Documents of the World Administrative Radio Conference for the planning of the HF bands allocated to the broadcasting service (1st session) (WARC HFBC-84 (1))
(Geneva, 1984)

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- The complete set of conference documents includes Document No. 1-253, DL No. 1-22, DT No. 1-53

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/1(Rev 1)-E
9 January 1984
Original : English

PLENARY MEETING

DRAFT
CONFERENCE STRUCTURE

FIRST SESSION OF THE WORLD ADMINISTRATIVE RADIO CONFERENCE FOR THE PLANNING OF THE HF BANDS ALLOCATED TO THE BROADCASTING SERVICE
Geneva, 1984

The agenda of the Conference appears in Resolution No. 874 which was adopted by the Administrative Council at the opening meeting of its 38th Session in Nairobi (November 1982). This Resolution is reproduced in the annex to Document No. 1 of the Conference.

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

Committee 1 - Steering Committee

Terms of Reference :

To coordinate the work of the Committees, fix the timetable of meetings, etc. (Nos. 468 and 469 of the International Telecommunication Convention, Nairobi, 1982).

Committee 2 - Credentials Committee

Terms of Reference :

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

Committee 3 - Budget Control Committee

Terms of Reference :

To determine the organization and the facilities available to the delegates, to examine and approve the accounts of expenditure incurred throughout the duration of the First Session of the Conference and to report to the Plenary Meeting the estimated total expenditure of the First Session, as well as the estimated costs entailed by the execution of the decisions of the First Session (Nos. 476 to 479 inclusive of the International Telecommunication Convention, Nairobi, 1982 and Nairobi Resolution No. 48).

Committee 4 - Technical Criteria Committee

Terms of Reference :

To establish the technical parameters to be used for planning and the principles governing the use of the exclusive and shared HF bands allocated to the Broadcasting Service (excluding those bands the use of which is restricted to the Tropical Zone), taking into account the following non-exhaustive list of items (items 4.1.1 to 4.1.12, and, in so far as technical matters are concerned, items 4.2.4 and 4.2.6 of the agenda) :

- definitions;
- methods for the prediction of field strength, optimum frequencies; atmospheric and man-made radio noise data; other factors concerning HF propagation which are relevant to the planning of broadcasting services;
- values of the appropriate solar index and the seasonal periods based on which planning should be carried out;
- DSB system specifications, transmission characteristics, including modulation and audio processing standards;
- receiver characteristics;
- radio-frequency protection ratios and channel spacing;
- minimum usable and nominal values of field strengths required for satisfactory service;
- transmitter power, antenna characteristics and effective radiated power appropriate for satisfactory service taking into consideration the above technical factors;
- maximum number of frequencies required for broadcasting of the same programme to the same zone;
- use of synchronized transmitters;
- determination of reception zone;
- SSB system specifications;

and, in so far as technical matters are concerned :

- a programme for progressive introduction of SSB transmissions;
- theoretical capacity of any given high frequency broadcasting band;

- in so doing the conclusions of the CCIR Report* will be considered.

- to consider the appropriate part of the IFRB report.

Committee 5 - Planning Criteria Committee

Terms of Reference :

To establish for use by the Second Session of the Conference : planning principles, methods of planning, approaches to implementation, the action necessary to eliminate harmful interference (items 4.2.1, 4.2.2, 4.2.3 and 4.2.5 of the agenda) and, in so far as methods of planning are concerned, items 4.2.4 and 4.2.6 of the agenda.

To identify, and to lay down specific guidelines for, the preparatory tasks to be carried out between the two sessions of the Conference including consideration of the methods to be used to assist the work of the Second Session (such as the establishment of an intersessional working group) and fix a timetable for the completion of these tasks (item 4.3 of the agenda).

To specify the form in which requirements for use in planning should be submitted to the Union and the preferred time limits (item 4.4 of the agenda).

To propose a tentative agenda for, and changes in duration, if any, of the Second Session, for consideration by the Administrative Council, noting in particular the recommendation made in 5.1 and 5.2 of Resolution No. 508 of WARC-79 (item 4.5 of the agenda).

To consider the appropriate part of the IFRB report including the twenty years of operation of the Article 17 procedure.

Committee 6 - Editorial Committee

Terms of Reference :

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

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* NOTE : CCIR Report : Technical Bases for the First Session of the WARC for the Planning of HF Bands Allocated to the Broadcasting Service

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/1-E
9 January 1984
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PLENARY MEETING

DRAFT
CONFERENCE STRUCTURE

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Terms of Reference :

To determine the organization and the facilities available to the delegates, to examine and approve the accounts of expenditure incurred throughout the duration of the First Session of the Conference and to report to the Plenary Meeting the estimated total expenditure of the First Session, as well as the estimated costs entailed by the execution of the decisions of the First Session (Nos. 476 to 479 inclusive of the International Telecommunication Convention, Nairobi, 1982 and Nairobi Resolution No. 48).

Committee 4 - Technical Criteria Committee

Terms of Reference :

To establish the technical parameters to be used for planning and the principles governing the use of the exclusive and shared HF bands allocated to the Broadcasting Service (excluding those bands the use of which is restricted to the Tropical Zone), taking into account the conclusions of the CCIR Report* and the following non-exhaustive list of items (items 4.1.1 to 4.1.12, and, in so far as technical matters are concerned, items 4.2.4 and 4.2.6 of the agenda) :

- definitions;
- methods for the prediction of field strength, optimum frequencies; atmospheric and man-made radio noise data; other factors concerning HF propagation which are relevant to the planning of broadcasting services;
- values of the appropriate solar index and the seasonal periods based on which planning should be carried out;
- DSB system specifications, transmission characteristics, including modulation and audio processing standards;
- receiver characteristics;
- radio-frequency protection ratios and channel spacing;
- minimum usable and nominal values of field strengths required for satisfactory service;
- transmitter power, antenna characteristics and effective radiated power appropriate for satisfactory service taking into consideration the above technical factors;
- maximum number of frequencies required for broadcasting of the same programme to the same zone;
- use of synchronized transmitters;
- determination of reception zone;
- SSB system specifications;

and, in so far as technical matters are concerned :

- a programme for progressive introduction of SSB transmissions;
- theoretical capacity of any given high frequency broadcasting band;
- to consider the appropriate part of the IFRB report.

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* NOTE : CCIR Report : Technical Bases for the First Session of the WARC for the Planning of HF Bands Allocated to the Broadcasting Service

Committee 5 - Planning Criteria Committee

Terms of Reference :

To establish for use by the Second Session of the Conference : planning principles, methods of planning, approaches to implementation, the action necessary to eliminate harmful interference (items 4.2.1, 4.2.2, 4.2.3 and 4.2.5 of the agenda) and, in so far as methods of planning are concerned, items 4.2.4 and 4.2.6 of the agenda.

To identify, and to lay down specific guidelines for, the preparatory tasks to be carried out between the two sessions of the Conference including consideration of the methods to be used to assist the work of the Second Session (such as the establishment of an intersessional working group) and fix a timetable for the completion of these tasks (item 4.3 of the agenda).

To specify the form in which requirements for use in planning should be submitted to the Union and the preferred time limits (item 4.4 of the agenda).

To propose a tentative agenda for, and changes in duration, if any, of the Second Session, for consideration by the Administrative Council, noting in particular the recommendation made in 5.1 and 5.2 of Resolution No. 508 of WARC-79 (item 4.5 of the agenda).

To consider the appropriate part of the IFRB report including the twenty years of operation of the Article 17 procedure.

Committee 6 - Editorial Committee

Terms of Reference :

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

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/2-E
10 January 1984

DRAFT

AGENDA

OF THE

FIRST PLENARY MEETING

Tuesday, 10 January 1984, at 1430 hrs

(Room II)

		Document No.
1.	Approval of the agenda	-
2.	Opening of the Conference	-
3.	Election of the Chairman of the Conference	-
4.	Election of the Vice-Chairmen of the Conference	-
5.	Address by the Secretary-General	-
6.	Conference Structure	DT/1
7.	Election of the Chairmen and Vice-Chairmen of the Committees	-
8.	Composition of the Conference Secretariat	-
9.	Allocation of documents to Committees	DT/3
10.	Invitations to the Conference	38
11.	Notifications sent to international organizations	39
12.	Date by which the Credentials Committee must submit its conclusions	-
13.	Working hours of the meetings of the Conference	-
14.	Financial responsabilities of administrative conferences	41
15.	Other business	-

R.E. BUTLER

Secretary-General

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

CAMR POUR LA RADIODIFFUSION A ONDES DÉCAMÉTRIQUES

PREMIÈRE SESSION, GENÈVE, JANVIER/FÉVRIER 1984

Document No. DT/3 (Rev.1)-F/E/S
10 January 1984
Original: francais/
anglais/
espagnol

SEANCE PLENIERE
PLENARY MEETING
SESIÓN PLENARIA

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

ATTRIBUTION DES DOCUMENTS / ALLOCATION OF DOCUMENTS
ATRIBUCIÓN DE LOS DOCUMENTOS

Séance Plénière Plenary Meeting Sesión Plenaria	: 1, 6 + Add.1, 22, 37, 38, 39, 40, 41
C2 - Pouvoirs Credentials Credenciales	: 2
C3 - Budgétaire Budget Presupuesto	: 6 + Add.1, 11, 12
C4 - Technique Technical Técnica	: 3, 4 + Corr.1, 5 + Add.1 + Corr.1, 6 + Add.1, 10(Rev.1) + Corr.1, 13, 14(Rev.1), 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27 + Corr.1 + Add.1, 28, 29, 30, 31
C5 - Planification Planning Planificación	: 3, 4 + Corr.1, 5 + Add.1 + Corr.1, 6 + Add.1, 7 + Corr.1, 8 + Corr.1 + Corr.2, 9(Rev.1), 10(Rev.1) + Corr.1, 13, 14(Rev.1), 15, 16, 17, 22, 23, 24, 25, 27 + Corr.1 + Add.1, 28, 29, 30, 31

