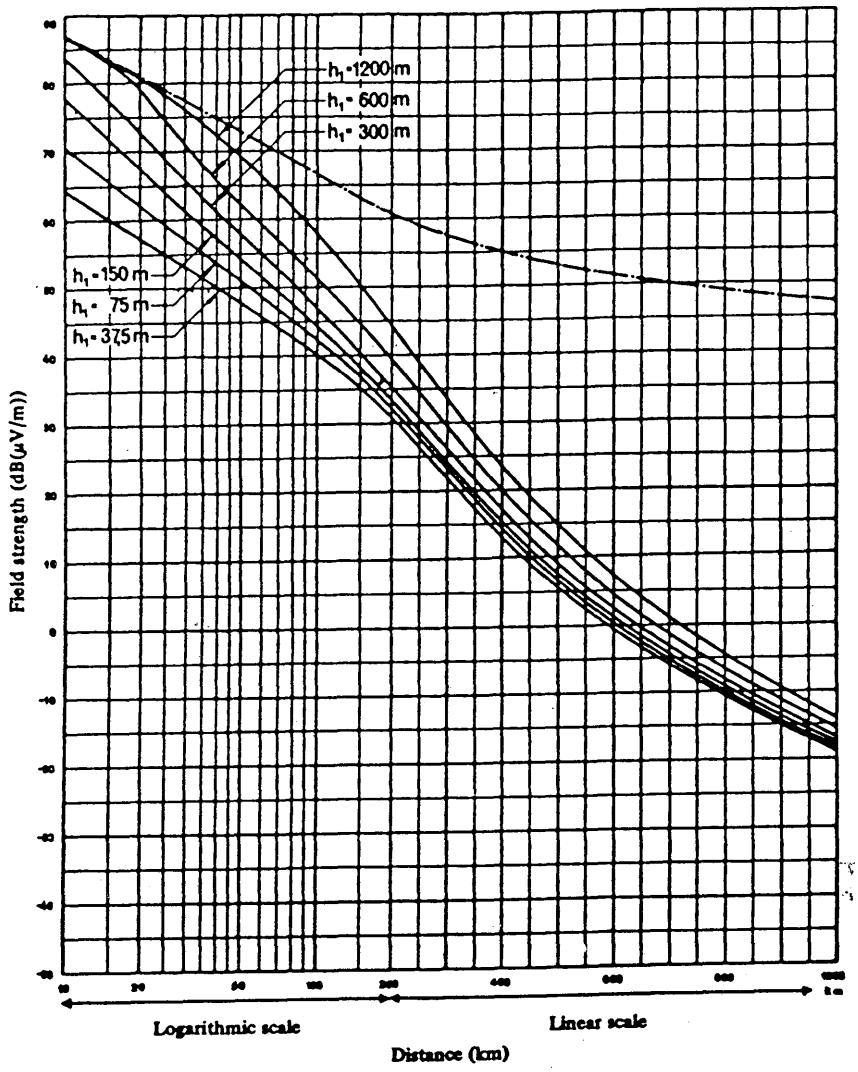


FIGURE 2.8 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*
Frequency: 30 to 250 MHz (Bands I, II and III); Cold sea; 1 % of the time;
50 % of the locations; h_0 = 10 m

—·—·— Free space

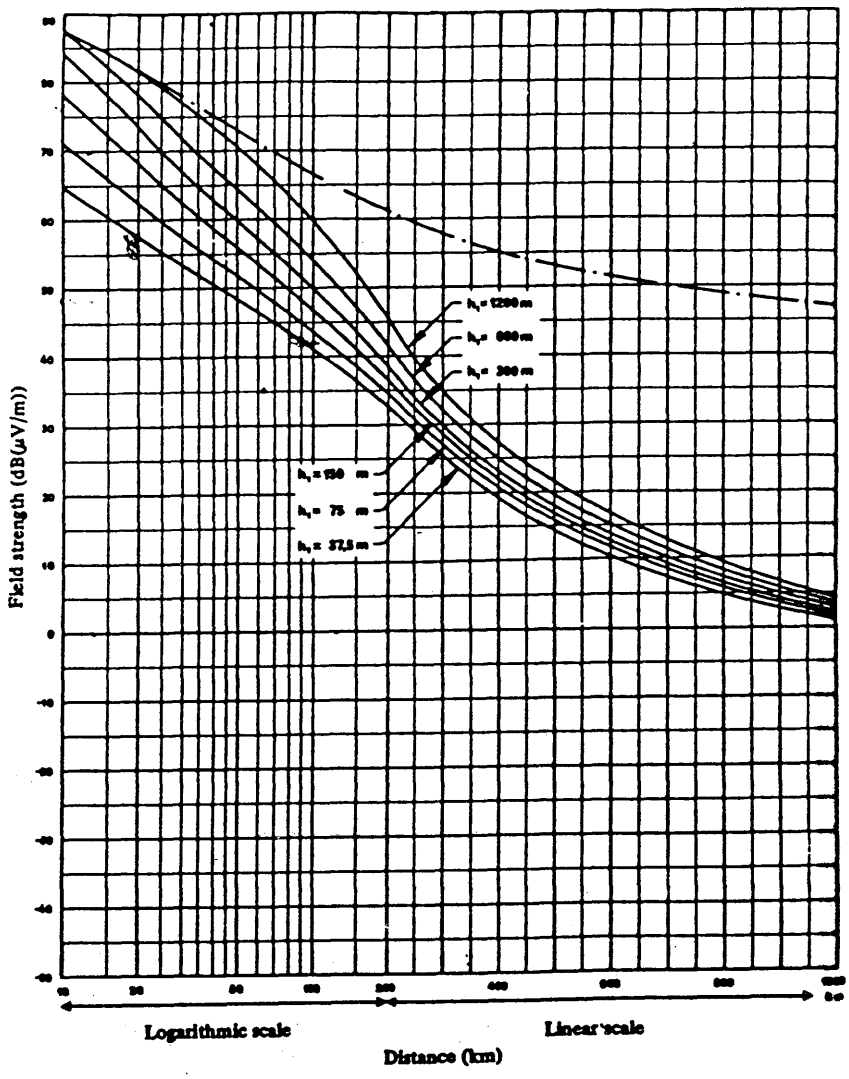


FIGURE 2.9 – *Field strength (dB(μV/m)) for 1 kW e.r.p.*
Frequency: 30 to 250 MHz (Bands I, II and III); Warm sea
1 % of the time, 50 % of the locations; h_2 = 10 m

Free space

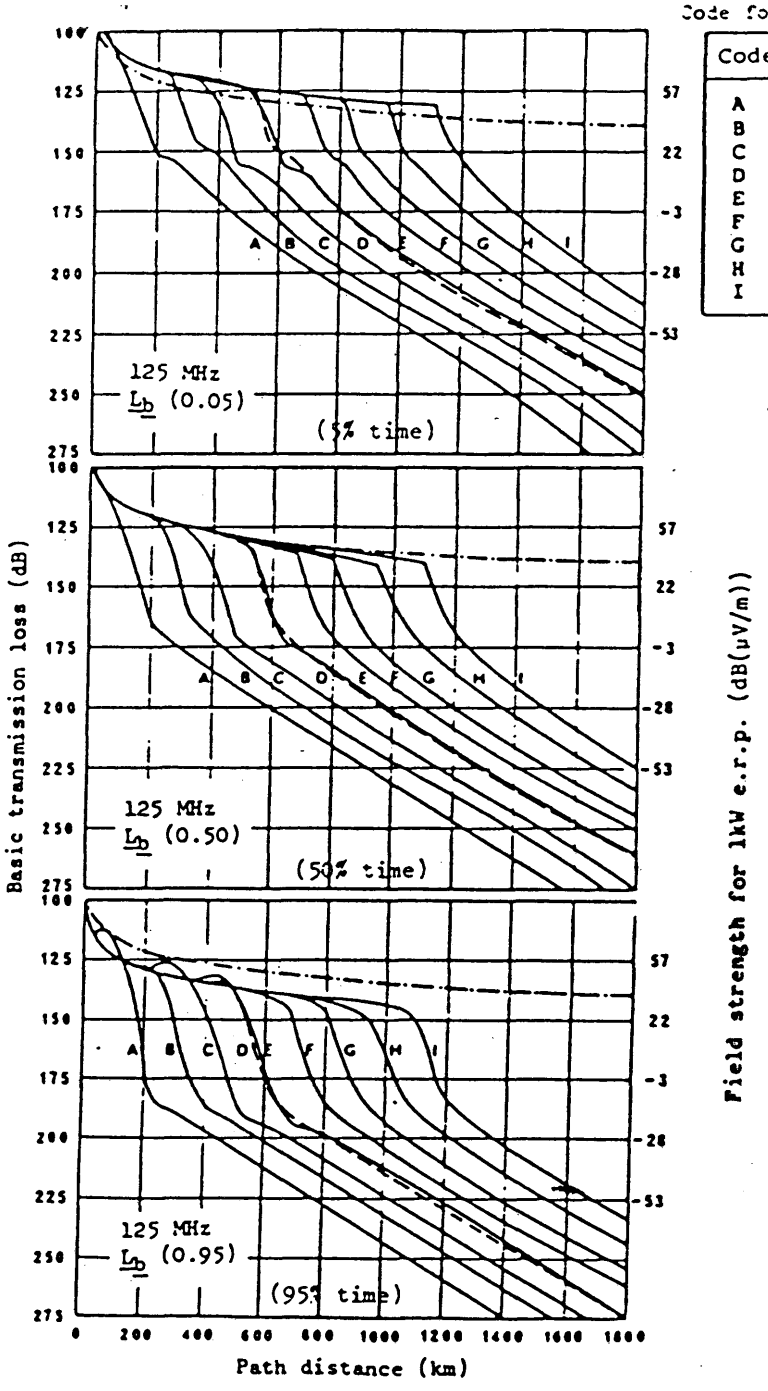


FIGURE 2.10 - Basic transmission loss at 125 MHz for 5 %, 50 % and 95 % of the time

The dotted-line curve is that for free-space

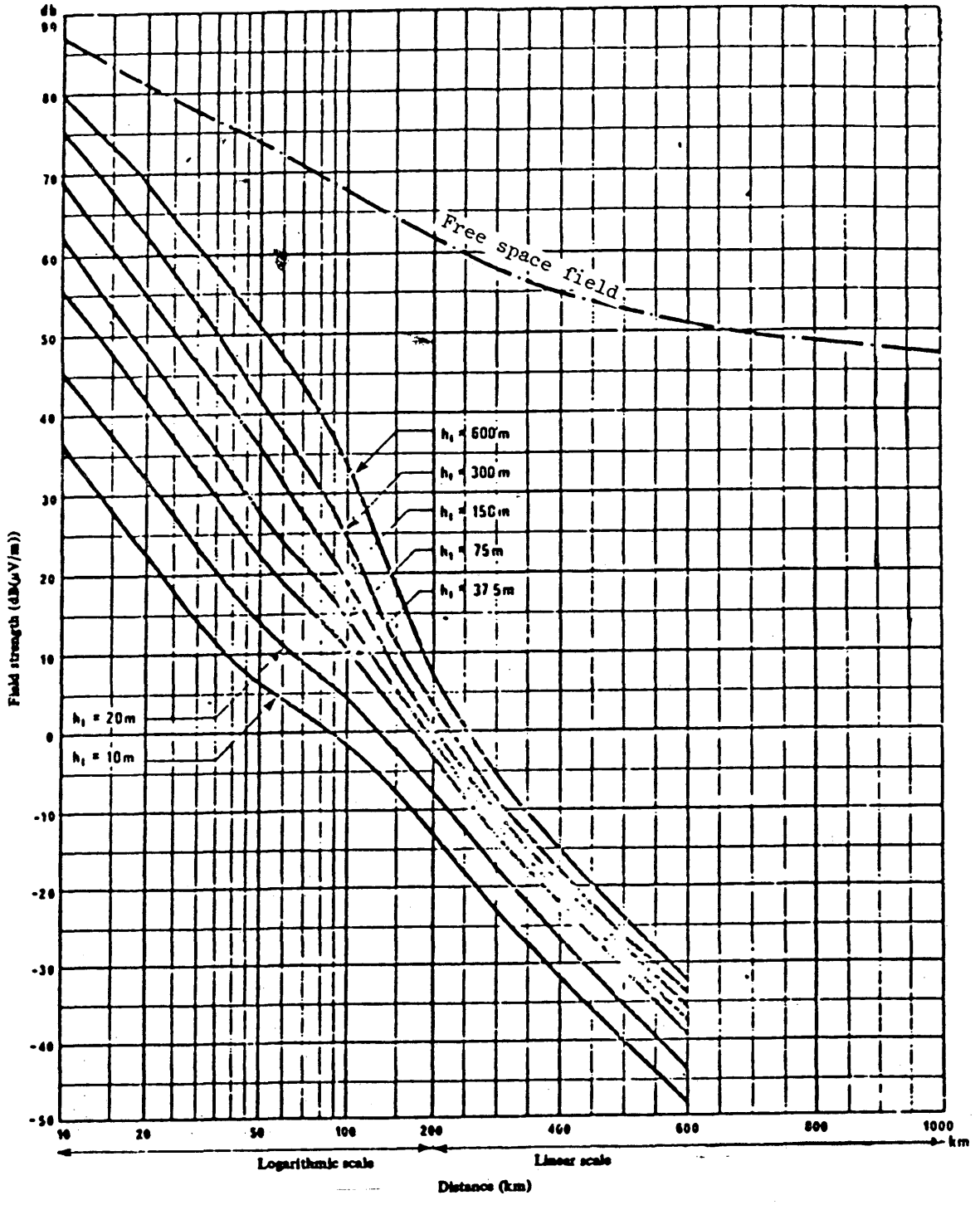


FIGURE 2.11 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency = 150 MHz, land, rural, 50% of the time: 50% of the locations; h_2 = 3 m

Free space

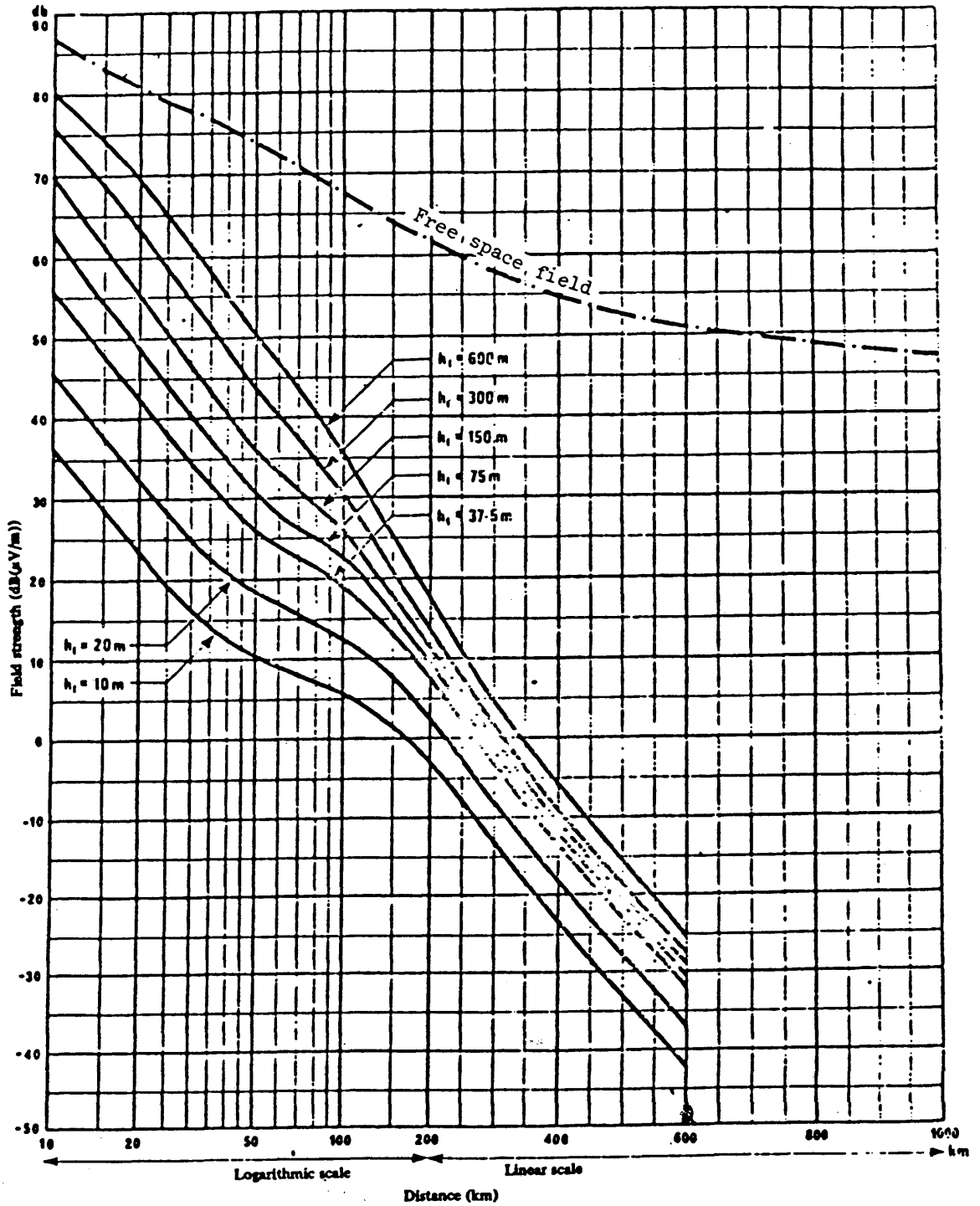


FIGURE 2.12 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency ≈ 150 MHz, land, rural, 10% of the time, 50% of the locations: h_2 = 3 m

—·—·—·— Free space

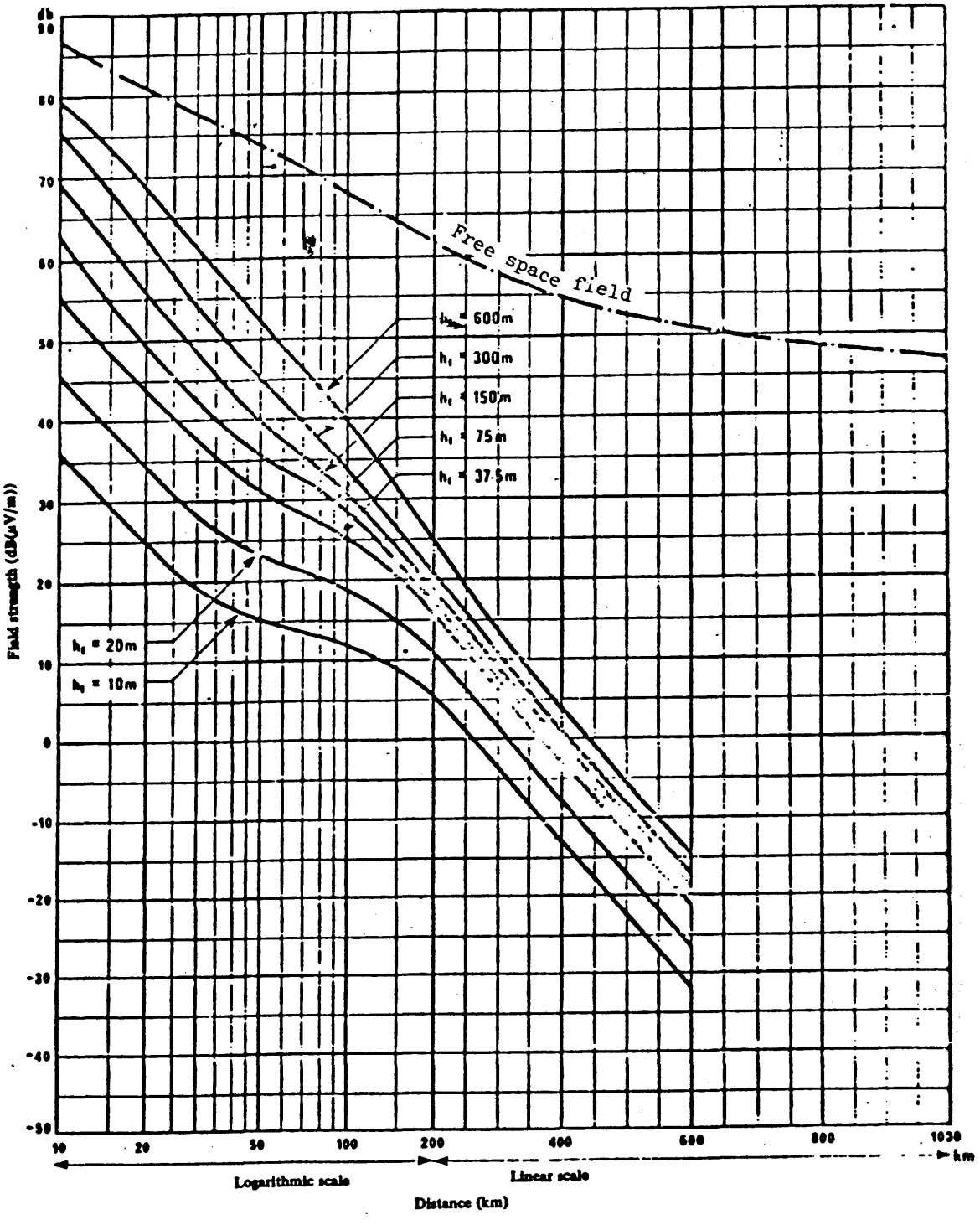


FIGURE 2.13 - Field strength (dB(μV/m)) for 1 kW e.r.p.

Frequency ~ 150 MHz, land, rural, 1% of the time, 50% of the locations; h_2 = 3 m

Free space

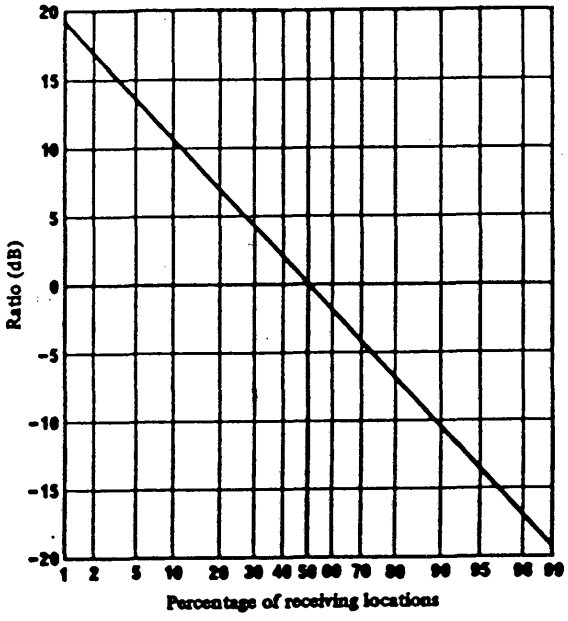


FIGURE 2.14 - *Ratio (dB) of the field strength for a given percentage of the receiving locations to the field strength for 50% of the receiving locations*

Frequency: 30 to 250 MHz (Bands I, II and III)

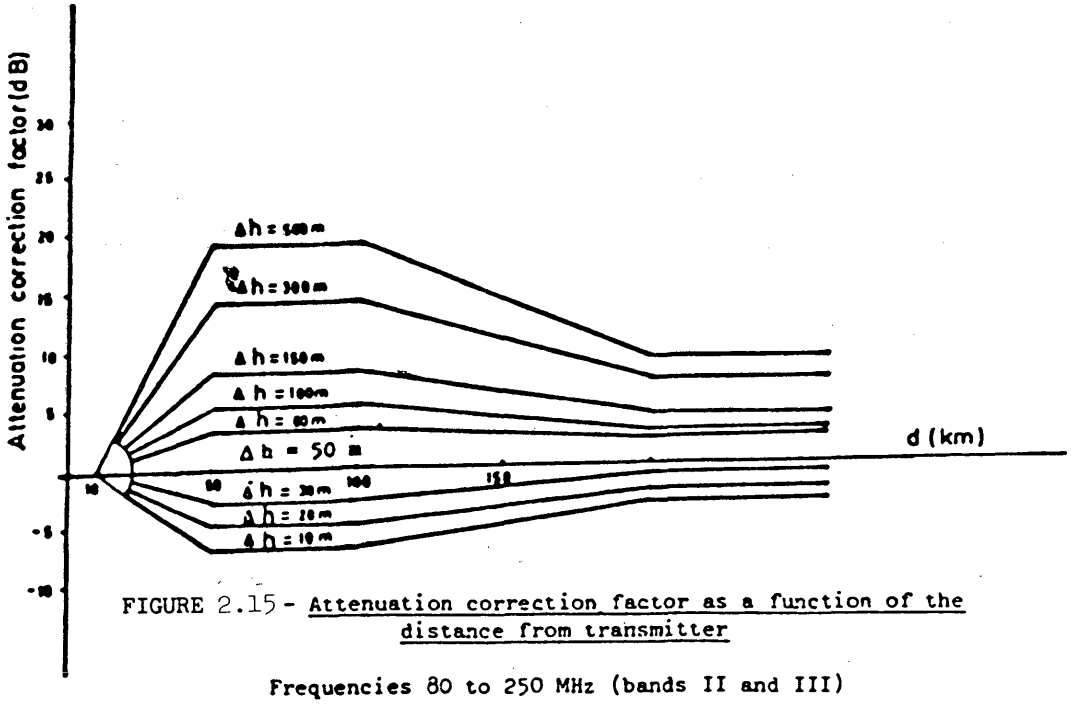
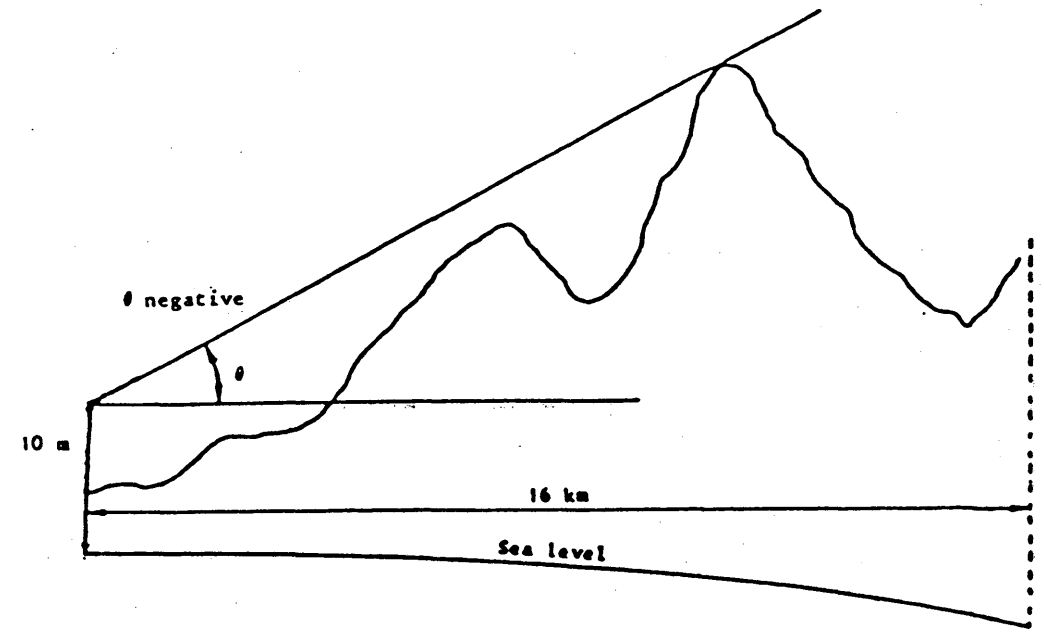


FIGURE 2.15 - Attenuation correction factor as a function of the distance from transmitter

Frequencies 80 to 250 MHz (bands II and III)

FIGURE 2.16 – *Definition of the parameter Δh*



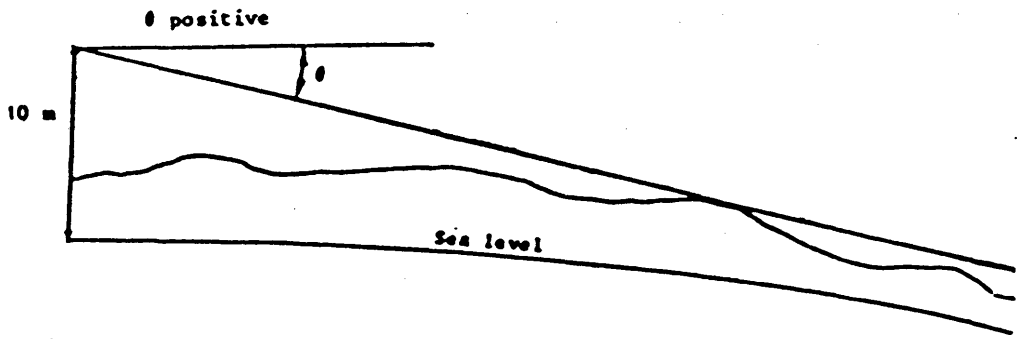


FIGURE 2.17 - Terrain clearance angle

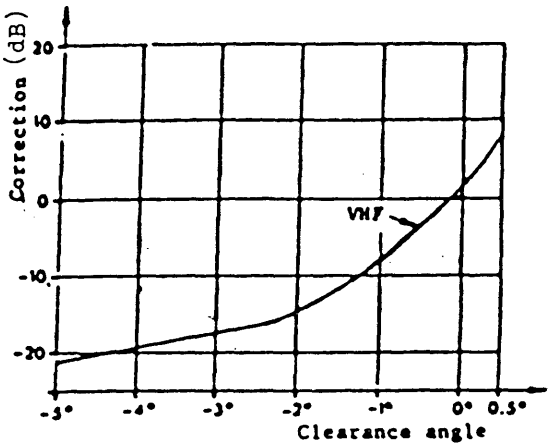


FIGURE 2.18 - Receiving terrain clearance angle correction

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT 15/E
27 August 1982
Original: English

WORKING GROUP 5 A

DRAFT

FIRST REPORT OF WORKING GROUP TO COMMITTEE 5

In conformity with its terms of reference, the Working Group examined the documents presented to the Conference and reached the following unanimous conclusions.

1. The planning at the Second Session shall be based on stereophonie reception at receivers on fixed locations. Suitable provisions shall be made for the inclusion of additional sub-carriers.

2. There should be no lower power limit for the stations to be included in the Plan. However, the Second Session of the Conference may organize the planning work in such a way that planning takes place in two steps. The low power stations, in such case, may be taken into account in the second stage of planning. Adequate protection, nevertheless, must be assured to every station included in the plan irrespective of its power.

3. The proposals regarding the analysis of the plan (the determination of cummulative effect of multiple interference) is within the competence of Committee 4 and is not within the terms of reference of Committe 5.

4. Document No. 26 (IFRB)

After the general discussion, in which the administrations and the IFRB

took part, the Group decided that:

-the existing or planned stations of the permitted services concerned should not be taken into account during planning of the broadcasting service at the Second Session of the Conference; and

-the other matters raised in the Document No. 26 are relevant to the Second Session of the Conference, whose attention should be drawn to this Document.

T. BOE

Chairman of Working Group 5 A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/16-E
27 August 1982
Original : English

WORKING GROUP 5A

PLANNING CONSTRAINTS

1. For several VHF/FM transmissions from a single site using a common antenna, the minimum frequency spacing should not be less than / 1.8 / MHz. (The use of a common antenna is the preferred arrangement for economic reasons.) However, in those cases where no frequencies can be assigned which fulfill the above constraint, a spacing down to / 0.8 / MHz may be adopted. This would be more acceptable at low power so that the use of a common transmitting antenna is still possible.

2. The use of VHF/FM transmissions separated in frequency by 10.7 / ±0.2 / MHz should be avoided as far as possible in common coverage areas.

This constraint is necessary because :

- local oscillator radiation from a receiver tuned to the lower frequency transmission may interfere with a nearby receiver tuned to the higher frequency transmission;
- intermodulation products at the receiver intermediate frequency may be generated either at co-sited transmitters or within a receiver.

3. The following notes may provide useful guidance in planning :

Difficulties could arise if frequency spacings of co-sited VHF/FM transmissions are equal to the duplex separation of the land mobile service in the area concerned.

Local oscillator radiation from television receivers operating in Band I may cause interference to VHF/FM receivers and harmonic radiation from VHF/FM receivers, local oscillators may cause interference to television receivers operating in Band III. These interference possibilities may need to be taken into account by administrations in preparing their VHF/FM requirements.

It may be advantageous, in certain cases, to minimize the number of intermodulation frequencies generated by co-sited VHF/FM transmitters. This can be achieved if equal frequency spacings are adopted. However, it may be desirable to avoid using equal frequency spacings for high power transmitters sited close to areas of high population density.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/17(Rev.3)-E
2 September 1982
Original : English

WORKING GROUP 5A

PLANNING PRINCIPLES

1. The Second Session of the Conference will be required to establish a frequency assignment plan in the band 87.5 - 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran which are contiguous with Region 1. The planning process shall use the inventory of requirements communicated by the administrations to the IFRB in accordance with the decisions of the First Session of the Conference.

Note : Considering the particular geographical situation of Iran, taking into account the complexity of the areas adjacent to Region 1, and due to the extent of interference calculations, the Administration of the Islamic Republic of Iran may communicate its requirements based on country-wide planning scheme.

2. The processing of a requirement should use the concept of providing broadcasting services to the required service area, while recognizing equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting. The planning should be carried out in such a way as to respect the rights of each country to arrange its broadcasting service in the most appropriate way in conformity with its specific needs (such as the peculiarities of its geography, its socio-political systems - multinational and multilingual composition of its population, federalism, local information systems etc. - and any other) and to choose the characteristics of its stations in order to attain an appropriate coverage of all its territory. In this case, planning may, according to the country, lead to either a system of national /programme/ coverage or a system of multiple regional or local coverages, or a combination of these systems. Some countries may base their national planning on co-siting of television stations and FM sound broadcasting stations. For the application of the principle of equal rights among countries and in order to take into account the diversity of systems of national, regional or local coverage, that each country may prefer, the concept of "equivalent national coverage" will be introduced. Every country will have assured right to the same number of equivalent national coverages. Joint planning of low power and high power stations near border areas will give rise to specific problems which will probably not be covered by general planning methods. /Especially, the use of networks with low power stations bordering networks with high power station will lead to less efficient use of the spectrum./

3. During the planning process all requirements should be processed in the same manner according to the technical evaluation procedure adopted by the Conference. In accordance with Resolution No. 510 of WARC 1979, the planning of the band 87.5 - 108 MHz in Region 1 and parts of Afghanistan and Iran which are contiguous to Region 1 should observe the following conditions :

- this new plan should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm, 1961;
- that this new plan in the band 87.5 - 100 MHz should not result in the deterioration of the service areas of those existing sound broadcasting stations operating in accordance with the Regional Agreement, Stockholm, 1961, which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961;
- the broadcasting stations in the new plan should not cause harmful interference to radio equipment used by aircraft for automatic landing purposes, which operates in the band 108 - 112 MHz.

A radical change in the situation obtaining in Europe would gradually lead to modifications which would affect the area to be protected and make it difficult or even impossible to observe the constraints imposed by Resolution No. 510.

4. Taking into account the modifications introduced in the planning criteria (such as the channel spacing and the degree of implementation of the Geneva 63 Plan), the systematic planning in Africa will cover the entire band 87.5 - 108 MHz.

5. In Europe, it would be desirable that administrations communicate their requirements relative to the band 87.5 - 100 MHz by taking into account their existing stations which operate in accordance with the Radio Regulations and the Stockholm (1961) Agreement. During the Second Session every appropriate effort shall be made to incorporate in the Plan :

a) those stations which currently operate in accordance with the Stockholm (1961) Plan;
b) planned modifications to this plan notified prior to /1 December 1983/; and
c) new requirements from administrations not signatories to the original plan notified prior to /1 December 1983/.

During the planning process, modifications to the existing assignments shall be carried out as far as possible, where necessary, without conflicting with Resolution No. 510 to ensure the equal rights of countries and remedy existing inequalities and incompatibilities.

6. Different planning approaches in Africa and Europe will require adaptation and resolution of incompatibilities on the basis of equal rights among all countries in Africa, Europe and Middle East. In resolving these incompatibilities, the status of the station resulting from the application of the Regional Agreements (Stockholm 1961, and Geneva 1963) should not /~~necessarily~~/ be taken into account.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/17(Rev.2)-E
31 August 1982
Original : English

WORKING GROUP 5A

PLANNING PRINCIPLES

1. The Second Session of the Conference will be required to establish a frequency assignment plan in the band 87.5 - 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran which are contiguous with Region 1. The planning process shall use the inventory of requirements communicated by the administrations to the IFRB in accordance with the decisions of the First Session of the Conference.

Note : Considering the particular geographical situation of Iran, taking into account the complexity of the areas adjacent to Region 1, and due to the extent of interference calculations, the Administration of the Islamic Republic of Iran may communicate its requirements based on country-wide planning scheme.

2. The processing of a requirement should use the concept of providing broadcasting services to the required service area, while recognizing equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting. The planning should be carried out in such a way as to respect the sovereign rights of each country to arrange its broadcasting service in the most appropriate way in conformity with its specific needs (such as the peculiarities of its geography, its socio-political systems - multinational and multilingual composition of its population, federalism, local information systems etc. - and any other) and to choose the characteristics of its stations in order to attain an appropriate coverage of all its territory. In this case, planning may, according to the country, lead to either a system of national /programme/ coverage or a system of multiple regional or local coverages, or a combination of these systems. Some countries may base their national planning on co-siting of television stations and FM sound broadcasting stations. For the application of the principle of equal rights among countries and in order to take into account the diversity of systems of national, regional or local coverage, that each country may prefer, the concept of "equivalent national coverage" will be introduced. Every country will have assured right to the same number of equivalent national coverages. Joint planning of low power and high power stations near border areas will give rise to specific problems which will probably not be covered by general planning methods.

3. During the planning process all requirements should be processed in the same manner according to the technical evaluation procedure adopted by the Conference. Due regard should be paid to the stations which are in operation in the planning area, particularly those being operated in accordance with the two Regional Agreements (Stockholm 1961 and Geneva 1963) [without, nevertheless, enjoying any priority]. [Notice should be taken by the administrations, while processing their plans, of their stations in the planning area.] Countries parties [concerned countries] to the mentioned Regional Agreements may communicate their requirements to the IFRB relating to the band 87.5 - 100 MHz as they appear in the updated regional plans annexed to the two Agreements, or modified to conform to their national planning constraints. Administrations pertaining to a congested area, such as some parts of the European Broadcasting Area, may agree among themselves to have their assignments in the band 87.5 - 100 MHz appear in the plan to be established by the Second Session as they appear in the updated Stockholm Plan 1961.

4. During the planning process, all proposed assignments shall be open to discussion for bilateral or multilateral negotiation among the countries concerned with the understanding that administrations may be requested to modify the characteristics of their stations. However, a change or modification should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm 1961.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/17(Rev.)-E
30 August 1982
Original : English

WORKING GROUP 5A

PLANNING PRINCIPLES

1. The Second Session of the Conference will be required to prepare a frequency assignment plan in the band 87.5 - 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran which are contiguous with Region 1. The planning process shall use the inventory of requirements communicated to the IFRB in accordance with the decisions of the First Session of the Conference.

Note : Considering the particular geographical situation of Iran, taking into account the complexity of the areas adjacent to Region 1, and due to the extent of interference calculations, caused by adjacent channels, the Administration of Iran may communicate its requests based on country-wide planning scheme.

2. The definition of a requirement should use the concept of providing broadcasting services to the required service area, while recognizing equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting. Recognition shall also be given to the sovereign rights of every country to make the most suitable arrangement of its broadcasting services, in conformity with the particularities of its geography and its socio-political system (multi-national and multi-lingual composition of its population, federalism, local information system, etc.) and to choose the characteristics of their stations in order to reach an appropriate coverage of all their territory; others may adopt an approach of multiple local coverages or combination of national and local coverages. Some countries may base their national planning on co-siting of television stations and FM sound broadcasting stations. Considering the limited capacity of the band available for planning and in order to ensure equality between countries, the new plan should provide for all countries in the planning area an equal number of "equivalent national coverages". Modifications to the plan after its entry into force, including addition of new stations, will be made following a procedure and technical criteria to be developed by the Second Session.

3. During the planning process all requirements should be processed in the same manner according to the technical evaluation procedure adopted by the Conference. Due regard should be paid to the stations which are in operation in the planning area, particularly those being operated in accordance with the two Regional Agreements (Stockholm 1961 and Geneva 1963) / without, nevertheless, enjoying any priority /
/ Notice should be taken by the administrations, while processing their plans, of their stations in the planning area /. Countries parties / concerned countries / to the mentioned Regional Agreements may communicate their requirements to the IFRB relating to the band 87.5 - 100 MHz as they appear in the updated regional plans annexed to the two Agreements, or modified to conform to their national planning constraints. Administrations pertaining to a congested area, such as some parts of the European Broadcasting Area, may agree among themselves to have their assignments in the band 87.5 - 100 MHz appear in the plan to be established by the Second Session as they appear in the updated Stockholm Plan 1961.

4. During the planning process, all proposed assignments shall be open to discussion for bilateral or multi-lateral negotiation among the countries concerned with the understanding that administrations may be requested to modify the characteristics of their stations. However, a change or modification should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm 1961.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/17-E
27 August 1982
Original : English

WORKING GROUP 5A

PLANNING PRINCIPLES

1. The Second Session of the Conference will be required to prepare a frequency assignment plan in the band 87.5 - 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran which are contiguous with Region 1. The planning process shall use the inventory of requirements communicated to the IFRB in accordance with the decisions of the First Session of the Conference.

2. The definition of a requirement should use the concept of providing broadcasting services to the required service area, while recognizing equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting. Recognition shall also be given to the sovereign rights of every country to make the most suitable arrangement of its broadcasting services, in conformity with the particularities of its geography and its socio-political system (multi-national and multi-lingual composition of its population, federalism, local information system, etc.) and to choose the characteristics of their stations in order to reach an appropriate coverage of all their territory; others may adopt an approach of multiple local coverages or combination of national and local coverages. Some countries may base their national planning on co-siting of television stations and FM sound broadcasting stations. Considering the limited capacity of the band available for planning and in order to ensure equality between countries, the new plan should provide for all countries in the planning area an equal number of "equivalent national coverages". Modifications to the plan after its entry into force, including addition of new stations, will be made following a procedure and technical criteria to be developed by the Second Session.

3. During the planning process all requirements should be processed in the same manner according to the technical evaluation procedure adopted by the Conference. Due regard should be paid to the stations which are in operation in the planning area, particularly those being operated in accordance with the two Regional Agreements (Stockholm 1961 and Geneva 1963). Countries parties to the mentioned Regional Agreements may communicate their requirements relating to the band 87.5 - 100 MHz as they appear in the updated regional plans annexed to the two Agreements, or modified to conform to their national planning constraints. Administrations pertaining to a congested area, such as some parts of the European Broadcasting Area, may agree among themselves to have their assignments in the band 87.5 - 100 MHz appear in the plan to be established by the Second Session as they appear in the updated Stockholm Plan 1961.

4. During the planning process, all proposed assignments shall be open to discussion for bilateral or multi-lateral negotiation among the countries concerned with the understanding that administrations may be requested to modify the characteristics of their stations. However, a change or modification should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm 1961.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Addendum No. 2 to
Document No. DT/18(Rev.1)-E
3 September 1982
Original : English

SUB-WORKING GROUP 5A-1

A N N E X 4

COMPATIBILITY WITH THE TELEVISION SERVICE IN THE BAND 87.5 - 100 MHz

1. Introduction

Requirements will be processed in accordance with the data bank to be set up by the IFRB from information supplied by administrations, or entered by the IFRB / for those administrations, which did not supply information /.

2. Compatibility assessment

2.1 All VHF/FM requirements which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961, will be assessed for compatibility with the television service.

For this purpose the existing situation shall be compared with the new Plan in the course of its development.

2.2 To permit this comparison, it will be necessary to calculate (as in 5) the usable field strength (E_u) for all television transmitters at a number of test locations (not more than 12) to be specified by the administrations concerned.

3. Reference situation

All existing or coordinated assignments to television, or VHF/FM stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm, 1961, shall be taken into account. The calculation for the reference situation need only be made once.

4. Situation, resulting from planning

All existing or coordinated assignments to television stations (as in 3) and all VHF/FM transmitters in the draft Plan, shall be taken into account.

5. Usable field strength for a television transmitter at the specified test location

5.1 The nuisance field from each interfering transmitter shall be calculated as in / 7, using appropriate protection ratio, taken from :

5.1.1. Table / 1 / for interference from a television transmitter, or

5.1.2 Figure / 1 / for interference from a VHF/FM transmitter.

5.2 Receiving antenna discrimination shall be taken from Figure /~2~/.

5.3 In the case of orthogonal polorization, a discrimination value of 10 dB shall be applied.

5.4 The interference contribution of each interfering transmitter is the value of the nuisance field derived in 5.1, together with any discrimination value derived in 5.2 and 5.3.

5.5 Eu shall be calculated from the individual interference contributions using the simplified multiplication method, taking into account the /~20~/ largest contributions and specified to one decimal place.

6. Incompatibility

An incompatibility only exists if any value of Eu obtained (as in 5) using the data of 4 exceeds the corresponding value of Eu in the reference situation.

TABLE /~1~/

Ratio of wanted to unwanted signal for colour television

1. Co-channel protection ratio in dB

Offset (multiples of 1/12 line-frequency)		0	1	2	3	4	5	6	7	8	9	10	11	12
Transmitter stability ±500 Hz (non-precision offset)	*T*	45	44	40	34	30	28	27	28	30	34	40	44	45

2. Lower adjacent channel protection ratio

- 6 dB

3. Upper adjacent channel protection ratio

+ 4 dB

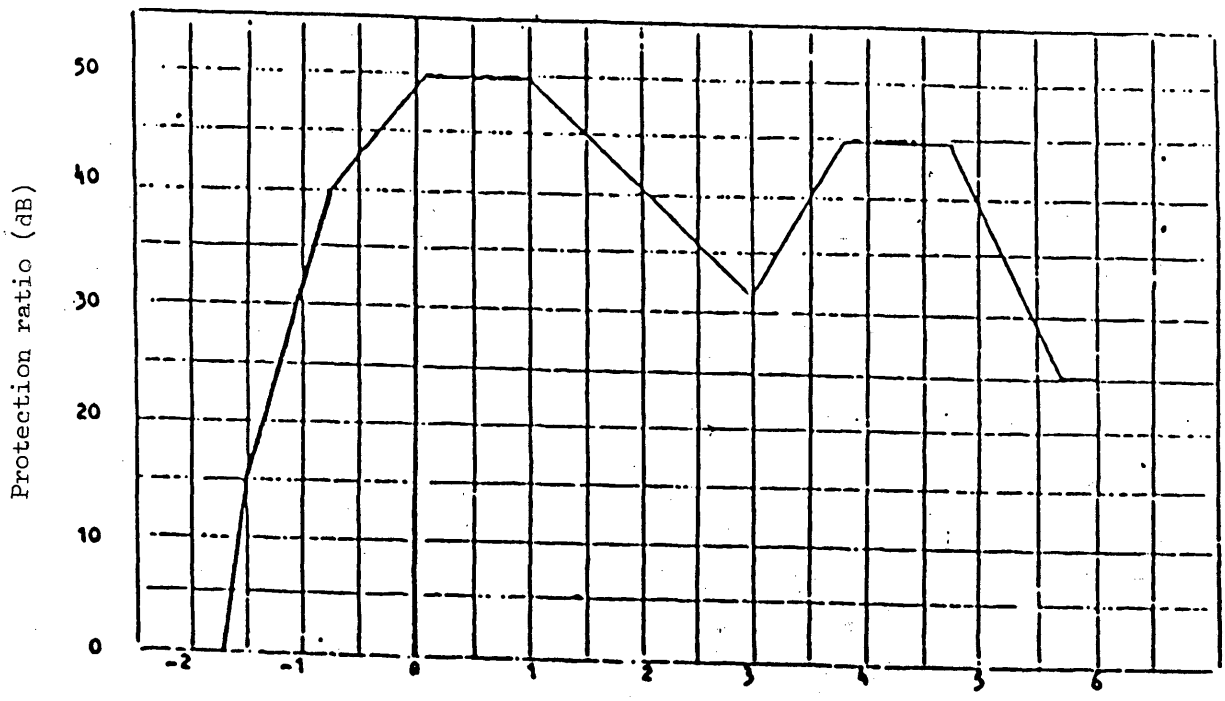


Figure [1] - 625-line system D/SECAM and K/SECAM. Protection from CW or frequency-modulated sound signal interference

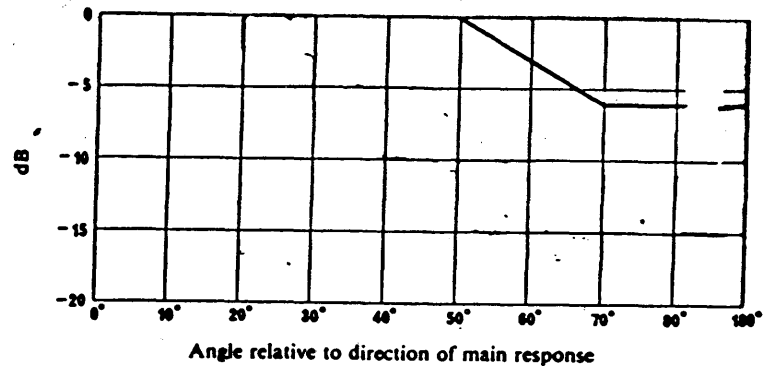


Figure [2] - Discrimination obtained by the use of a directional receiving antenna for the television service in the band 87.5 - 100 MHz

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Addendum No. 1 to
Document No. DT/18(Rev.1)-E
1 September 1982
Original : English

SUB-WORKING GROUP 5A-1

A N N E X 1

LATTICE PLANNING METHOD

In this Annex the use of the lattice planning method will be explained, whereas its theory is described in CCIR Report 944. The basic idea of this planning method is the repeated use of a geometrically regular channel distribution scheme over a vast area. As only channel distribution schemes are selected, which are optimized in terms of coverage by reducing interference within the network to the achievable minimum, it can be assumed that their repeated use would result in a plan which, after some further refinement, might be acceptable to everyone.

Although the use of one single channel distribution scheme would permit a high degree of spectrum utilization efficiency, conditions may prevail in the area to be planned which suggest the use of different schemes in different parts of the area. Actually the situation in Europe is considerably different from that in Africa and the countries of the Middle East. Whilst in the countries of the last-mentioned area planning may start from scratch, in Europe the plan for the television service in the band 84 to 100 MHz in Eastern European countries will have to be retained and be respected when assigning frequencies to VHF/FM sound broadcasting transmitters. It is for this reason that two different channel distribution schemes will be used, one for Europe in the band 100 to 108 MHz and the other for Africa and Middle East in the band 87.5 to 108 MHz.

The lattices will have to be carefully adapted to one another in order to limit any reduction in spectrum utilization efficiency to the minimum practicable. Geographical separation of the two areas over a wide distance range will be provided by the Mediterranean Sea. Nevertheless, some difficulties will persist and become particularly important in areas where there is no, or nearly no, geographical separation.

The lattices selected for Europe or Africa and the Middle East contain / 80 / or 34 channels, respectively. In Europe this scheme would permit assignments to be made to transmitters for providing 2 or 3 coverages in accordance with the requirements that will be specified. In Africa and the Middle East there will be a possibility to provide 6 coverages throughout the area, which seems to satisfy the needs of the vast majority of the countries situated in this part of the planning area.

To enable the application of the lattice planning method, in practice, it is useful to subdivide the planning area into sub-areas in such a way that the resulting sub-areas are similar in shape to the lattice selected, i.e. rhombic, in principle, and that the number of transmitter sites within each sub-area does not exceed the number (/ 80 / or 34) of available channels. In this respect it is assumed that in Africa and the Middle East the average distance between neighbouring transmitter sites is of the order of 80 - 100 km which, with 34 channels available per coverage, would correspond to a distance between transmitter sites using the same channel of approximately 470 - 580 km (co-channel distance).

In the preparation of planning it is, thus, appropriate to apply the channel distribution scheme by entering it in a geographical map which is covered by a rhombic coordinate system having, say, 480 km unit distances which correspond to the assumed co-channel distance. From this map administrations will be able to select appropriate frequencies for assignment to the transmitters at the nearest site. It should be noted that the assignment of one frequency from the theoretical scheme corresponds in reality to the assignment of a group of six channels which are separated from one another by 34 channels each. Needless to say that each frequency channel taken from the scheme can only be assigned once in that particular sub-area. It is worth mentioning that departures from the assignment procedure described would be admissible, e.g. in order to assign two groups of three frequencies each to two neighbouring transmitter sites although, in the theoretical lattice these six frequencies are derived from one and the same lattice point. Moreover, it needs to be stated that after assignment of a group of six frequencies to six transmitters at the same site, the major planning constraints will automatically be respected : the separation between channels used at the same site is 34; this would permit the use of an appropriate multiplexing equipment; and a separation of 10.7 ± / 0.2 / MHz (local oscillator frequency) is avoided. However, no compatibility aspects with other services can automatically be taken into account when using the lattice planning method.

In Europe, where an / 80 / channel distribution scheme will be applied in the band 100 to 108 MHz, it is more difficult to respect the planning constraints : as two or more frequencies are, after adequate distortion of the theoretical lattice, to be assigned to transmitters sharing the same site, it has to be made sure in every individual case that the separations between frequencies would permit the use of multiplexers. Moreover, there will be absolutely no means to automatically avoid, at the same site, the use of frequencies having a separation of 10.7 ± / 0.2 / MHz. Consequently, this particular constraint will need extensive checking.

A N N E X 2

ANALYSIS OF THE PLAN

1. Introduction

Requirements will be analyzed on the basis of the databank to be set up by the IFRB from information supplied by administrations.

2. Method for preliminary analysis

The usable field strength (E_u) will be calculated at the site of the wanted transmitter, without taking receiving antenna discrimination into account.

It may be expected, in the light of experience gained so far, that the E_u on the coverage contour will, on average, be 8 dB lower than that calculated for the transmitter site.

The nuisance field from each potentially interfering transmitter shall be calculated according to the method given in / part of the report of the First Session /.

E_u will be calculated by the / simplified multiplication method/power sum method / taking into account the / 20 / largest values of nuisance field.

3. Analysis for each administration

3.1 E_u will be calculated for each requirement submitted by an administration. The arithmetic mean of all E_u (dB) will be calculated together with the standard deviation.

3.2 A further study, shall be carried out for all those transmitters having unsatisfactory assignments, that is those for which E_u is more than 10 dB higher than the mean. This study, which will be performed according to the method of preliminary analysis (see 2) will be carried out as if the transmitter concerned were assigned each channel in turn in the frequency band 87.5 to 108 MHz. This will provide the E_u on each channel.

4. Examination of incompatibilities and frequency planning constraints

The following will be examined for each transmitter :

- incompatibility with the television service in the band 87.5 to 100 MHz (see Annex 4);
- incompatibility with the aeronautical radionavigation service in the band 108 to 118 MHz (see Annex 5);
- frequency spacing of less than 1.8 MHz for co-sited transmitters;
- frequency spacing between 10.5 and 10.9 MHz for co-sited transmitters.

For the purpose of the last /2/ examinations, transmitters will be regarded as co-sited if they have the same site coordinates.

5. First analysis

During the first analysis of requirements, only those transmitters shall be considered which have a maximum e.r.p. of not less than /100/ W and for which a frequency has been notified by an administration as part of its requirement.

6. Presentation of results

The following information will be presented to each administration for its transmitters.

6.1 For each transmitter :

- E_u at the transmitter site;
- a list of the /6/ largest sources of interference together with their nuisance fields and the bearings from the wanted transmitter site.

6.2 For all of its transmitters :

- the mean and standard deviation of all E_u;
- a graphical presentation (see Figure 1) of E_u on each channel in the band 87.5 to 108 MHz for each transmitter having an unsatisfactory assignment (see 3.2);
- lists of transmitters which have incompatibilities with other services of which contravene the frequency planning constraints (see 4).

7. Resubmission of requirements

When administrations are presented with the results of the first analysis, any administration with an unsatisfactory assignment, or with an identified incompatibility will be invited to submit to the IFRB alternative proposals which may include the results of bilateral or multilateral negotiations.

If no change is desired, the IFRB shall be informed.

8. Second analysis

The revised requirements will be analyzed and administrations will be presented with results for all stations which have been affected in any way, excluding the graphical presentations.

9. Inclusion of low power transmitters

At each location of a low power transmitter, E_u for all channels will be calculated (see 3.2) in order that the IFRB may assign an appropriate frequency.

10. Third analysis

The requirements will be analyzed and results will be presented to administrations having low power transmitters or having transmitters affected by the inclusion of low power transmitters.

11. Second Session of the Conference

During the Conference, administrations may wish to make changes to requirements resulting from bilateral or multilateral negotiations. The effect of such changes will be analyzed from time to time and the results will be published.

It should be possible that a coverage analysis (see 12) be provided in the case of difficult problems, at the request of an administration.

12. Determination of the coverage area of a transmitter

The coverage area of a transmitter is determined by calculating each of /_36_/ radials at /_10°_/ intervals, the distance at which the field strength from that transmitter is equal to the E_u as calculated in /_ _/. In calculating E_u, receiving antenna discrimination shall be taken into account.

13. Publication of coverage areas resulting from the Plan

Subsequently to the Conference, the coverage area (see 12) shall be published for all transmitters in the Plan. For each transmitter this information shall consist of /_36_/ radial distances, together with the corresponding E_u.

ANNEX 3

METHOD OF FOREMOST PRIORITY

The method of foremost priority consists in assigning to the transmitter for which the number of appropriate frequencies is smallest the most favourable among these frequencies (worst transmitter - best frequency). This means that frequencies are successively assigned to every transmitter following the order of decreasing difficulty in terms of interference. For every transmitter in sequence a frequency is selected which suffers least interference and produces the smallest amount practicable of additional interference. This procedure is repeated until all transmitters have obtained a frequency. It goes without saying that in this procedure account has to be taken of all constraints implied.

Obviously, this method can be time consuming and its reliability may only be warranted when a computer is used. The use of a high-speed computer may, however, provide important assistance in this procedure and may, in fact, be the only resort in some cases.

It will at first be necessary to discover, by way of an appropriate analysis (see Annex 2), the deficiencies of an assignment plan by computing the usable field strength, checking the constraints to be respected or applying the compatibility procedures. Unsatisfactory frequency assignments, that are those whose usable field strength exceeds the average value in that country by more than /~10~/ dB or assignments which are incompatible with other services will be identified in this way and the transmitters will be included in the list to which the method of foremost priority will have to be applied. Also in the following step assistance can be provided, e.g. by computing and plotting, for the sites of such transmitters, the usable field strength as a function of frequency (see Figure 1). Graphical presentations of this type are particularly useful when more than one frequency is to be found for the same site. In general, these frequencies may be considered most appropriate for which the lowest values of usable field strength are shown. This implies, however, that their use is compatible with other services and that the planning constraints are respected.

It may be clear from the above explanations that the graphical presentation of the usable field strength as a function of frequency might also successfully be used to find frequencies for assignment to transmitters for which no frequency was assigned in the first step of the planning procedure (i.e. during the use of the lattice planning method), e.g. for low-power transmitters.

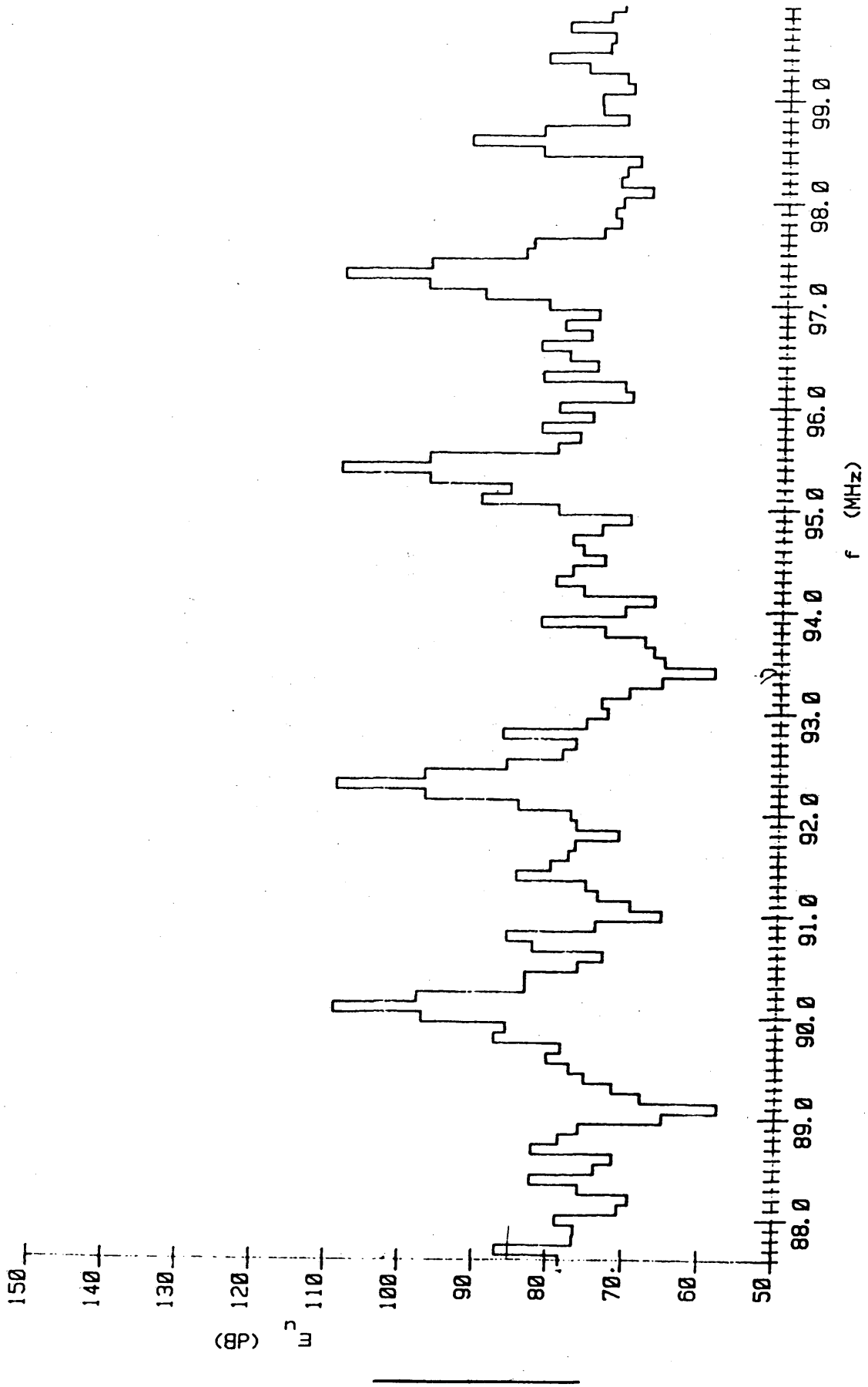

150
140
130
120
110
100
90
80
70
60
50
(dBµ) E
88.0
89.0
90.0
91.0
92.0
93.0
94.0
95.0
96.0
97.0
98.0
99.0
f (MHz)
STEREO

Figure 1

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/18(Rev.1)-E
31 August 1982
Original : English

SUB-WORKING GROUP 5A-1

PLANNING METHODS

Ad hoc Group 5A-1 held three meetings on 27, 30 and 31 August 1982 and considered, within its terms of reference (Document No. DT/13) the Chapter 6 on planning methods in Document No. DT/9. After extensive discussion it proposes the following draft text for inclusion in the Report of the First Session of the Conference :

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

1) the use of the lattice planning method by the administrations to select appropriate frequencies for assignment to given stations (Annex 1);

2) the preliminary analysis of the draft plan obtained so far by means of a simplified computation method (Annex 2);

3) the inclusion of low-power stations in, and the refinement of, the plan by the method of foremost priority (Annex 3) followed by negotiations among administrations concerned;

4) analysis of the plan using a more complex computation method in the case of critical assignments (Annex 2).

In the course of the planning procedure some of the above steps may have to be repeated, as appropriate. In particular, step 4 will need to be repeated after introduction of modifications, resulting from bilateral and multilateral consultations during the Second Session of the Conference.

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 modifications of or additions to the plan in the time subsequent to the Second Session of the Conference.

In the preparation of a frequency plan in the band 87.5 to 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran the two following planning methods shall be used :

1) regular lattice planning with linear channel distribution scheme;

2) method of foremost priority (planning by trial and error).

The efficiency of the two methods will depend on circumstances which may vary considerably from one part of the planning area to the other. For instance, in Europe it is likely that frequency assignments in the band 87.5 to 100 MHz to VHF/FM transmitters will only be subject to slight modifications in a restricted number of cases in most of the countries, whereas in the remaining part of the planning area an assignment plan for the entirety of sound-broadcasting transmitters will have to be established.

The lattice planning method which is given in Annex 1 / CCIR Report 944 / would be a powerful tool in the latter case, but it would be of little use in the former case.

Although it is desirable that, when use is made of lattice planning, the same channel distribution scheme is applied throughout the planning area, because of the variation of conditions in different parts of the area, it is thought appropriate to use two different channel distribution schemes.

The main advantage of this method is that the whole planning area can be sub-divided at the beginning into sub-areas of adequate size and shape. This will permit planning to start simultaneously in various parts of the planning area. A further advantage is that the method permits the quick assignment of large numbers of frequencies to non-constrained transmitters. This is due to the fact that within a theoretical channel distribution scheme mutual interference is brought down to the minimum practicable and that by its adaptation to a practical situation interference will be increased only slightly.

However, the applicability of the method is restricted to networks with transmitters of comparable interference potential (power, effective antenna height). The method should, therefore, not be used for the assignment of frequencies to low-power transmitters in an environment of numerous high-power transmitters. It may also fail to be applicable if a large number of constraints has to be respectd, as for instance, the protection against the origination of annoying intermodulation frequencies.

The method of foremost priority is described in Annex 3.

The advantage of this method is that all the constraints to be respected in every individual case can be taken into account. However, the method is time-consuming and its reliability is only warranted when a computer is used. Nevertheless, there can be no doubt that in parts of the planning area and in parts of the band conditions will be found in which the use of this method will be the only resort.

Because of the limited time that will be available for planning purposes during the Second Session of the Conference it is felt that both methods should go together. In the band 100 - 108 MHz in Europe (including the Asian part of the U.S.S.R.) and in the whole band in the remaining part of the planning area the lattice planning method shall be used in the first instance, as a help in preliminary planning. However, further planning may require the use of the method of foremost priority, especially in the planning of "desperate" cases and in the refinement procedure. In this respect it may well happen that planning in Europe while providing protection to the aeronautical radionavigation service will have to be considered as a desperate case.

Considering the size of the area to be planned, the expected large number of requirements to be included in the plan and the complexity of the planning task, some preparatory work is required to be carried out by IFRB in the period between the two sessions. This would permit to provide administrations preliminary results of calculations before the opening of the second session of the Conference. For the reasons mentioned above the following procedure is suggested.

1. The lattice method will be used as soon as possible after the First Session of the Conference with the view to help administrations in formulating their requirements in an orderly manner. It will assist mainly the developing countries which are not able to attend the present session.

2. Two different lattices will be used in this stage :

- a channel distribution with / 80 / channels for planning of the band 100 to 108 MHz in Europe (Figure 1)*);
- a channel distribution with 34 channels for the remainder of the planning area which will permit to provide 6 coverages in the band 87.5 to 108 MHz (Figure 2)*).

3. When using the lattice method in the band 100 to 108 MHz, administrations in Europe may communicate their requirements in the band 87.5 - 100 MHz as they result from the application of the Regional Agreement, Stockholm 1961.

4. When using a channel distribution scheme, countries pertaining to a given zone may decide not to include low-power stations in the lattice scheme. These low-power stations will be treated at a later stage before or during the Second Session of the Conference, so that, at the end of the Second Session, all frequency assignments will have been made whatever the power of the transmitter.

H. EDEN
Chairman of Sub-Working Group 5A-1

*) The figures will be provided at a later time during the First Session.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/18-E
30 August 1982
Original : English

SUB-WORKING GROUP 5A-1

PLANNING METHODS

Ad hoc Group 5A-1 held two meetings on 27 and 30 August 1982 and considered, within its terms of reference (Document No. DT/13) the Chapter 6 on planning methods in Document No. DT/9. After extensive discussion it proposes the following draft text for inclusion in the Report of the First Session of the Conference :

In the preparation of a frequency plan in the band 87.5 to 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran the two following planning methods shall be used :

1) regular lattice planning with linear channel distribution scheme;

2) method of foremost priority (planning by trial and error).

The efficiency of the two methods will depend on circumstances which may vary considerably from one part of the planning area to the other. For instance, in Europe it is likely that frequency assignments in the band 87.5 to 100 MHz to VHF/FM transmitters will only be subject to slight modifications in a restricted number of cases in most of the countries, whereas in the remaining part of the planning area an assignment plan for the entirety of sound-broadcasting transmitters will have to be established.

The lattice planning method which is given in Annex 1 / CCIR Report 944 / would be a powerful tool in the latter case, but it would be of little use in the former case.

Although it is desirable that, when use is made of lattice planning, the same channel distribution scheme is applied throughout the planning area, because of the variation of conditions in different parts of the area, it is thought appropriate to use two different channel distribution schemes.

The main advantage of this method is that the whole planning area can be sub-divided at the beginning into sub-areas of adequate size and shape. This will permit planning to start simultaneously in various parts of the planning area. A further advantage is that the method permits the quick assignment of large numbers of frequencies to non-constrained transmitters. This is due to the fact that within a theoretical channel distribution scheme mutual interference is brought down to the minimum practicable and that by its adaptation to a practical situation interference will be increased only slightly.

However, the applicability of the method is restricted to networks with transmitters of comparable interference potential (power, effective antenna height). The method should, therefore, not be used for the assignment of frequencies to low-power transmitters in an environment of numerous high-power transmitters. It may also fail to be applicable if a large number of constraints has to be respectd, as for instance, the protection against the origination of annoying intermodulation frequencies.

The method of foremost priority is described in Annex 2.

The advantage of this method is that all the constraints to be respected in every individual case can be taken into account. However, the method is time-consuming and its reliability is only warranted when a computer is used. Nevertheless, there can be no doubt that in parts of the planning area and in parts of the band conditions will be found in which the use of this method will be the only resort.