R.E. BUTLER
Secrétaire général

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

CAMR POUR LA RADIODIFFUSION A ONDES DÉCAMÉTRIQUES

PREMIÈRE SESSION, GENÈVE, JANVIER/FÉVRIER 1984

V

Document No. DT/3-F/E/S
6 janvier 1984
Original: francais/
anglais/
espagnol

SEANCE PLENIERE
PLENARY MEETING
SESIÓN PLENARIA

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

ATTRIBUTION DES DOCUMENTS / ALLOCATION OF DOCUMENTS
ATRIBUCIÓN DE LOS DOCUMENTOS

Séance Plénière Plenary Meeting Sesión Plenaria	:	1, 6 + Add.1, 22
C2 - Pouvoirs Credentials Credenciales	:	2
C3 - Budgétaire Budget Presupuesto	:	11, 12
C4 - Technique Technical Técnica	:	3, 4 + Corr.1, 5 + Add.1 + Corr.1, 6 + Add.1, 10(Rev.1), 13, 14(Rev.1), 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27 + Add.1, 28, 29, 30, 31
C5 - Planification Planning Planificación	:	3, 4 + Corr.1, 5 + Add.1 + Corr.1, 6 + Add.1, 7 + Corr.1, 8 + Corr.1, 9 + Corr.1, 10(Rev.1), 13, 14(Rev.1), 15, 16, 17, 22, 23, 24, 25, 27 + Add.1, 28, 29, 30, 31

R.E. BUTLER
Secrétaire général

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/4(Rev.1)-E
11 January 1984
Original : English

COMMITTEE 4

ORGANIZATION OF THE WORK IN COMMITTEE 4

The work of the Committee is sub-divided as follows :

Working Group 4A - Propagation, radio noise and solar indices
(Agenda items 4.1.1 to 4.1.3)

- methods for the prediction of field strength, optimum frequencies; atmospheric and man-made radio noise data; other factors concerning HF propagation which are relevant to the planning of broadcasting services;
- values of the appropriate solar index and the seasonal periods based on which planning should be carried out;
- and, insofar as propagation matters are concerned, the establishment of the definitions necessary for the Conference.

Reference : Document 22/CCIR Chapters 2 and 3

Documents : PHL/3/6 to PHL/3/9
CAN/4/1 to CAN/4/3
G/5/1 to G/5/4 and G/5/8
CHN/10/1 to CHN/10/3 and CHN/46/1 to CHN/46/3
AUS/13/1 to AUS/13/4
URS/14/1 to URS/14/4
BGD/21/2
PNG/23/
USA/24/1 to USA/24/4
ARG/26/1
DDR/27/1 to DDR/27/3
KEN/29/2 to KEN/29/6
D/30/
IND/33/1, IND/33/2 and IND/33/4 to IND/33/7
MEX/42/1 and MEX/42/2
YUG/43/1 to YUG/43/5

Working Group 4B - Technical parameters for planning and system specification
(Agenda items 4.1.4 to 4.1.12, 4.2.4 and 4.2.6)

1. - DSB system specifications, transmission characteristics, including modulation and audio processing standards and receiver characteristics;

2. - radio-frequency protection ratios and channel spacing;

3. - minimum usable and nominal values of field strengths required for satisfactory service;

4. - transmitter power, antenna characteristics and effective radiated power appropriate for satisfactory service taking into consideration the above technical factors;

5. - maximum number of frequencies required for broadcasting of the same programme to the same zone;

6. - use of synchronized transmitters;

7. - reception zone;

8. - SSB system specifications and, insofar as technical matters are concerned, the programme for progressive introduction of SSB transmissions;

9. - theoretical capacity of any given high frequency broadcasting band;

10. - and the establishment, as required, of definitions necessary for the progress of work.

Reference : Document 22/CCIR, Chapters 4 to 11 and 13

Documents : PHL/3/1 to PHL/3/5 and PHL/3/10 to PHL/3/26
CAN/4/4 to CAN/4/12, CAN/4/16 and CAN/4/18
G/5/1, G/5/5 to G/5/8 and G/5/10
CHN/10/1 to CHN/10/3, CHN/47/1
AUS/13/5 to AUS/13/17
URS/14/1, URS/14/5 to URS/14/10, URS/14/12, URS/14/16 and URS/14/17
HOL/16/1 to HOL/16/4
HOL/17/1
PNG/23/1 to PNG/23/7
BGD/18/1 to BGD/18/3
BGD/19/1 and BGD/19/2
BGD/20/1
BGD/21/1
USA/24/1, USA/24/5 to USA/24/20 and USA/24/22
ARG/26/1
DDR/27/1, DDR/27/4 to DDR/27/11
ALG/28/12 to ALG/28/19
KEN/29/1, KEN/29/2, KEN/29/7 to KEN/29/22
D/30/
AUS/31/1
ARG/32/1 to ARG/32/3
IND/33/1 to IND/33/3, IND/33/8 to IND/33/27
PRG/34/1, PRG/34/2, PRG/35/1 to PRG/35/3
MEX/42/3 to MEX/42/12
YUG/43/2, YUG/43/6 to YUG/43/22

J. RUTKOWSKI
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/4-E
10 January 1984
Original : English

COMMITTEE 4

ORGANIZATION OF THE WORK IN COMMITTEE 4

It is proposed to sub-divide the work into the following Working Groups :

4-A - Definitions (Agenda items 4.1.1 and 4.1.11)

To review and complete the definitions necessary for the Conference (including the determination of the reception zones).

Reference : Document 22/CCIR Chapters 2 and 11

Documents : PHL/3/1 to PHL/3/5
CAN/4/1 and CAN/4/11
G/5/1 and G/5/8
CHN/10/1 to CHN/10/3
AUS/13/17
URS/14/1
PNG/23/1
USA/24/1 and USA/24/19
ARG/26/1
DDR/27/1 and DDR/27/10
ALG/28/
KEN/29/1 and KEN/29/2
D/30/1
IND/33/1 to IND/33/3 and IND/33/25
MEX/42/9
YUG/43/2

4-B - Propagation, radio noise and solar indices (Agenda items 4.1.2 and 4.1.3)

- methods for the prediction of field strength, optimum frequencies; atmospheric and man-made radio noise data; other factors concerning HF propagation which are relevant to the planning of broadcasting services;

- values of the appropriate solar index and the seasonal periods based on which planning should be carried out.

Reference : Document 22/CCIR Chapter 3 + Annex 3-I

Documents : PHL/3/6 to PHL/3/9
CAN/4/2 and CAN/4/3
G/5/2 to G/5/4
AUS/13/1 to AUS/13/4
URS/14/2 to URS/14/4
BGD/21/2
USA/24/2 to USA/24/4
DDR/27/2 and DDR/27/3
KEN/29/3 to KEN/29/6
D/30/2

IND/33/4 to IND/33/7
MEX/42/1 and MEX/42/2
YUG/43/1 to YUG/43/5

4-C - System specifications (Agenda items 4.1.4, 4.1.5, 4.1.10, 4.1.12 and 4.2.4)

- DSB system specifications, transmission characteristics, including modulation and audio processing standards;

- SSB system specifications;

- receiver characteristics;

- use of synchronized transmitters;

and, insofar as technical matters are concerned :

- a programme for progressive introduction of SSB transmissions.

Reference : Document 22/CCIR Chapters 5, 10 and 13

Documents : PHL/3/10 to PHL/3/13, PHL/3/15, PHL/3/21 and PHL/3/22
CAN/4/4, CAN/4/5, CAN/4/12 and CAN/4/16
G/5/7 and G/5/10
AUS/13/5 to AUS/13/10
URS/14/5, URS/14/6, URS/14/12 and URS/14/16
HOL/16/1 to HOL/16/4
PNG/23/2 and PNG/23/7
USA/24/5 to USA/24/9, USA/24/18, USA/24/20 and USA/24/22
DDR/27/4, DDR/27/5 and DDR/27/11
ALG/28/16
KEN/29/7 to KEN/29/10, KEN/29/21 and KEN/29/22
D/30/4
AUS/31/1
IND/33/8, IND/33/9, IND/33/23, IND/33/24 and IND/33/27
PRG/34/1, PRG/34/2 and PRG/35/1
MEX/42/3, MEX/42/8, MEX/42/10 and MEX/42/12
YUG/42/6, to YUG/42/8 and YUG/42/22

4-D - Technical parameters for planning (Agenda items 4.1.6, 4.1.7, 4.1.8, 4.1.9 and 4.2.6)

- radio-frequency protection ratios and channel spacing;

- minimum usable and nominal values of field strengths required for satisfactory service;

- transmitter power, antenna characteristics and effective radiated power appropriate for satisfactory service taking into consideration the above technical factors;

- maximum number of frequencies required for broadcasting of the same programme to the same zone;

- theoretical capacity of any given high frequency broadcasting band.

Reference : Document 22/CCIR Chapters 4, 7, 8 (Annexes 8-I and 8-II and 9)

Documents : PHL/3/14 to PHL/3/26
CAN/4/6 to CAN/4/9 and CAN/4/18
G/5/5 and G/5/6
AUS/13/11 to AUS/13/16
URS/14/7 to URS/14/10 and URS/14/17
HOL/17/1
BGD/18/1 to BGD/18/3
BGD/19/1 and BGD/19/2
BGD/20/1
BGD/21/1
PNG/23/4 to PNG/23/6
USA/24/10 to USA/24/17
DDR/27/6 to DDR/27/9
ALG/28/12 to ALG/28/19
KEN/29/11 to KEN/29/19
D/30/3
ARG/32/1 to ARG/32/3
IND/33/10 to IND/33/22
PRG/35/2 and PRG/35/3
MEX/42/4 to MEX/42/7
YUG/43/9 to YUG/43/20

J. RUTKOWSKI
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/5(Rev.1)-E
12 January 1984
Original : English

COMMITTEE 5

DRAFT STRUCTURE OF ORGANIZATION OF COMMITTEE 5

It is proposed to have two Working Groups namely Working Group 5-A and Working Group 5-B with the following terms of reference :

Working Group 5-A :

To establish for use by the Second Session of the Conference : planning principles, methods of planning, approaches to implementation (items 4.2.1, 4.2.2 and 4.2.3 of the agenda) and, insofar as methods of planning are concerned, items 4.2.4 and 4.2.6 of the agenda.

Working Group 5-B :

To identify, and to lay down specific guidelines for, the preparatory tasks to be carried out between the two sessions of the Conference including consideration of the methods to be used to assist the work of the Second Session (such as the establishment of an intersessional working group) and fix a timetable for the completion of these tasks (item 4.3 of the agenda).

To specify the form in which requirements for use in planning should be submitted to the Union and the preferred time limits (item 4.4 of the agenda).

Subsequently, at a later stage an ad hoc Group of Committee 5 will be set up to deal with the following :

To propose a tentative agenda for, and changes in duration, if any, of the Second Session, for consideration by the Administrative Council, noting in particular the recommendation made in 5.1 and 5.2 of Resolution 508 of WARC-79 (item 4.5 of the agenda).

I. ULLAH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/5-E
11 January 1984
Original : English

COMMITTEE 5

DRAFT STRUCTURE OF ORGANIZATION OF COMMITTEE 5

It is proposed to have two Working Groups namely Working Group 5-A and Working Group 5-B with the following terms of reference :

Working Group 5-A :

To establish for use by the Second Session of the Conference : planning principles, methods of planning, approaches to implementation, the action necessary to eliminate harmful interference (items 4.2.1, 4.2.2, 4.2.3 and 4.2.5 of the agenda) and, insofar as methods of planning are concerned, items 4.2.4 and 4.2.6 of the agenda.

Working Group 5-B :

To identify, and to lay down specific guidelines for, the preparatory tasks to be carried out between the two sessions of the Conference including consideration of the methods to be used to assist the work of the Second Session (such as the establishment of an intersessional working group) and fix a timetable for the completion of these tasks (item 4.3 of the agenda).

To specify the form in which requirements for use in planning should be submitted to the Union and the preferred time limits (item 4.4 of the agenda).

Subsequently, at a later stage an ad hoc Group of Committee 5 will be set up to deal with the following :

To propose a tentative agenda for, and changes in duration, if any, of the Second Session, for consideration by the Administrative Council, noting in particular the recommendation made in 5.1 and 5.2 of Resolution 508 of WARC-79 (item 4.5 of the agenda).

I. ULLAH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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COMMITTEE 5

ORGANIZATION OF THE WORK IN COMMITTEE 5

It is proposed to allocate documents to the Working Groups as follows :

Working Group 5A

Reference

Document 22/CCIR, Chapter 12

Documents

Agenda Item 4.2.1

PHL/3/23
CAN/4/13
J/7/1
CHN/8/1 to CHN/8/7
URS/14/13
AUT/15/1 and AUT/15/2
USA/24/21
DDR/27/12
ALG/28/1 to ALG/28/7
KEN/29/23 to KEN/29/29
D/30/2
IND/33/28 to IND/33/36
MEX/42/11
YUG/43/23
ARG/44/1 to ARG/44/3
F/54/2
B/55/19
PRG/58/1

Agenda Item 4.2.2

PHL/3/24
G/5/9 and G/5/11
CAN/4/14
CHN/9/1
AUT/15/2
HOL/17/2
URS/14/14
J/7/1
USA/24/21A
DDR/27/13
KEN/29/30 to KEN/29/32
AUS/31/1A
IND/33/37
YUG/43/24
VEN/52/1
F/54/3

Agenda Item 4.2.3

CAN/4/15
CHN/9/
URS/14/15

Agenda Item 4.2.4

YUG/43/25

Agenda Item 4.2.6

CAN/4/18

Working Group 5B

Reference

Document 22/CCIR, Chapter 12

Documents

Agenda Item 4.3

CAN/4/19
CAN/4/24 and CAN/4/25
G/5/11
USA/24/24
MEX/49/RES

Agenda Item 4.4

CAN/4/20
CAN/4/23
CHN/10/1 to CHN/10/3
ALG/28/8 to ALG/28/11

Ad Hoc Group (Agenda Item 4.5)

Documents

CAN/4/21
CAN/4/27
HOL/16/4

I. ULLAH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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COMMITTEE 5

ORGANIZATION OF THE WORK IN COMMITTEE 5

It is proposed to allocate documents to the Working Groups as follows :

Working Group 5-A

Reference

Document 22/CCIR, Chapter 12

Documents

Agenda Item 4.2.1

PHL/3/23
CAN/4/13
CHN/8/1 to CHN/8/7
URS/14/13
AUT/15/1
USA/24/21
DDR/27/12
ALG/28/1 to ALG/28/7
KEN/29/23 to KEN/29/29
D/30/2
IND/33/28 to IND/33/36
MEX/42/11
YUG/43/23
ARG/44/1 to ARG/44/3
PRG/58/1

Agenda Item 4.2.2

PHL/3/24
G/5/9 and G/5/11
CAN/4/14
CHN/9/1
AUT/15/2
HOL/17/2
URS/14/14
J/7/1
USA/24/?
DDR/27/13
KEN/29/30 to KEN/29/32
AUS/31/?
IND/33/37
YUG/43/24
VEN/52/1

Agenda Item 4.2.3

CAN/4/15
URS/14/15

Agenda Item 4.2.4

YUG/43/25

Agenda Item 4.2.5

CAN/4/17 and CAN/4/22
USA/24/23
HOL/25/1
PRG/35/4
VEN/51/2 to VEN/51/4

Agenda Item 4.2.6

CAN/4/18

Working Group 5-B

Reference

Document 22/CCIR, Chapter 12

Documents

Agenda Item 4.3

CAN/4/19
CAN/4/24 and CAN/4/25
USA/24/24
MEX/49/RES

Agenda Item 4.4

CAN/4/20
CAN/4/23
CHN/10/1 to CHN/10/3
ALG/28/8 to ALG/28/11

Ad Hoc Group (Agenda Item 4.5)

Documents

CAN/4/21
CAN/4/27
HOL/16/4

I. ULLAH
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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Addendum 2 to
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WORKING GROUP 4B

LIST OF DOCUMENTS ASSIGNED TO WORKING GROUP 4B

The following documents are to be added to the list of documents :

1. URS/78

3. URS/73 + Corr.1

4. BOL/70/5

Y. TADOKORO
Chairman of Working Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Addendum 1 to
Document DT/7-E
13 January 1984

WORKING GROUP 4B

LIST OF DOCUMENTS ASSIGNED TO WORKING GROUP 4B

The following documents are to be added to the list of documents :

1. IRN/56/8 to 56/12
   J/57/1
   EQA/69/2

2. F/54/1
   IRN/56/7, 56/12 to 56/15
   J/57/2
   EQA/69/2

3. CHN/45/4
   IRN/56/16 to 56/26
   J/57/3
   EQA/69/3

4. F/54/1
   IRN/56/21 to 56/23
   EQA/69/4, 69/5
   ARG/71/1

5. EQA/69/6

6. IRN/56/24

7. IRN/56/25
   J/57/4
   EQA/69/7

8. F/54/1
   IRN/56/26
   J/57/5

9. J/75/

Y. TADOKORO
Chairman of Working Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4B

LIST OF DOCUMENTS ASSIGNED IN WORKING GROUP 4B

According to the organization of the work reported in Document DT/4(Rev.1), the list of documents assigned to each item to be discussed is as follows :

1. DSB system specifications, transmission characteristics, including modulation and audio processing standards and receiver characteristics (Agenda items 4.1.4 and 4.1.5)

Reference : Document 22/CCIR (Chapters 5 and 6)

Documents : PHL/3/10 to 3/13 and 3/15
CAN/4/4, 4/5
AUS/13/5 to 13/10
URS/14/5, 14/6
BGD/20/1
PNG/23/2, 23/3
USA/24/5 to 24/9
DDR/27/4, 27/5
KEN/29/7 to 29/10
IND/33/8, 33/9
PRG/34/1, 35/1
MEX/42/3
YUG/43/6 to 43/8
B/55/12
IRN/56/
J/57/

2. Radio-frequency protection ratios and channel spacing (Agenda item 4.1.6)

Reference : Document 22/CCIR (Chapter 6)