Because of the limited time that will be available for planning purposes during the Second Session of the Conference it is felt that both methods should go together. In the band 100 - 108 MHz in Europe (including the Asian part of the U.S.S.R.) and in the whole band in the remaining part of the planning area the lattice planning method shall be used in the first instance, as a help in preliminary planning. However, further planning may require the use of the method of foremost priority, especially in the planning of "desperate" cases and in the refinement procedure. In this respect it may well happen that planning in Europe while providing protection to the aeronautical radionavigation service will have to be considered as a desperate case.

Considering the size of the area to be planned, the expected large number of requirements to be included in the plan and the complexity of the planning task, some preparatory work is required to be carried out by IFRB in the period between the two sessions. This would permit to provide administrations preliminary results of calculations before the opening of the second session of the Conference. For the reasons mentioned above the following procedure is suggested.

1. The lattice method will be used as soon as possible after the First Session of the Conference with the view to help administrations in formulating their requirements in an orderly manner. It will assist mainly the developing countries which are not able to attend the present session.

2. Two different lattices will be used in this stage :

- a channel distribution with / 80 / channels for planning of the band 100 to 108 MHz in Europe (Figure 1)*);
- a channel distribution with 34 channels for the remainder of the planning area which will permit to provide 6 coverages in the band 87.5 to 108 MHz (Figure 2)*).

3. When using the lattice method in the band 100 to 108 MHz, administrations in the congested area in Europe may communicate their requirements in the band 87.5 - 100 MHz as they result from the application of the Regional Agreement.

4. When using a channel distribution scheme, countries pertaining to a given zone may agree not to include low-power stations in the lattice scheme. These low-power stations will be treated at a later stage before or during the Second Session of the Conference, so that, at the end of the Second Session, all frequency assignments will have been made whatever the power of the transmitter.

H. EDEN
Chairman of Sub-Working Group 5A-1

Annexes : 2

*) The figures will be provided at a later time during the First Session

ANNEX 1

REPORT 944

THEORETICAL NETWORK PLANNING

(Question 46/10, Study Programme 46L/10)

(1982)

1. Introduction

Broadcasting-transmitter networks should be planned in such a way that the required coverage of the area is provided using the minimum number of frequencies. From the purely technical standpoint, the coverage area of each transmitter depends upon a number of factors, for example: transmitter power, minimum usable field strength, radio-frequency protection ratio, the distance between transmitters sharing the same or adjacent channels, channel spacing, bandwidth of emission and other factors influencing wave propagation. It also depends on the channel distribution scheme.

When a large number of channels are to be planned or replanned for a particular AM or FM sound or television service, it has been found that effecting an efficient use of the spectrum can prove difficult when employing empirical methods only. For this reason, a theory of uniform transmitter networks was developed during the late 1950s and early 1960s [EBU, 1960]. This method can be applied with success when some uniformity of standards exists for the service to be planned. Furthermore, the frequency band to be planned should be constrained as little as possible, i.e. there should ideally be complete freedom in assigning any frequency to any transmitter.

The theory is not only useful in designing new or remodelling actual transmitter networks, but also provides a powerful tool for determining optimal technical parameters such as channel spacing, transmitter characteristics, etc., and identifying the best attainable coverage possible.

The method described below has already been used during the VHF/UHF European Broadcasting conference, Stockholm 1961, during the African VHF/UHF Broadcasting Conference, 1963, and helped in preliminary studies for the Geneva 1975 LF/MF Broadcasting Conference.

2. The theory of regular networks

It should be noted that the networks which will be studied in the present section are purely theoretical in the following sense:

- all the transmitters are identical: their power and antenna height are the same;
- they are equipped with non-directional antennas;
- propagation is isotropic and independent of frequency, at least within the band to be planned.
- for the purpose of calculating distances, the planning area is assumed to be flat and the population evenly spread over its surface; there are neither political nor natural boundaries.

In those conditions, and provided interference is negligible, the coverage area, i.e., the region where a good reception is achievable with a normal domestic receiver, is limited by a contour within which the electromagnetic field strength is greater than or equal to the value necessary to obtain a given signal-to-noise ratio. In the ideal situation described above, this contour is a circle whose radius depends on the type of service and the propagation laws valid for the frequency range considered. If it is desired to cover the whole of the planning area using such circular coverage areas, it is quite obvious that the number of transmitters per unit surface will be minimized if they are situated at the vertices of a lattice of equilateral triangles (Fig. 1). It should be noted that there is not one transmitter per triangle, but rather one transmitter for each pair of triangles forming a rhombus (shaded area of Fig. 1). This remark is of importance when computing the network efficiency.

With this configuration, every location on the planning area is served by at least one transmitter and overlapping of service areas is minimized. In what follows, we will take as a unit of length the side of the elementary equilateral triangle. The transmitter density is then one per elementary rhombus, the area of which is $\sqrt{3}/2$. The network efficiency can be expressed as the ratio of the total area where the service is acceptable (the area of the elementary rhombus) to the sum of the (overlapping) coverage areas. A regular lattice of equilateral triangles gives the optimum value, i.e., 0.83 (each transmitter has a coverage area of $\pi/3$ with a radius of $\sqrt{3}/3$). The ideal value would obviously be 1, but it is not attainable as it is impossible to cover a surface with circles without overlapping areas. A regular lattice of squares (or of isosceles right triangles) only achieves a ratio of 0.64 (each transmitter has a coverage area of $\pi/2$ with a radius of $\sqrt{2}/2$).

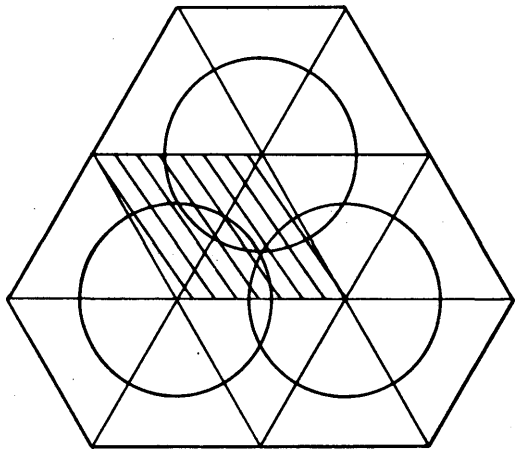


FIGURE 1 – *Location and coverage areas of identical broadcasting transmitters in a regular network*

It should be noted that actual transmitter networks are neither geometrically regular, nor do their technical characteristics correspond to those of the theoretical network. Deviations from geometrical regularity and from the power and antenna height of the theoretical network towards lower values will inevitably result in lower network efficiency. Nevertheless it is possible to derive, from the results of studies concerning theoretical networks, a fairly clear picture of the relationship between these factors and network efficiency.

3. An example of theoretical network

It is assumed first of all that the available frequency band has been divided, in an appropriate manner, into channels sufficiently wide for a sound or television programme to be located within its limits and adequately spaced (9 kHz for AM sound broadcasting; 100 or 200 kHz for FM sound broadcasting; 6 or 8 MHz for television (200 kHz and 6 MHz correspond to the American channels)) to make co-channel interference predominant vis-à-vis adjacent-channel interference.

It is then easy to derive, from this channel spacing, the number of channels that can be used when planning. As this number is obviously finite, it is inevitable that, at some more or less large distance from the starting point, the first channel assigned has to be re-used. The smaller the distance D, between two transmitters operating on the same channel, the smaller the number of channels needed to cover the whole planning area. But it is necessary that D be large enough for the two co-channel transmitters not to interfere unduly with each other.

It is not difficult to evaluate D. With the help of suitable propagation curves, field strengths of the wanted transmitter and of the interferer are computed, for given percentages of time (see Recommendations 368 and 370), on the circle defined in § 2, limiting the coverage area of the wanted transmitter. D is chosen sufficiently large so that the difference, expressed in dB, between the two field strengths is larger than the protection ratio which is to be found in the relevant Recommendations 560, 412, 418 and Report 306. The case of multiple interference will be dealt with later.

With N channels, it is possible to cover N elementary rhombi, that is an area equal to $N\sqrt{3}/2$, taking as unit area the surface of a square whose side is equal to the side of the elementary triangle. So another kind of network arises using rhombi consisting of N elementary rhombi, and it is logical to stick to the conclusion found in § 2: a given channel will be repeated at the nodes of a lattice of rhombi whose shorter diagonal is equal to the side, the area of which is $N\sqrt{3}/2$. This rhombus will be called the "co-channel rhombus" and the length D of its side is $\sqrt{N}$ ($\sqrt{N}$ times the side of the elementary triangle). The characteristics of rhombic lattices will be shown in a simple example, where $N = 13$ (see Fig. 2).

- *Period:* all the co-channel rhombi are identical. A two-dimensional periodicity appears. It may remind the reader of the theory of elliptical functions.
- *Channel distribution:* within a co-channel rhombus, channels might be distributed at random, but in every rhombus their locations should be identical. However, a random distribution is not suitable if it is necessary to take into account interference other than co-channel interference, which is usually the case. Assuming that a homogenous network leads to the most efficient utilization of the spectrum, it is necessary for the interfering signals on any channel to have the same strength, wherever the transmitter is.

Hence if, taking account of the protection ratio between adjacent-channel transmitters (referred to here as 1-channel transmitters; likewise 2-channel transmitters are spaced by 2 channels, etc.), channel 1 is placed at a point which is sufficiently far from channel 0, this defines for channel 1 a co-channel rhombic which is offset from the co-channel rhombic for channel 0, by the vector $\overline{01}$. To meet the requirement referred to above, for homogeneity, channel 2 will be placed such that $\overline{12} = \overline{01}$, and so on for the other channels. Channel N falls on channel 0. If we consider the 13 channel network in Fig. 2, it is seen that someone moving along the straight lines of the elementary triangle lattice will find the channel numbers are in an arithmetic progression, modulo 13. Starting from channel 0 and heading west, he will encounter channels: 2, 4, 6, 8, 10, 12, 1, 3, 5, 7, 9, 11, 0, etc. It is therefore very easy to define the entire network on the basis of the progression step in two distinct directions: + 2 towards the left and + 5 towards the top righthand corner.

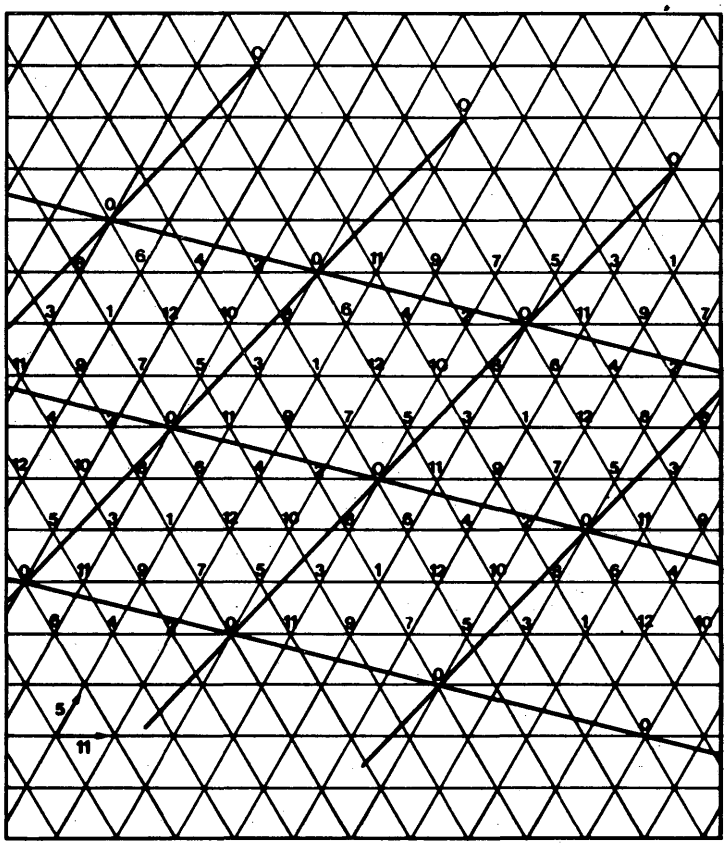


FIGURE 2 – *Example of regular lattice for 13 channels*

4. Ideal and non-ideal networks

To make the calculations easier, it is convenient to refer the plan to a system of two coordinate axes, bearing equal scales but making an angle of 60° rather than the conventional 90° (see Fig. 3).

We already know that the side of the co-channel rhombus has a length equal to $\sqrt{N}$, but it is necessary for the rhombus to coincide with the intersections of the elementary lattice. In the tilted coordinate system, the distance of any point (x,y) from the origin is:

$$(x^2 + xy + y^2)^{1/2} *$$

If two integers a and b can be found such that $a^2 + ab + b^2 = N$ (number of channels), then there is a co-channel rhombus whose vertices coincide with the intersections of the elementary lattice. $N = 13$ corresponds to the case where $a = 3$ and $b = 1$. In the following discussion, such numbers will be called "rhombic numbers". Some of them are given on Fig. 4.

* All the distances in this section are calculated on the base of this formula and expressed in the multiples of units equal to the length of a side of an elementary triangle.

There are other conditions for the choice of a and b: they shall not have any common divisor, either between themselves or with N, and neither of them can be equal to zero. For instance, if they are both even numbers, only the even-numbered channels will appear. The other restriction will be given later. The theory still works if N is not exactly a rhombic number. The co-channel rhombus becomes a co-channel parallelogram, with an area equal to N. In this case, the sides of the parallelogram are not equal; one of them is shorter than $\sqrt{N}$ and as a consequence this co-channel distance is slightly smaller than for the rhombus.

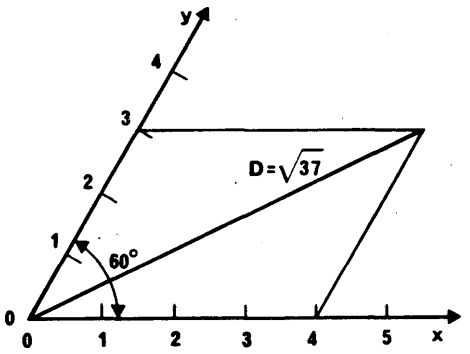


FIGURE 3 – *Reference coordinates of regular lattices*

b \ a	1	2	3	4	5	6	7	8	9	10	11	12
1	3	7	13	21	31	43	57	73	91	111	133	157
2			19		39		67		103		147	
3				37	49		79	97		139		
4					61		93		133			
5						91	109	129	151			
6							127					

FIGURE 4 – *Table of rhombic numbers*

Figure 5 shows a network with 26 channels, 26 not being a rhombic number. However, in this particular case, it is seen that the shortest co-channel distance is the shorter side of the parallelogram whose length equals 4.358. This is not much less than the distance $\sqrt{N} = 5.099$ which would have been obtained if 26 were a rhombic number. The lengths of other co-channel distances, e.g. the longer side of the parallelogram or the shorter diagonal of it, are 5.291 and 6.082 respectively. The next rhombic number is 31 an example of which is given in Fig. 6.

Figure 7 shows a network with 120 channels, 120 not being a rhombic number. However, in this particular case, it is seen that the shortest co-channel distance is the diagonal whose length equals 10.58. The lengths of the sides are 11.53 and 10.82, respectively. None of these numbers is much less than the distance $\sqrt{N} = 10.95$, which would have been obtained if 120 were a rhombic number. This lattice may not be optimum for VHF planning.

In the case of N not being a rhombic number, there are three possibilities:

- not to take note of this value N and consider the nearest rhombic number which could be used instead (e.g. 111; see Fig. 4);
- to consider the resulting regular lattice despite its consisting of co-channel parallelograms;
- to distort the lattice so as to transform co-channel parallelograms to rhombi. In these circumstances the elementary rhombi would become parallelograms, and network efficiency would decrease. This decrease will only be slight when N is fairly large.

The best choice among the three options depends on the circumstances to be taken into account.

It is not always easy to find the progression steps such that the channel assigned to the origin will reappear at the vertices of the co-channel rhombus or parallelogram. Referring Fig. 2 to the slant coordinate system of Fig. 3, the steps p along the x-axis and q along the y-axis must satisfy the following equations:

$$1 \cdot p + 3 \cdot q = kN \qquad \text{and} \qquad 4 \cdot p - 1 \cdot q = k'N$$

k and k' are integers.

In Fig. 2, $p = 11$, $q = 5$, $k = 2$, and $k' = 3$, for $N = 13$. These steps are indicated in Fig. 2. In the case of a non-rhombic number, there is more than one parallelogram and many attempts are necessary to find the best one [Arnaud, 1962]. Even in the case of rhombic numbers it may happen that two different co-channel rhombi exist, as it appears on Fig. 4 for 91 (9 and 1 or 6 and 5).

The case where a or $b = 0$ is a trivial one. If, for example, $b = 0$, the co-channel rhombus sides coincide with the x and y axes, and $a = \sqrt{N}$. The sum of steps along the axes from one vertex to the next must be N; consequently their value is $\sqrt{N}$ and it is then only possible to write on the lattice channels that are multiples of $\sqrt{N}$

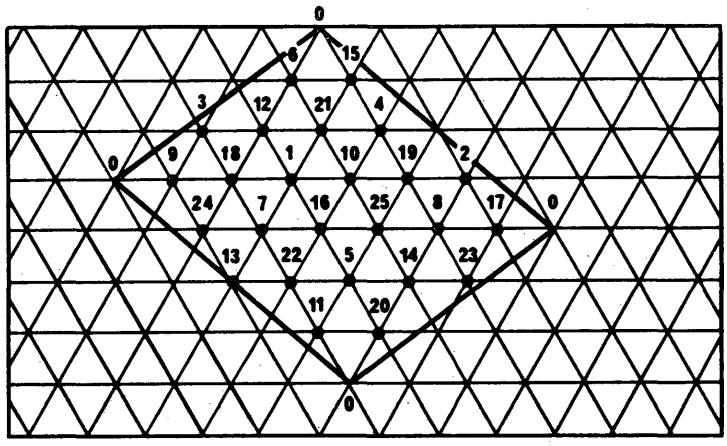


FIGURE 5 – *Network with 26 channels*

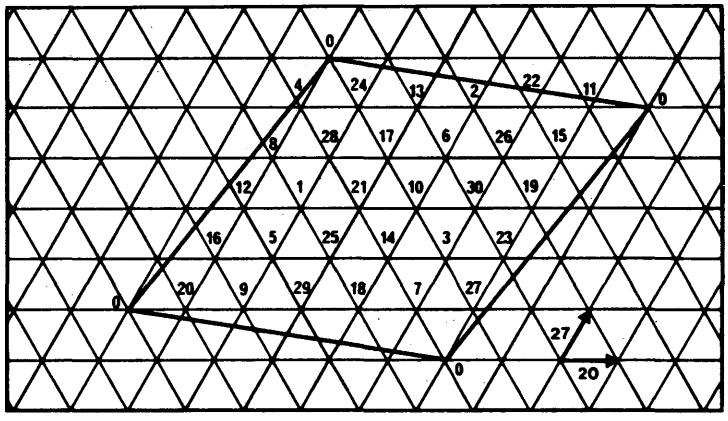


FIGURE 6 – *Example of an optimum regular lattice for 31 channels*

5. Evaluation of interference

5.1 *Co-channel interference*

It has been explained in § 3 how the minimum necessary number of channels derives from the consideration of propagation curves and protection ratios, but only one interfering transmitter has been taken into account. On Fig. 8 are drawn a few co-channel rhombi for a co-channel distance D, the wanted transmitter being at the centre and the eighteen others surrounding it are the interferers. In the case of VHF or UHF broadcasting, the coverage area is evaluated on the basis of the 50% or 1% of the time propagation curves of Recommendation 370 (for the wanted or interfering transmitter, respectively), taking due account of the characteristics of the transmitter (effective radiated power, antenna height, frequency) and the minimum usable field strength. (See

Recommendation 412). In § 2, the coverage area radius has been found to be $\sqrt{3}/3$ times the side of the elementary rhombus. So the scale of the lattice is known. The first six interfering transmitters are at a distance $D = \sqrt{N}$, and as a first approximation it will be assumed here that D is large enough and that the interfering field strength is almost the same at the wanted transmitter location and on the fringe of its coverage area. In a more accurate study, the ratio of wanted/interfering signals should be calculated at the limit of the coverage area, at least at the six locations shown by roman numerals I to VI on Fig. 8.

D has to be long enough for the difference (in decibels) between the wanted field strength exceeded for 50% of the time and the combined interfering field strengths exceeded for 1% of the time, to be greater or equal to the co-channel protection ratio. Then it should be checked whether the twelve transmitters located on the second hexagon (see Fig. 8) have any influence, but in general this is not the case unless D is very small.

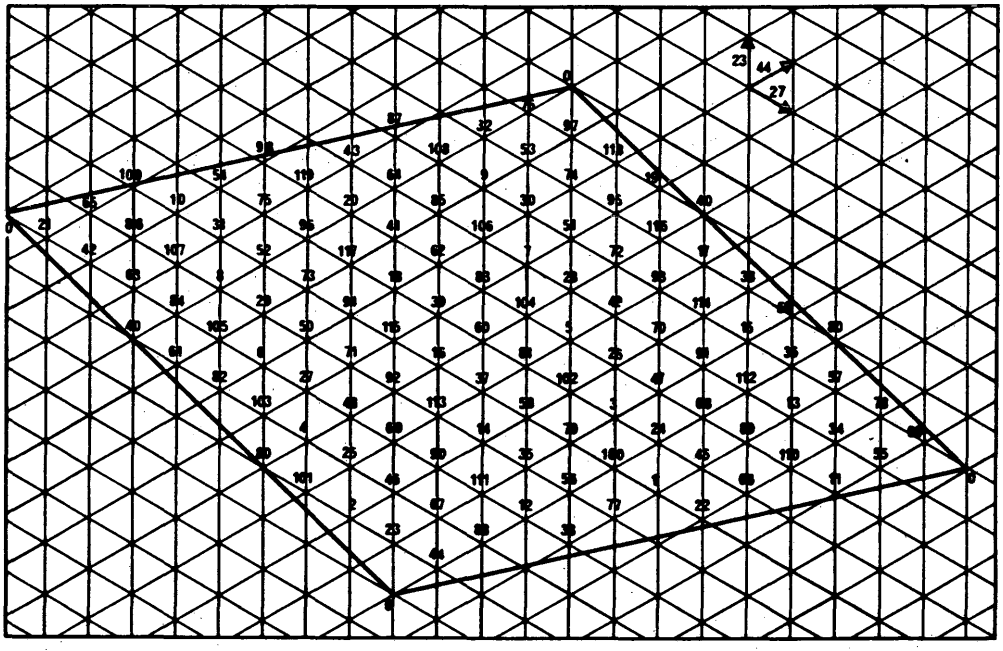


FIGURE 7 – *Network with 120 channels*

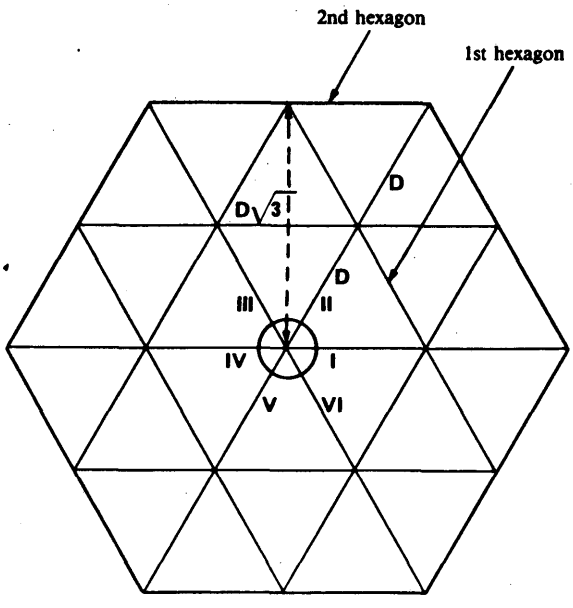


FIGURE 8 – *Location of co-channel transmitters*

5.2 *Adjacent channel interference*

The network of Fig. 2 will serve as a practical example. D is assumed to have been found to be equal to $\sqrt{13}$. By definition, the network is regular and any given channel can be studied. Take for instance channel 7. The adjacent channel distances are $\sqrt{3}$ and 2. There are 4 adjacent channel interfering transmitters. As in the case of co-channel interference, their total field strength will be evaluated at the transmitter location first, and then, if the wanted/interfering signal ratio is only slightly different from the protection ratio, at the most critical points at the limit of the coverage area. Other adjacent channel transmitters are much more remote. Their distances are $\sqrt{7}$, $\sqrt{12}$, $\sqrt{13}$, etc.

For a wanted transmitter on channel C, there are in each co-channel rhombus at least two adjacent channel interfering transmitters on channels $C + 1$ and $C - 1$. The further the transmitters $C + 1$ and $C - 1$ are from the corners of the co-channel rhombus of C, the better will be the network; the ideal positions will be the centres of gravity of the two equilateral triangles making up the rhombus. Hence if transmitter $C + 1$ is exactly at one of these centres of gravity, $C + 2$ will be exactly at the other and $C + 3$ will coincide with C which is absurd. This occurs with the network with $N = 21$ channels. If the coincidence of a point in the network with the centres of gravity is only approximate, channel $C + 2$ will be twice as far from the centre of gravity of the triangle, however channel $C + 3$ will be still fairly close to channel C which is unfavourable in FM sound broadcasting as this corresponds to a carrier spacing of 300 kHz (in parts of Europe) for which the protection ratio is only slightly negative (−7 dB).

5.3 *Multiple interference*

Both in theory and in practice more than one interfering transmitter has to be respected. At the site of the wanted transmitter in the network of Fig. 2 there are co-channel transmitters interfering with near identical signal strength and in addition there are four interfering adjacent-channel transmitters. It should not be overlooked that at least 2-channel and 3-channel transmitters will also need to be taken into account. In practice it has proved useful to compute the usable field strength on the basis of at least those interferers which cause the strongest interference potential. It cannot however be a matter for this description of a planning method to advocate one or the other method of computing multiple interference effects.

6. Planning constraints

When planning a particular type of service, some constraints have to be kept in mind and most of them result from the receiver design. It is useful to distinguish between internal and external constraints. Such constraints and their generating mechanisms are discussed in Report 946.

7. Use of theoretical networks

Theoretical networks may be of some help in trying to find the optimum characteristics of transmitters [Sauvet-Goichon, 1980] or the most suitable type of modulation parameters or channel spacing. There is a good probability that a solution found to be optimum in a regular network would be the best one for an actual network as well and in any event it will be far easier to study the former with the help of computerized methods.

7.1 *Simple network*

The allocated band, 16 MHz wide, is divided into 159 channels. Below 159 the largest rhombic number is 157 (12 and 1, see Fig. 4). Two channels are then left empty. They may replace channels whose use is precluded by some local constraints (see § 6) or fill gaps in mountainous areas or near borders. As a general rule, more than one programme is broadcast from a given location and some geographical neighbouring assignments will be moved to the same point. Figures 9 and 10 show two examples of channel clustering. Assignments made at the vertices of the shaded areas are concentrated to the centre of gravity of each area. It should be checked that this does not involve an unacceptable increase in interference.

Figure 11 gives the steps to build a 157 channel network. Their derivation is given in Annex I. The 1961 Stockholm Plan for UHF television has been based on a channel clustering C, $C + 3$, $C + 6$.

7.2 *Multiple networks*

When there is a large number of channels (more than about 50), and if, as is usual, each centre consists of several transmitters, it is possible to split the band into sub-bands, each of them including the same number of channels and possibly reserved for a separate programme. It should be noted that the African Plan has been designed on a channelling of 86 kHz, i.e. 185 channels in 16 MHz, for 6 networks of 31 channels or 5 networks of 37 channels (37 is a rhombic number).

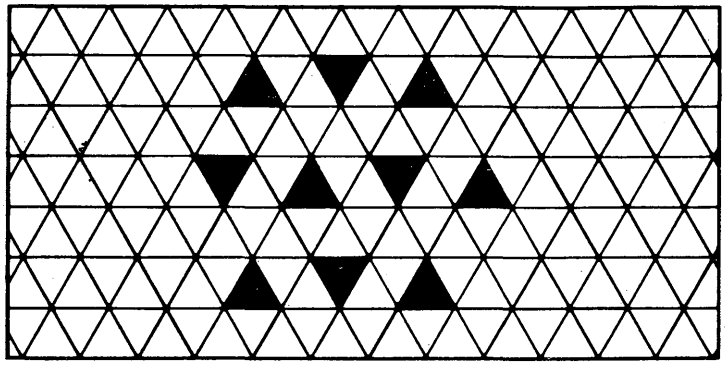


FIGURE 9 – *Clustering of neighbouring channels*

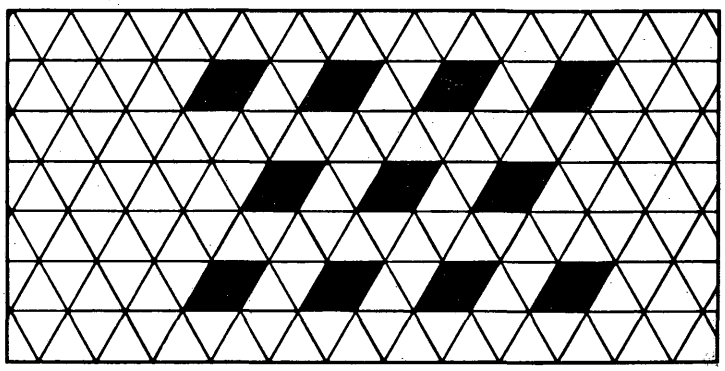


FIGURE 10 – *Clustering of neighbouring channels*

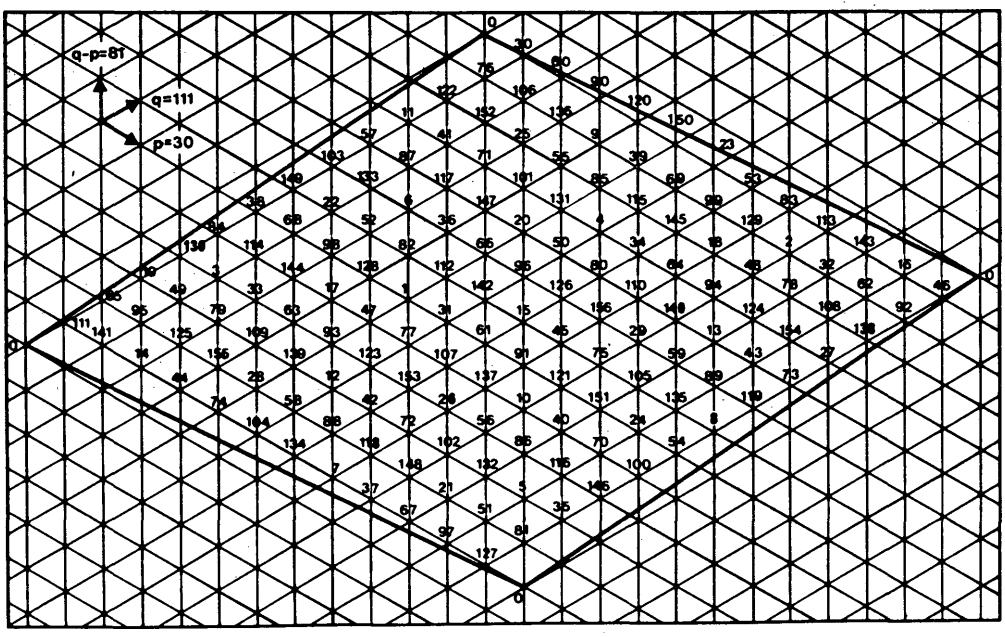


FIGURE 11 – *Example of an optimum regular lattice for 157 channels*

8. Number of channels needed for full area coverage with one programme in VHF sound broadcasting

8.1 *General considerations*

Based on the previously discussed method the number of channels needed for the dissemination of one programme in VHF sound broadcasting to provide full coverage was evaluated.

The investigations are made for different average distances between transmitters, two antenna heights, (300 m and 600 m), two coverage factors (90% and 100%) and an effective radiated power of 100 kW. Monophonic and stereophonic services were taken into account. The calculation of the interferences was carried out using the simplified multiplication method (see Report 945).

This method had previously been used during:

- the European Broadcasting Conference, Stockholm, 1961,
- the African Broadcasting Conference, Geneva, 1963.

8.2 *Performance of the calculations*

8.2.1 *Basic assumptions*

The investigations are based on idealized networks with a regular lattice of transmitters, linear distribution of channels and equilateral co-channel triangles. The so-called elementary triangles which are formed by three neighbouring transmitters are in this case not equilateral in general, but only for certain numbers of channels [EBU, 1960].

The calculations are based on the following conditions:

- field strength E (50,50) (Recommendation 370),
- field strength E (50,1) (Recommendation 370),
- protection ratios (Recommendation 412),
- local variation of field strength: 8.3 dB,
- receiving antenna,
  monophony : omnidirectional,
  stereophony : directional with 12 dB front-to-back ratio,
- minimum usable field strength (Recommendation 412)
  monophony : 48 dB(μV/m),
  stereophony : 54 dB(μV/m),
- channel spacing : 100 kHz.

8.2.2 *Calculation of the usable field strength*

8.2.2.1 *Method of calculation*

The calculation of these interferences was carried out using the simplified multiplication method.

Experience in some countries has shown that the coverage situation found in actual practice is, on average, in acceptable agreement with computation results obtained with the simplified multiplication method. In the subsequent sections only this method has been used for the determination of the required number of channels.

8.2.2.2 *Number of interfering transmitters*

For the calculation of interferences in the theoretical lattice, the 18 strongest interfering co-channel transmitters and the 40 strongest interfering adjacent channel transmitters having frequency separations up to 400 kHz were taken into account. (The relatively large number of interfering adjacent channel transmitters is only relevant with close channel spacings.)

8.2.3 *Variation of parameters*

The average distance of transmitters was varied between 40 and 120 km in steps of 10 km. For the effective height of the transmitter antenna, 300 and 600 m were chosen, because the average height values in many European countries fall into that range. The effective radiated power was set to 100 kW to ensure that interference rather than noise will limit the coverage area; this being a condition for efficient spectrum utilization (see Report 414 (Kyoto, 1978)). For small distances between transmitters however, considerably less power would provide equal percentage of coverage with the same number of channels.

8.2.4 *Results*

The number of channels needed in a theoretical network under different conditions can be found in Figs. 12 to 15. For a monophonic service with an omnidirectional receiving antenna and for a stereophonic service with a directional receiving antenna (12 dB front-to-back ratio), the number of channels required is almost equal.

In an idealized theoretical network based on the above assumptions with an effective transmitter antenna height of 300 m, an effective radiated power of 100 kW and an average distance between transmitters greater than 70 km:

- for 90% coverage about 25 channels are necessary (Fig. 12),
- for 100% coverage about 31 channels are necessary (Fig. 13).

Examples of possible channel distribution for corresponding numbers of channels are given in Figs. 5 and 6.

The number of channels needed for one programme in a theoretical network can only give an approximation to the number needed for a real network. The less the uniformity of the real network considered the more extra channels will be needed. As experience with existing networks in the range 87.5-100 MHz in continental Europe has shown, up to 4 programmes are possible in this range.

Based on theoretical study and practical experience, it may be assumed that for the entire frequency band 87.5-108 MHz:

- for 90% coverage about 7 programmes,
- for 100% coverage about 6 programmes,

should be practicable.

In practical networks, the power and the effective antenna height of any single transmitter should be set to the lowest possible value to obtain the intended coverage.

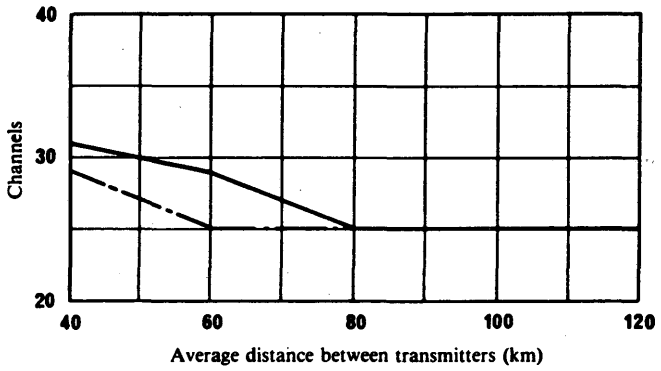


FIGURE 12 – *Number of channels needed in a theoretical network for coverage 90 % and antenna height 300 m*

—·— : monophony (0 dB - antenna gain)
——— : stereophony (12 dB - front-to-back ratio of the antenna)

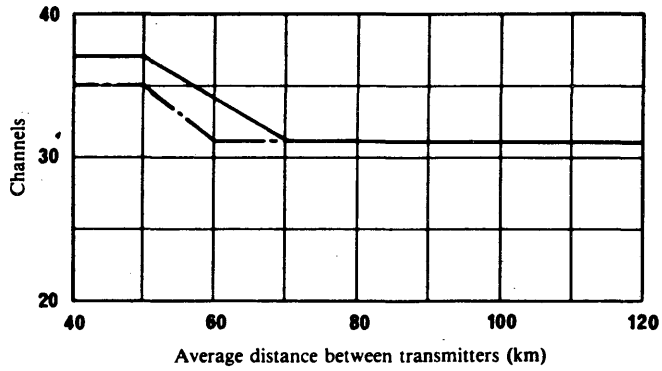


FIGURE 13 – *Number of channels needed in a theoretical network for coverage 100 % and antenna height 300 m*

—·— : monophony (0 dB - antenna gain)
——— : stereophony (12 dB - front-to-back ratio of the antenna)

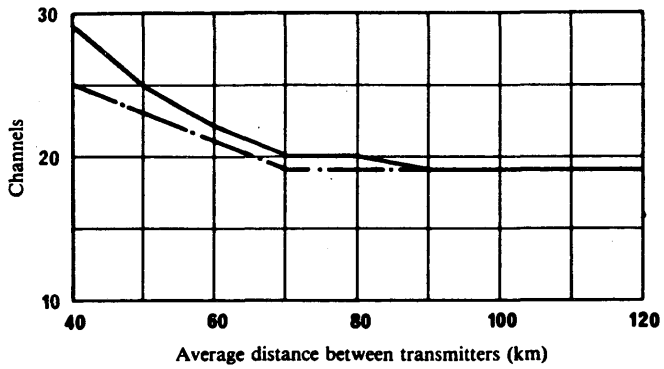


FIGURE 14 – *Number of channels needed in a theoretical network for coverage 90 % and antenna height 600 m*

—·— : monophony (0 dB - antenna gain)
——— : stereophony (12 dB - front-to-back ratio of the antenna)

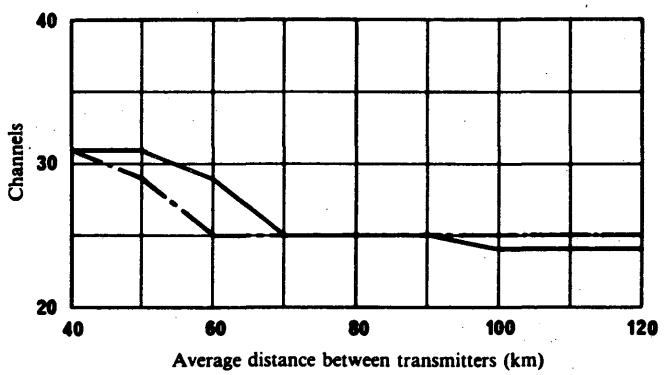


FIGURE 15 – *Number of channels needed in a theoretical network for coverage 100 % and antenna height 600 m*

—·— : monophony (0 dB - antenna gain)
——— : stereophony (12 dB - front-to-back ratio of the antenna)

9. Conclusions

When the number of channels is high, it seems difficult to achieve by purely empirical means the best use of the frequency spectrum. The theory of regular networks appears as an efficient tool to reach an optimum. Moreover, in an area where the surface of the earth is divided amongst many countries, it is a good way to assure them they have obtained a fair share of the spectrum. Consideration could also usefully be given to means of planning irregular networks in special cases where these may be more appropriate.

ANNEX I

CHOICE OF THE PROGRESSION STEPS IN AN OPTIMUM 157 CHANNEL LATTICE

A systematic study has been made of all the rhombic numbers less than 160, involving calculations of distance for 1-, 2- and 3- channel distances for all sets of values of p and q.

Those results that appear the most useful are shown below (Table I) (to simplify the presentation, the square of the distance is shown). The Table extends only to $N = 100$ to limit its size.

TABLE I

	p	q	Adjacent	2-channel	3-channel
$N = 19$ ($a = 3, b = 2$)	6	10	4	3	3
$N = 31$ ($a = 5, b = 1$)	7	27	7	7	3
$N = 37$ ($a = 4, b = 3$)	6	29	9	3	7
	9	25	9	7	3
$N = 39$ ($a = 5, b = 2$)	4	29	7	7	9
$N = 43$ ($a = 6, b = 1$)	5	13	12	7	3
$N = 49$ ($a = 5, b = 3$)	12	29	13	9	3
$N = 57$ ($a = 7, b = 1$)	11	37	13	7	9
$N = 61$ ($a = 5, b = 4$)	6	23	13	7	12
	15	27	16	13	3
$N = 67$ ($a = 7, b = 2$)	4	53	13	13	12
	8	39	19	13	3
	21	27	12	7	13
$N = 73$ ($a = 8, b = 1$)	5	33	19	7	12
	6	25	13	9	16
	7	17	19	19	3
	11	58	12	13	19
$N = 79$ ($a = 7, b = 3$)	4	17	13	19	21
	6	65	16	7	19
	11	27	19	9	12
	22	54	21	19	3
$N = 91$ ($a = 6, b = 5$)	4	68	16	19	21
	9	62	21	13	12
	15	73	25	21	3
$N = 91$ ($a = 9, b = 1$)	4	55	19	21	12
	6	37	19	9	21
	8	19	27	19	3
$N = 93$ ($a = 7, b = 4$)	5	61	25	13	9
	17	40	16	13	21
$N = 97$ ($a = 8, b = 3$)	6	81	19	13	21
	13	30	21	19	12
	26	60	28	21	3

As an example we give here the details of the calculations used to find the best progression steps for $N = 157$ channels.

As $157 = 12^2 + 12 \times 1 + 1^2$, the step p and q should be such that

$$12p + q = 0 \text{ modulo } 157$$

p and q must greater than 3 so that transmitter coverages on channels C and $C+1$, $C+2$ or $C+3$ do not overlap.

The first values to be tested are $p = 4$ and $q = 109$. Then $q - p = 105$ (see Fig. 11 for definition of p, q, $p - q$). The question now is to find out where channel 1 (or 156) falls, as here the co-channel rhombus of channel 0 is considered. As the lattice is homogeneous and regular, we can begin with any channel. The ideal location for channel 1 is at the centre of gravity of any of the two triangles which join up to form the co-channel rhombus. The adjacent channel distance would then be

$$\sqrt{157} \times \sqrt{3}/3 = 7.23$$

For $p = 4$ and $q = 109$, channel 1 will be found at three $(q - p)$ steps: $q - p = 105$; $3 \times 105 = 315 = 1$ modulo 157. Adjacent channel distance is 3, which is far shorter than the maximum of 7.23.

For $p = 5$ and $q = 97$ $(q - p = 92)$ channel 156 will be found at five $(q - p)$ steps, plus two p steps: $5 \times 92 + 2 \times 5 = 470 = 156$ modulo 157. Adjacent channel distance is $\sqrt{19}$. Hopefully a better solution exists.

For $p = 6$ and $q = 85$ $(q - p = 79)$ channel 1 will be found at two steps, as $2(q - p) = 158 = 1$ modulo 157. This is far too close.

For $p = 7$ and $q = 73$ $(q - p = 66)$ channel 156 will be found at three p steps plus four q steps: $3 \times 7 + 4 \times 73 = 313 = 156$ modulo 157. The 1-channel distance is $\sqrt{37} = 6.08$. Channels 156 and 1 are near the centres of gravity of the triangles as are channels 155 and 2; channels 154 and 3 at a distance of $\sqrt{12}$ from channel 0. A thorough search amongst all the pairs, p and q, shows that there are only a few sets of steps resulting in 1-channel distance greater than or equal to 6. They are given in the following Table II, together with the 2-channel and 3-channel distances.

TABLE II

p	q	Adjacent	2-channel	3-channel
7	73	$\sqrt{37}$	$\sqrt{39}$	$\sqrt{12}$
11	25	$\sqrt{48}$	$\sqrt{37}$	$\sqrt{3}$
20	74	$\sqrt{37}$	$\sqrt{21}$	$\sqrt{21}$
24	26	6	1(!)	
30	111	$\sqrt{39}$	$\sqrt{19}$	$\sqrt{21}$
33	75	$\sqrt{39}$	$\sqrt{7}$	$\sqrt{48}$

(!) This eliminates the combination.

The final choice depends on the protection ratios for 2 and 3 channel interferences. The pair 24 and 26 will not be suitable.

If it were planned to cluster channels in groups of 3 or 4 (see Figs. 9 and 10) it would be more appropriate to have all steps greater than, say, 20 to avoid multiplexing problems (see [Arnaud, 1962]). Such a network is drawn on Fig. 11 ($p = 30$, $q = 111$). If no clustering is foreseen, or if a channel spacing of 20 is acceptable for colocated transmitters, then the network $p = 20$, $q = 74$ is slightly better.

ANNEX 2

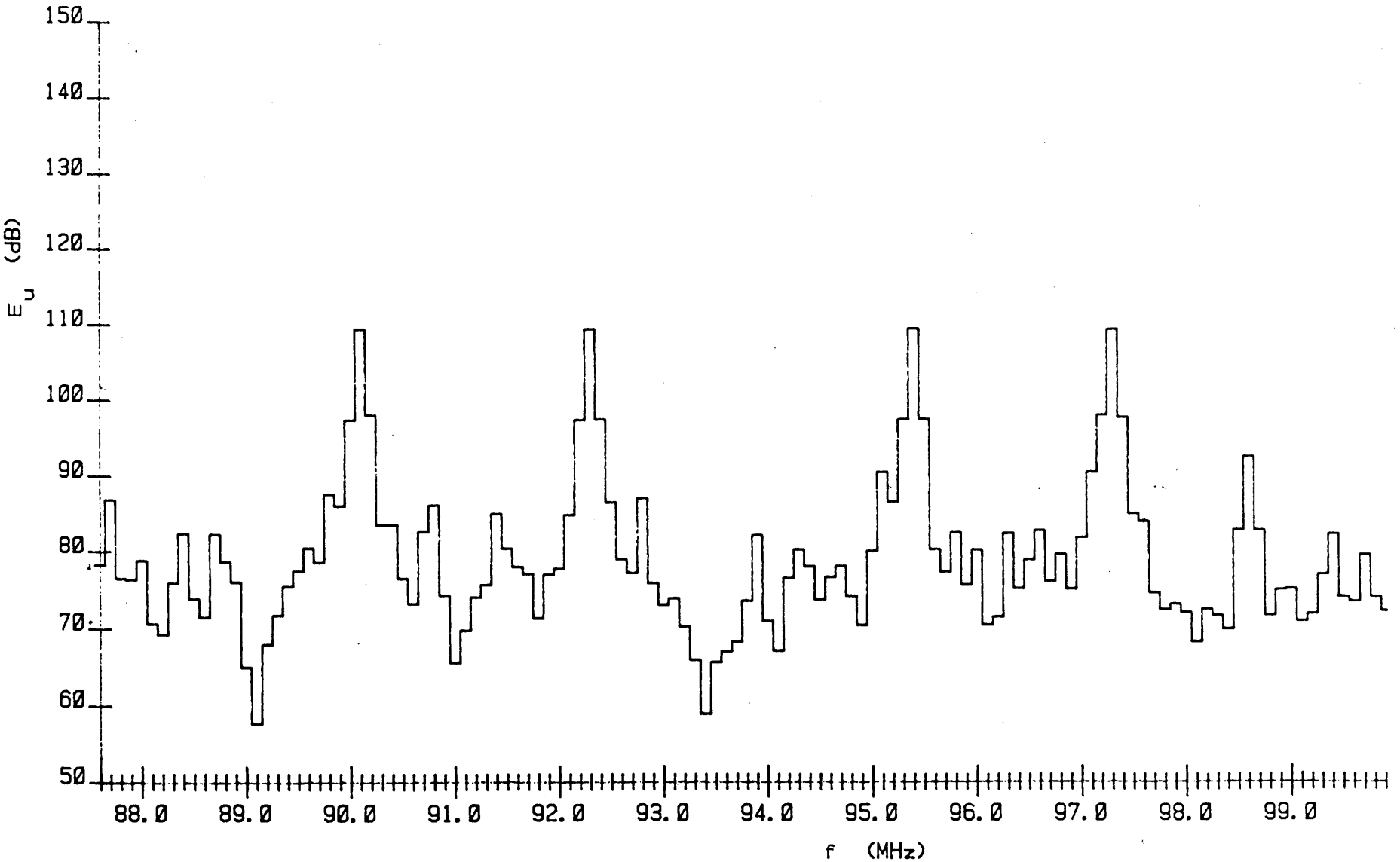
METHOD OF FOREMOST PRIORITY

The method of foremost priority consists in assigning to the transmitter for which the number of appropriate frequencies is smallest the most favourable among these frequencies (worst transmitter-best frequency). This means that frequencies are successively assigned to every transmitter following order of decreasing difficulty in terms of interference. For every transmitter in sequence a frequency is selected which suffers and produces the smallest amount practicable of additional interference. This procedure is repeated until all transmitters have obtained a frequency. It goes without saying that in this procedure account has to be taken of all constraints implied.

Obviously, this method can be time-consuming and its reliability is only warranted when a computer is used. The use of high-speed electronic computers may be appropriate to assist in this procedure and may, in fact, be the only resort in some cases.

The method can, for instance, be applied in the following way : It will be possible, by way of an appropriate analysis, to bring about the deficiencies of any frequency assignment plan. Unsatisfactory frequency assignments, if any, will be discovered as the value of the associated usable field strength will exceed the average value (in a given area) considerably (by more than / 10 / dB. Additional assistance can be provided by computing and plotting, for the site of such transmitters, the usable field strength as a function of frequency (Figure 1). Graphical presentations of this type may be of considerable help in finding appropriate frequencies for assignment to transmitters at this particular site.

The same graph may prove useful in cases where protection to other service is unsatisfactory, although the usable field strength would be acceptable.


150
140
130
120
110
100
90
80
70
60
50
E_u (dB)
88.0
89.0
90.0
91.0
92.0
93.0
94.0
95.0
96.0
97.0
98.0
99.0
f (MHz)

STEREO

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/19-E
1st September 1982

LIST OF DOCUMENTS

(No. 1 to 50)

PL = Plenary meeting
C = Committee

No.	Origin	Title	Destination
1 + Corr.1	SG	Agenda of the Conference	PL
2	SG	Credentials of delegations	C.2
3	SG	Budget of the Conference	C.3
4	G	Proposals for the work of the Conference	C.4,C.5
5	NOR	Interference caused by the oscillators in FM Broadcasting receivers	C.5
6	NOR	Circular or elliptical polarization for FM Broadcasting	C.4
7	D	Proposals for the work of the Conference - Technical bases	C.4
8	D	Proposals for the work of the Conference - Planning methods	C.5
9	D	Proposals for the work of the Conference - Planning principles	C.5
10	D	Proposals for the work of the Conference	C.4,C.5
11	URS	Proposals for the work of the Conference	C.4,C.5
12	BEL	Study of compatibility between the Broadcasting Service in the band 100-108 MHz and the Aeronautical Radiocommunication Services in the band 108-136 MHz	C.4
13	F	Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Radio-navigation and Aeronautical Mobile (R) Services in the band 108-136 MHz	C.4
14	SG	Report of the CCIR	C.4,C.5
15	SG	Contributions of non-exempt Recognized Private Operating Agencies and International Organizations	C.3

No.	Origin	Title	Destination
16	DDR	Proposals and remarks concerning the work of the Conference	C.4,C.5
17	AUT	Proposals for the work of the Conference - Requirement form (Agenda item 2)	C.4,C.5
18	AUT	Proposals for the work of the Confernece - Planning principles (Agenda item 1.10)	C.5
19	HOL	Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Services in the bands 108-136 MHz	C.4
20	S	Low power stations	C.5
21	GRC	Item 1.9 of the Agenda - Compatibility of the FM Broadcasting Service with the Aeronautical Radionavigation Service	C.4
22	YUG	Proposals for the work of the Conference	C.4,C.5
23	SG	Convening of the Conference	PL
24	SG	Invitations	PL
25	SG	Notification of International Organizations	PL
26	SG	Primary and permitting Services in the band 87.5-108 MHz in Region 1	C.4,C.5
27	HOL	Characteristics of portable and mobile receivers	C.4,C.5
28	SG	Loss of the right to vote	PL
29 +Add.1	AFS	Proposal for the work of the conference - Optimum channel spacing and channel distribution	C.5
30	D	Compatibility between the broadcasting service in the band 87.5 - 108 MHz and the Aeronautical Services in the bands 108 - 136 MHz	C.4
31	E	Proposals for the work of the conference - Radio frequency protection ratios	C.4
32	E	Proposals for the work of the conference - Modulation standards, emitting bandwiths (including stereophony and other systems having additional sub-carriers)	C.4

No.	Origin	Title	Destination
33	E	Proposals for the work of the conference - Propagation characteristics and methods used to forecast field strength values in the VHF band and to calculate the service areas of sound broadcasting stations	C.4
34	E	Proposals for the work of the conference - Optimum channel spacing, channel distribution	C.4
35	E	Proposals for the work of the conference - Planning principles	C.4
36	G	Sharing criteria between the FM sound broadcasting service with land mobile services in the bands 87.5 - 108 MHz	C.4
37 +(Rev.)	SG	Allocation of documents	-
38 +(Rev.)	SG	Conference Chairmen and Vice-Chairmen	-
39	SG	Secretariat of the conference	-
40	D	RF-Protection ratios between the broadcasting service and the aeronautical radionavigation service	C.4
41	SG	Conference structure	-
42	Chairman	Proposed structure of the report to be submitted to the second session of RABC reg 1 +	PL
43	4B	Note from the Chairman	C.4
44	G	Addition of interference contributions : proposed modification to simplified multiplication method	C.5
45	HOL	Classification of emissions	-
46	5B	First report of working group 5B to Committee 5	C.5
47	4C	Report of the Chairman Sharing criteria between FM sound broadcasting service and TV broadcasting service in the bands 87.5 - 108 MHz	C.4
48	4C	Sharing criteria between the FM broadcasting service with land mobile services in the bands 87.5 - 108 MHz	C.4
49	C.4	Summary record of the first meeting	C.4
50	MLI	Low-power stations	C.4,C.5

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/20-E
31 August 1982
Original : English

WORKING GROUP 4B

DRAFT

Report of Working Group 4B to Committee 4

THE METHODS FOR THE ASSESSMENT OF MULTIPLE INTERFERENCE

1. Terms of reference

Committee 4 was asked by Committee 5 to make a technical comparison between the available methods of assessing multiple interference so that Committee 5 can decide which method is to be used in planning.

2. Available documentation

The contributions available from administrations were Documents Nos. 8, 16, 18 and 27 which all proposed the use of the Simplified Multiplication method which corresponds to the statistical nature of the propagation curves and Document No. 44 which proposes a modification to the Simplified Multiplication method based on / technical reasoning and / some experimental results.

The CCIR Contribution, Document No. 14, which gives a technical comparison between statistical and non-statistical methods served as the basis for discussion.

The sections of Document No. 14 discussed were section 4.4.3, which gives a very brief comparison between the Power Sum method and the Simplified Multiplication method, and Annex 4.1, CCIR Report 945 which takes the comparison into more detail.

Further, it was noted by the IFRB that the Simplified Multiplication method was used for the Stockholm 1961 Conference and officially recognized at the African Broadcasting Conference, Geneva, 1963, as indicated in Document No. DT/6.

3. Discussion

The CCIR text will not be reproduced here but the discussion arising in Working Group 4B is recorded.

3.1 Relative complexity of the two methods

With respect to the conclusions in section 4.4.3 regarding the complexity of the Simplified Multiplication Method for producing a plan, Working Group 4B felt that the modern, more powerful computers should be able to handle adequately the Simplified Multiplication method even with the expected vast increase in the number of assignments to be considered over those in 1961. Moreover it was considered that the difference in computer time to run both methods was not significant. Furthermore, although the IFRB, who already had a sub-routine for the Power Sum method for the

LF/MF Conference, Geneva, 1975, had not yet developed a program to cater for the integrals, members of Working Group 4B indicated that the probability integral could be entered into the computer in tabular form or by a polynomial expression.

With regard to bi-lateral or multilateral discussions, where quick answers would be required on the basis of the Simplified Multiplication method, it was considered that approximations and graphical methods could be used. Also the number of iterations in the full method can be limited to give answers which are accurate to about /1/ dB instead of, for example, 0.03 dB as illustrated in Table II of the Annex to CCIR Report /AH/10/.

3.2 Basic assumptions

One administration raised queries on some of the basic assumptions used in the Simplified Multiplication method :

i) No correlation between Fields of Interest.

Document No. 44 demonstrates that a positive correlation with location between wanted and interfering signals could be expected rather than zero correlation and gives results of measurements in one area which show that this is so. It was generally doubted whether these limited results were sufficient to change a method which has been used for 20 years.

Working Group 4B agreed that the basic assumption of zero correlation of wanted and interfering signals with location could possibly be queried but that at the moment there is no evidence from other areas to warrant any change in this basis of the Simplified Multiplication method or for an actual value of the correlation factor.

The question of correlation with location could be studied in the CCIR and re-addressed at the second session if more information becomes available.

ii) One interfering field dominates at the reception location.

This assumption was queried but no information was forthcoming on its validity.

3.3 Relative levels

Working Group 4B noted that the use of the Simplified Multiplication method, leading to higher values of usable field strength than the Power Sum method, had the effect of building a safety factor into the planning procedure and this was deemed by some administrations to be necessary. The use of a positive correlation with location coefficient rather than zero would help to alleviate this difference.

Further, it was noted that the difference between the Power Sum method and the Simplified Multiplication method is greatest when there are several interferers of similar magnitude.

4. Conclusions

A comprehensive technical comparison between the Power Sum method and the Simplified Multiplication method of assessing multiple interference is given in Document No. 14.

In the opinion of Working Group 4B, although the Power Sum method is easier to apply there is more technical justification for the use of the Simplified Multiplication method in that it takes account of the statistical nature of the propagation curves and despite this it adds little to the necessary computing time in the planning process.

There may be a need to develop simple methods of approximation to this method before the second session so that it can easily be used outside the main planning forum. A refinement to this method which would have the effect of reducing the usable field strengths is to include a positive rather than a zero correlation coefficient with location of the wanted and interfering signals. However there is currently insufficient evidence from a sufficient number of areas to support the inclusion of this refinement and this is another area for the CCIR to study and for input to the second session.

G.C. STEMP
Chairman of Working Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/21-E
1 September 1982
Original : French

WORKING GROUP 5B

Terms of reference and membership of Sub-Working Group 5B-2

Terms of reference : To prepare, on the basis of the discussions within Working Group 5B, a schedule for the preparation and submission of requirements to the IFRB.

Membership :	Name	Country	Pigeon-hole
Chairman	E. Martínez de Aragón	Spain	174
	M. Derragui	Algeria	294
	W. Biermann	Federal Republic of Germany	41
	S. Tarantino	Italy	249
	R.J. Byrne	United Kingdom	69
	I. Chindine	U.S.S.R.	31
	A. Berrada	IFRB	630
	J. Fonteyne	IFRB	648

C. TERZANI
Chairman of Working Group 5B

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/22-E
1 September 1982
Original : English

COMMITTEE 4

DRAFT

Final Report of the Chairman of Working Group 4B to Committee 4

1. Working Group 4B has held six meetings and completed all the work given to it by Committee 4 as follows :

Conference Agenda item 1.2

The Working Group examined Documents Nos. 4, 7, 8, 11, 14, 16, 29 and 34 and agreed the output text as in Document No. 54.

With respect to Table I and the accompanying text in proposal URS/11/2 against this Agenda item, Working Group 4B considered this to be pertinent to Committee 5 and a draft letter to this effect is contained in Document No. 43.

Conference Agenda item 1.3

Working Group 4B examined Documents Nos. 4, 7, 11, 14, 16 and 32 and the agreed output text is contained in Document No. 54.

With regard to the necessary bandwidth, Working Group 4B considered that it was not necessary to specify a value. Further, it was noted by the Netherlands Administration that they had reservations on the method used to determine the necessary bandwidth and that they would be submitting a contribution to the CCIR (circulated as Document No. 45 for information).

Conference Agenda item 1.4

The Working Group examined Documents Nos. 4, 7, 11, 14, 16, 27 and 31 and agreed the text on this subject contained in Document No. 64.

It was noted that the figures quoted for systems with a deviation of 50 kHz were only from one administration and that further study is required both to fill in the gaps and to confirm the values given in Table III of Document No. 64 for interference from systems with 75 kHz deviation to systems with 50 kHz deviation.

Conference Agenda item 1.5

Working Group 4B examined Documents Nos. 4, 7, 11, 14, 16, 22 and 27 and the agreed text for this Agenda item is contained in Document No. 64.

The Working Group decided that it was not necessary to specify a reference usable field strength (E ref.). A few administrations thought that the text was incompatible with that for Conference Agenda item 1.4 in that a higher minimum usable field strength should be applied for systems with 50 kHz deviation compared with those using 75 kHz deviation.

Conference Agenda item 1.6

Working Group 4B examined Documents Nos. 4, 7, 14, 16 and 22 and the agreed output is contained in Document No. 64.

Conference Agenda item 1.7

The Working Group examined Documents Nos. 4, 6, 7, 11, 14, 16, 27 and 35 and agreed the output text which appears in Document No. 64.

Conference Agenda item 1.8

The Working Group examined Documents Nos. 7, 11 and 16 and the agreed output text is given in Document No. 54.

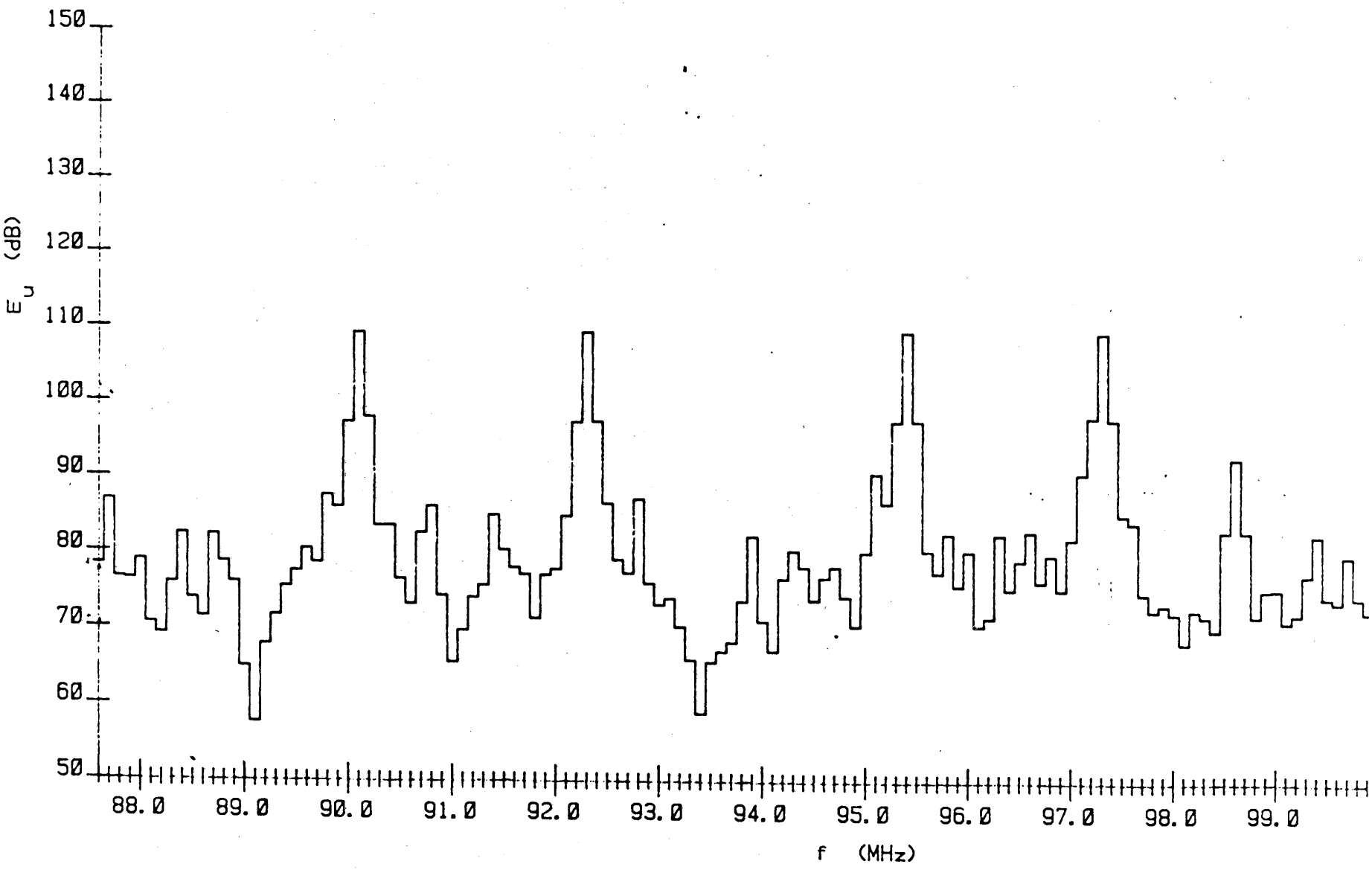
2. Other matters

Multiple intereference

Working Group 4B had a discussion on the relative technical merits of assessing multiple interference on the basis of the input in Documents Nos. 8, 14, 16, 18, 27 and 44. The agreed report to Committee 4 is contained in Document No. /DT/20/.

Finally, I would like to thank all delegations for their constructive participation in the work of Working Group 4B and especially the Drafting and Editorial Groups led by Mr. Del Duce (I), Mr. Gröschel (D), Mr. Bell (G) and Mr. Keller/Mr. Gilbean (F).

G.C. STEMP
Chairman of Working Group 4B


150
140
130
120
110
100
90
80
70
60
50
E_u (dBµ)
88.0
89.0
90.0
91.0
92.0
93.0
94.0
95.0
96.0
97.0
98.0
99.0
f (MHz)

STEREO

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/23-F
1 September 1982
Original : Spanish

WORKING GROUP 5B

Draft Report of Sub-Working Group 5B-2 to Working Group 5B

1. Introduction

Sub-Working Group 5B-2, which was set up at the third meeting of Working Group 5B and whose membership and terms of reference are contained in Document No. DT/21, met twice.

At its meetings, the special problems facing developing and developed countries and the IFRB were thoroughly discussed. Relevant documents of past Regional Administrative Broadcasting Conferences, such as the report of the Regional Administrative MF Broadcasting Conference (Region 2), First Session, Buenos Aires, 1980, the report of the First Session of the Regional Administrative MF/LF Broadcasting Conference (Regions 1 and 3), the report of the preparatory meeting of experts for the African Broadcasting Conference, Geneva, 1964, and the report of the preparatory meeting of CCIR experts for the European Broadcasting Conference, Cannes, 1961, were also considered.

The Sub-Working Group's deliberations were based on working Document No. DL/14.

After examining the various different reasoned points of view, which were defended with great ability and force by the various members of the Sub-Group, the table and figure attached at the end of this report were agreed upon.

The schedule set out in point 3 reflects a number of reasonable assumptions and working hypotheses upon which, however, the Conference has not yet formed an opinion. It may therefore still take decisions which might affect the schedule proposed by the Sub-Group within the limitations mentioned above.

The activities taken into consideration in preparing the tentative schedule are indicated below.

2. Possible activities of administrations and the IFRB between the First and Second Sessions of the Regional Sound Broadcasting Conference

a) In a Conference Resolution, the IFRB, by circular-letter, invites the administrations concerned to notify their requirements within the time limits and on the forms approved by the Conference at its First Session.

b) In planning, and in checking and preparing their requirements, administrations observe the planning methods and principles approved by the Conference, wherever possible establishing contacts and carrying out preliminary coordination with neighbouring countries.

c) The IFRB prepares and finalizes the computer programs it considers necessary for performing the tasks entrusted to it by the Conference. These may include the following :

- C.1 Storage of requirements.
- C.2 Arrangement and classification of the inventory of requirements by frequency, sub-band and/or country.
- C.3 Publication of the complete inventory, or of parts of it, according to countries or sub-bands.

- C.4 Choice of suitable frequencies, in accordance with the planning methods and principles, in cases where the desired frequency is not entered on the request form.
- C.5 Calculations of interference and incompatibility and publication of the results.
- C.6 Compilation of statistics.

d) Administrations submit their requirements to the IFRB.

e) The IFRB executes the corresponding programs.

f) The IFRB sends in duplicate to administrations the results of its interference calculations, the basic inventory of requirements with appropriate observations and a statement of incompatible requirements. All this information will form a document to be submitted to the Second Session of the Conference.

g) Administrations study the information and prepare proposed modifications to their requirements for submission to the Second Session and, when they consider it necessary, undertake bilateral or multilateral coordination beforehand.

h) Administrations notify the IFRB as soon as possible of the modifications they have made as a result of activity "g" to the requirements submitted in "d". The IFRB inserts these corrections into the inventory, makes the corresponding calculations and prepares a revised document for the Conference.

The sequence of activities is summarized in the attached table.

3. Proposed schedule

To take account of the activities mentioned in the previous section and various other factors, the Sub-Group approved the following proposed schedule :

Period		Activity
18 September 1982 - 31 December 1982	:	"a"
18 September 1982 - 1 February 1984	:	"b" and "c"
1 October 1983 - 1 February 1984	:	"d"
1 February 1984 - 31 June 1984	:	"e"
1 July 1984 - 15 July 1984	:	"f"
16 July 1984 - 30 October 1984	:	"g"
1 October 1984 - 30 October 1984	:	"h"

A sketch of the proposed schedule is attached in the Figure.