Documents : PHL/3/16 and 3/17
CAN/4/6
AUS/13/11, 13/12
URS/14/7
BGD/18/1 to 18/3 and 20/1
PNG/23/4
USA/24/10 to 24/12
DDR/27/6
KEN/29/12 to 29/15
D/30/
IND/33/10 to 33/14
MEX/42/4
YUG/43/9 to 43/13
CHN/45/2
B/55/13, 55/14

3. Minimum usable and nominal values of field strengths required for satisfactory service (Agenda item 4.1.7)

Reference : Document 22/CCIR (Chapter 7)

Documents : PHL/3/18
CAN/4/7
G/5/5
AUS/13/13
URS/14/8
BGD/21/1
DDR/27/7
USA/24/13 to 24/15
KEN/29/16, 29/17
IND/33/15, 33/16
MEX/42/5
YUG/43/14 to 43/18
CHN/45/3
B/55/15

4. Transmitter power, antenna characteristics and effective radiated power appropriate for satisfactory service taking into consideration the above technical factors (Agenda item 4.1.8)

Reference : Document 22/CCIR (Chapters 4 and 8 and Annexes 8-I and 8-II)

Documents : PHL/3/14, 3/19, 3/25, 3/26
CAN/4/8
G/5/6
AUS/13/14, 13/15
URS/14/9, 14/10, 14/17
BGD/19/1
PNG/23/5
USA/24/16
DDR/27/8
ALG/28/17 to 28/19
KEN/29/11, 29/18, 29/19
IND/33/17 to 33/20
PRG/35/2
MEX/42/6
YUG/43/19
CHN/47/1, CHN/9/3(Rev.1)
B/55/16, 55/17

5. Maximum number of frequencies required for broadcasting of the same programme to the same zone (Agenda item 4.1.9)

Reference : Document 22/CCIR (Chapter 9)

Documents : PHL/3/20
CAN/4/9
AUS/13/16
URS/14/10
HOL/17/1
BGD/19/2

PNG/23/6
USA/24/17
DDR/27/9
ALG/28/12 to 28/15
KEN/29/20
ARG/32/1 to 32/3
IND/33/21, 33/22
PRG/35/3
MEX/42/7
YUG/43/20
VEN/51
B/55/18

6. Use of synchronized transmitters (Agenda item 4.1.10)

Reference : Document 22/CCIR (Chapter 10)

Documents : PHL/3/21
CAN/4/10
G/5/7
USA/24/18
ALG/28/16
KEN/29/21
IND/33/23, 33/24
MEX/42/8

7. Reception zone (Agenda item 4.1.11)

Reference : Document 22/CCIR (Chapter 11)

Documents : CAN/4/11, 4/26
G/5/8
AUS/13/17
URS/14/11
USA/24/19
DDR/27/10
IND/33/25, 33/26
MEX/42/9
YUG/43/21
VEN/51/3
B/55/6

8. SSB system specifications and, insofar as technical matters are concerned, the programme for progressive introduction of SSB transmissions (Agenda items 4.1.12 and 4.2.4)

Reference : Document 22/CCIR (Chapter 13)

Documents : PHL/3/22
CAN/4/12, 4/16
G/5/10
URS/14/12, 14/16
HOL/16/1 to 16/4
PNG/23/7

USA/24/20, 24/22
DDR/27/11
KEN/29/22
D/30/4
AUS/31/1, 31/2
IND/33/27
PRG/34/2
MEX/42/10, 42/12
YUG/43/22, 43/25
VEN/51/8
B/55/20

9. Theoretical capacity of any given high frequency broadcasting band (Agenda item 4.2.6)

Document : CAN/4/18

The list of documents concerning the establishment of definitions necessary for the progress of work will be issued separately.

Y. TADOKORO
Chairman of Working Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

PRINCIPLES RELATING TO ITEM 4.2.1 OF THE AGENDA

		Documents
I.	Principles	
1.	Equality of rights of all countries	PHL/3/23 J/7/1 paragraph 2.1.2 CHN/8/2 AUT/15/1 ALG/28/1 D/30/2 IND/33/28 YUG/43/23 PRG/58/1
2.	Equitable treatment of requirements	CAN/4/13 J/7/1 paragraph 2.1.2 CHN/8/1 and CHN/8/2 URS/14/13 AUT/15/1 and AUT/15/2 ALG/28/4 and ALG/28/7 MEX/42/11 YUG/43/23 B/55/19 PRG/58/1
3.	Rational use of the frequency spectrum	
4.	Opting for flexible planning that can take into account new requirements and/or possible changes in broadcasting requirements	
II.	Other subjects	
1.	Transitional period for conversion from DSB to SSB	
2.	Continuity in the use of frequencies	

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4B

DEFINITIONS

PHI/3/1 2.1.1.1 Service area and coverage area

NEW | In addition to the two terms "service area" and "coverage area", as defined in CCIR, it is considered desirable to introduce the notion of the "required service area", which might be defined as the area within which an administration requires to establish a service meeting the agreed technical criteria.

PHI/3/2 2.1.1.2 Reception zones

The CIRAF zones given in Appendix 1 to the Radio Regulations are considered appropriate for the description of the required service area. If a smaller area is to be described, a zone may be sub-divided geographically (e.g. North, South, East, West). The sub-dividion should, however, be more precisely defined. For this prupose, an appropriate reference point in each CIRAF zone would be defined. The geographical sub-divisions of zones may be described precisely by the lines of latitude and longitude passing through this reference point.

PHI/3/3 2.1.1.3 Test points

For the purposes of evaluating incompatibilities in a frequency assignment plan, a grid of suitably distributed test points, adequate in number, may be adopted. These test points should not, however, be included in the description of a "requirement".

PHI/3/4 2.1.2 Classification of transmissions

Transmissions may not be classified as "National" and "International". However, for facilitating planning, the transmissions may be classified, in relation to the range, as short distance (0 to 2,000 km), and long distance (beyond 2,000 km).

CAN/4/1

CCIR | 9. Audio-Frequency (AF) Signal-to-Interference Ratio: The ratio (expressed in dB) between the values of the voltage of the wanted signal and the voltage of the interference, measured under specified conditions, at the audio-frequency output of the receiver.

This ratio corresponds closely to the difference in volume of sound (expressed in dB) between the wanted program and the interference.

CCIR | 10. Audio-Frequency (AF) Protection Ratio: The agreed minimum value of the audio-frequency signal-to- interference ratio considered necessary to achieve a subjectively defined reception quality.

This ratio may have different values according to the type of service desired.

CCIR | 11. Radio-Frequency (RF) Wanted-to-Interfering Signal Ratio: The ratio (expressed in dB) between the values of the radio-frequency voltage of the wanted signal and the voltage of the interfering signal, measured under specified conditions, at the radio-frequency input of the receiver.

For example, in the case of amplitude-modulation wanted and interfering transmissions (carrier with double sideband), the chosen values will be the effective radio-frequency voltages that correspond to the wanted and interfering carriers.

13. Required Service Area (in HF broadcasting): The area within which an administration requires a service of technically satisfactory quality.

14. Coverage Area: The area associated with a station for a given service and a specified frequency within which, under specified technical conditions, radiocommunications may be established with one or several other stations either for reception or transmission or both.

NEW

17. Reception Points: Geographically defined locations within a reception zone for High Frequency broadcasting purposes.

18. Broadcast Requirement: A requirement to provide a broadcasting service during a specified period to a specified reception area from a particular transmitter station.

G/5/1 Corrigendum 2 to Document 5

CCIR

The United Kingdom proposes adoption of the definitions of minimum usable field strength and of usable field strength contained in CCIR Recommendation 499-2 and as endorsed in Chapter 2 of the Report from the CCIR to the Conference. However, the United Kingdom considers it important that the following explanatory notes be associated with the definitions.

1. MINIMUM USABLE FIELD STRENGTH

Note

The term minimum usable field strength may apply either for a stable or a fading wanted signal. For a fading signal it is taken as the median value.

The desired reception quality relates to a period of time equal to or in excess of that over which the noise background is statistically stationary.

The minimum usable field strength may be quoted for the same time period as that used to specify the reception quality or over a longer period. When it is for a longer period, it depends also on the percentage of time for which the desired reception quality must be achieved. For a fading wanted signal this

NEW

percentage is a function of its correlation with the fading of the noise.

2. USABLE FIELD STRENGTH

Note

The term usable field strength may apply either for a stable or a fading wanted signal. For a fading signal it is taken as the median value.

The desired reception quality relates to a period of time equal to or in excess of that over which the noise background is statistically stationary.

The usable field strength may be quoted for the same time period as that used to specify the reception quality or over a longer period. When it is for a longer period, it depends also on the percentage of time for which the desired reception quality must be achieved. For a fading wanted signal this percentage is a function of its correlation with the fading of the noise and interference.'

CHN/10/1 Corrigendum 1 to Document 10(Rev.1)

Programme requirement

NEW A requirement to provide a broadcasting programme with specific content in a specific time block to a specific service area by one or more administrations, regardless of the number of transmitter stations or transmitters available for use.

URS/14/1

CCIR Reduced carrier : Carrier emitted at a power level below the peak envelope power. (CCIR Recommendation 326-3)

PNG/23/1

NEW a) Definitions

National broadcasting station

A station in the broadcasting service whose coverage is intended to provide a national service within the frontiers of the country concerned.

USA/24/1

CCIR Reference usable field-strength (Eref): The agreed value of the usable field-strength that can serve as a reference or basis for frequency planning.

CCIR Audio-frequency (AF) signal-to-interference ratio: The ratio (expressed in dB) between the values of the voltage of the wanted signal and the voltage of the interference, measured under specified conditions*, at the audio-frequency output of the receiver. This ratio corresponds closely to the difference in volume of sound (expressed in dB) between the wanted programme and the interference.