E. MARTINEZ DE ARAGON
Chairman of Sub-Working Group 5B-2

TABLE

Sequence of activities

DATES	ACTIVITIES				REMARKS
	IFRB		ADMINISTRATIONS		
17-09-82					End of First Session
18-09-82 01-01-83	Preparation and distribution of circular-letter with forms ("a")	Preparation and finalization of computer programs ("c")		Planning in each country Pre-coordination Checking of requirements Preparation of requests for frequency assignments ("b")	
			Submission of requirements to IFRB ("d")		
01-10-83 01-02-84	Receipt of requests				
  31-06-84	Execution of programs ("e")				
01-07-84 15-07-84	Dispatch of results of calculations and basic inventory to Administrations ("f")		Receipt of results of calculations and basic inventory prepared by IFRB		
16-07-84			Study of information Bilateral coordination Preparation of proposed modifications ("g")		
01-10-84 30-10-84			Notification of modifications to IFRB ("h")		
31-10-84					Beginning of Second Session

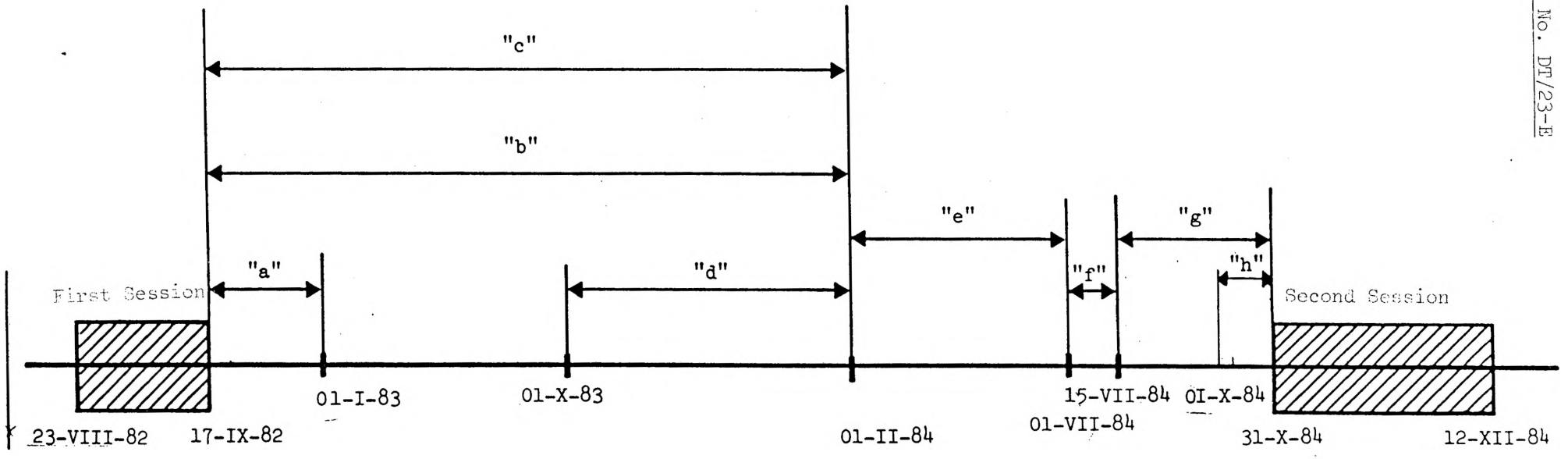


Figure - Proposed schedule
(See point 3)

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/24-E
1 September 1982
Original : English

WORKING GROUP 5A

DRAFT

Fourth Report of the Working Group 5A to Committee 5

EQUIVALENT NATIONAL COVERAGE

The "equivalent national coverage" is the /~weighted sum~/ of the coverage areas relative to 100% national coverage by means of a transmitter network operating at reference conditions. Weighting will have to be done individually for every coverage area according to the effective radiated power and the effective height of the antenna used.

Reference conditions :

Effective transmitter antenna height : 300 m

Effective radiated power : 100 kW

Average distance between transmitters : greater than 70 km

For 100% coverage about 31 channels are necessary

In practical network, the power and the effective antenna height of any single transmitter should be set to the lowest possible value to obtain the intended coverage.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/25-E
2 September 1982
Original : French/English

WORKING GROUP 5A

DRAFT

Fifth Report of Working Group 5A to Committee 5

In the Annex to this Document, Working Group 5A presents its Fifth Report relating to planning principles.

T. BOE
Chairman of Working Group 5A

Annex : 1

A N N E X

6.1 Planning principles

6.1.1 The Second Session of the Conference will be required to establish a frequency assignment plan in the band 87.5 - 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran which are contiguous with Region 1. The planning process shall use the inventory of requirements communicated by the administrations to the IFRB in accordance with the decisions of the First Session of the Conference.

Note : Considering the particular geographical situation of Iran, taking into account the complexity of the areas adjacent to Region 1, and due to the extent of interference calculations, the Administration of the Islamic Republic of Iran may communicate its requirements based on country-wide planning scheme.

6.1.2 The processing of a requirement should use the concept of providing broadcasting services to the required service area, while recognizing equal rights for all countries with regard to the use of the band 87.5 - 108 MHz for broadcasting. The planning should be carried out in such a way as to respect the rights of each country to arrange its broadcasting service in the most appropriate way in conformity with its specific needs (such as the peculiarities of its geography, its socio-political systems - multinational and multilingual composition of its population, federalism, local information systems etc. - and any other) and to choose the characteristics of its stations in order to attain an appropriate coverage of all its territory. In this case, planning may, according to the country, lead to either a system of national /programme/ coverage or a system of multiple regional or local coverages, or a combination of these systems. Some countries may base their national planning on co-siting of television stations and FM sound broadcasting stations. For the application of the principle of equal rights among countries and in order to take into account the diversity of systems of national, regional or local coverage, that each country may prefer, the concept of "equivalent national coverage" will be introduced. Every country will have assured right to the same number of equivalent national coverages. Joint planning of low power and high power stations near border areas will give rise to specific problems which will probably not be covered by general planning methods. Especially, the use on the two sides of a border of networks made up of low power stations and networks made up of high power stations may lead to less efficient use of the spectrum.

Note :

Modification to the original text, Document No. DT/17(Rev.3).

6.1.3 During the planning process all requirements should be processed in the same manner according to the technical evaluation procedure adopted by the Conference. In accordance with Resolution No. 510 of WARC 1979, the planning of the band 87.5 - 108 MHz in Region 1 and parts of Afghanistan and Iran which are contiguous to Region 1 should observe the following conditions :

- this new plan should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement, Stockholm, 1961;
- that this new plan in the band 87.5 - 100 MHz should not result in the deterioration of the service areas of those existing sound broadcasting stations operating in accordance with the Regional Agreement, Stockholm, 1961, which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961;
- that radio equipment used by aircraft for automatic landing purposes, which operates in the adjacent band 108 - 112 MHz, may be subject to harmful interference from nearby broadcasting stations operating in the band 87.5 - 108 MHz if the frequencies of the respective stations are not selected with care and that such interference can put human life at risk.

6.1.3bis A radical change in the situation obtaining in Europe would gradually lead to modifications which would affect the area to be protected and make it difficult or even impossible to observe the constraints imposed by Resolution No. 510. During the planning process, all proposed assignments shall be open to discussion for bilateral or multilateral negotiation among the countries concerned, which may be conducted either directly or through the IFRB, with the understanding that administrations may be requested to modify the characteristics of their stations.

6.1.4 Taking into account the modifications introduced in the planning criteria (such as the channel spacing and the degree of implementation of the Geneva 63 Plan), the systematic planning in Africa will cover the entire band 87.5 - 108 MHz. This planning will be based on the theoretical network method. To this end, a lattice using a nominal station separation will be established and will be used as a guide for the choice of appropriate channels. It is recommended that the Agreement include in an appropriate manner the channels which may be selected by the countries which were not present at the Second Session and which had not submitted their requirements in order to facilitate later the coordination among the countries concerned.

6.1.5 In Europe, it would be desirable that administrations communicate their requirements relative to the band 87.5 - 100 MHz by taking into account their existing stations which operate in accordance with the Radio Regulations and the Stockholm (1961) Agreement. During the Second Session every appropriate effort shall be made to incorporate in the Plan :

a) those /- sound broadcasting -/ stations which currently operate in accordance with the Stockholm (1961) Plan, /- starting with the sound broadcasting stations which are situated in the coordination area with countries using this band for TV in accordance with the Stockholm Regional Agreement, 1961; -/

b) planned modifications to the Plan notified prior to /- 1 December 1983 -/; and

c) new requirements from administrations not signatories to the original Plan notified prior to /- 1 December 1983 -/.

During the planning process, modifications to the existing assignments shall be carried out as far as possible, where necessary, without conflicting with Resolution No. 510 to ensure the equal rights of countries and remedy existing inequalities and incompatibilities.

6.1.6 Countries signatories of the Stockholm Agreement, 1961, which, in the Plan annexed to this Agreement, in the band 87.5 - 100 MHZ, have entries for television stations only, can submit requirements for assignments to FM sound broadcasting stations in this band.

6.1.7 Different planning approaches in Africa and Europe will require adaptation and resolution of incompatibilities on the basis of equal rights among all countries in Africa, Europe and Middle East. In resolving these incompatibilities between FM sound broadcasting stations, the status of such stations resulting from the application of the Regional Agreements (Stockholm, 1961, and Geneva 1963) should not /- necessarily -/ be taken into account.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/26-E
3 September 1982
Original : English

WORKING GROUP 5A

DRAFT

Report of the Chairman of Sub-Working Group 5A-1 to the Chairman of Working Group 5A

Planning methods

Ad hoc Group 5A-1 held several meetings on 27, 30 and 31 August 1982 and considered, within its terms of reference (Document No. DT/13) the Chapter 6 on planning methods in Document No. DT/9. After extensive discussion it proposes the following draft text for inclusion in the Report of the First Session of the Conference :

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

1) the use of the lattice planning method by the administrations to select appropriate frequencies for assignment to given stations (Annex 1);

2) the preliminary analysis of the draft plan obtained so far by means of a simplified computation method (Annex 2) together with the examination of incompatibilities with the television service in the band 84 - 100 MHz (Annex 4), interference to radio equipment used by aircraft for automatic landing purposes in the band 108 to 112 MHz (Annex 5) and incompatibilities with the fixed or mobile services in Region 3 (Annex 6);

3) the inclusion of low-power network and low-power stations in, and the refinement of, the plan by the method of foremost priority (Annex 3) followed by negotiations among administrations concerned;

4) analysis of the plan using a more complex computation method in the case of critical assignments (Annex 2) together with the examination of incompatibilities with other services, as in step 2 (Annexes 4, 5 and 6).

In the course of the planning procedure some of the above steps may have to be repeated, as appropriate. In particular, step 4 will need to be repeated after introduction of modifications, resulting from bilateral and multilateral consultations during the Second Session of the Conference.

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 modifications of or additions to the plan in the time subsequent to the Second Session of the Conference.

In the preparation of a frequency plan in the band 87.5 to 108 MHz for the countries of Region 1 and for parts of Afghanistan and Iran the two following planning methods shall be used :

1) regular lattice planning with linear channel distribution scheme;

2) method of foremost priority (planning by trial and error).

The efficiency of the two methods will depend on circumstances which may vary considerably from one part of the planning area to the other. For instance, in Europe it is likely that frequency assignments in the band 87.5 to 100 MHz to VHF/FM transmitters will only be subject to slight modifications in a restricted number of cases in most of the countries, whereas in the remaining part of the planning area an assignment plan for the entirety of sound-broadcasting transmitters will have to be established.

The lattice planning method, the use of which is described in Annex 1, would be a powerful tool in the latter case, but it would be of little use in the former case.

Although it is desirable that, when use is made of lattice planning, the same channel distribution scheme is applied throughout the planning area, because of the variation of conditions in different parts of the area, it is thought appropriate to use two different channel distribution schemes.

The main advantage of this method is that the whole planning area can be sub-divided at the beginning into sub-areas of adequate size and shape. This will permit planning to start simultaneously in various parts of the planning area. A further advantage is that the method permits the quick assignment of large numbers of frequencies to non-constrained transmitters. This is due to the fact that within a theoretical channel distribution scheme mutual interference is brought down to the minimum practicable and that by its adaptation to a practical situation interference will be increased only slightly.

However, the applicability of the method is restricted to networks with transmitters of comparable interference potential (power, effective antenna height). The method should, therefore, not be used for the assignment of frequencies to low-power transmitters in an environment of numerous high-power transmitters. It may also fail to be applicable if a large number of constraints has to be respected as for instance, the protection against the origination of annoying intermodulation frequencies.

The method of foremost priority is described in Annex 3.

The advantage of this method is that all the constraints to be respected in every individual case can be taken into account. However, the method is time-consuming and its reliability is only warranted when a computer is used. Nevertheless, there can be no doubt that in parts of the planning area and in parts of the band conditions will be found in which the use of this method will be the only resort.

Because of the limited time that will be available for planning purposes during the Second Session of the Conference it is felt that both methods should go together. In the band 100 - 108 MHz in Europe (including the Asian part of the U.S.S.R.) and in the whole band in the remaining part of the planning area the lattice planning method shall be used in the first instance, as a help in preliminary planning. However, further planning may require the use of the method of foremost priority, especially in the planning of "desperate" cases and in the refinement procedure. In this respect it may well happen that planning in Europe while providing protection to the aeronautical radionavigation service will have to be considered as a desperate case.

Considering the size of the area to be planned, the expected large number of requirements to be included in the plan and the complexity of the planning task, some preparatory work is required to be carried out by IFRB in the period between the two sessions. This would permit to provide administrations preliminary results of calculations before the opening of the second session of the Conference. For the reasons mentioned above the following procedure is suggested.

1. The lattice method will be used as soon as possible after the First Session of the Conference with the view to help administrations in formulating their requirements in an orderly manner. It will assist mainly the developing countries which are not able to attend the present session.

2. Two different lattices will be used in this stage :

- a channel distribution with / 80 / channels for planning of the band 100 to 108 MHz in Europe (Figure 1);

- a channel distribution with 34 channels for the remainder of the planning area which will permit to provide 6 coverages in the band 87.5 to 108 MHz (Figure 2).

3. When using the lattice method in the band 100 to 108 MHz, administrations in Europe may communicate their requirements in the band 87.5 - 100 MHz as they result from the application of the Regional Agreement, Stockholm 1961.

4. When using a channel distribution scheme, countries pertaining to a given zone may decide not to include low-power stations in the lattice scheme. These low-power stations will be treated at a later stage before or during the Second Session of the Conference, so that, at the end of the Second Session, all frequency assignments will have been made whatever the power of the transmitter.

Figure : 1a, 1b

Annexes : 4

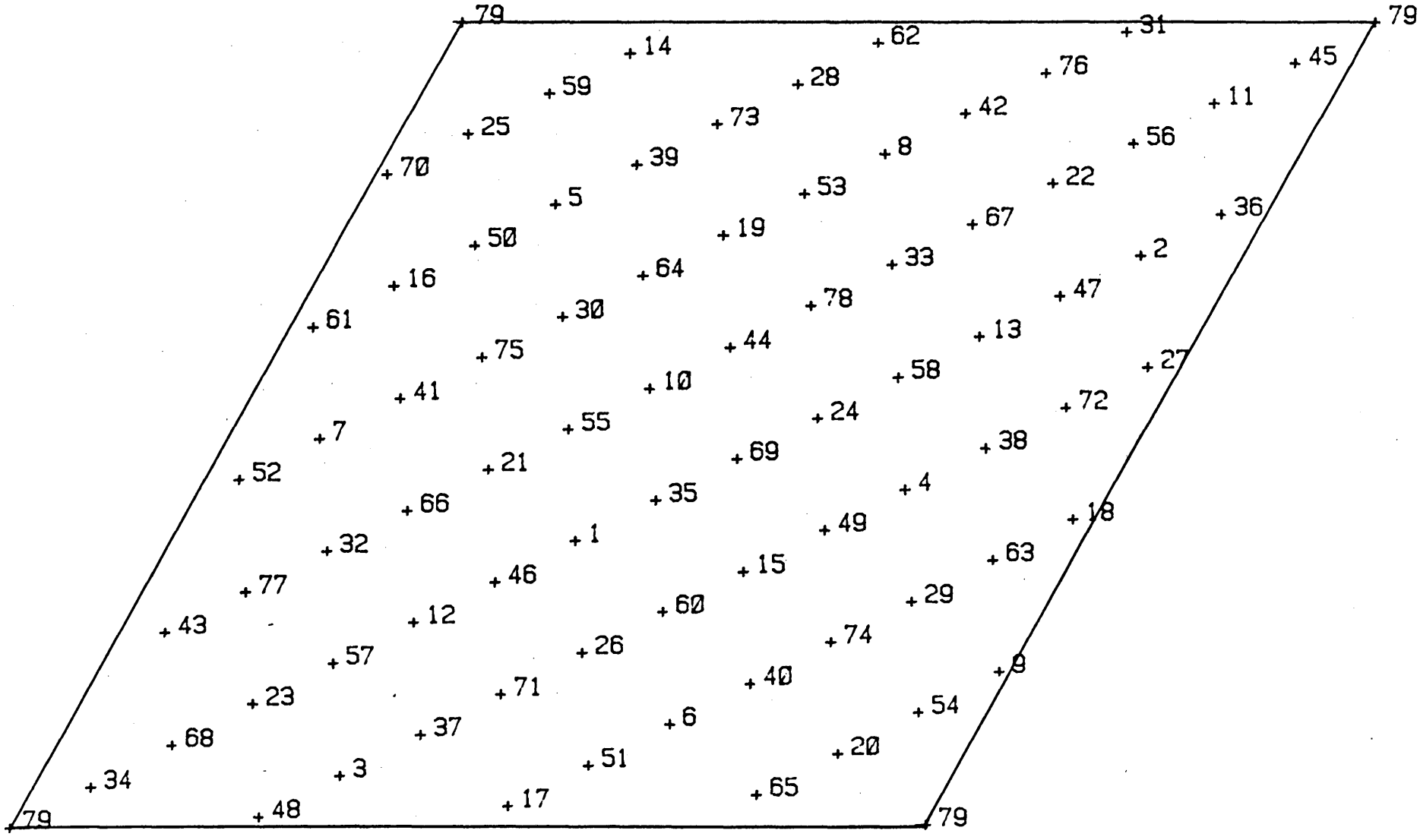

79
79
79
79
14
62
31
45
59
28
76
11
25
73
42
56
70
39
8
22
5
53
67
36
50
19
33
2
16
64
78
47
61
30
44
13
75
58
27
41
10
24
72
7
55
69
38
52
21
35
4
66
49
18
32
1
15
63
77
46
60
29
43
12
74
57
26
40
9
23
71
6
54
68
37
20
34
3
51
65
48
17

Figure 1A

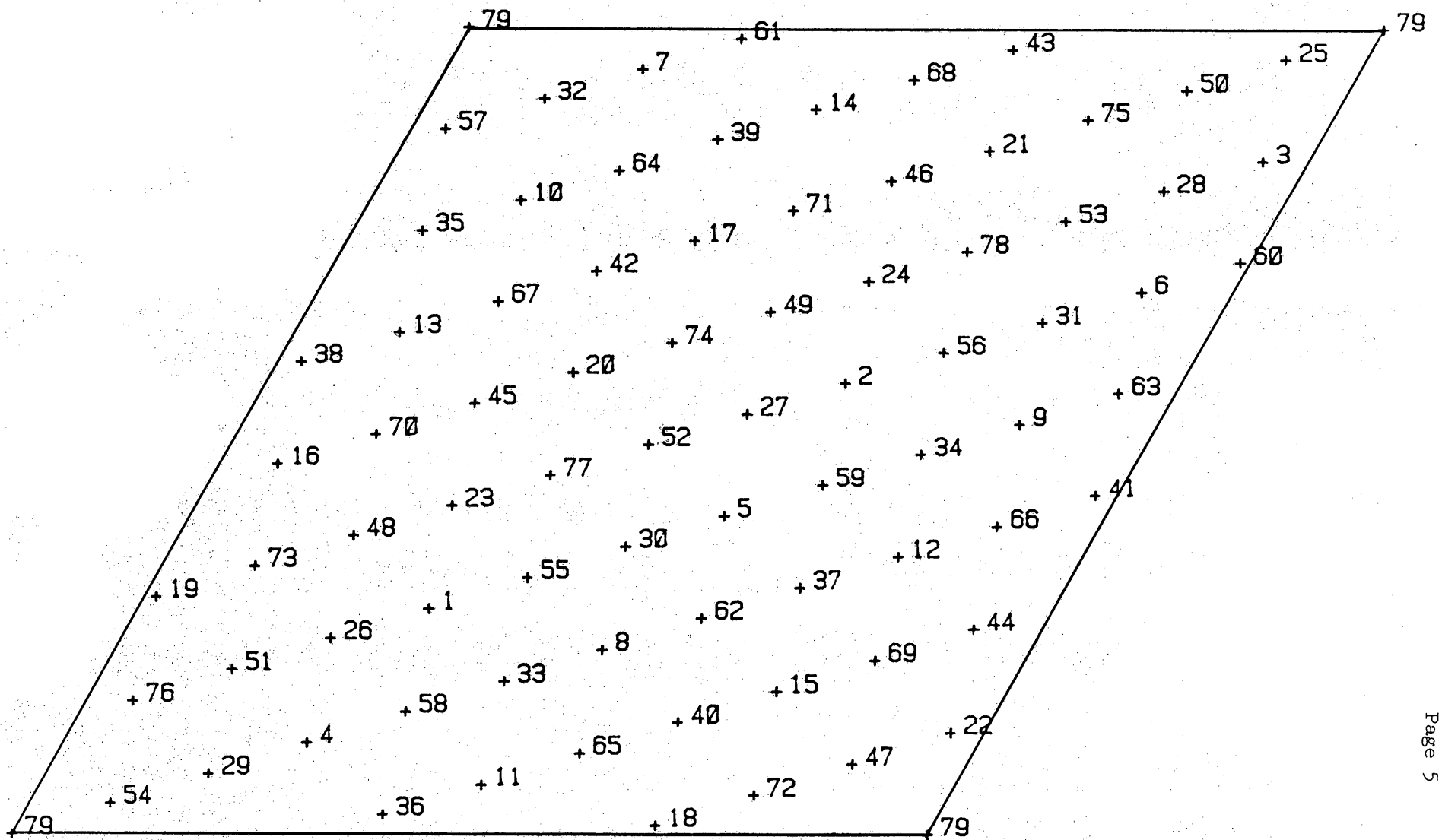

79
61
43
25
7
68
50
32
14
75
57
39
21
3
64
46
28
10
71
53
35
17
78
60
42
24
6
67
49
31
13
74
56
38
20
2
63
45
27
9
70
52
34
16
77
59
41
23
5
66
48
30
12
73
55
37
19
1
62
44
26
8
69
51
33
15
76
58
40
22
4
65
47
29
11
72
54
36
18
79
79

Figure 1B

ANNEX 1

LATTICE PLANNING METHOD

In this Annex the use of the lattice planning method will be explained, whereas its theory is described in CCIR Report 944. The basic idea of this planning method is the repeated use of a geometrically regular channel distribution scheme over a vast area. As only channel distribution schemes are selected, which are optimized in terms of coverage by reducing interference within the network to the achievable minimum, it can be assumed that their repeated use would result in a plan which, after some further refinement, might be acceptable to everyone. However, no compatibility aspects with other services, can automatically be taken into account when using the lattice planning method.

Although the use of one single channel distribution scheme would permit a high degree of spectrum utilization efficiency, conditions may prevail in the area to be planned which suggest the use of different schemes in different parts of the area. Actually the situation in Europe is considerably different from that in Africa and the countries of the Middle East. Whilst in the countries of the last-mentioned area planning may start from scratch, in Europe the plan for the television service in the band 84 to 100 MHz in Eastern European countries will have to be retained and be respected when assigning frequencies to VHF/FM sound broadcasting transmitters. It is for this reason that two different channel distribution schemes will be used, one for Europe in the band 100 to 108 MHz and the other for Africa and Middle East in the band 87.5 to 108 MHz.

The lattices will have to be carefully adapted to one another in order to limit any reduction in spectrum utilization efficiency to the minimum practicable. Geographical separation of the two areas over a wide distance range will be provided by the Mediterranean Sea. Nevertheless, some difficulties will persist and become particularly important in areas where there is no, or nearly no, geographical separation.

To enable the application of the lattice planning method, in practice, it is useful to subdivide the planning area into sub-areas in such a way that the resulting sub-areas are similar in shape to the lattice selected, i.e. rhombic, in principle, and that the number of transmitter sites within each sub-area does not exceed the number ($\lfloor 80 \rfloor$ or $\lfloor 34 \rfloor$) of available channels. In preparation of the planning procedure this subdivision of the planning area by drawing on to a map, in accordance with the specific needs in the two parts of this area, the two different lattices for Europe and the remaining parts of the area has already been done (Figure ...).

The lattices selected for Europe or Africa and the Middle East contain $\lfloor 80 \rfloor$ or $\lfloor 34 \rfloor$ channels, respectively. In Europe this scheme would permit assignments to be made to transmitters for providing 2 or 3 coverages in accordance with the requirements that will be specified. In Africa and the Middle East there will be a possibility to provide 6 coverages throughout the area, which seems to satisfy the needs of the vast majority of the countries situated in this part of the planning area.

In this respect it is assumed that in Africa and the Middle East the average distance between neighbouring transmitter sites is of the order of 80 - 100 km which, with / 34 / channels available per coverage, would correspond to a distance between transmitter sites using the same channel of approximately / 470 - 580 / km (co-channel distance). In the preparation of planning it is, thus, appropriate to apply the channel distribution scheme by entering it in a geographical map which is covered by a rhombic coordinate system having, say, / 480 / km unit distances which correspond to the assumed co-channel distance. From this map administrations will be able to select appropriate frequencies for assignment to the transmitters at the nearest site. It should be noted that the assignment of one frequency from the theoretical scheme corresponds in reality to the assignment of a group of six channels which are separated from one another by 34 channels each. Needless to say that each frequency channel taken from the scheme can only be assigned once in that particular sub-area. It is worth mentioning that departures from the assignment procedure described would be admissible, e.g. in order to assign two groups of three frequencies each to two neighbouring transmitter sites although, in the theoretical lattice these six frequencies are derived from one and the same lattice point. Moreover, it needs to be stated that after assignment of a group of six frequencies to six transmitters at the same site, the major planning constraints will automatically be respected : the separation between channels used at the same site is / 34 /; this would permit the use of an appropriate multiplexing equipment; and a separation of 10.7 ± / 0.2 / MHz (local oscillator frequency) is avoided.

In Europe, the average distance between neighbouring transmitters is of the order of / / km. In this area, where an / 80 / channel distribution scheme will be applied in the band 100 to 108 MHz, it is more difficult to respect the planning constraints : as two or more frequencies are, after adequate distortion of the theoretical lattice, to be assigned to transmitters sharing the same site, it has to be made sure in every individual case that the separations between frequencies would permit the use of multiplexers if this is desired. Moreover, there will be absolutely no means to automatically avoid, at the same site, the use of frequencies having a separation of 10.7 ± / 0.2 / MHz. Consequently, this particular constraint will need extensive checking.

A N N E X 2

ANALYSIS OF THE PLAN

1. Introduction

Requirements will be analyzed on the basis of the databank to be set up by the IFRB from information supplied by administrations, or entered by IFRB / for those administrations, which did not supply information /.

2. Method of analysis

In each analysis the nuisance field from each potentially interfering transmitter shall be calculated at the site of the wanted transmitter according to the method given in / part of the report of the First Session /.

[The usable field strength, E_u, shall then be calculated by the / simplified multiplication/power sum / method taking into account the / 20 / largest values of nuisance field, specified to one decimal place.]

[In the absence of a decision by the First Session on the method to be used for calculations of E_u, the power sum method will be used for carrying out the preparatory work for the Second Session.]

2.1 Preliminary analysis

In the preliminary analysis the above calculations shall be carried out. However, no account shall be taken of the receiving antenna discrimination.

2.2 Final analysis

In the final analysis the coverage area of a transmitter shall be evaluated by an additional calculation. This calculation, in which account is taken of the receiving antenna discrimination, determines on each of / 36 / radials at / 10° / intervals the distance at which the field strength from that transmitter is equal to E_u.

In the light of experience gained so far it is to be expected that E_u values on the coverage contour (obtained in the final analysis) will, on average, be approximately 8 dB lower than the corresponding E_u at the transmitter site (determined in the preliminary analysis).

3. First analysis for each administration

3.1 During the first (preliminary) analysis of requirements, only those transmitters shall be considered which have a maximum e.r.p. of not less than / 100 W/20 dBW / and for which a frequency has been specified by the administration as part of its requirement.

3.2 E_u will be calculated in a preliminary analysis for each requirement submitted by the administration. Moreover, the arithmetic mean of all E_u (dB (μV/m)) shall be calculated together with the standard deviation.

3.3 For all those transmitters having unsatisfactory assignments, that is those, for which E_u exceeds the mean by more than 10 dB, a further study shall be carried out as a preliminary analysis. E_u shall be calculated on each channel as if the transmitter were assigned each channel in turn in the frequency band 87.5 - 108 MHz.

4. Examination of incompatibilities and frequency planning constraints

The following will be examined for each transmitter :

- incompatibility with the television service in the band 87.5 - 100 MHz (Annex 4);
- interference to radio equipment used by aircraft for automatic landing purposes, which operates in the band 108 - 112 MHz (Annex 5);
- incompatibility with the fixed or mobile services in Region 3 (Annex 6);
- frequency spacing between / 10.5 and 10.9 / MHz for transmitters separated by no more than D (km) = 10 $\log_{10}$ (e.r.p.$_{max}$/1000). E.r.p.$_{max}$ is the higher power of the two transmitters involved and is expressed in watts. If e.r.p.$_{max}$ is 1000 W or less, D = 0;
- for transmitters having identical site coordinates and identical outcome height / above ground level /, a frequency spacing of less than / 1.8 / MHz or, if they have only identical site coordinates, a frequency spacing of less than / 0.8 / MHz.

5. Presentation of results

The following information will be presented to each administration for its transmitters.

5.1 For each transmitter :

- E_u at the transmitter site;
- a list of the / 6 / largest sources of interference together with their nuisance fields and the bearings from the wanted transmitter site.

5.2 For all of its transmitters :

- the mean and standard deviation of all E_u;
- a graphical presentation (see Figure 1) of E_u on each channel in the band 87.5 to 108 MHz for each transmitter having an unsatisfactory assignment (see 3.3);
- lists of transmitters which have incompatibilities with other services or which contravene the frequency planning constraints (see 4).

6. Proposed modifications to the requirements

Administrations will study the results of the calculations and prepare proposed modifications to the frequencies of their requirements for submission to the Second Session of the Conference and, when they consider it necessary, undertake bilateral or multilateral coordination beforehand.

Administrations shall bring these proposed modifications to the notice of the IFRB by / date /. If no change is desired, the IFRB shall be informed by the same date.

7. Second (preliminary) analysis

The requirements including the proposed modifications will be analyzed (as in 2.1) and administrations will be presented with results for all stations which have been affected in any way, excluding the graphical presentations.

8. Inclusion of low power transmitters

At each location of a low power transmitter, E_u for all channels will be calculated (see 3.3) in order that the IFRB may assign an appropriate frequency.

9. Third (preliminary) analysis

The draft plan will be analyzed (as in 2.1) and results will be presented to administrations having low power transmitters or having transmitters affected by the inclusion of low power transmitters.

10. Second Session of the Conference

During the Conference, administrations may wish to make changes to requirements resulting from bilateral or multilateral negotiations. The effect of such changes will be analyzed from time to time and the results will be published.

It should be possible that a coverage analysis (see 2.3) be provided in the case of difficult problems, at the request of an administration.

11. Determination and publication of coverage areas resulting from the plan

Subsequent to the Conference the coverage areas of all transmitters in the plan shall be determined in a final analysis (see 2) and the results shall be published. For each transmitter this information shall consist of / 36 / radial distances, together with the corresponding E_u values.

ANNEX 3

METHOD OF FOREMOST PRIORITY

The method of foremost priority consists in assigning to the transmitter for which the number of appropriate frequencies is smallest the most favourable among these frequencies (worst transmitter - best frequency). This means that frequencies are successively assigned to every transmitter following the order of decreasing difficulty in terms of interference. For every transmitter in sequence a frequency is selected which suffers least interference and produces the smallest amount practicable of additional interference. This procedure is repeated until all transmitters have obtained a frequency. It goes without saying that in this procedure account has to be taken of all constraints implied.

Obviously, this method can be time consuming and its reliability may only be warranted when a computer is used. The use of a high-speed computer may, however, provide important assistance in this procedure and may, in fact, be the only resort in some cases.

It will at first be necessary to discover, by way of an appropriate analysis (see Annex 2), the deficiencies of an assignment plan by computing the usable field strength, checking the constraints to be respected or applying the compatibility procedures. Unsatisfactory frequency assignments, that are those whose usable field strength exceeds the average value in that country by more than ± 10 dB or assignments which are incompatible with other services will be identified in this way and the transmitters will be included in the list to which the method of foremost priority will have to be applied. Also in the following step assistance can be provided, e.g. by computing and plotting, for the sites of such transmitters, the usable field strength as a function of frequency (see Figure 1). Graphical presentations of this type are particularly useful when more than one frequency is to be found for the same site. In general, those frequencies may be considered most appropriate for which the lowest values of usable field strength are shown. This implies, however, that their use is compatible with other services and that the planning constraints are respected.

It may be clear from the above explanations that the graphical presentation of the usable field strength as a function of frequency might also successfully be used to find frequencies for assignment to transmitters for which no frequency was assigned in the first step of the planning procedure (i.e. during the use of the lattice planning method), e.g. for low-power transmitters.