CCIR Audio-frequency (AF) protection ratio: The agreed minimum value of the audio-frequency signal-to-interference ratio considered necessary to achieve a subjectively-defined reception quality. This ratio may have different values according to the type of service desired.

CCIR Radio-frequency (RF) wanted-to-interfering signal ratio: The ratio, expressed in dB, between the values of the radio-frequency voltage of the wanted signal and the interfering signal, measured at the input of the receiver under specified conditions*. For example, in the case of amplitude-modulation wanted and interfering transmissions (carrier with double sideband), the chosen values will be the effective radio-frequency voltages that correspond to the wanted and interfering carriers.

NEW Required service area (in HF broadcasting): The area within which an Administration requires a service of technically satisfactory quality.

NEW Coverage area: The area associated with a station for a given service and a specified frequency within which, under specified technical conditions, radio communications may be established with one or several other stations either for reception or transmission or both.

ARG/26/1 2. Definitions

NEW

2.1 National HF broadcasting : A broadcasting service intended to meet requirements within the frontiers of a country.

2.2 International HF broadcasting : A broadcasting service intended for areas located beyond the frontiers of a country.

DDR/27/1 **Definitions (item 4.1.1)**

CCIR

For the work of the Conference, definitions contained in the Report by the CCIR to the WARC-HF-BC which are included in the Radio Regulations and certain CCIR Recommendations, should be used.

IND/33/1 It is proposed that the definitions of the various terms relevant to WARC-HFBC should be the same as given in RR and whenever such definitions are not existing in RR, they should be the same as given in the report of CCIR to the Conference (Doc. 22). In addition, the following definitions for Basic MUF and required service area are proposed :-

IND/33/3

NEW

Required Service Area :

The area within which an administration requires a grade of service conforming to the agreed technical criteria.

Note : In addition to the two concepts 'service area' and 'coverage area' which are applicable only in defacto. or planned condition, it may be necessary to introduce a third term 'Required Service Area' for the purposes of planning. The term is considered necessary for an administration to describe its requirements. (The definition of this term exists neither in the RR's nor in the CCIR texts).

B/55/2 2. Terms related to field-strength

- Minimum usable field-strength (E_{min})

CCIR

Minimum value of the field-strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of natural and man-made noise, but in the absence of interference from other transmitters. This value will serve as a basis for frequency planning.

B/55/5 - National HF Broadcasting Service

NEW

The high frequency broadcasting service in which the service area of the transmitting station is included within the borders of the country where it is installed.

B/55/6 RECEPTION ZONES

The Brazilian Administration proposes the adoption of CIRAF zones, contained in Appendix 1 of the Radio Regulations, as a basis for describing the service areas.

To facilitate the specification of a service area a set of test points, limited to a maximum of nine points, should be used in addition of the CIRAF zones and their sub-division. For this purpose those test points currently used by IFRB, (IFRB Circular Letter 461) must be adopted. [However, to better describe the service areas of short-distance and regional HF broadcasting additional test points may be necessary.]

NEW

B/55/7 Broadcasting requirement

NEW [A requirement to provide a broadcasting service during a specified period to a specified reception area from a particular transmitter station, taking into account the available equipment of the Administrations.]

Y. TADOKORO
Chairman of Working Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 5A

DRAFT

FIRST REPORT OF WORKING GROUP 5A

PLANNING PRINCIPLES

1. In accordance with the International Telecommunication Convention and with the Radio Regulations annexed thereto, the planning of the high frequency bands allocated to the broadcasting service shall be based on the principle of equal rights of all countries, large or small to have equitable access to these bands and to utilize them in accordance with the decisions taken by this Conference. Planning shall also attempt to reach an efficient utilization of these frequency bands, while taking into account the technical and economical constraints that may exist in certain cases.

2. On the basis of the above, the following planning principles shall be applied.

2.1 All the /requirements/, current or future, formulated by the administrations shall be taken into account and be treated on an equitable basis, so as to guarantee the equality of rights covered in paragraph 1 above and to ensure a satisfactory service to every administration.

2.2 All the /requirements/, /national and international/, shall be treated on an equal basis, with due consideration of the differences between these two kinds of /requirements/.

2.3 The planning procedure will attempt to ensure, as far as practicable, the continuity of the utilization of a frequency or of a frequency band. However, such frequency continuity should not prevent equal and technically optimum treatment of all /requirements/.

2.4 The periodical planning process shall be based solely on the /requirements/ that will become operational during the planning period. It shall furthermore be flexible to take into account new /requirements/ and modifications to the existing /requirements/, in accordance with the modification procedures to be adopted by the Conference.

2.5 The planning procedure shall be based on DSB transmissions. Voluntary SSB transmissions may however be permitted in lieu of planned DSB transmissions, without increasing the level of interference caused to DSB transmissions appearing in the Plan.

2.6 For efficient spectrum utilization, only one frequency should be used, whenever possible, to satisfy a given /requirement/ to a given /required service area/ and in any case the number of frequencies used should be the minimum necessary to provide satisfactory reception.

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 5A

DRAFT

FIRST REPORT OF WORKING GROUP 5A

PLANNING PRINCIPLES

1. In accordance with the International Telecommunication Convention and with the Radio Regulations annexed thereto, the planning of the high frequency bands allocated to the broadcasting service shall be based on the principle of equal rights of all countries, large or small to have equitable access to these bands and to utilize them in accordance with the decisions taken by this Conference. Planning shall also attempt to reach an efficient utilization of these frequency bands, while taking into account the technical and economical constraints that may exist in certain cases.

2. On the basis of the above, the following planning principles shall be applied.

2.1 All the requirements, current or future, formulated by the administrations, shall be taken into account and be treated on an equitable basis, so as to guarantee the equality of rights covered in paragraph 1 above and to ensure a satisfactory service to every administration.

2.2 All the requirements, national and international, shall be treated on an equal basis, with due consideration of the differences between these two kinds of requirements.

2.3 The treatment of the requirements referred to in paragraphs 2.1 and 2.2 above could require the definition of a unit of measure that may serve the purpose of evaluating their degree of satisfaction.

2.4 In a first stage of the equitable application of the planning procedure an attempt will be made to include the highest possible number of the formulated requirements. Limitations could be imposed on the remaining requirements if their inclusion in the planning process leads to a deterioration of the situation.

2.5 The planning procedure will attempt to ensure, [as far as practicable if possible,] the continuity of the utilization of a frequency or of a frequency band. However, such frequency continuity should not prevent equal and technically optimum treatment of all requirements.

2.6 The periodical planning process shall be based solely on the requirements that will become operational during the planning period. It shall furthermore be flexible to take into account new requirements and modifications to the existing requirements, in accordance with the modification procedures to be adopted by the Conference.

2.7 The planning procedure shall be based on DSB transmissions. Voluntary SSB transmissions may however be permitted in lieu of planned DSB transmissions, without impairing the reception of DSB transmissions appearing in the plan.

2.8 AUT/15/2 In order to ensure efficient utilization of the HF-bands and sufficient flexibility in planning, the agreed planning method should contain appropriate provisions to guarantee the necessary protection for "minimum requirements" of all countries in any of the future plans irrespective of the overall number of requirements.

2.9 A.12.1.1.1 Efficient spectrum utilization

Any planning method used should be based on technical procedures* and technical standards which will lead towards efficient spectrum utilization. Efficient spectrum utilization inter alia presumes that assigned frequencies would be placed in service. In the case of seasonal plan(s) of frequencies which result from the planning process, only broadcasting requirements which will be operational in the relevant season would be accommodated. Moreover, only one frequency should be used, whenever possible, to radiate a particular programme to a given reception area and in any case the number of frequencies used should be the minimum necessary to provide satisfactory reception of the particular programme in each of the areas for which it is intended (CCIR Recommendation 410).

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* Technical procedures are intended, inter alia, to take into account the modifications in the propagation conditions due to seasonal variation and sunspot number changes.

2.10 a) A.12.1.1.4 Proportionally restricted protection

Those requirements for which, through lack of the requisite technical facilities, the agreed reference usable field strength is not ensured in the required service area, could obtain only proportionally reduced protection.

2.10 b) B/55/19 4. Proportionally restricted protection

Those requirements for which, through lack of the requisite technical facilities, the agreed field strength used as a basis for planning (Emin) is not ensured in the required service area, could obtain only proportionally reduced protection. (Provided that the technical criteria would be adopted compatibly with the different economical situation of the countries.)

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Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 5A

DRAFT

FIRST REPORT OF WORKING GROUP 5A

PLANNING PRINCIPLES

1. In accordance with the International Telecommunications Convention and with the Radio Regulations annexed thereto, the planning of the high frequency bands allocated to the broadcasting service shall be based on the principle of equal rights of all countries, large or small to have access to these bands and to utilize them / within the limits established by this Conference /*. Planning shall also attempt to reach an efficient utilization of these frequency bands, while taking into account the technical and economical constraints that may exist in certain cases.

2. On the basis of the above, the following planning principles shall be applied.

2.1 All the requirements, current or future, formulated by the administrations, shall be taken into account and be treated on an equitable basis, so as to ensure a satisfactory service to every administration.

2.2 All the requirements, whether national or international, shall be treated on an equal basis.

2.3 The treatment of the requirements could require the definition of a unit of measure that may serve the purpose of evaluating their degree of satisfaction.

2.4 In a first stage of the equitable application of the planning procedure an attempt will be made to include the highest possible number of the formulated requirements. Limitations could be imposed on the remaining requirements if their inclusion in the planning process leads to a deterioration of the situation.

2.5 The planning procedure will attempt to ensure, if possible, the continuity of the utilization of a frequency or of a frequency band.

2.6 The periodical planning process shall be based solely on the requirements that will become operational during the planning period. It shall furthermore be flexible to take into account new requirements or modifications to the existing requirements.

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* This sentence would be retained if the Conference adopts technical limitations such as power, etc.

2.7 The planning procedure shall be based on the utilization of DSB and the Conference shall establish a timetable that will provide :

- the date, from which, the introduction of SSB shall be regulated;
- the date beyond which new DSB transmitters will no longer be installed;
- the date beyond which DSB emissions shall cease.

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 4A

DRAFT

REPORT OF DRAFTING GROUP 4A-1 TO WORKING GROUP 4A

1. The Drafting Group 4A-1 met on Friday, 13 January 1984, at 1200 hours in Room IX. Mr. F.S.C. Pinheiro (Brazil) was Chairman.

2. Participants were from B, CAN, F, G, I, URS and USA.

3. The mandate of the Drafting Group 4A-1 was to propose definitions for reliability, using as a starting point the Appendix I of CCIR draft Report 892 (MOD I) as printed in the "Conclusions of the Interim Meeting of Study Group 6 (1983)".

4. The Drafting Group 4A-1 proposes the following texts :

Circuit reliability

NOC Probability for a single circuit that a specified performance is achieved at a single frequency.

NOC Reception reliability

Probability for a single receptor that a specified performance is achieved by taking into account all transmitted frequencies.

MOD Broadcast reliability

Probability for a single service area that a specified performance
NOC is achieved by taking into account all transmitted frequencies.

NOC Note 1 - The above terms are preceded by the word "basic" when the background is noise alone and by "overall" when the background is noise and interference.

NOC Note 2 - When the background is noise and interference, the above terms may relate either to the effects of a single interferer or to multiple interference from co-channel and adjacent-channel transmissions.

MOD Note 3 - For HF broadcasting applications, a given value of signal-to-noise ratio or signal-to-(noise and interference) ratio is the specified performance.

NOC Note 4 - The above terms relate to one or more periods of time which should be stated.

SUP Note 5 - For a given radio service the definitions contained above may need to be adapted to the requirements of that service.

5. The translation of "performance" into French needed revision.

6. The Drafting Group 4A-1 wishes to draw the attention of Working Group 4A and of Committee 4 that :

- all definitions should be grouped together in Chapter 2;
- the definition of "broadcast reliability" appearing on page 25 of the CCIR Report should be deleted;
- the text of section 4.2.1 (and possibly of section 4.2.6) of the CCIR Report be amended :
  - by drawing attention to the definition of broadcast reliability in Chapter 2;
  - to be only explanatory material and to mention parameters needed to compute broadcast reliability.

F.S.C. PINHEIRO
Chairman of Drafting Group 4A-1

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/12-E
13 January 1984
Original : English

WORKING GROUP 4B

DRAFT DEFINITIONS

1. Channel spacing

Channel spacing for DSB should be 10 kHz.

In the interest of spectrum conservation, it is also permissible to interleave DSB transmissions midway between two adjacent channels, i.e. 5 kHz separation between carrier frequencies, to different geographical areas. When SSB transmissions are introduced the channel spacing should become 5 kHz.

2. Recommended nominal carrier frequencies

Carrier frequencies should be integral multiples of 5 kHz.

L. BRADLEY
Chairman of ad hoc Drafting Group 4B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

DRAFT REPORT BY THE CHAIRMAN OF AD HOC GROUP 5A-1 TO WORKING GROUP 5A

It was not possible to reach a consensus on a possible definition of the term "broadcasting requirement". Of those administrations present, none took exception to the following possible definition, as far as it goes :

> "A requirement to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitter station."

Some administrations considered this wording to be sufficient in itself. Others, however, considered that further matters should be mentioned in the definition. Two possibilities were proposed but found no clear acceptance :

1) the addition to the above text of a second sentence, as follows : "The administrations may also indicate the technical characteristics of the equipment and the desired frequencies.";

2) the addition to the above text of a second sentence, as follows : "The basic characteristics as well as any other optional characteristics to be associated with such a requirement are given in /_ _7.".

DR. A. MARSHALL
Chairman of ad hoc Group 5A-1

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5B

INTERSESSIONAL WORK

(Agenda item 4.3)

This working document has been prepared to assist delegations in the discussion.

Section A gives a list of some of the questions that need to be answered.

Section B provides a list of the proposals from administrations that are relevant to matters discussed in Working Group 5B.

K. OLMS
Chairman of Working Group 5B

Annexes : 2

SECTION A

Intersessional Work

(non-exhaustive, preliminary list of questions)

Based on the method developed by the first session of the Conference :

- What intersessional work needs to be carried out between the two sessions (March 1984 - October 1986) ?

- Should an intersessional Working Group be established ?

- If yes :
  - what are its terms of reference ?
  - what is its composition ?
  - what are its working methods ?
  - how are the results to be presented ?

- What work is to be carried out by the IFRB ?

- What budgetary consequences are to be expected ? (See Doc. No. 41)

- What time schedule for completion of the intersessional tasks can be envisaged ?

SECTION B

Agenda item 4.3

CAN/4/19

The first session of the HF Broadcasting Conference will establish the technical parameters to be used for planning and the principles governing the use of the HF bands allocated to the broadcasting service. It will also specify the form in which broadcast requirements for use in planning should be submitted, and the timetable for submission. The broadcasting requirements of as many administrations as possible should be submitted early to allow an inter-sessional working group to assemble and test the computer programs agreed to for the planning of the HF broadcasting bands. This inter-sessional working group will also provide recommendations on the minimum number of frequencies required for broadcasting to the same zone, and on the theoretical capacity of any given high frequency broadcasting band as well as on propagation and compatibility information. Thus an outline of a computer-aided planning system, which will incorporate all of the above information, should be available by August 1986 and the details forwarded to all administrations prior to the second session of the Conference.

Proposal

It is proposed that an inter-sessional working group be established consisting of ten or more administrations to begin the important task of assisting the IFRB to assemble and produce a working computer system by August 1986 so that results can be forwarded to administrations prior to the second session in October 1986.

CAN/4/24

DRAFT RESOLUTION CAN/4

INTER-SESSIONAL WORKING GROUP (IWG)

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, Geneva, 1984,

considering

a) that the availability of appropriate computer programs is essential to carry out adequately the planning of the HF broadcasting bands;

b) that some administrations have already begun to consider and develop such computer programs in connection with their national preparations and that these programs can assist other administrations and the IFRB in their respective preparations;

c) that specific guidelines for the preparatory tasks to be carried out before the commencement of the second session of the Conference, including assistance to the work of the second session by the establishment of an Inter-sessional Working Group (IWG), and the establishment of a timetable for the completion of these tasks are essential to the success of the Conference;

invites administrations

1. to co-operate and provide the Inter-sessional Working Group with computer programs;

2. to provide specialists in broadcasting and computer programming fields;

requests IFRB

1. to take the necessary steps for the convening of the Inter-sessional Working Group meetings;

2. to complete their engineering and other preparatory studies in good time prior to the second session.

CAN/4/25

The terms of reference for this IWG are as follows:

1) to design a computer system according to the method approved at the first session of the HF Broadcasting Conference;

2) to assemble all related computer programs on HF broadcast planning into an operational system on the IFRB computers, according to the system design;

3) to use the technical parameters agreed to at the first session of the HF Broadcasting Conference;

4) to co-operate with the CCIR and the IFRB in this important inter-sessional activity;

5) to prepare a report for the information and comment of all administrations.

The proposed timetable will be as follows:

a) The Inter-sessional Working Group to meet in Geneva commencing in mid 1984 for a period of [five weeks];

b) The Inter-sessional Working Group to reconvene in early 1985 for a period of [three weeks] for the purpose of examining the results of the IFRB computer programming activities and to take into account the latest submission of broadcast requirements.

c) The IFRB to continue its computer programming activities until early 1986 for the purpose of producing a full report which shall be distributed to all administrations by August 1986;

d) All administrations to review the report and to offer comments as necessary prior to the second session;

e) The IWG to make itself available during the Second Session of the conference for the purpose of providing continuing advice and assistance as required.

G/5/11 However successful may be the preparatory session, a vital connective with the main session will be the development of computer tools for application by the latter. The mechanism of a panel or group of experts has previously been employed by the Union to good effect. The essence of such a group is that certain administrations, with appropriate expertise and human resources, make them available collectively to serve the Union in a joint effort. They will however need the clearest possible instructions from the preparatory session as to the best planning method and as to the tools required for the speedy and effective application of that method by the main session of the conference. Similarly, the submission, assembly, sorting and collating of the requirements of administrations for HF broadcasting - and the preparation of a data-base or catalogue of stated requirements - must all be done during the inter-sessional period. In the particular matter of submitting requirements, administrations will need clear advice on the format to be employed. Appropriate guidance will need to be given on all these matters by the preparatory session of the WARC, 1984/1986.