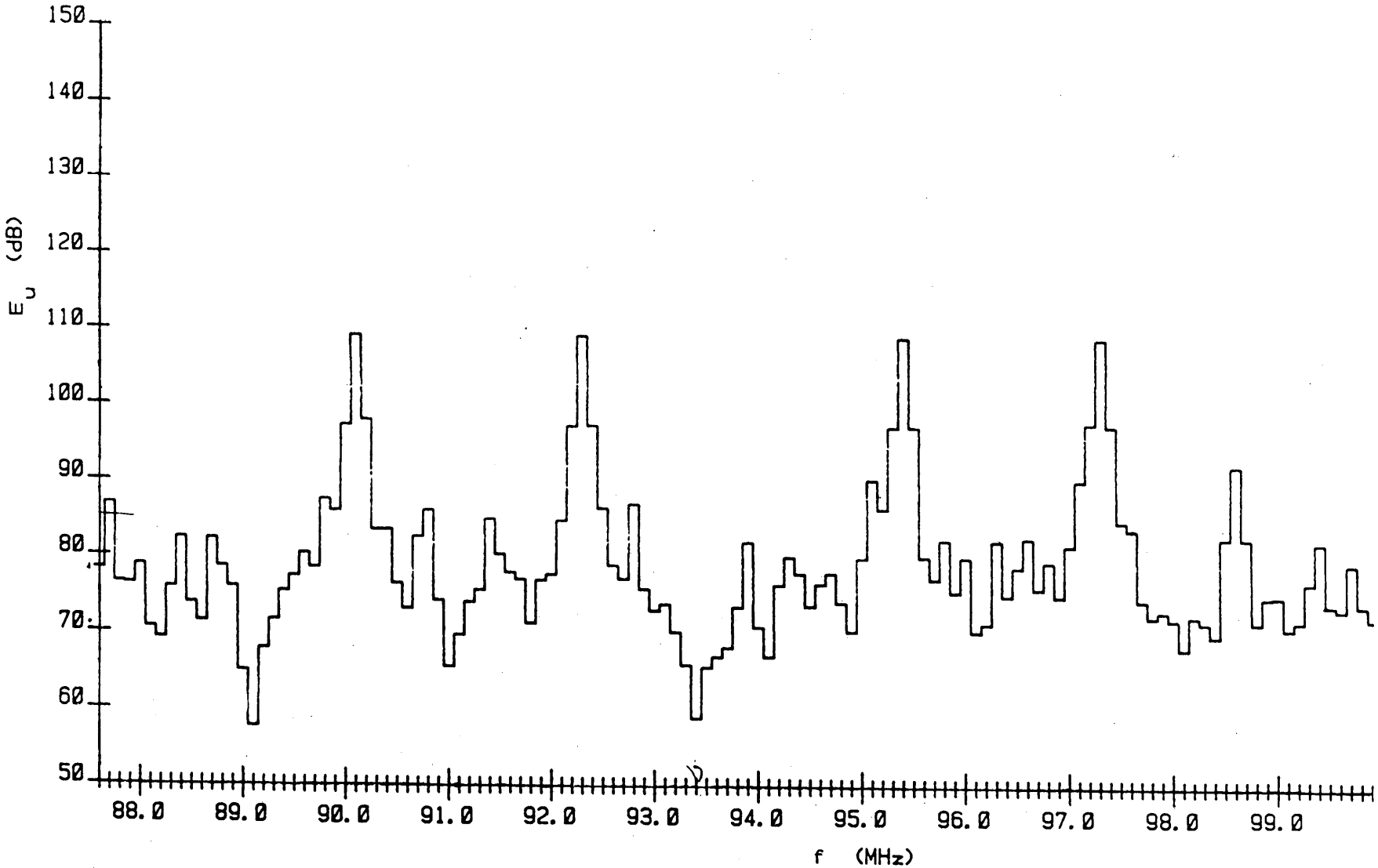


Figure 1

STEREO

A N N E X 4

COMPATIBILITY WITH THE TELEVISION SERVICE IN THE BAND 87.5 - 100 MHz

1. Introduction

Requirements will be processed in accordance with the data bank to be set up by the IFRB from information supplied by administrations, or entered by the IFRB / for those administrations, which did not supply information /.

2. Compatibility assessment

2.1 All VHF/FM requirements which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961, will be assessed for compatibility with the television service. For this purpose the existing situation shall be used as the reference situation and be compared with the new plan in the course of its development.

2.2 To permit this comparison, it will be necessary to calculate (as in 5) the usable field strength (E_u) for all television transmitters at a number of test locations (not more than 12), within the existing coverage area, to be specified by the administrations concerned.

3. Reference situation

All existing or planned assignments to television, or VHF/FM stations in the band 87.5 - 100 MHZ made in accordance with the Regional Agreement, Stockholm, 1961 and notified to the IFRB before / 1 December 1983 /, shall be taken into account. The VHF/FM broadcasting stations in Region 3 operating in accordance with the Radio Regulations and notified / before 1 December 1983 / to the IFRB, shall be included in the reference situation. The calculation for the reference situation need only be made once.

4. Situation, resulting from planning

All existing or coordinated assignments to television stations (as in 3) and all VHF/FM transmitters in the draft Plan, shall be taken into account.

5. Usable field strength for a television transmitter at the specified test location

5.1 The nuisance field from each interfering transmitter shall be calculated as in / / using appropriate protection ratio, taken from :

5.1.1. Table / 1 / for interference from a television transmitter, or

5.1.2 Figure / 1 / for interference from a VHF/FM transmitter.

5.2 Receiving antenna discrimination shall be taken from Figure /~2~/.

5.3 In the case of orthogonal polorization, a discrimination value of 10 dB shall be applied.

5.4 The interference contribution of each interfering transmitter is the value of the nuisance field derived in 5.1, together with any discrimination value derived in 5.2 and 5.3.

5.5 Eu shall be calculated from the individual interference contributions using the simplified multiplication method, taking into account the /~20~/ largest (either TV or VHF/FM) contributions and specified to one decimal place.

6. Incompatibility

An incompatibility only exists if any value of Eu obtained (as in 5) using the data of 4 exceeds the corresponding value of Eu in the reference situation by more than 0.5 dB.

TABLE /~1~/

Ratio of wanted to unwanted signal for colour television (CCIR Report 306-4)

1. Co-channel protection ratio in dB

Offset (multiples of 1/12 line-frequency)		0	1	2	3	4	5	6	7	8	9	10	11	12
Transmitter stability ±500 Hz (non-precision offset)	*T*	45	44	40	34	30	28	27	28	30	34	40	44	45

2. Lower adjacent channel protection ratio

- 6 dB

3. Upper adjacent channel protection ratio

+ 4 dB

PROTECTION RATIO CURVE FOR TELEVISION SYSTEMS

D-SECAM AND K-SECAM (CCIR REPORT 306-4)

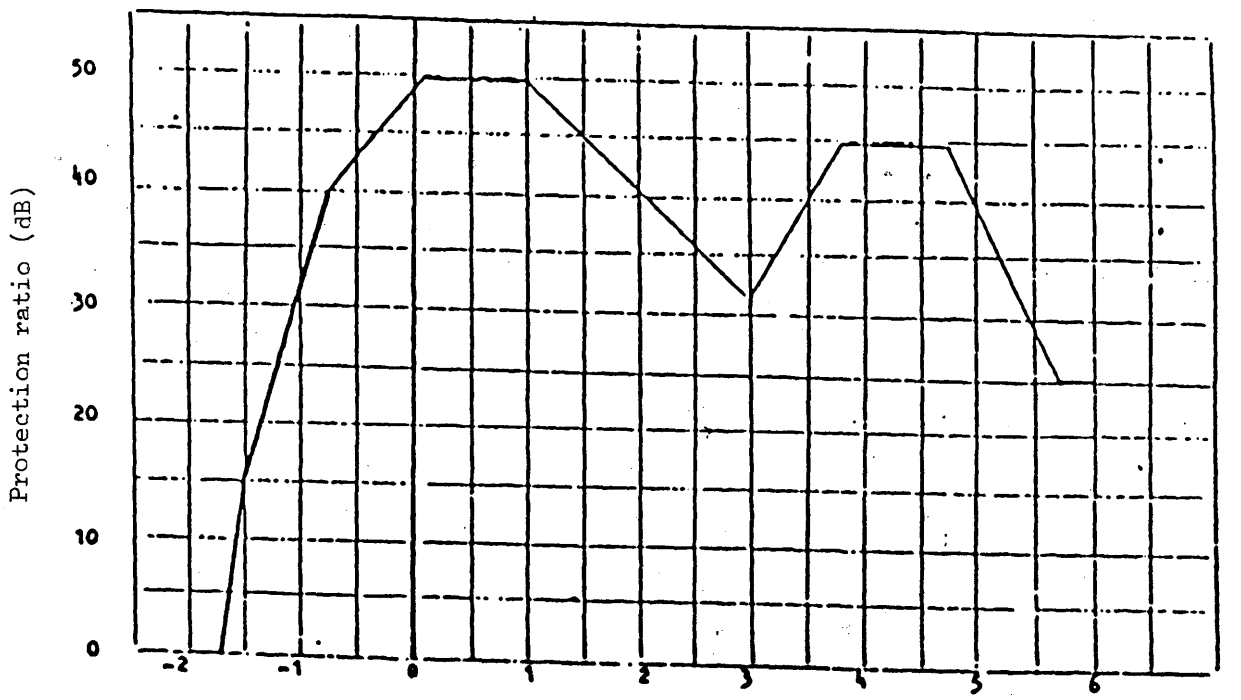


Figure [1] - 625-line system D/SECAM and K/SECAM. Protection from CW or frequency-modulated sound signal interference

RECEIVING ANTENNA DISCRIMINATION - CCIR RECOMMENDATION 419

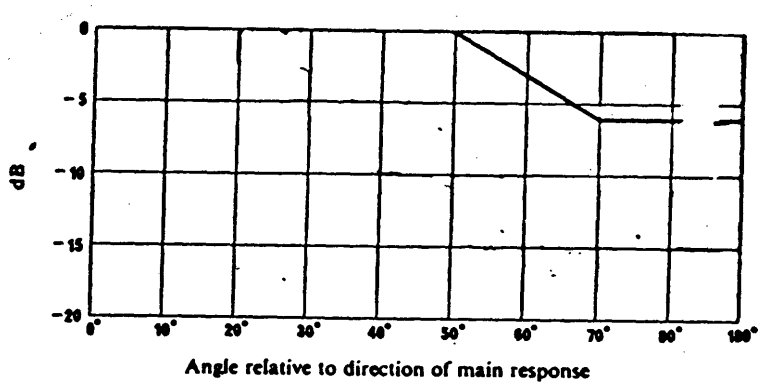


Figure [2] - Discrimination obtained by the use of a directional receiving antenna for the television service in the band 87.5 - 100 MHz

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/27-E
3 September 1982
Original : English

WORKING GROUP 5A

1. Definitions

1.1 Coverage area

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

In this area the protection against interference is provided for 99% of time.

Note 1 : The field strength of the wanted transmitter is derived from propagation curve relating to 50% of locations and for 50% of time.

Note 2 : The usable field strength is calculated by / simplified multiplication/power-sum / method, the tropospheric interference being derived from the propagation curves relating to 50% of locations and for 1% of time, and steady interference being derived from propagation curves relating to 50% of locations and for 50% of the time.

1.2 Service area

The area in which the administration responsible for the service has the right to demand that the agreed protection conditions be provided.

T. BOE
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/28-E
6 September 1982
Original : English

COMMITTEE 4

Report of the Chairman of Drafting Group 4C-7 and the Chairman of Working Group 4C to the Chairman of Committee 4

PROPOSED TEXT FOR INCLUSION IN SECTION 9.10

AND ANNEX 3 OF DOCUMENT No. 81

9.10 The values for the compatibility criteria established at this Conference are the least stringent possible for planning purposes with present equipment in use in the broadcasting and aeronautical services. Even so, in some areas they are likely to unduly inhibit the development of broadcasting services. Improvements in certain characteristics of equipment in these services would ease the planning constraints on both services. The various interference modes lead broadly to equal constraints (see Table A). Therefore in order to progressively ease the compatibility problems, improvement generally of the same order are needed for both services. But where interference arises from two broadcasting transmitter sites, then improvements in the performance of the aeronautical service airborne equipment alone would ease the compatibility constraints. (For additional information see Annex 3.)

In order to examine this prospect, urgent studies are requested of CCIR. These studies are set out in Recommendations / A / and / B / in Docs. 84 and 85. If CCIR can quantify the improvements possible in the equipment of both services, then the second part of the Conference should take these into account in planning. The Conference will also need to establish a suitable time period for these improvements in equipment performance to be brought about taking into account the practical issues involved and the important safety considerations in respect of the aeronautical services. The concept would then be for certain broadcasting assignments having compatibility constraints to be planned but not implemented until a date set by the second part of the Conference for the new compatibility criteria to come into force.

ANNEX 3

Improvements in equipment

Interference to airborne equipment from Type "A" mechanisms cannot practically be reduced by improvements in aeronautical receivers. No benefit can therefore be assumed in planning.

Interference effects due to Type "B" mechanisms can be reduced by improvement in the airborne antenna and receiver design particularly in respect of front end rejection characteristics. Factors such as overall cost of replacement, the performance environment within the aircraft and implementation time scale must be taken into account in any improvement programme. Extended time scales for a sufficient re-equipment to assure new parameters in planning is likely because of economic and operational factors.

CCIR Report 929 (see Conference Document No. 14) discusses current equipment and expected improvements (paragraph 4.2.2) and future system characteristics (paragraph 4.2.3), and studies are continuing within the CCIR on this subject.

The broadcasting authorities should make efforts to reduce the level of spurious emissions in the band 108 - 137 MHz (particularly third-order intermodulation products) from broadcasting transmitters. A level significantly lower than that required in Appendix 8 of the Radio Regulations would considerably reduce the problem of interference.

Aeronautical authorities should make efforts to improve the out-of-band rejection characteristics of airborne receiving equipment in the band 87.5 - 108 MHz. National and international organizations concerned with avionics equipment should cooperate in promoting a programme to achieve this with a view to the earliest practical implementation. It is clear however that this could take considerable time.

S.R. TEMPLE
Chairman of Drafting Group 4C-7

F.R. NEUBAUER
Chairman of Working Group 4C

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/29-E
6 September 1982
Original : English

AD HOC GROUP 5/2

Terms of reference of ad hoc Group 5/2

1. Impact of decisions taken in Committee 4, relative to compatibility between services, on planning principles and planning methods developed in Committee 5.

2. Report to Committee 5 on recommended course of action.

K. OLMS
Chairman of ad hoc Group 5/2

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/30-E
7 September 1982
Original : English

AD HOC GROUP 5/2

COMPATIBILITY CRITERIA AND PLANNING METHODS

This working document reproduces extracts from relevant documents already approved by the competent Committees or which were still in the approval process for the time being.

1. Compatibility criteria established by Committee 4

1.1 FM-BC - Land mobile

The sharing criteria for the protection of the land mobile service in the bands 87.5 to 88 MHz and 104 to 108 MHz shall be the following :

FIELD STRENGTH TO BE PROTECTED : 15 dB μV/m at 3 m height

PROTECTION RATIO :

Frequency separation between carriers of the two services (kHz)	Protection ratio for AM land mobile services (dB)	Protection ratio for FM land mobile services (dB)
0	18	8
25	16	6
50	4.5	- 5.5
75	- 7.5	-17.5
100	-17.5	-27.5

PROPAGATION DATA TO BE USED FOR SHARING CALCULATIONS : paragraph 2.3 of Document No. 53

PERCENTAGE LOCATIONS PROTECTED : 50%

PERCENTAGE TIME PROTECTED : 90%

POLARIZATION PROTECTION FOR HORIZONTAL POLARIZED BROADCASTING EMISSION : 18 dB Base Station
8 dB Mobile Station

The sharing criteria to protect the broadcasting service from interference from the land mobile service within or immediately adjacent to the coverage area of the broadcasting transmitter should be the following :

MINIMUM CARRIER FREQUENCY SEPARATION
REQUIRED IN SAME AREA : 500 kHz

The relevant protection ratio factors are to be found in CCIR Report 659.

1.2 FM-BC - Fx

The basic criteria can be those as established for the land mobile service (see Document No. 48). The field strength to be protected, the height gain factor and the effect of the directivity of the antenna in the fixed service are for consideration between the administrations concerned.

1.3 FM-BC - TV-BC

1.3.1 Protection ratios for the D/SECAM system interfered by FM sound broadcasting are given in CCIR Report 306-4.

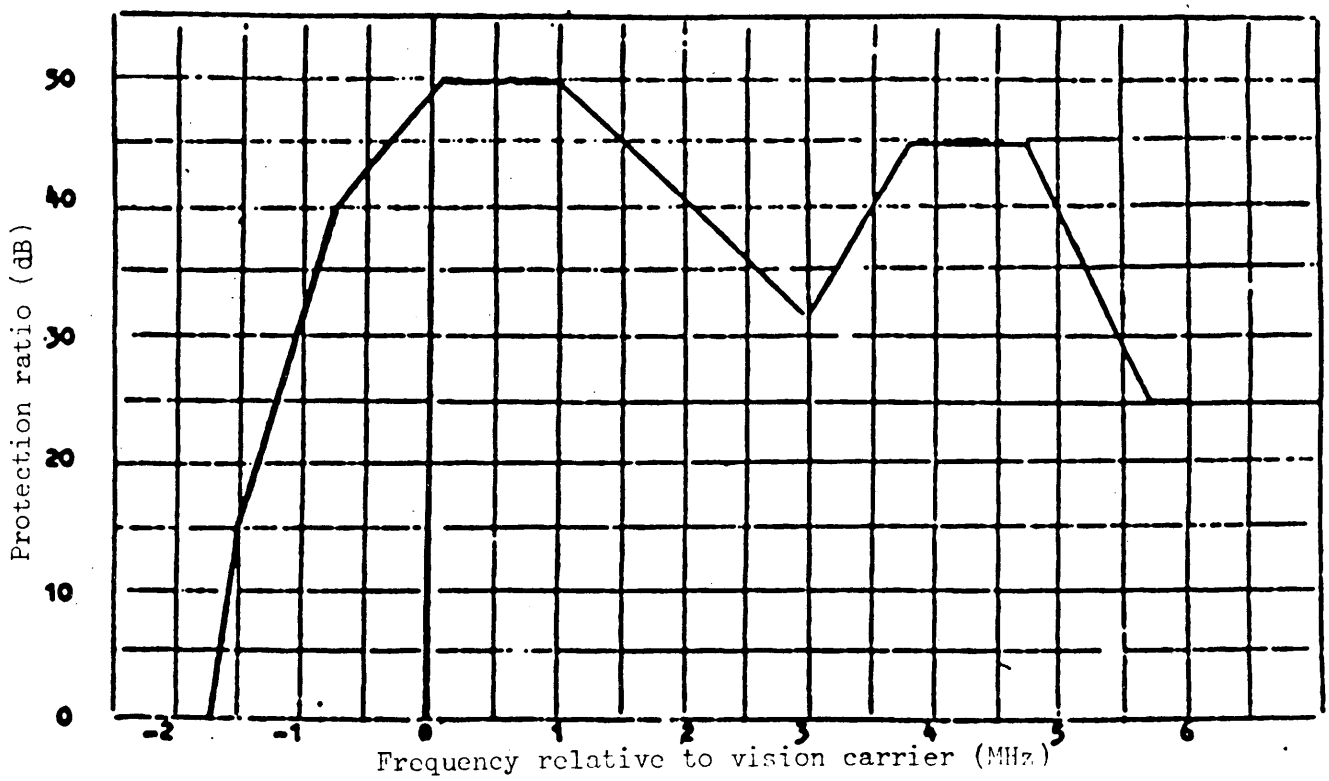


Figure 1 - 625-line system D/SECAM and K/SECAM
Protection from CW or frequency-modulated sound signal interference

1.3.2 Protection ratios for the FM sound broadcasting interfered by television broadcasting (D/SECAM) are given in the CCIR Report 947 in Figure 2.

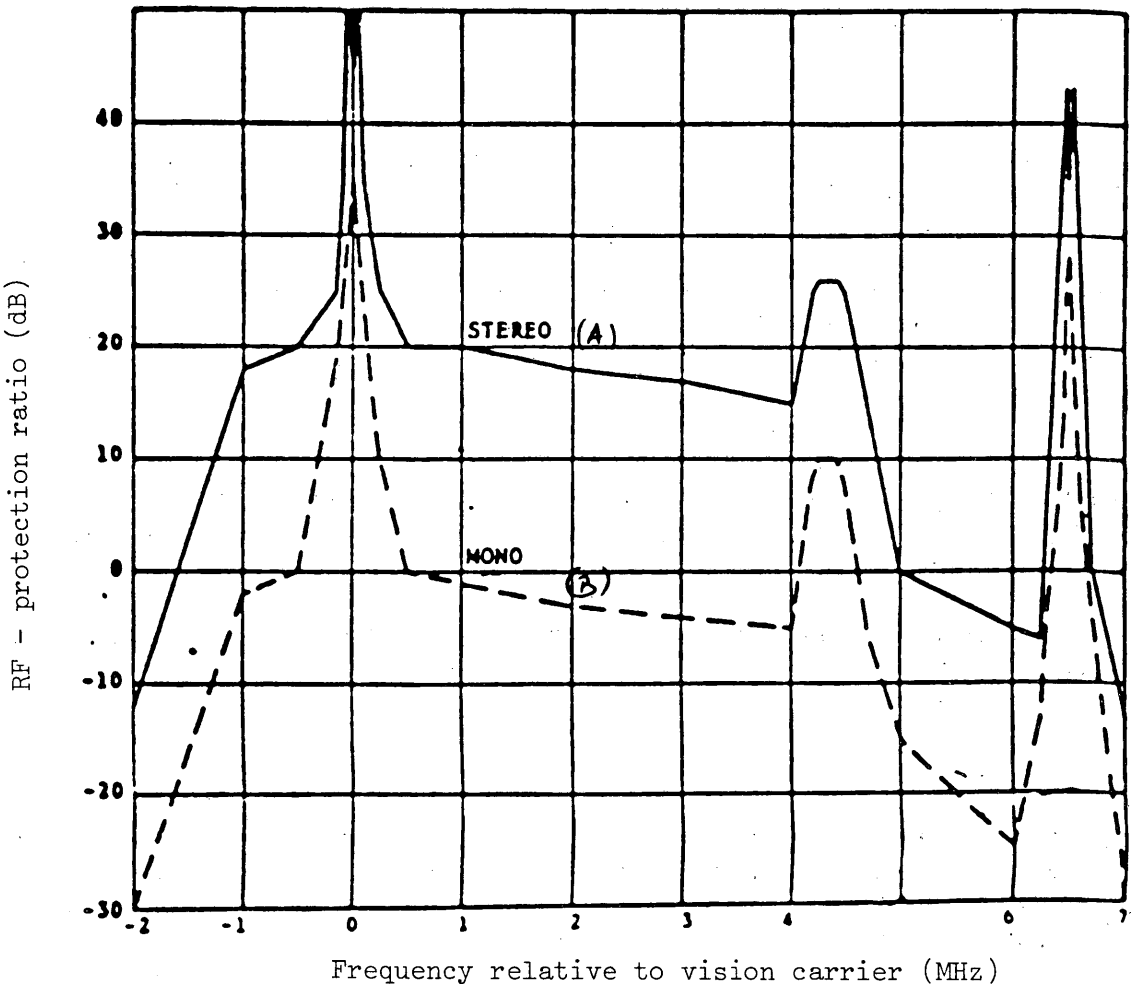


Figure 2 - Radio-frequency protection ratio required by frequency modulation sound broadcasting at frequencies between 87.5 MHz and 108 MHz against interference from D/SECAM television transmission

Steady interference

1.4 FM-BC - Aeronav

1.4.1 ILS localizer

Type A i) Protection ratio

At carrier coincidence : 17 dB

±50 kHz from carrier coincidence : 10 dB

±100 kHz from carrier coincidence : 5 dB

±150 kHz from carrier coincidence : 2 dB

±200 kHz from carrier coincidence : -1 dB

A condition of carrier coincidence exists when the centre frequency of the intermodulation product is the same as that of an ILS localizer channel.

The figures above take into account multiple interference entries resulting from FM broadcast emissions.

A graph of the values above is given in Figure 2.

Type A ii)

The ratio of 17 dB for the carrier coincidence case of Type A i) interference may be used as the basis of interference assessments for this mode. Insufficient data is available to define the typical energy levels of FM broadcasting transmissions in the region of interest of 200 to 500 kHz from the broadcast carrier. Further studies within national administrations are necessary to define the levels at points spaced by 50 kHz over this range. The reference bandwidth for such studies should be that of a typical ILS receiver.

Type B i)

Only third order intermodulation products are considered below, because any unacceptable degradation of receiver performance due to fifth or higher order intermodulation is unlikely to occur in practice.

The intermodulation threshold criteria are derived for a single intermodulation product. In cases, where two or more intermodulation products may be generated on the receiving frequency, linear addition of the powers of the intermodulation products may be assumed.

If none of the broadcasting signals exceeds at the receiver input a level of -25 dBm it may, in general, be assumed that no unacceptable degradation of receiver performance will occur due to intermodulation on any ILS channel. Otherwise a more detailed examination is required based on the following criteria which apply when the third-order product has a frequency in the ILS channel concerned.

Type B ii) (Desensitization of ILS-localizer receivers)

An unacceptable degradation of ILS-localizer receiver performance may be caused, due to desensitization, if the level of a broadcasting signal exceeds -20 dBm at the receiver input on a frequency near the band-edge (108 MHz).

For broadcasting signal frequencies from 108 MHz to 106 MHz the threshold level increases linearly from -20 dBm to -5 dBm.

Sufficient measurement results are not available for frequencies below 106 MHz, where a constant threshold level of -5 dBm should, therefore, be assumed.

In order to determine a possible desensitization of ILS-localizer receivers caused by more than one broadcasting signal, linear summation of the signal levels on a power basis may be used.

1.4.2 VOR

Protection criteria

Only a limited amount of bench test data is available to assess the protection criteria of VOR receivers from FM broadcasting signals. Present information suggests that the behaviour of VOR receivers is not dissimilar to that for ILS for the three interference modes studied, as in many cases the two systems have common antennas and common circuitry up to and including the second detector.

Further study is necessary to confirm and refine the present data. In the meantime first order estimates of compatibility may be made by the application of the criteria for ILS, including the treatment of the case of inside area conflicts.

1.5 VHF communications

Protection criteria

Type A i)

For this interference mode a protection ratio of 17 dB at carrier coincidence has been derived from available test data. No data is available on the relaxation for frequency offset.

Type A ii)

Due to the separation of 10 MHz between the lowest assignable VHF communications channel and the broadcasting band edge of 108 MHz no account need be taken of this effect.

Type B i)

Only third order intermodulation products of the form

$$2f_1 - f_2 = fa \quad (f_1 > f_2)$$

or

$$f_1 + f_2 - f_3 = fa$$

need to be considered, because no unacceptable degradation of receiver performance due to fifth and higher order intermodulation is likely to occur in practice. In the equations above f_1, f_2 and f_3 are the frequencies of the broadcasting signals and fa is the receiving frequency.

If none of the broadcasting signals exceeds at the receiver input, a level of -10 dBm, it may be assumed that no unacceptable degradation of receiver performance will occur due to intermodulation on any VHF-communications channel.

Using the conversion factor described in paragraph 5 and assuming free space propagation, this threshold level is reached at a distance of 2.8 km from a broadcasting station with an effective radiated power of 100 kW and a frequency between 100 MHz and 108 MHz.

In cases where the threshold level of -10 dBm is exceeded, reference should be made to CCIR Report 929, where a method for assessing areas of interference is described.

Type B ii) (Desensitization of VHF-communications receivers)

An unacceptable degradation of VHF-communications receiver performance may be caused, due to desensitization, if the level of a broadcasting signal exceeds -10 dBm at the receiver input.

In order to determine a possible desensitization caused by more than one broadcasting signal, linear summation of the signal levels on a power basis may be assumed.

Using the conversion factor described in paragraph 5 and assuming free space propagation, this threshold level is reached at a distance of 2.8 km from a broadcasting transmitter with an e.r.p. of 100 kW and a frequency between 100 MHz and 108 MHz. In case of three co-sited broadcasting transmitters each with an e.r.p. of 100 kW and frequencies between 100 MHz and 108 MHz, the desensitization distance would be 4.8 km.

2. Definition of planning

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

1) the use of the lattice planning method by the administrations to select appropriate frequencies for assignment to given stations (Annex 1);

2) the preliminary analysis of the draft plan obtained so far by means of a simplified computation method (Annex 2) together with the examination of incompatibilities with the television service in the band 84 - 100 MHz (Annex 4), interference to radio equipment used by aircraft for automatic landing purposes in the band 108 to 112 MHz (Annex 5) and incompatibilities with the fixed or mobile services in Region 3 (Annex 6);

3) the inclusion of low-power network and low-power stations in, and the refinement of, the plan by the method of foremost priority (Annex 3) followed by negotiations among administrations concerned;

4) analysis of the plan using a more complex computation method in the case of critical assignments (Annex 2) together with the examination of incompatibilities with other services, as in step 2 (Annexes 4, 5 and 6).

In the course of the planning procedure some of the above steps may have to be repeated, as appropriate. In particular, step 4 will need to be repeated after introduction of modifications, resulting from bilateral and multilateral consultations during the Second Session of the Conference.

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 modifications of or additions to the plan in the time subsequent to the Second Session of the Conference.

3. Application of compatibility criteria

3.1 FM-BC - TV-BC

Compatibility with the television service in the band 87.5 - 100 MHz

1. Introduction

Requirements will be processed in accordance with the data bank to be set up by the IFRB from information supplied by administrations, or entered by the IFRB / for those administrations, which did not supply information /.

2. Compatibility assessment

2.1 All VHF/FM requirements which are situated in the coordination area with countries using this band for television in accordance with the Regional Agreement, Stockholm, 1961, will be assessed for compatibility with the television service. For this purpose the existing situation shall be used as the reference situation and be compared with the new plan in the course of its development.

2.2 To permit this comparison, it will be necessary to calculate (as in 5) the usable field strength (E_u) for all television transmitters at a number of test locations (not more than 12), within the existing coverage area, to be specified by the administrations concerned.

3. Reference situation

All existing or planned assignments to television, or VHF/FM stations in the band 87.5 - 100 MHZ made in accordance with the Regional Agreement, Stockholm, 1961 and notified to the IFRB before / 1 December 1983 /, shall be taken into account. The VHF/FM broadcasting stations in Region 3 operating in accordance with the Radio Regulations and notified / before 1 December 1983 / to the IFRB, shall be included in the reference situation. The calculation for the reference situation need only be made once.

4. Situation, resulting from planning

All existing or coordinated assignments to television stations (as in 3) and all VHF/FM transmitters in the draft Plan, shall be taken into account.

5. Usable field strength for a television transmitter at the specified test location

5.1 The nuisance field from each interfering transmitter shall be calculated as in / 1 /, using appropriate protection ratio, taken from :

5.1.1. Table / 1 / for interference from a television transmitter, or

5.1.2 Figure / 1 / for interference from a VHF/FM transmitter.

5.2 Receiving antenna discrimination shall be taken from Figure /~2~/.

5.3 In the case of orthogonal polorization, a discrimination value of 10 dB shall be applied.

5.4 The interference contribution of each interfering transmitter is the value of the nuisance field derived in 5.1, together with any discrimination value derived in 5.2 and 5.3.

5.5 Eu shall be calculated from the individual interference contributions using the simplified multiplication method, taking into account the /~20~/ largest (either TV or VHF/FM) contributions and specified to one decimal place.

6. Incompatibility

An incompatibility only exists if any value of Eu obtained (as in 5) using the data of 4 exceeds the corresponding value of Eu in the reference situation by more than 0.5 dB.

TABLE /~1~/

Ratio of wanted to unwanted signal for colour television (CCIR Report 306-4)

1. Co-channel protection ratio in dB

Offset (multiples of 1/12 line-frequency)		0	1	2	3	4	5	6	7	8	9	10	11	12
Transmitter stability ±500 Hz (non-precision offset)	*T*	45	44	40	34	30	28	27	28	30	34	40	44	45

2. Lower adjacent channel protection ratio

- 6 dB

3. Upper adjacent channel protection ratio

+ 4 dB

RECEIVING ANTENNA DISCRIMINATION - CCIR RECOMMENDATION 419

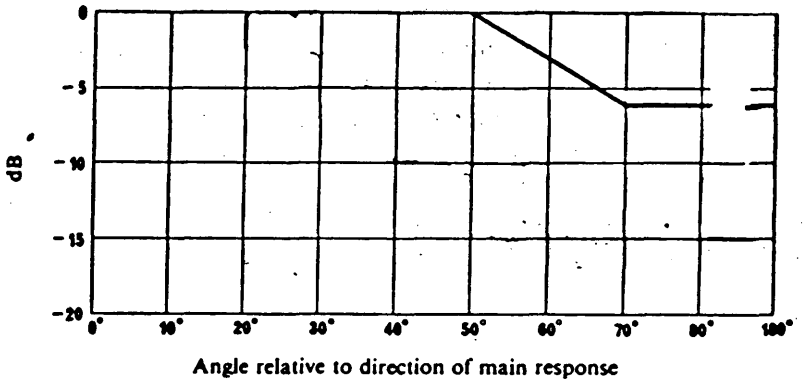


Figure /2/ - Discrimination obtained by the use of a directional receiving antenna for the television service in the band 87.5 - 100 MHz

3.2 FM-BC - Aeronav (Document No. 81)

9. Recommendations

9.1 Prior to the Second Session of the Regional Broadcasting Conference, administrations should calculate and draw on a suitable map an interference contour around each proposed VHF broadcasting station site according to the values set down in Table A.

TABLE A

Coordination zone around a broadcasting station

e.r.p. kW	≥ 100	50	10	1
Distance km	125	125	125	40

These values are based on the assumptions that the broadcasting station only just meets the limits of spurious emissions as set down in Appendix 8 of the Radio Regulations, a broadcasting antenna gain of 10 dB, a minimum field strength to be protected of 32 dB (μV/m) and a protection ratio of 17 dB.

Where this contour cuts an ILS or VOR service volume as promulgated in the appropriate aeronautical publications, a detailed compatibility analysis shall be undertaken. In many cases, this may be achieved through existing national coordination machinery but, in some cases, the joint analysis will need to take place between administrations of neighbouring countries. Where the interference contours from two or more broadcasting stations cut the same aeronautical service volume then they will need to be treated together for the mode of interference arising from intermodulation generated in the aeronautical receiver itself.

9.2 The first stage in the analysis should be to determine whether, for each mode of interference set out in section 1 and by applying the measures set out in sections 7.2, 7.3 and 7.4, a compatibility exists between the two services. For example by applying the values set out in 7.4 the coordination zone reduces to the values set down in Table B.

TABLE B

Coordination zone with -85 dB filtering at the broadcasting station

e.r.p. kw	200	150	100	50	10	1
distance km	31	27	22	15.5	7.0	2.2

Where such compatibility exists, planning of the broadcast frequency assignments can proceed without constraints imposed by the need to protect the aeronautical services.

9.3 For those countries having a large number of both broadcasting stations and aeronautical radionavigation stations, the application of the methods set out in 9.1 and 9.2 by manual means will constitute a huge workload. Computer methods can contribute significantly to reducing the task and rapidly identifying the conflict situations. Where such computer methods are used it would be of greatest value if the results could identify :

i) those broadcasting stations which do not affect the aeronautical service in any way;

ii) those which require additional filtering and identifying the necessary degree of suppression of spurious emissions;

iii) those requiring frequency planning solutions.

9.4 For the cases where compatibility cannot easily be resolved, a more detailed case by case study should be undertaken applying the factors set out in section 8. By this means, it may be possible to further eliminate problem cases.

9.5 For each individual case still without a solution, the administrations should determine, taking account of future expansion of the aeronautical service, over the intended life of the broadcasting plan, whether protection in the service volume is required over a limited number of channels or for the entire band 108 - 118 MHz. In the first case the administration should then calculate whether the particular measures set out in section 7.5 could provide a solution.

9.6 Where compatibility is clearly only feasible through broadcasting frequency planning solutions, the administration, when submitting its requirements, shall indicate in a supplementary note to the IFRB what particular frequency planning constraints are needed in order to ensure compatibility with the aeronautical service for each individual case. These supplementary constraints shall be deemed as requirements and satisfied in planning during the Conference to the extent that it is feasible.

9.7 During the broadcasting service planning there will be a need for a computer analysis facility specifically intended to identify any broadcasting assignments which do not meet the compatibility requirements for the aeronautical radionavigation stations identified by administrations to IFRB under 9.6

9.8 If, after following the procedures set out in 9.1 to 9.6 above, a solution is still not arrived at then the only other possible way a solution may be found is to choose another site for the broadcasting station. It is conceivable in some situations that this may not be feasible in which case such a broadcasting station assignment will be non-implementable.

9.9 Part 2 of the Regional Broadcasting Conference, when establishing the regulatory procedures whereby the broadcasting plan can be subsequently modified, will need to include steps to ensure that the necessary degree of protection is afforded to the aeronautical service in the 108 to 137 MHz band.