4. Inter-Sessional Activities. Whichever planning method may be adopted by the preparatory session of the WARC, it will clearly be essential for the main sessio to have ready for its use a live database of broadcasting requirements and techni facilities as well as the necessary computer programs to apply that method. Equally, any planning method adopted by the main session of the WARC must as far as possible have been fully tested before that session begins. These requirement will demand a high level of inter-sessional activity, the scope and direction of which must be specified by the preparatory session. On this basis the United Kingdom proposes that the preparatory session should establish a timetable of events and the formats for the submission of administrations' broadcasting requir ments and technical facilities, determine the resources of personnel and programs required (and if possible identify sources), calculate any costs to the ITU[2] and formally request administrations and the Administrative Council to supply these resources. Upon the assumption that the resources will be found, the UK further proposes that the feasibility of the combined planning methods 5 and 7 should, by these means, be tested during the inter-sessional period and the outcome reported to the main session of the WARC for its consideration.

USA/24/24 PROPOSALS: The United States of America believes that a productive intersessional working group could greatly facilita and reduce the work that will be required of the second sessio of the Conference. Accordingly, it is proposed that such a group be established to study and report, to the second sessio the actions necessary for implementing the Planning Method selected.

MEX/49/RES **DRAFT RESOLUTION RELATING TO THE ESTABLISHMENT OF A GROUP OF EXPERTS**

The First Session of the World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, Geneva, 1984,

considering

a) item 4.3 of the agenda of the Conference;

b) that the work of the Second Session would be facilitated if, as part of the related preparatory work, a group representative of administrations were to conduct a thorough analysis of the technical criteria and the planning methods and principles proposed by the present Session and submit its conclusions to administrations and the Second Session;

resolves

1. to set up a Group of Experts composed of specialists from twelve administrations, chosen having regard to geographical distribution, to give due consideration to the results of the First Session, conduct studies and prepare the necessary reports on :

1.1 planning methods and procedures, including planning exercises;

1.2 other matters which might be of interest to the Second Session;

2. that at its first meeting the Group of Experts should decide on its organization and methods of work;

3. that the Group of Experts should complete its work sufficiently early for its report to be distributed in good time to all administrations;

invites the Administrative Council

1. to invite the administrations of the following Members to appoint a specialist to the Group of Experts referred to in resolves 1;

2. to provide the necessary resources for the experts' subsistence allowance and travel expenses, secretariat costs and the required data processing support, so that the Group of Experts is able to conduct its work in a satisfactory manner;

MEX/49/RES (Cont.)

requests the IFRB

1. to convene the Group of Experts and provide it with the necessary support, taking into account the decisions of the Administrative Council in respect of the invitation contained in this Resolution;

2. to assist and participate in the work of the Group of Experts and to continue the preparatory tasks for which it has responsibility;

3. to take the necessary steps to distribute the Group of Experts' report to all administrations six months before the Second Session;

requests the CCIR

to take part in the deliberations of the Group of Experts and to assist in its work;

requests the Secretary-General

1. to provide the Group of Experts with the facilities required for the performance of its task;

2. to make provision in the Conference budget for covering the expenses of the Group of Experts, by including the necessary credits in the draft submitted to the Administrative Council;

urges the administrations listed in invites the Administrative Council 1

to provide specialists for the Group of Experts;

invites administrations

to make available to the Group of Experts any relevant computer programs in their possession.

F/77/RES

RESOLUTION ...

on the structure and terms of reference of a group of experts set up to facilitate the work of the Second Session of the World Administrative Radio Conference for the Planning of HF Bands Allocated to the Broadcasting Service

(HFBC 1986)

The First Session of the World Administrative Radio Conference for the Planning of HF Bands Allocated to the Broadcasting Service (Geneva, 1984),

considering

a) that the Administrative Council envisaged the establishment of an inter-sessional working group in item 4.3 of the agenda of the Conference, as prepared at its 38th Session;

b) that the First Session of the Conference recognizes the need for such a group to prepare the work of the Second Session;

resolves

- to instruct the Administrative Council, at its 39th Session, to appoint a voluntary group of experts seconded by administrations;

- to establish the terms of reference of the group in accordance with the text annexed to this Resolution;

urges the Administrative Council

- to ensure that there is no increase in the personnel taking part in that work;

- to ensure that the expenditure entailed does not exceed the limits laid down in the Additional Protocol to the Nairobi Convention;

requests the IFRB

to assist the group of experts;

F/77/RES (Cont.)

requests further the other permanent organs of the Union

to cooperate, whenever necessary, in ensuring the successful accomplishment of the task of the group of experts;

instructs the Secretary-General

to submit the report prepared jointly by the group of experts and the IFRB to the Administrative Council at its 1986 session so that it may be sent to administrations at least two months before the opening of the Second Session of the Conference.

ANNEX

(to Resolution ...)

TERMS OF REFERENCE OF THE GROUP OF EXPERTS

1. In accordance with the planning principles and method adopted by the First Session of the Conference, to determine what further operations are required to determine the frequency of each emission in order to ensure optimum use of the available spectrum.

If more than one follow-up operation is feasible, to specify the advantages and disadvantages of each one.

2. To establish the appropriate computer programs.

3. To perform planning exercises with those programs in order to check their utility and, if necessary, to compare them.

4. To apply the programs to specific examples relating to all emissions with a recent tentative schedule.

To examine the results obtained in relation to the technical criteria adopted by the First Session.

Agenda item 4.4

CAN/4/20

A broadcast requirement is defined as a need to provide a broadcast service during a specified period to a specified reception area from a particular transmitter station. If the same program service originating from an administration for the same period and reception area is transmitted from more than one station then these are considered to be separate but associated requirements. A separate notice is required for each of these requirements with a change in the name and location of the transmitter station.

In general, a separate notice shall be sent to the IFRB for notifying each new broadcast requirement which is to acquire an operational designation for a particular season, for any change in the characteristics of a broadcast requirement for the season or in mid-season, and/or for any deletion of a broadcast requirement in the Master List or of a frequency assignment in the High Frequency Broadcasting Schedule for the season.

The proposed "Form of Notice for the Submission of HF Broadcast Requirements", specified on page 54 of these documents (i.e., section A of Appendix 2), covers the minimum mandatory information and additional optional data that are required. The planning concept based on broadcast requirements makes full use of vital information provided and therefore it is essential that accurate details are submitted at the outset. In Resolution No. CAN/3 contained in page 37, it is suggested that administrations take note of a number of important factors related to the submission of broadcast requirements.

The time schedule and functions of the Inter-sessional Working Group are contained in pages 38 and 39 so that the necessary preparations can be completed after the first session of the Conference establishes principles and a method of planning. The Inter-sessional Working Group will engage in its tasks in consultation with the IFRB and CCIR to ensure that the second session has the necessary computer programming and broadcast requirement information to enable administrations to proceed with the actual planning exercise.

CAN/4/23

BROADCASTING REQUIREMENTS

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service, Geneva, 1984,

considering

a) that this session of the Conference is to establish for use by the second session the form in which requirements for use in planning should be submitted to the ITU and the timetable for submission;

b) that the success of this planning Conference will be dependent upon administrations setting forth their minimum requirements to the Conference in order to avoid spectrum congestion, on the adoption of technical standards sufficient to support a satisfactory service, and on the adoption of planning methods capable of maximizing the efficient use of the spectrum;

c) that a standard and simplified requirements form is very important towards obtaining the necessary program information to enable planning of the HF bands;

d) that the technical parameters and the planning principles agreed to at the first session will require a significant amount of computer programming to develop a suitable working model;

requests the IFRB

1. to give special attention to the form in which broadcasting requirements are to be submitted by administrations;

2. to inform administrations of the format and the timetable for the submission of broadcast requirements;

3. to prepare suitable facilities to process broadcasting requirements.

SOME CONSIDERATIONS ON PROGRAMME REQUIREMENTS

CHN/10/1 1. Programme requirements submitted to the Conference by administrations should include the following major items :

1) Required service area ——— expressed in CIRAF zones as described in Appendix 1 of the Radio Regulations. If the required service area is smaller than an entire zone, it should be indicated as a country or part of a country using symbols in the Preface to the International Frequency List, as far as possible, or described by sub-dividing the CIRAF zones geographically in accordance with the stipulations of the Conference.

2) Broadcasting time block ——— expressed in UTC.

3) Future programme requirements, belonging to the projected category, should be noted with the dates from which they will be put into implementation.

CHN/10/2 2. Administrations should incidentally provide the following parameters of technical facilities used to implement their programme requirements :

1) Transmitting sites ——— place names and their geographical longitudes and latitudes.

2) Transmitter powers and the frequency bands in which the transmitters can operate.

3) Types of transmitting antennas and the frequency bands in which the antennas can operate ——— if a certain antenna is of a type other than one of the standard types specified by the Conference, its major parameters should be given.

CHN/10/3 3. The following provisions should be complied with by administrations in submitting their programme requirements :

1) Transmissions of identical broadcasting programmes by one administration from one or more than one transmitting site in the same time block to the same required service area should be treated as one programme requirement.

CHN/10/3 (Cont.)

2) If an identical broadcasting programme is transmitted by another administration or other administrations in the same time block to the same required service area, it should be noted with which programme requirement(s) of which administration(s) the submitted broadcasting requirement is identical. This (these) programme requirement(s) should be processed by the Conference, in accordance with agreed and unified criteria and procedures, as the same programme requirement implemented from multiple transmitting sites.

3) The above-mentioned identical broadcasting programmes are defined as the broadcasting programmes having the same content and in the same language, taking no account of the call-signs and musical signatures at the beginnings and conclusions of the transmissions.

4) Appropriate frequencies used for implementation of each programme requirement should be selected by the Conference in accordance with the agreed and unified criteria and procedures and should not be proposed by administrations. If desired frequency bands or frequencies are raised by administrations, they should serve for information only.