9.10 /- Text to be supplied concerning urgent studies requested of CCIR. -/

9.11 The attention of ICAO should be drawn to the pressing need to promote a programme of up-grading the out-of-band rejection characteristics of airborne receivers, in particular, rejection of signals in the broadcasting service bands below 108 MHz.

10. Conclusion

A difficult and complex problem arises in attempting to plan the introduction of the broadcasting service, which in general employs high radiated power, in a band immediately adjacent in the radio frequency spectrum to a band used by a service which uses much lower powers and features sensitive receiving systems for important safety of life functions. The problem is exacerbated by the fact that, in order to meet the coverage requirements, the locations of broadcasting transmitting stations are often near and in some cases within the service volume of the aeronautical service systems. The full severity of the problem will not become clear until administrations have undertaken the case by case studies that have been recommended in section 9. At this stage it may be tentatively concluded that full exploitation of the new spectrum made available by WARC 1979 to the broadcasting service may be constrained in some areas by the need to provide the essential protection to the aeronautical safety services. Significant alleviation of these constraints may be expected only when improvements in the relevant characteristics of the equipment of the broadcasting and the aeronautical services can be effected.

2.2.5 Inside service area conflict

In situations where the broadcasting site is located within the ILS service area as specified at 2.1 above, no general rules can be stated since each situation will differ in respect of the interference threat, the point at which it is the worst, and the pattern and density of air operations within the service area.

Study and assessment on a case-by-case basis by aviation and broadcasting authorities concerned will be necessary to refine and evaluate the individual character of each conflict situation encountered. The material in Annex 1 may be used as guidance in these studies.

In cases where an administration confirms that an assessment for a particular ILS made using the criteria in paragraph 2.2 is satisfactory to establish compatibility, the general rules may be applied in this case.

A N N E X 1

GUIDELINES FOR CONFLICT ASSESSMENT FOR THE CASE OF BROADCAST STATIONS WITHIN THE SERVICE AREA OF ILS

For these situations (paragraph 2.2.5) it appears possible to state basic guidelines which may be used and added to as necessary in particular cases where the conflict contains features with a more significant potential to interfere with air operations.

These basic guidelines are :

i) a minimum protection figure as defined in paragraph 2.2 enhanced where necessary by a further margin to take account of the broadcast station proximity to the ILS course sector;

ii) special measures may be necessary where the worst effect of the predicted interference is experienced in the sector from 6 n. miles to the touchdown point and along the runway, and in the case of back beam operation out to a similar point in the reverse direction. The category, or expected future category of ILS operation is an important factor in deciding acceptability. In all such cases further protection will be necessary in most instances particularly in the case of interference due to Mode A i);

iii) the higher figure of 100 microvolts per metre for the wanted signal strength as specified in ICAO Annex 10 may be used as the basis where it has been established and confirmed under all operational conditions;

iv) in respect of air operations particular points to be considered are :

a) the intersection of interference areas with the course sector and their effect on aircraft within this sector,

b) mandatory approach procedures, radar vectoring paths and areas of higher density of use,

c) the area over which a disturbance may be experienced in relation to its effect on automatically coupled systems,

v) where it can assist resolution, and to refine the assessment, account may be taken of secondary technical features of which the following are some :

a) vertical polar diagram of the broadcast radiation,

b) terrain effects,

c) higher nominal ILS signals in particular parts of the service volume as confirmed by measurement.

4. Consequences of application of the criteria

7.1 General

In order to meet the protection criteria which are essential to protect the aeronautical radionavigation service from the mechanisms of interference identified in section 1, there are four principle means by which the broadcasting service could contribute towards a practical solution to the compatibility problem. These are elaborated upon in sections 7.2 to 7.5. There is also the possibility that the general aeronautical requirements can be relaxed in specific cases. Further, in the longer term, improvements in the characteristics of airborne installations is desirable. These aspects are dealt with in section 8.

7.2 Limiting the broadcasting station power

For all modes of interference a reduction in interfering power can be achieved by reducing the broadcasting station power. However, since the broadcasting power is set by the coverage requirement such a reduction would directly reduce the coverage or the quality of reception within the same coverage area.

7.3 Set minimum separation distance between the broadcasting station transmitter site and the aeronautical service volume

This is the most effective way of gaining sufficient attenuation of the broadcasting signal to meet the aeronautical service protection criteria (see Annex 2).

In many instances there will be little or no choice in the location of the broadcasting transmitting station e.g. airports located near major cities. For economic reasons the use of existing broadcasting transmitting station sites for new services may also be essential. Thus, in many cases, distance is not a variable which can simply be set to suit the sharing criteria.

7.4 Improve filtering of broadcasting service transmitters

Spurious emissions from broadcasting transmitters must meet the requirements of the Radio Regulations i.e. Appendix 8. An important case is intermodulation interference generated at broadcasting station transmitter sites which can be reduced by fitting improved combining filters and paying careful engineering attention to all possible sources of non-linearity following the output stages of the transmitters. Through such measures it is technically feasible to reduce the level of third order intermodulation interference generated at the broadcasting station transmitter site to -85 dB relative to the carrier power. It is also technically feasible to fit

improved filters on the output of transmitters to improve suppression of other spurious emissions to the order of -90 dB. In view of the additional cost, these values should only be applied in those situations where problems of compatibility with the aeronautical service demand it. There may be a need in some cases for an even greater suppression of spurious emissions from the broadcasting stations than the values indicated above.

7.5 Arrange broadcasting service frequency plan to minimize interference to the aeronautical radionavigation service

There are two ways in which the placement of broadcasting assignments within the plan can add to or reduce the burden of solving compatibility problems with the aeronautical radionavigation service. The first is how far below 108 MHz the broadcasting assignment is placed. The second is the particular combination of carriers chosen. This latter factor is pertinent to the two interference mechanisms where the generation of intermodulation products is the cause of the interference.

7.5.1 Frequency separation between the broadcasting service assignment and the aeronautical radionavigation service assignment

The aeronautical radionavigation service airborne receiving equipment has some rejection of out-of-band signals due mainly to antenna characteristics, and may be assumed to provide 3 dB plus one dB for each MHz down from 108 MHz. This rejection characteristic may be applied to all the type B modes of interference.

The interference due to out-of-band emissions from a FM broadcasting station reduces the further away a broadcasting assignment is placed below 108 MHz.

7.5.2 Relationship between two or more broadcasting carriers in the same service area of the aeronautical radionavigation station

By programming the mathematical relationship for the intermodulation frequencies into a computer it is possible to predict frequencies on which the most significant of these interference carriers (i.e. third order products) will fall. This would apply to products radiated from the transmitter site or produced in the aeronautical receiver. Thus, in theory, it is feasible to choose the assignments at a particular multi-channel broadcasting station transmitter site or combination of nearby sites such that all the intermodulation interference carriers do not coincide with any assignments of nearby aeronautical radionavigation service systems. However, this implies that spurious emissions from the broadcasting service will fall in the unused portions of the aeronautical band in that specific location. From a purely broadcasting viewpoint unless this is possible, it would impose severe constraints on broadcasting assignments and hence militate against the efficient use of the spectrum between 87.5 - 108 MHz.

7.5.3 Practical limitations in arranging the broadcasting service frequency plan to minimize interference to the aeronautical radionavigation service

On the broadcasting side, the task of arranging a compatible set of assignments within the broadcasting service will be a very difficult task. Imposing constraints in order to meet the aeronautical radionavigation service protection requirements will add to the complexity of the task and the time needed to make a plan. Indeed it would be a quite formidable task for information on all ILS and VOR systems to be submitted to the Conference and be taken comprehensively into account in the planning process. On the aeronautical radionavigation service side there would naturally be a preference to preserve the efficiency of use of their spectrum, i.e. for the protection

criteria to be applied across the whole band rather than the actual assignment which may exist at present. In particular, if levels of harmful interference resulting from implementing a broadcasting plan fall in the 108 - 118 MHz band between the existing aeronautical channels in use, it will inhibit the possibility of replanning the aeronautical band and of being able to provide new assignments to meet future growth.

From the foregoing, it can be seen that it is highly desirable to limit to the absolute minimum the number of compatibility problems with the aeronautical radionavigation service for which the Regional Broadcasting Conference is asked to find special frequency planning solutions.

A N N E X 2

MINIMUM DISTANCES FOR PRINCIPAL MODES OF INTERFERENCE BASED ON CRITERIA SET OUT IN SECTIONS 2 AND 7 AND -85 dB FILTERING AT THE BROADCASTING STATIONS

a) Third-order intermodulation products radiated by transmitter assuming -85 dB filtering

Transmitter e.r.p. (kW)	Distance (km) for :	
	ILS	VOR
100	22	10
50	15.5	7
10	7.0	3.2
1	2.2	1
Protected field strength, dB(μV/m)	32	39
Protection ratio, dB	17	17

b) Intermodulation in receiver : equal field strengths
(applies to $2f_1 - f_2$ or $f_1 + f_2 - f_3$ for examples given)

Distance (km) for following cases :

MHz, f_1, f_2, f_3	108, 105, 102		100, 97, 94		94, 91, 88	
System	ILS	VOR	ILS	VOR	ILS	VOR
Permitted field strength dB(μV/m)	100	102	108	110	114	116
e.r.p. 100 kW	22	18	9	7.0	4.5	3.5
50 kW	15.5	13	6.2	5.0	3.1	2.5
10 kW	7.0	5.6	2.8	2.2	1.4	1.1
1 kW	2.2	1.8	0.9	0.7	0.45	0.35

c) Desensitization

Distance (km) for following cases (ILS or VOR) :

Frequency, MHz	108	107	106	100
Permitted dBm at receiver	-20	-12.5	-5	-5
Permitted field strength dB(μV/m)	101	109.5	118	124
e.r.p. 100 kW	20	7.4	2.8	1.4
50 kW	14	5.2	2.0	1.0
10 kW	6	2.2	0.9	0.45
1 kW	2	0.7	0.3	0.14

8. Factors within the aeronautical radionavigation and aeronautical mobile (R) services which may facilitate compatibility

There are no general measures in the immediate future within the aeronautical service which would ease the compatibility problem, although in the longer term it is in the interest of both the broadcasting and the aeronautical services for the aeronautical service airborne receivers to be significantly improved in respect of interference immunity.

Meanwhile, in each individual situation, factors may exist which could provide provide an easement of the situation. These factors include :

a) terrain effects e.g. shielding,

b) higher signal levels in particular parts of the service volume,

c) typical operational heights in use,

d) acceptable constraints on a part of the aeronautical band which is not in use and need not be protected to the full criteria in a particular individual location,

e) change of aeronautical service assignment in a specific location. (This is unlikely to be possible in some countries due to the tight constraints within the aeronautical band.)

f) radiation pattern of the broadcasting station in the direction of the aeronautical service volume.

Where such easements do appear feasible, an acceptable assurance of aircraft safety may require ground and perhaps airborne measurements of signal levels under appropriate conditions. For all such situations a case by case examination by an administration or administrations is necessary. Consideration also needs to be given by administrations to the problem of blocking and desensitization of airborne receivers when aircraft fly close to broadcasting transmitting station sites. Within a limited volume around such a site it is impossible to meet the necessary protection criteria. One solution for the communications case might be for such zones to be published and for aircraft to avoid them or at least be made aware of the interference situation within such zones. However, again case by case treatment by administrations, taking the operational situation fully into account, is the only way to determine whether this approach is consistent with the very important air safety considerations.

K. OLMS
Chairman of ad hoc Group 5/2

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/31-E
7 September 1982
Original : English

AD HOC GROUP 5/2

DRAFT

Structure of Report to Committee 5

1. Introduction

List of possible incompatibilities (in the order of impact)

2. Compatibility assessment and reference situation

2.1 Land mobile service

2.2 Fixed service

2.3 TV-BC service

2.4 Aeronautical radionavigation service

2.5 Aeronautical mobile service

3. Additional conditions

3.1 Power limitations/geographical separation

3.2 Filtering

3.3 Frequency separation

3.4 Receiver intermodulation

3.5 Case by case alleviation (site shielding, higher signal levels etc.)

4. Conclusion(s)

K. OLMS
Chairman of ad hoc Group 5/2

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/32-E
6 September 1982
Original : French

WORKING GROUP 5B

DRAFT

RESOLUTION No. COM 5/1

IFRB ACTIVITIES BETWEEN THE FIRST AND SECOND SESSIONS OF THE CONFERENCE

The Regional Administrative Conference for FM Sound Broadcasting in the VHF Band (Region 1 and certain countries concerned in Region 3) (First Session, Geneva, 1982),

considering

a) that the current Session has adopted a programme of work making it the task of the IFRB to draw up the List of Requirements and so far as possible to carry out incompatibility calculations on the basis of this List;

b) that the IFRB will have to develop the computer programs needed to perform the tasks mentioned in Chapter ....;

c) that some Administrations have developed or will develop software relating to incompatibility calculations,

recognizing

a) that this activity represents an additional burden of work for the IFRB, which has limited means at its disposal to prepare for the Second Session of the Conference;

b) that the Administrative Council at its 37th session (1982) made limited provision in Resolution No. 870 for additional fixed-term staff for the preparation of administrative radio conferences,

resolves

1. to invite the Administrations which have prepared computer programs applicable to the relevant studies listed in Chapter ... to communicate these programs to the IFRB and, if necessary, to second computer specialists to the IFRB for short periods in order to adapt the programs to the ITU computer system;

2. to invite the IFRB to perform between the First and Second Sessions of the Conference the tasks mentioned in Chapter ... so far as possible, and to send the results to Administrations;

3. to invite the IFRB to provide Administrations with such assistance as may be requested of it with a view to the submission of requirements and the preparation of the Second Session of the Conference;

4. to draw the attention of the Administrative Council to the facilities deemed necessary to enable the IFRB to carry out the tasks mentioned above.

C. TERZANI
Chairman of Working Group 5B

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/33-E
10 September 1982
Original : French

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 No. 41.

2. Meetings

The Committee met twice, on 24 August and 10 September 1982.

The Working Group set up by the Committee to examine the credentials to the Conference, taking account of the provisions of the International Telecommunication Convention, met on 2 and 10 September 1982.

The Chairman and Vice-Chairman of the Committee and the delegates of Algeria, the Federal Republic of Germany and Czechoslovakia took part in these meetings.

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 Vice-Chairman of Committee 2 to examine the credentials received after the date indicated in the present report and to report to the Plenary Meeting on the matter.

J.G. DE MATOS
Chairman of Committee 2

Annex : 1

A N N E X

1. Credentials submitted

1.1 Credentials found to be in order

1.1.1 Credentials presented by countries which have ratified the Convention (or acceded thereto) and to which the provisions of No. 97 of the Convention do not apply.

Conclusion : The delegations of the above-mentioned countries are entitled to vote.

1.1.2 Countries to which the provisions of No. 97 of the Convention apply.

Conclusion : The delegations of these countries are not entitled to vote.

2. Credentials provisionally deposited (Convention No. 362)

The delegations of these countries are entitled to vote.

3. Delegations which have not deposited their credentials

The delegations of these countries are not entitled to vote.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/34-E
9 September 1982
Original : French

AD HOC GROUP 5/2

Data processing method for assessing compatibility between the broadcasting and the aeronautical services

1. Compatibility with the aeronautical radionavigation services is guaranteed if the criteria defined in Document No. 100 are met at all points of the ILS, VOR or VHF service areas.

In practice, the calculations can be limited to a number of points at which conditions are considered to be the most difficult.

For some countries, the large number of calculations (several thousand field strength calculations) will probably necessitate a data processing method based on the following practical considerations.

2. Choice of test points

2.1 ILS

If the broadcasting station is not in the ILS service area, the 4 points (A, B, C and D) defined in Figure 1 shall be chosen.

If the broadcasting station is within the ILS service area, the field strength shall be calculated at a distance of / 100 m / from the antenna of the broadcasting station in the direction of maximum e.r.p.

2.2 VOR

If the broadcasting station is not in the VOR service area, the 4 cardinal points (N, E, S and W) of the circle forming the boundary of the service areas at a height of 1,000 m above the beacon shall be chosen.

If the broadcasting station is within the VOR service station, the field strength shall be calculated at a distance of / 300 m / from the antenna of the broadcasting station in the direction of maximum e.r.p.

2.3 VHF

Service volumes vary widely. Initially, for the sake of simplicity, the 4 cardinal points / 30 km / from the airport at a height of 1,000 m greater than the height of the airport shall be protected. Other test points of service volume will possibly have to be determined later after the operational studies.

3. Propagation calculations

Calculations shall be limited to the test points in line-of-sight from the broadcasting station, it being assumed that the terrain is at the same height as the airport.

4. Checking of criteria

4.1 Type A interference

After the test points and calculating the field strengths produced by the broadcasting stations have been determined, the out-of-band rejection necessary for the application of the criteria for the different aeronautical services shall be determined.

4.2 Type B interference

After the frequencies of the broadcasting stations have been determined, the various criteria defined in Document No. 100 shall be checked.

These criteria involve the field strength at the test point, and also the frequencies determined for each broadcasting station.

Certain conflict situations may therefore be resolved by modifying the frequencies of the broadcasting stations.

K. OLMS
Chairman of ad hoc Group 5/2

*) Where provided to the usable range and height.

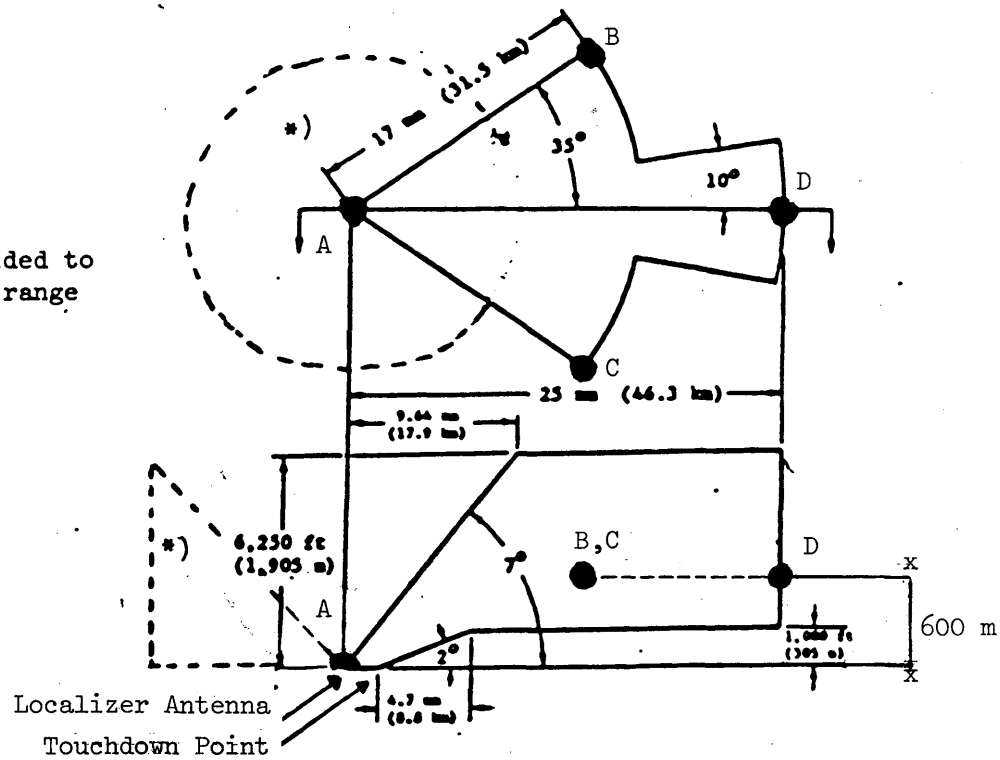


Figure 1 - Test points for ILS localizer protection volume

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/35(Rev.1)-E
10 September 1982
Original : English

AD HOD GROUP 5/2

DRAFT

Report of the Chairman of ad hoc Group 5/2 to the Chairman of Committee 5

1. Introduction

The ad hoc Group 5/2 discussed the impact of decisions taken in Committee 4, relative to compatibility between services on planning principles and planning methods developed in Committee 5, according to its terms of reference.

There is a possibility of incompatibility between sound broadcasting service in the band 87.5 - 108 MHz and the following services :

- land mobile and fixed service (87.5 - 108 MHz);
- television broadcasting service (87.5 - 100 MHz);
- aeronautical radionavigation service (108 - 118 MHz);
- aeronautical mobile (R) service (118 - 137 MHz).

2. Compatibility assessment

2.1 Land mobile and fixed services

Provisions in footnotes RR 581, 582 and 587 to 589 allocate some parts of the band 87.5 - 108 MHz in some countries in Region 1 to the land mobile, fixed and mobile except aeronautical mobile (R) services on a permitted basis. Provisions of RR 419 state that in the preparation of frequency plans the primary service (i.e. the sound broadcasting service) has prior choice of frequencies.

The frequency assignments to broadcasting stations to be included in the Plan can be selected without regard to existing or planned stations of the permitted services in Region 1.

In Region 3, the band 87 - 100 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis. The sharing certeria which are to be taken into account when assigning frequencies to broadcasting stations near to Region 3 are to be found in items 5.1 and 5.2 of the Report of the First Session [Document No. 100].

An appropriate text for inclusion in item 6.3 is given in Annex 6 (Document No. 92).

2.2 Television broadcasting service

The new Plan should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement (Stockholm, 1961). The administrations will send to the IFRB the details of these assignments which are to be protected using the sharing criteria given in / Annex 4 of Document No. 92 /, item 6.3 of the Report of the First Session.

For the calculation of the interference, it is necessary to determine the percentage of time and the propagation curves (Figures 2.1 to 2.9 of Document No. 97) which have to be applied. It is suggested that the interference should be calculated for / 1% / of the time in calculations of the compatibility between sound broadcasting and television broadcasting services.

2.3 Aeronautical radionavigation

The ad hoc Group examined the documents from Committees 4 and 5 and prepared Annex / 5 / containing a method of calculation to be used for analysing the plan before and during the Second Session of the Conference. This annex will be Annex 5 to Document No. 92. If the broadcasting and aeronautical stations belong to one and the same country, administrations may use this method or any other method they consider useful. Annex / 5 / will make it possible to determine whether there is likely to be any incompatibility between stations belonging to different countries. The resolution of such incompatibilities through bilateral or multilateral negotiations will be based on criteria and methods accepted by the administrations concerned.

If Annex 5 is adopted, items 5.3.9.1 to 5.3.9.8 could be deleted from Chapter 5 (Document No. 109).

Consequential changes to paragraph 7.3 of Document No. 89(Rev.1) are given in Annex 1.

2.4 Aeronautical mobile (R) service

The protection criteria for the aeronautical mobile (R) service are given in item 5.3.4 of the Report of the First Session / Document No. 100 /.

It is felt necessary to protect the aeronautical mobile (R) service, taking into account the safety aspects involved.

The administrations would consider the incompatibilities between the aeronautical mobile (R) service and the sound broadcasting service in preparation of their requirements.

The interim planning process will continue on the assumption that there will be no serious problems of incompatibility. However, as the extent of the problems is still unknown the Second Session may wish to determine the more precise application of the protection necessary.

3. Additional remark

The results of analyses of draft plans by the IFRB at various stages up to and including the Second Session will include an indication of incompatibilities with the aeronautical radionavigation service. It should be emphasized that the purpose is to inform administrations of those cases where they should undertake further detailed examination, after which they should indicate to the IFRB whether or not the related broadcasting assignments can be accepted.

4. Conclusions

In the course of the international planning procedure between the First and Second Sessions of this Conference, the calculations concerning incompatibilities between the sound broadcasting service and other services should take into consideration :

1) the mobile and the fixed services in countries of Region 3;

2) the existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement (Stockholm, 1961) : the details of these assignments will be sent to the IFRB;

3) the planning constraints needed to ensure compatibility with the aeronautical radionavigation service which are submitted to the IFRB in a supplementary note for each individual case together with the requirements of the administration concerned.

K. OLMS
Chairman of ad hoc Group 5/2

Annexes : 3

A N N E X 1

7.3 Processing of requirements by the IFRB

After validating them, the IFRB shall enter all the requests in a register with a view to establishing an inventory of requirements, on the basis of which the interference calculations and incompatibility checks will be made.

The IFRB shall send to each administration in duplicate, as soon as possible and not later than 30 April 1984, a separate printed list of the requirements of the administration concerned.

Administrations shall check the data on their stations and shall communicate to the IFRB not later than 30 June 1984 any material errors they have detected and the information relating to aeronautical stations which are likely to be affected.

The IFRB shall check this information and carry it into the inventory of requirements.

(Annexes 2, 3 and 4 do not exist)

ANNEX /5/

COMPATIBILITY BETWEEN VHF BROADCASTING STATIONS AND STATIONS OF THE AERONAUTICAL RADIONAVIGATION AND AERONAUTICAL MOBILE (R) SERVICES

1. The calculation method and criteria contained in this Annex must be used for analyzing the plan before and during the Second Session of the Conference. If the broadcasting and aeronautical stations belong to one and the same country, administrations may use this method or any other method they consider useful. This Annex will make it possible to determine whether there is likely to be any incompatibility between stations belonging to different countries. The resolution of such incompatibilities through bilateral or multilateral negotiations will be based on criteria and methods accepted by the administrations concerned.

2. Compatibility between broadcasting stations in the band /87.5 to 108 MHz/ and aeronautical radionavigation stations in the band /108 to 118 MHz/ and stations of the aeronautical mobile (R) service in the band /118 to 137 MHz/ must be ensured in the following stages :

2.1 When an administration defines its requirements with a view to communicating them to the IFRB, it may apply the coordination area concept referred to in point 3 to identify and to indicate in an additional note the specific frequency planning constraints which are essential to ensure compatibility in each case with the aeronautical service. These additional constraints are regarded as requirements that so far as possible should be met during the Second Session of the Conference when the plan is drawn up. (Note to Working Group 5/2 : In what form are the specific constraints to be communicated?)

2.2 At a later stage, when an administration receives the inventory of requirements established by the IFRB (not later than 30 April 1984), it should use the coordination distances mentioned in point 3 to identify the broadcasting stations /of other countries/ which are likely to affect the operation of any ILS, VOR or VHF station, it should determine the test points to be used and it should communicate to the IFRB by /30 June 1984/ the geographical coordinates of the ILS, VOR and VHF station sites together with the azimuth, distance and height of each test point.

2.3 The IFRB shall apply the software to be supplied to it by /the French Administration/ to determine whether the protection criteria defined in point 5 have been met, and it shall include the results in the general analysis of the plan.

2.4 Administrations shall endeavour through bilateral and multilateral negotiations to resolve incompatibilities using the criteria and methods they consider most appropriate.

3. Coordination zone around a broadcasting station

In a first step and in order to eliminate those broadcasting stations which will not affect aeronautical stations administrations should calculate and draw on a suitable map an interference contour around each proposed VHF broadcasting station site according to the values set down in the following table :

Coordination zone around a broadcasting station

e.r.p. kW	≥ 10	1
Distance km	125	40

Where this contour does not cut the area below an ILS or VOR service volume the broadcasting station is considered as not being likely to affect any aeronautical station.

4. Test points

While applying paragraph 6 for the resolution of incompatibilities administrations shall, in a second step, carry out interference calculations at a limited number of test points. These test points shall be communicated to the IFRB where required.

4.1 ILS

4.1.1 If the broadcasting station is not in the area below the service volume defined in item 5.3.2.1 the points A, B, C defined in Figure 1 shall be used together with point D, unless an alternative test point is indicated by the responsible administration.

4.1.2 If the broadcasting station is within the area below the ILS service volume, a case-by-case assessment is necessary (see 5.3.2.2.5). Unless otherwise specified the field strength shall be calculated at a distance of 100 m from the broadcasting antenna. (Note to ad hoc Group 5/2 : in which direction?)

4.2 VOR

4.2.1 If the broadcasting station is not in the VOR service area, the 4 cardinal points (N, E, S and W) of the circle forming the boundary of the service areas at a height of 1,000 m above the beacon shall be chosen.

4.2.2 If the broadcasting station is in the VOR service area, a case-by-case assessment is necessary (see 5.3.3.2). Unless otherwise specified the field strength shall be calculated at a distance of 300 m from the antenna of the broadcasting station. (Note to the ad hoc Group 5/2 : in which direction?)

4.3 VHF communications

Service volumes vary widely. Initially, for the sake of simplicity, the 4 cardinal points 30 km from the land station in the aeronautical mobile (R) service at a height of 1,000 m above the height of the land station shall be considered unless

alternative test points are indicated by the responsible administration.

VHF communication for on route purposes may be treated on a case-by-case basis depending on the operational significance.

5. Analysis of incompatibilities

The IFRB shall use the information relating to test points together with the inventory of requirements in order to assess the incompatibilities using the following criteria.

5.1 Propagation

Calculations shall be limited to the test points in line-of-sight from the broadcasting station, it being assumed that the terrain is at the same height as the aeronautical station and the effective earth's radius is 4/3 of the actual radius. Calculations shall be made using free space propagation conditions / and e.r.p. in the horizontal plan /. No account should be taken of polarization differences.

5.2 Protection criteria

For any broadcasting station in the band / 87.5 - 108 MHz / having a test point of an aeronautical station in its coordination zone, the field strength of the broadcasting stations at the test point shall be calculated as an interfering signal and compared with the following minimum field strengths :

- ILS : 40 µV/m
- VOR : 90 µV/m

The calculations shall indicate :

- those cases for which the ratio of the minimum field strength to the calculated interfering signal reduced by / 85 / dB is lower than 17 dB,
- those broadcasting transmitters which cause at the test point an interference exceeding -25 dBm corresponding to an interfering field strength derived from the following formula :

$$E\ dB(\mu V/m) = N(dBm) + 121 + (108 - f(MHz))$$

where f is the frequency of the broadcasting station.

5.3 Publication of the results

The publication of the results of the calculations shall indicate for each incompatibility :

a) the identification of the aeronautical station affected;

b) the identification of the broadcasting station giving rise to the incompatibilities;

c) the value in decibels by which the required protection ratio has been exceeded at / each / / one / test point;

d) the value of interferences exceeding -25 dBm at / each / / one / test point.

6. Resolution of incompatibilities

6.1 After application of the coordination zone as indicated in paragraph 3 above, where this contour cuts an ILS or VOR service volume, a detailed compatibility analysis shall be undertaken by the administrations. In many cases, this may be achieved through existing national coordination machinery but, in some cases, the joint analysis will need to take place between administrations of neighbouring countries. Where the interference contours from two or more broadcasting stations cut the same aeronautical service volume then they will need to be treated together for the mode of interference arising from intermodulation generated in the aeronautical receiver itself.

The first stage in the analysis should be to determine whether, for each mode of interference set out in section 5.3.1 and by applying the measures set out in sections 5.3.7.2 to 5.3.7.4, a compatibility exists between the two services. For example by applying the values set out in section 5.3.7.4 the coordination zone reduces to the values set down in Table B.

TABLE B

Coordination zone with -85 dB filtering at the broadcasting station

e.r.p. kW	200	150	100	50	10	1
distance km	31	27	22	15.5	7.0	2.2

Where such compatibility exists, planning of the broadcast frequency assignments can proceed without constraints imposed by the need to protect the aeronautical services.

6.2 **For those countries having a large number of both broadcasting stations and aeronautical radionavigation stations, the application of the methods set out** in paragraphs 3 and 6.1 by manual means will constitute a huge workload. Computer methods can **contribute significantly to reducing the task and rapidly identifying the conflict situations. Where** the administrations use computer methods it would be of greatest value if the results could identify :

i) **those broadcasting stations which do not affect the aeronautical service in any way;**

ii) **those which require additional filtering and identifying the necessary degree of suppression of spurious emissions;**

iii) **those requiring frequency planning solutions.**

6.3 **In cases where incompatibility still** cannot be resolved, a more detailed **case by case study should be undertaken applying the factors set out in section** 5.3.8. **By this means, it may be possible to further eliminate problem cases.**

6.4 **For each individual case still without a solution, the administrations should determine, taking account of future expansion of the aeronautical service** over the **intended life of the broadcasting plan, whether protection in the service volume is required over a limited number of channels or for the entire band** 108 to 118 MHz. In **the first case the administration should then calculate whether the particular measures set out in section** 5.3.7.5 could provide a solution.

6.5 **Where compatibility is clearly only feasible through broadcasting frequency planning solutions, the administration, when submitting its requirements, shall indicate in a supplementary note to the IFRB what particular frequency planning constraints are needed in order to ensure compatibility with the aeronautical service for each individual case. These supplementary constraints shall be deemed as requirements** to be satisfied in planning during the Conference to the extent feasible.

6.6 **During the broadcasting service planning there will be a need for a computer analysis facility specifically intended to identify any broadcasting assignments which do not meet the compatibility** requirements **for the aeronautical radionavigation stations** indicated by administrations to the IFRB under 6.5.

6.7 **If, after following the procedures set out in** 6.1 to 6.5 above, a solution is still not arrived at, then the only other possible solution may be to choose another site for the broadcasting station. It is conceivable in some situations that this may not be feasible; in this case such an assignment may appear in the Plan but cannot be implemented due to an unresolvable incompatibility with the aeronautical radionavigation service.

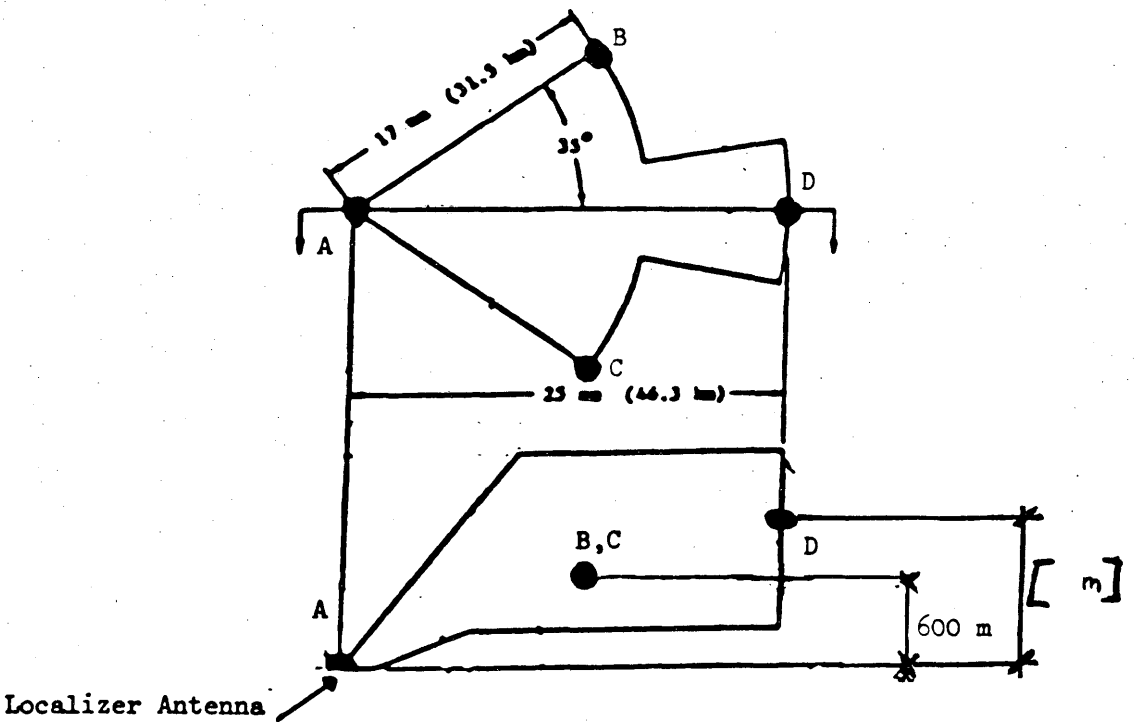


Figure 1 - Test points for ILS localizer

ANNEX 6

The assessment of incompatibilities with the fixed and mobile services in Region 3, except in Afghanistan and Iran, shall be made at the border between Regions 1 and 3 applying the sharing criteria contained in items 5.1 and 5.2.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/35-E
9 September 1982
Original : English

AD HOC GROUP 5/2

DRAFT

Report of the Chairman of ad hoc Group 5/2 to the Chairman of Committee 5

1. Introduction

The ad hoc Group 5/2 discussed the impact of decisions taken in Committee 4, relative to compatibility between services on planning principles and planning methods developed in Committee 5, according to its terms of reference.

There is a possibility of incompatibility between sound broadcasting service in the band 87.5 - 108 MHz and the following services :

- land mobile and fixed service (87.5 - 108 MHz);
- television broadcasting service (87.5 - 100 MHz);
- aeronautical radionavigation service (108 - 118 MHz);
- aeronautical mobile (R) service (118 - 137 MHz).

2. Compatibility assessment

2.1 Land mobile and fixed services

Provisions in footnotes RR 581, 582 and 587 to 589 allocate some parts of the band 87.5 - 108 MHz in some countries in Region 1 to the land mobile, fixed and mobile except aeronautical mobile (R) services on a permitted basis. Provisions of RR 419 state that in the preparation of frequency plans the primary service (i.e. the sound broadcasting service) has prior choice of frequencies.

The frequency assignments to broadcasting stations to be included in the Plan can be selected without regard to existing or planned stations of the permitted services in Region 1.

In Region 3, the band 87 - 100 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis. The sharing certeria which are to be taken into account when assigning frequencies to broadcasting stations near to Region 3 are to be found in items 5.1 and 5.2 of the Report of the First Session [Document No. 100].

The ad hoc Group 5/2 proposes to replace the last sentence of item 5.1 referring to the CCIR Report 659 by the text in Annex 1 to this report.

2.2 Television broadcasting service

The new Plan should in no way affect existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement (Stockholm, 1961). The administrations will send to the IFRB the details of these assignments which are to be protected using the sharing criteria given in / Annex 4 of Document No. 92 /, item 6.3 of the Report of the First Session.

For the calculation of the interference, it is necessary to determine the percentage of time and the propagation curves (Figures 2.1 to 2.9 of Document No. 97) which have to be applied. It is suggested that the interference should be calculated for / 1% / of the time in calculations of the compatibility between sound broadcasting and television broadcasting services.

2.3 Aeronautical radionavigation

Aeronautical radionavigation equipment used by aircraft, which operates in the adjacent band 108 - 112 MHz, may be subject to harmful interference from nearby broadcasting stations operating in the band 87.5 - 108 MHz.

Prior to the Second Session of the Regional Broadcasting Conference, administrations should calculate and draw on a suitable map an interference contour around each proposed VHF broadcasting station site according to the values set down in Table A.

TABLE A

Coordination zone around a broadcasting station

e.r.p. kW	≥ 100	50	10	1
Distance km	125	125	125	40

Where this contour cuts an ILS or VOR service volume as promulgated in the appropriate aeronautical publications, a detailed compatibility analysis shall be undertaken by the administration. If after the procedure outlined in items 5.3.9.2 to 5.3.9.5 / Document No. 100 / the incompatibility problem still cannot be solved, the administration, when submitting its requirements, shall indicate in a supplementary note to the IFRB what particular frequency planning constraints are needed in order to ensure compatibility with the aeronautical service for each individual case. These supplementary constraints shall be deemed as requirements and satisfied in planning during the Conference to the extent that it is feasible.

In referring to specific planning constraints, the administration will have to indicate the test points too, at which the required protection should be afforded. A systematic method to determine these test points is given in Document No. DT/34.

2.4 Aeronautical mobile (R) service

The protection criteria for the aeronautical mobile (R) service are given in item 5.3.4 of the Report of the First Session / Document No. 100 /.

It is felt necessary to protect the aeronautical mobile (R) service, taking into account the safety aspects involved.

The administrations would consider the incompatibilities between the aeronautical mobile (R) service and the sound broadcasting service in preparation of their requirements.

The interim planning process will continue on the assumption that there will be no serious problems of incompatibility. However, as the extent of the problems is still unknown the Second Session may wish to determine the more precise application of the protection necessary.

3. Additional remark

The results of analyses of draft plans by the IFRB at various stages up to and including the Second Session will include an indication of incompatibilities with the aeronautical radionavigation service. It should be emphasized that the purpose is to inform administrations of those cases where they should undertake further detailed examination, after which they should indicate to the IFRB whether or not the related broadcast assignments can be accepted.

4. Conclusions

In the course of the international planning procedure between the First and Second Sessions of this Conference, the calculations concerning incompatibilities between the sound broadcasting service and other services should take into consideration :

1) the mobile and the fixed services in countries of Region 3;

2) the existing or planned assignments to television stations in the band 87.5 - 100 MHz made in accordance with the Regional Agreement (Stockholm, 1961) : the details of these assignments will be sent to the IFRB;

3) the planning constraints needed to ensure compatibility with the aeronautical radionavigation service which are submitted to the IFRB in a supplementary note for each individual case together with the requirements of the administration concerned.

K. OLMS
Chairman of ad hoc Group 5/2

Annex : 1

A N N E X

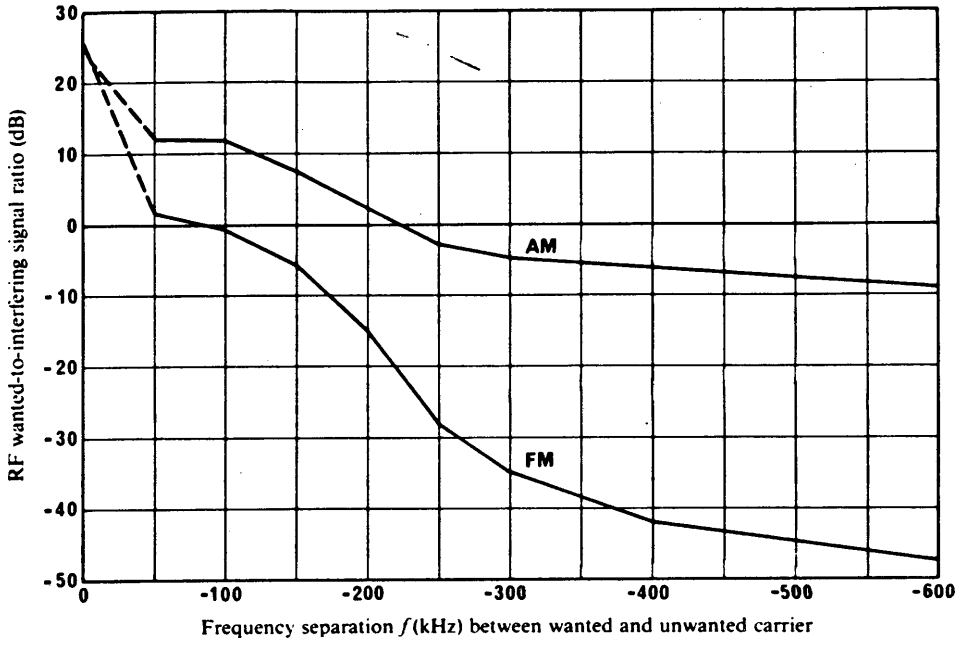


FIGURE 1— *Comparison of the RF wanted-to-interfering signal ratio in the case of narrowband FM and AM*

AM: Unwanted signal amplitude modulated (modulation depth m = 95%). Receiver input voltage 1 mV.

FM: Unwanted signal frequency modulated (modulation index m = 1).

Additional information can be found in CCIR Report 659.

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/36-E
9 September 1982
Original : French

COMMITTEE 3

DRAFT

Report of the Budget Control Committee to the Plenary Meeting

The Budget Control Committee held three meetings during the Conference and examined the points arising from its terms of reference.

Under the provisions of Nos. 442 and 445 of the International Telecommunication Convention, Malaga-Torremolinos, 1973, its terms of reference were :

a) to determine the organization and the facilities available to delegates, and

b) to examine and approve the accounts for expenditure incurred throughout the duration of the Conference.

Having completed its work, the Committee hereby submits this report to the Plenary for consideration under Chapter XI, Article 77, No. 444 of the Convention.

1. Determination of the organization and facilities available to delegates

As there were no comments by delegations on the subject, Committee 3 concluded that the organization and the working facilities available to delegates were entirely satisfactory.

2. Conference budget

The Budget Control Committee took note of the Conference budget as approved by the Administrative Council as its 36th Session, 1981, and adjusted, under the provisions of Administrative Council Resolution No. 647, to take account of changes in the United Nations common system concerning staff salaries and allowances. The budget is shown in Annex 1 below.

It is pointed out that the expenses incurred for this Regional Conference do not form part of the ordinary budget. In conformity with Article 15, No. 95, of the Convention, the expenses must be borne in accordance with their unit of classification by all the Members concerned, namely those in Region 1 as well as Afghanistan and Iran.

3. Position as regards Conference expenditure

Under the Convention, the Budget Control Committee is required to submit to the Plenary Meeting a report showing as accurately as possible the estimated amount of expenditure incurred by the Conference.

Annex 2 hereto gives a statement of the Conference budget with a breakdown of credits by budget subhead and item, along with actual expenditure to 10 September 1982. It also indicates the 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 Swiss francs, thus leaving a surplus of Swiss francs over the budget approved by the Administrative Council and adjusted by virtue of Resolution No. 647.

4. Contributions from recognized private operating agencies and non-exempt international organizations

Article 116 of the Financial Regulations of the Union provides that the report by the Budget Control Committee to the Plenary Meeting must include a statement of recognized private operating agencies and international organizations required to contribute to the defrayal of Conference expenditure, together with a list of international organizations that are exempted from contributions under No. 548 of the Convention.

This statement constitutes Annex 3 hereto.

5. Sharing of Conference expenditure

Since the present Conference is a Regional Conference within the meaning of No. 42 in Article 7 of the Convention (Malaga-Torremolinos, 1973) the expenditure arising from it must be borne by all the Members of the Regions concerned according to the class of contribution they have chosen. Annex 4 hereto gives a list of the Members which must bear the costs of the Conference.

According to the statement of account in Annex 2, the total expenditure is estimated at Swiss francs. On the basis of the number of contributory units of the Members required to bear the Conference expenditure (see Annex 4), the amount of the contributory unit may be estimated at 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 dispatch. Since invoices can probably be sent to participants on 30 November 1982, they should be settled not later than 31 January 1983. From 1 February 1983 they will be subject to interest at 3 percent for the first 180 days and at 6 percent thereafter.

In accordance with the provisions of No. 445 of the Convention, this report will be transmitted together with any comments by the Plenary Meeting to the Secretary-General for reference to the Administrative Council at its next annual session.

The Plenary Meeting is requested to approve this report.

K. OLMS
Chairman of Committee 3

ANNEX 1

BUDGET OF THE REGIONAL BROADCASTING CONFERENCE

Section 14 Regional Administrative Conference, Regions 1 and 3 Items		Budget 1982 - Swiss francs -	Adjusted budget 1) - Swiss francs -
		Geneva	
I.	Staff expenses		
14.101	Salaries and related expenses of the Conference Secretariat staff	1,017,000	1,127,900
14.102	Salaries and related expenses of the translation, typing and reproduction services staff	493,000	546,000
14.103	Travel (recruitment)	80,000	80,000
14.104	Insurance	40,000	40,000
		1,630,000	1,793,900
II.	Travel expenses		
14.201	Subsistence costs at Conference venue	-	-
14.202	Travel to Conference venue and back	-	-
14.203	Transport of material to Conference venue and back	-	-
III.	Premises and equipment		
14.301	Premises, furniture, machines	55,000	55,000
14.302	Document production	72,000	72,000
14.303	Office supplies and overheads	30,000	30,000
14.304	Postage, telephone calls, telegrams	65,000	65,000
14.305	Technical installations	5,000	5,000
14.306	Sundry and unforeseen	10,000	10,000
14.307	Use of outside computers	-	-
		237,000	237,000
IV.	Other expenses		
14.401.01	IFRB preparatory work	90,000	90,000
14.401.02	CCIR preparatory work	10,000	10,000
14.402	Interest credited to the ordinary budget	38,000	38,000
		138,000	138,000
V.	Final Acts		
14.501	Report for the second session	30,000	30,000
	Total, I to V	2,035,000	2,198,900

Note :

1) Budget approved by the Administrative Council and adjusted to take account of changes introduced in the UN common system of salaries and allowances.

A N N E X 2

This Annex will comprise the table in the document entitled :

Position as regards Conference expenditure at 10.9.1982

A N N E X 3

PARTICIPATION BY RECOGNIZED PRIVATE OPERATING AGENCIES AND INTERNATIONAL ORGANIZATIONS IN THE WORK OF THE CONFERENCE

	Number of contributory units
1. Recognized private operating agencies	
None	
2. International organizations	
International Civil Aviation Organization (ICAO)	*)
Inter-American Association of Broadcasters (IAAB)	*)
International Air Transport Association (IATA)	*)
International Radio and Television Organization (OIRT)	*)
Arab States Broadcasting Union (ASBU)	*)
European Broadcasting Union (EBU)	*)
Union of National Radio and Television Organizations of Africa (URTNA)	*)

*) International organizations exempt from any contribution under Administrative Council Resolution No. 574.

ANNEX 4

CONTRIBUTION BY MEMBERS OF THE UNION TO THE DEFRAYAL OF THE EXPENSES OF THE REGIONAL CONFERENCE

No. 95 of the International Telecommunication Convention, Malaga-Torremolinos, 1973, provides that the expenses incurred by regional administrative conferences shall be borne by all the Members of the Regions concerned. These Members are the following :

Members of Region 1

		Contributory units
1.	ALBANIA (People's Socialist Republic of)	½
2.	ALGERIA (Algerian Democratic and Popular Republic)	1
3.	GERMANY (Federal Republic of)	25
4.	ANGOLA (People's Republic of)	½
5.	SAUDI ARABIA (Kingdom of)	1
6.	AUSTRIA	1
7.	BAHRAIN (State of)	½
8.	BELGIUM	5
9.	BENIN (People's Republic of)	½
10.	BYELORUSSIAN SOVIET SOCIALIST REPUBLIC	1
11.	BOTSWANA (Republic of)	½
12.	BULGARIA (People's Republic of)	1
13.	BURUNDI (Republic of)	½
14.	CAMEROON (United Republic of)	½
15.	CAPE VERDE (Republic of)	½
16.	CENTRAL AFRICAN REPUBLIC	½
17.	CYPRUS (Republic of)	½
18.	VATICAN CITY STATE	½
19.	COMOROS (Federal and Islamic Republic of the)	½
20.	CONGO (People's Republic of the)	½
21.	IVORY COAST (Republic of the)	1
22.	DENMARK	5
23.	DJIBOUTI (Republic of)	½
24.	EGYPT (Arab Republic of)	2
25.	UNITED ARAB EMIRATES	1
26.	SPAIN	3
27.	ETHIOPIA	1
28.	FINLAND	3
29.	FRANCE	30

		Contributory units
30.	GABON REPUBLIC	½
31.	GAMBIA (Republic of the)	½
32.	GHANA	1
33.	GREECE	1
34.	GUINEA (People's Revolutionary Republic of)	½
35.	GUINEA-BISSAU (Republic of)	½
36.	EQUATORIAL GUINEA (Republic of)	½
37.	UPPER VOLTA (Republic of)	½
38.	HUNGARIAN PEOPLE'S REPUBLIC	1
39.	IRAQ (Republic of)	½
40.	IRELAND	2
41.	ICELAND	½
42.	ISRAEL (State of)	1
43.	ITALY	10
44.	JORDAN (Hashemite Kingdom of)	½
45.	KENYA (Republic of)	½
46.	KUWAIT (State of)	1
47.	LESOTHO (Kingdom of)	½
48.	LEBANON	1
49.	LIBERIA (Republic of)	1
50.	LIBYA (Socialist People's Libyan Arab Jamahiriya)	1½
51.	LIECHTENSTEIN (Principality of)	½
52.	LUXEMBOURG	½
53.	MADAGASCAR (Democratic Republic of)	1
54.	MALAWI	½
55.	MALI (Republic of)	½
56.	MALTA (Republic of)	½
57.	MOROCCO (Kingdom of)	1
58.	MAURITIUS	½
59.	MAURITANIA (Islamic Republic of)	½
60.	MONACO	½
61.	MONGOLIAN PEOPLE'S REPUBLIC	½
62.	MOZAMBIQUE (People's Republic of)	½
63.	NIGER (Republic of the)	½
64.	NIGERIA (Federal Republic of)	2
65.	NORWAY	5
66.	OMAN (Sultanate of)	½
67.	UGANDA (Republic of)	½
68.	NETHERLANDS (Kingdom of the)	10
69.	POLAND (People's Republic of)	3
70.	PORTUGAL	½
71.	QATAR (State of)	½
72.	SYRIAN ARAB REPUBLIC	½
73.	GERMAN DEMOCRATIC REPUBLIC	3
74.	UKRAINIAN SOVIET SOCIALIST REPUBLIC	3

		Contributory units
75.	ROMANIA (Socialist Republic of)	1
76.	UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	30
77.	RWANDA (Republic of)	½
78.	SAN MARINO (Republic of)	½
79.	SAO TOME AND PRINCIPE (Democratic Republic of)	½
80.	SENEGAL (Republic of the)	1
81.	SIERRA LEONE	½
82.	SOMALI DEMOCRATIC REPUBLIC	½
83.	SUDAN (Democratic Republic of the)	1
84.	SWEDEN	10
85.	SWITZERLAND (Confederation of)	10
86.	SWAZILAND (Kingdom of)	½
87.	TANZANIA (United Republic of)	½
88.	CHAD (Republic of the)	½
89.	CZECHOSLOVAK SOCIALIST REPUBLIC	3
90.	TOGOLESE REPUBLIC	½
91.	TUNISIA	2
92.	TURKEY	2
93.	UNION OF SOVIET SOCIALIST REPUBLICS	30
94.	YEMEN ARAB REPUBLIC	½
95.	YEMEN (People's Democratic Republic of)	½
96.	YUGOSLAVIA (Socialist Federal Republic of)	1
97.	ZAIRE (Republic of)	1
98.	ZAMBIA (Republic of)	½
99.	ZIMBABWE (Republic of)	1
		249

Members of Region 3 :

100.	AFGHANISTAN (Democratic Republic of)	½
101.	IRAN (Islamic Republic of)	1
	TOTAL for 101 countries of Regions 1 and 3	250 ½

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/37-E
10 September 1982

LIST OF DOCUMENTS
(No. 51 to 100)

PL = Plenary
C = Committee

No.	Origin	Title	Destination
51	C.5	Summary Record of the first meeting	C.5
52	C.5	Summary Record of the Second meeting	C.5
53(Rev.2)	WG 4A	Report - Chapter 2 - Propagation	C.4
54	WG 4B	First Report	C.4
55	C.6	Summary Record of the first meeting	C.6
56	SWG 5B-1	Report - Draft form for use in submitting requirements to the IFRB	WG 5B
57	C.2	Summary Record of the first meeting	C.2
58	PL	Minutes of the first plenary meeting	PL
59	WG 5A	First Report	C.5
60	WG 5A	Second Report	C.5
61	C.5	Note from the Chairman - Information required in preparation of the form for submission of requirements to the IFRB	C.4
62	S.G.	Position of the accounts of the Conference as at 25 August 1982	C.3
63	C.3	Summary Record of the first meeting	C.3
64(Rev.1)	WG 4B	Second Report	C.4
65	WG 4A	Note from the Chairman	C.4
66	SWG 4C-1	Report - Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Services in the bands 108-136 MHz	WG 4C

No.	Origien	Title	Destination
67	C.4	Note from the Chairman	C.5
68(Rev.1)	WG 4B	Third Report - The methods for the assessment of multiple interference	C.4
69(Rev.2)	WG 5B	Second Report - Draft form for use in submitting requirements to the IFRB	C.5
70	ad hoc G 5/1	Proposed structure of chapters 6 and 7 of the Conference Report	C.5
71	WG 4C	Report- Chapter 5 - Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Services in the bands 108-136 MHz	C.4
72	WG 5A	Third Report	C.5
73 +Corr.1	SWG 5B-2	Report	WG 5B
74	WG 4C	Report - Sharing criteria between the FM Sound Broadcasting Service with the Fixed Service in the bands 87.5-108 MHz	C.4
75	SWG 4C-1	Report - Compatibility between the Broadcasting Service in the bands 87.5-108 MHz and the Aeronautical Services in the band 108-136 MHz	WG 4C
76	WG 5A	Fourth Report	C.5
77	WG 4A	Note from the Chairman submitting Draft Recommendation	C.4
78	WG 4B	Final Report	C.4
79	C.4	Note from the Chairman	C.5
80	WG 2A	Report	C.2
81(Rev.2)	WG 4C	Report - Chapter 5 - Compatibility between the Broadcasting Service in the band 87.5-108 MHz and the Aeronautical Services in the bands 108-137 MHz	C.4
82	C.5	First series of texts to the Editorial Committee	C.6
83	C.5	First Report	PL
84	WG 4C	Report - Draft Recommendation /A/	C.4

No.	Origin	Title	Destination
85	WG 4C	Report - Draft Recommendation /B/	C.4
86	C.4	First Report	PL
87	C.4	First series of texts	C.6
88	PL	Minutes of the second plenary meeting	PL
89(Rev.1)	WG 5B	Third Report	C.5
90	WG 5A	Fifth Report	C.5
91	WG 5A	Sixth Report	C.5
92	WG 5A	Seventh Report	C.5
93	C.4	Note from the Chairman	C.5
94	C.4	Draft Recommendation No. COM.4/2	C.4
95	C.3	Summary Record of the second meeting	C.3
96	WG 5B	Resolution No. COM 5/1 - IFRB Activities between the first and second sessions of the Conference	C.5
97	C.6	B.1	PL
98	C.6	B.2	PL
99	C.4	Second Report	PL
100	C.4	Second series of texts to the Editorial Committee	C.6

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/38-E
11 September 1982
Original : English

AD HOC 5/5

CORRESPONDENCE BETWEEN CHANNEL NUMBERS AND FREQUENCIES

Ad hoc Group 5/5 submits the following proposals for amendments to Document No. 92 for consideration and approval by Committee 5 :

1. Add on page 5 a new paragraph 4 as follows and renumber existing paragraph 4 to become 5 :

"4. A table showing frequencies corresponding to channel numbers used in Africa and Middle East or used in Europe is given in Annex 7."

PAGE INTENTIONALLY LEFT BLANK

PAGE LAISSEE EN BLANC INTENTIONNELLEMENT

Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia
A	E		A	E		A	E		A	E	
No.	No.	MHz	No.	No.	MHz	No.	No.	MHz	No.	No.	MHz
		87.6			91.1			94.6			98.1
		87.7			91.2			94.7			98.2
		87.8			91.3			94.8			98.3
		87.9			91.4			94.9			98.4
		88.0			91.5			95.0			98.5
		88.1			91.6			95.1			98.6
		88.2			91.7			95.2			98.7
		88.3			91.8			95.3			98.8
		88.4			91.9			95.4			98.9
		88.5			92.0			95.5			99.0
		88.6			92.1			95.6			99.1
		88.7			92.2			95.7			99.2
		88.8			92.3			95.8			99.3
		88.9			92.4			95.9			99.4
		89.0			92.5			96.0			99.5
		89.1			92.6			96.1			99.6
		89.2			92.7			96.2			99.7
		89.3			92.8			96.3			99.8
		89.4			92.9			96.4			99.9
		89.5			93.0			96.5		0	100.0
		89.6			93.1			96.6		1	100.1
		89.7			93.2			96.7		2	100.2
		89.8			93.3			96.8		3	100.3
		89.9			93.4			96.9		4	100.4
		90.0			93.5			97.0		5	100.5
		90.1			93.6			97.1		6	100.6
		90.2			93.7			97.2		7	100.7
		90.3			93.8			97.3		8	100.8
		90.4			93.9			97.4		9	100.9
		90.5			94.0			97.5		10	101.0
		90.6			94.1			97.6		11	101.1
		90.7			94.2			97.7		12	101.2
		90.8			94.3			97.8		13	101.3
		90.9			94.4			97.9		14	101.4
		91.0			94.5			98.0		15	101.5

Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia	Channel/Canal		Frequency Fréquence Frecuencia
A	E		A	E		A	E		A	E	
No.	No.	MHz	No.	No.	MHz	No.	No.	MHz	No.	No.	MHz
	16	101.6		32	103.2		48	104.8		64	106.4
	17	101.7		33	103.3		49	104.9		65	106.5
	18	101.8		34	103.4		50	105.0		66	106.6
	19	101.9		35	103.5		51	105.1		67	106.7
	20	102.0		36	103.6		52	105.2		68	106.8
	21	102.1		37	103.7		53	105.3		69	106.9
	22	102.2		38	103.8		54	105.4		70	107.0
	23	102.3		39	103.9		55	105.5		71	107.1
	24	102.4		40	104.0		56	105.6		72	107.2
	25	102.5		41	104.1		57	105.7		73	107.3
	26	102.6		42	104.2		58	105.8		74	107.4
	27	102.7		43	104.3		59	105.9		75	107.5
	28	102.8		44	104.4		60	106.0		76	107.6
	29	102.9		45	104.5		61	106.1		77	107.7
	30	103.0		46	104.6		62	106.2		78	107.8
	31	103.1		47	104.7		63	106.3		79	107.9

A = Africa and Middle East
Afrique et Moyen-orient
África y Oriente medio

E = Europe
Europa

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/39-E
13 September 1982
Original : English

AD HOC GROUP 5/2

Regional Administrative Radio Conference
for VHF sound broadcasting in the band 87.5 - 108 MHz
Second Session (31 October - 12 December 1984)

ADDITIONAL NOTE

FORM FOR SUBMISSION OF FREQUENCY PLANNING CONSTRAINTS
WHICH ARE NEEDED TO ENSURE COMPATIBILITY BETWEEN
SOUND BROADCASTING AND AERONAUTICAL RADIONAVIGATION SERVICES
/ Doc. DT/35(Rev.1) Annex / 5 / item 2.1 /

(01) ADMINISTRATION	ADM. SERIAL No.	(00) IFRB SERIAL No.
----------	----------	----------

(41) IDENTIFICATION of the aeronautical radionavigation station which may be affected by broadcasting stations.

AERONAUTICAL RADIONAVIGATION STATION

Frequency	Name	Country	Longitude Degree E/W min	Latitude Degree N/S min
___.___	----------	----------	----------	----------

(42) FREQUENCY BANDS to be avoided, which would not be assigned to a broadcasting station if the field strength of the broadcasting station is higher than the level given below at the site of the aeronautical radionavigation station.

from ___.___ MHz to ___.___ MHz

from ___.___ MHz to ___.___ MHz

from ___.___ MHz to ___.___ MHz

(43) MAXIMUM FIELD STRENGTH

at the site of the aeronautical radionavigation station ___ µV/m

FORM FOR SUBMISSION OF DATA FOR CALCULATION OF INCOMPATIBILITIES
BETWEEN SOUND BROADCASTING AND AERONAUTICAL RADIONAVIGATION SERVICES
/ Doc. DT/35(Rev.1) Annex / 5 / item 2.2 /

(01) ADMINISTRATION	ADM. SERIAL No.	(00) IFRB SERIAL No.
----------	----------	----------

(51) AERONAUTICAL RADIONAVIGATION STATION which is likely to be affected :

Frequency	Name	Country
___.___ MHz	----------	----------

Longitude Degree E/W min	Latitude Degree N/S min	Type	Height of antenna above sea level in metres
----------	----------	☐ ILS ☐ VOR ☐ VHF Com	---------

(52) TEST POINTS

	AZIMUTH FROM THE AERONAUTICAL RADIONAVIGATION STATION TO THE TEST POINT	DISTANCE BETWEEN THE AERONAUTICAL RADIONAVIGATION STATION AND THE TEST POINT IN Km	HEIGHT ABOVE SEA LEVEL IN METRES
1.	----------	----------	----------
2.	----------	----------	----------
3.	----------	----------	----------
4.	----------	----------	----------

(53) BROADCASTING STATIONS which are likely to affect the aeronautical radionavigation station :

	Country	Name	Serial No.	Frequency
1.	---	----------	----------	---.--- MHz
2.	---	----------	----------	---.--- MHz
3.	---	----------	----------	---.--- MHz
4.	---	----------	----------	---.--- MHz
5.	---	----------	----------	---.--- MHz
6.	---	----------	----------	---.--- MHz

K. OLMS
Chairman of ad hoc Group 5/2

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/40-E
13 September 1982
Original : French

AD HOC GROUP 5/2

Draft

Report of the Chairman of ad hoc Group 5/2 to the Chairman of Committee 5

Chapter 5 of the report of the Conference

It is proposed that the following figure (Figure 5.1) should be inserted at the end of paragraph 5.1 of the report of the Conference (Document No. 109).

The figure is taken from the original proposal annexed to Document No. DT/35, with the addition of the stereophonic protection ratio curve from CCIR Report 659 (Figure 1). That curve is also reproduced in the report of the CCIR to the First Session of the Conference (Figure 6.1).

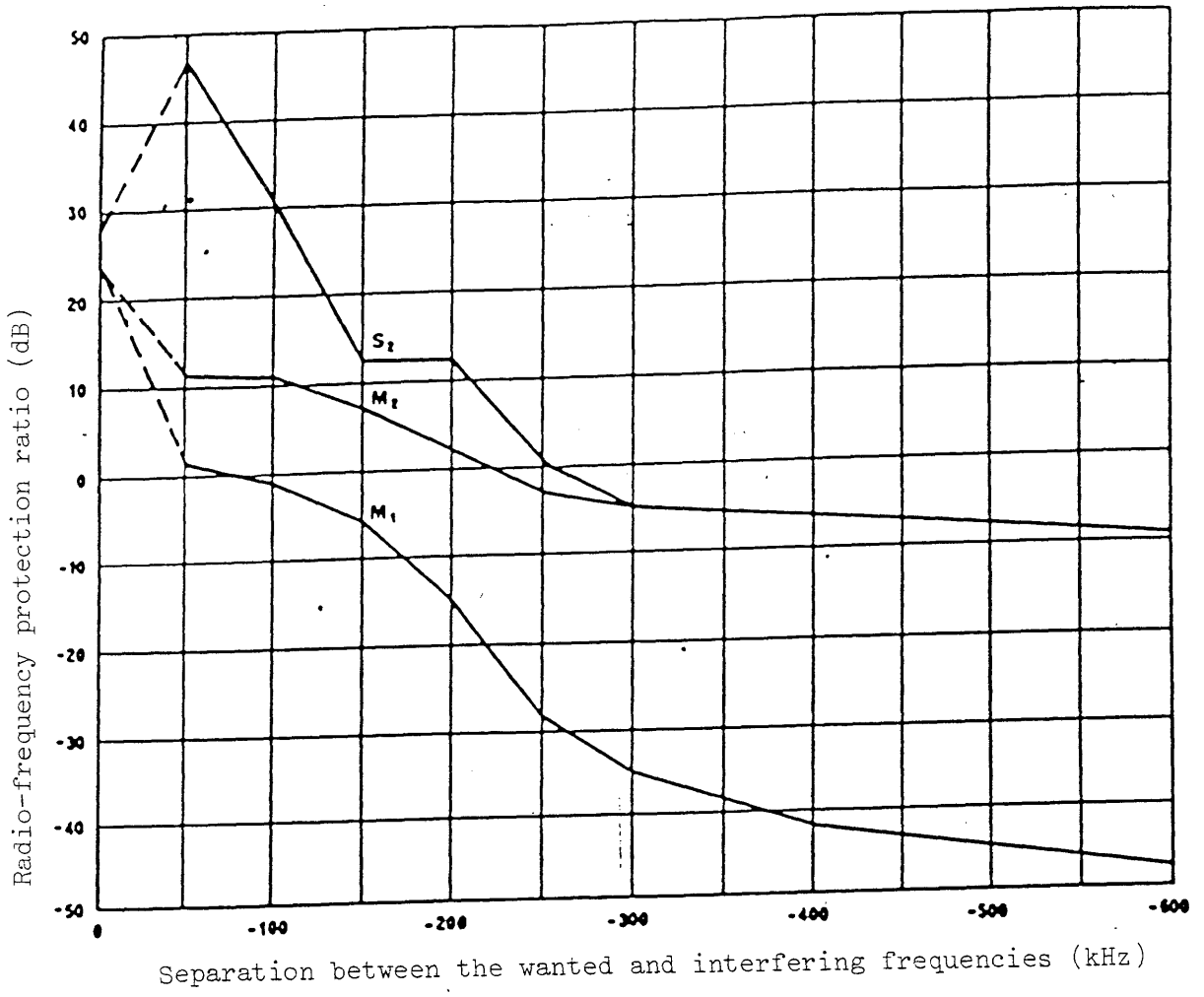


FIGURE 5.1

RF protection ratio curves for a monophonic or stereophonic FM emission with interference by an FM or AM narrow-band emission. Steady interference. (Average curves for the ratios measured on domestic receivers)

Curve M_1 : monophonic reception (unwanted signal: FM, modulation index m = 1)

M_2 : monophonic reception (unwanted signal: AM, modulation depth m = 95%, receiver input voltage 1 mV)

S_2 : stereophonic reception (unwanted signal AM, modulation depth m = 95%, receiver input voltage 1 mV)

K. OLMS
Chairman of ad hoc Group 5/2

INTERNATIONAL TELECOMMUNICATION UNION

REGIONAL BROADCASTING CONFERENCE

(FIRST SESSION) GENEVA, 1982

Document No. DT/41-E
16 September 1982
Original : French

PLENARY MEETING

Document No. 146, Annex F, Section 6 :

1) Delete the words "It should be noted ..... by 31 channels".

2) Replace the words "the separation between channels ..... a separation in the range of 10.7 ± 0.2 MHz (receiver intermediate frequency) (see section 6.4.2 of the Report)" by :

"The groups of six channels that may thus be obtained at the same site must respect the following constraints :

a) a separation of 10.7 ± 0.2 MHz (receiver intermediate frequency between channels is to be avoided;

b) spacing is to be irregular with a view to avoiding intermodulation products;

c) any channels still available are to be placed at the upper end of the band.

The IFRB shall aim at the most appropriate distribution and, if necessary, shall make changes in the channel distribution indicated in Figure 6.1.

The results thus obtained shall subsequently be communicated to the Administrations of the countries in Region 1 and to those of Afghanistan and Iran."

Document No. 146, Section 6.3.7.1 :

Replace the first paragraph by :

"6.3.7.1 The channel distribution schemes detailed in Figure 6.1 shall in due course be communicated by the IFRB to the Administrations in Africa and the Middle East. Figure 6.2 gives the channel distribution schemes in the remainder of the planning area, and the correspondence between channel numbers and frequencies is given in Table 1. For the purpose of completing the requirement forms, and in bilateral or multilateral negotiations, frequencies only should be used in order to avoid any ambiguity.

It should be noted ..... (NOC)."