CHN/10/4

"4. Based on the above considerations, a definition of 'programme requirement' is given below :

A requirement to provide a broadcasting programme with specific content in a specific time block to a specific service area by one or more administrations, regardless of the number of transmitter stations or transmitters available for use."

ALG/28/8 When submitting its broadcasting requirements, each administration shall indicate the order of priority in which they are to be treated.

Reason : This listing is a consequence of the previous proposals.

ALG/28/9 For each broadcasting requirement, the service area to be covered and the intended broadcasting schedule shall be given. By way of information, the frequency (or frequency band) desired by the submitting administration may be indicated.

Reasons : a) To provide for uniform planning on the basis of broadcasting requirements and wave propagation conditions.

b) To allow some flexibility in the processing of requests when drawing up the plan.

ALG/28/10 Where a developing country administration possesses only transmitters operating on preset frequencies, the latter may be indicated in the request and will be taken into account.

Reason : To take account of real cases, in derogation of the rule laid down in ALG/28/9.

ALG/28/11 In addition to the essential data referred to in ALG/28/9 and, where applicable, in ALG/28/10, an administration's overall request shall contain technical information such as :

- coordinates of possible locations;
- technical characteristics of transmitting equipment available at each location;
- possibility of synchronizing two or more transmitters;
- directivity of antennas;
- possibility of coupling transmitters;
- any other relevant technical data.

Reason : To provide the planner with sufficient technical data to enable him to calculate as many variants as possible.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

Note by the Chairman of Working Group 5A

In response to a request made during the second meeting of Working Group 5A, the enclosed document, containing the statement by the Chairman of the IFRB, is submitted to Working Group 5A.

M. OUHADJ
Chairman of Working Group 5A

Annex : 1

ANNEX

During the discussion of the principles of planning in Working Group 5A, particularly the question of flexibility, a request was made for the publication of the statement made by the Chairman of the IFRB. The substance of that statement is given below.

The attention of the Group is invited to a basic element for high-frequency broadcasting which is related to the question of flexibility but which, unfortunately, has not been covered in any of the proposals from administrations to the First Session of the Conference, probably because the administrations wished to treat this item at the Second Session. The question relates to the definitive status of the use of frequencies for HF broadcasting. In conformity with the Radio Regulations, the status given to the use of a frequency derives from its recording by the IFRB in the Master International Frequency Register (Master Register), with an appropriate date in Column 2 which, according to the service and the frequency band concerned and the Finding by the IFRB, may lead to either the right to international recognition or the right to international protection. This procedure applies to all radio-communication services with the exception of HF broadcasting. For this latter service, the World Administrative Radio Conference of 1959 decided that the use of frequencies by HF broadcasting shall not bear any date in Column 2, with the exception of the date of the first use (Column 2c) which, by definition, is a data which is recorded for information only. The World Administrative Radio Conference of 1979 decided to delete these recordings from the Master Register and to continue to publish them in a list annexed to the International Frequency List. Once the adopted planning methodology is applied, may it be seasonal or annual in one form or another, the question that arises is to determine how the use of frequencies by administrations shall be recorded if at all. Should they be recorded in the Master Register and be given a status in the form of international recognition by all the countries? Should the present system be maintained, that is to say to record them in a list annexed to the International Frequency List without any juridical status?

The very nature of HF broadcasting probably led the legislators in previous conferences to approach this question with considerable caution and to confer to the use of frequencies by HF broadcasting the status of a recording made for information only. If this Conference were to decide that that procedure should be continued, then a question would arise as to whether a basic list or a plan or a list of foreseen use should form part of the Final Acts of the Conference for ratification by all Member States. There are thus two possibilities, either :

- the Conference decides that the basic list should form part of the Final Acts of the Conference, in which case it would be necessary to provide procedures which would permit updating of that list in order to have a live plan which would be modified as a function of the changes in requirements; or

- the basic list does not form part of the Final Acts of this Conference but becomes a list aimed at indicating the intentions of countries as to future utilization. Its updating could be made automatically on the basis of the information received from administrations by the IFRB.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4B

AGENDA ITEM 4.1.1 - DEFINITIONS

1. The Conference adopted the following definitions which are to be found in the relevant ITU Radio Regulations (1982) :

- Terms relating to emission

  Emission (RR 132)
  Class of emission (RR 133)
  Single-sideband emission (RR 134)
  Full-carrier single-sideband emission (RR 135)
  Reduced-carrier single-sideband emission (RR 136)
  Suppressed-carrier single-sideband emission (RR 137)
  Out-of-band emission (RR 138)

- Terms relating to frequency

  Frequency tolerance (RR 145)

- Terms relating to bandwidth

  Necessary bandwidth (RR 146)

- Terms relating to power

  Power (RR 150)
  Peak envelope power (RR 151)
  Mean power (RR 152)
  Carrier power (RR 153)
  Gain of an antenna (RR 154)
  Equivalent isotropically radiated power (e.i.r.p.) (RR 155)
  Effective radiated power (e.r.p.) (RR 156)

- Terms relating to zones of reception

  Geographic zones for broadcasting* (Appendix 1 of RR)

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* Commonly known as CIRAF zones.

2. The following definitions were also adopted :

Terms relating to the emission

- Reduced carrier

Carrier emitted at a power level reduced by at least 6 dB below the peak envelope power.

Terms related to field-strength

- Minimum usable field-strength (E_{min})

Minimum value of the field-strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of natural and man-made noise, but in the absence of interference from other transmitters.

- Usable field-strength (E_u)

Minimum value of the field-strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of noise and interference, either in an existing situation or as determined by agreements or frequency plans.

- Reference usable field-strength (E_{ref})

The agreed value of the usable field-strength that can serve as a reference or basis for frequency planning.

Terms related to the ratio of wanted and unwanted signals

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

The ratio (expressed in dB) between the values of the voltage of the wanted signal and the voltage of the interference, measured under specified conditions*, at the audio-frequency output of the receiver.

- Audio-frequency (AF) protection ratio

The agreed minimum value of the audio-frequency signal-to-interference ratio considered necessary to achieve a subjectively-defined reception quality.

- Radio-frequency (RF) wanted-to-interfering signal ratio

The ratio, expressed in dB, between the values of the radio-frequency voltage of the wanted signal and the interfering signal, measured at the input of the receiver under specified conditions*.

---

* The specified conditions include such diverse parameters as : spacing ΔF of the wanted and interfering carrier, emission characteristics (type of modulation, modulation depth, carrier-frequency tolerance, etc.), receiver input level, as well as the receiver characteristics (selectivity and susceptibility to cross-modulation, etc.).

- Radio-frequency (RF) protection ratio

The value of the radio-frequency wanted-to-interfering signal ratio that enables, under specified conditions*, the audio-frequency protection ratio to be obtained at the output of a receiver.

- Relative radio-frequency protection ratio

This ratio is the difference, expressed in decibels, between the protection ratio when the carriers of the wanted and unwanted transmitters have a frequency difference of Δf (Hz or kHz) and the protection ratio when the carriers of these transmitters have the same frequency.

- Selectivity of a receiver

A measure of its ability to discriminate between a wanted signal to which the receiver is tuned and unwanted signals.

- Sensitivity of a receiver

A measure of its ability to receive weak signals and to produce an output having usable strength and acceptable quality.

- Noise-limited sensitivity of a receiver

The noise-limited sensitivity expresses the ability of the receiver's radio-frequency part to receive weak signals. It is equal to the minimum level of the radio-frequency input signal, expressed in dB(μV/m) modulated 30% at the standard reference frequency, and which produces in the output power a chosen value of signal-to-noise ratio.

Terms related to coverage and service area

- Coverage area (of a broadcasting transmitter in a given broadcasting band) : (CCIR Recommendation 499-2)
The area within which the field-strength of a wanted transmission is equal to or greater than the usable field-strength. In the case of fluctuating interference or noise, the percentage of time during which this condition is satisfied should be stated.

- Service area

The area associated with a station for a given service and a specified frequency under specified technical conditions where radiocommunications may be established with existing or projected stations and within which the protection afforded by a frequency assignment or allotment plan or by any other agreement must be respected.

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* The specified conditions include such diverse parameters as : spacing ΔF of the wanted and interfering carrier, emission characteristics (type of modulation, modulation depth, carrier-frequency tolerance, etc.), receiver input level, as well as the receiver characteristics (selectivity and susceptibility to cross-modulation, etc.).

L.L. BRADLEY
Chairman of Drafting Group 4B-1

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

Draft

SECOND REPORT OF WORKING GROUP 5A

PLANNING METHODS

The results of the general discussion on the solution of incompatibilities and the order for processing requirements (respectively, items 3.1 and 3.2 of agenda WG/5A-5) held at Working Group 5A's fifth meeting may be summed up as follows.

1. Solution of incompatibilities

Administrations recognize that it will probably be impossible to accommodate all the requirements to be formulated with the same degree of protection and that cases of incompatibility will therefore arise before and during the bringing into operation of the requirements.

It will be necessary to develop automatized procedures for the solution of incompatibilities, on the basis of the planning principles adopted by the Conference and incorporated in the planning processes.

There should be pre-established limits for the application of these automatized procedures; outside those limits, administrations will be able to undertake coordination.

2. Order for processing requirements

Some administrations stated that it was difficult, if not impossible, to set any order of priority for the requirements they would be formulating; they expressed the view that requirements should be processed on an equitable basis, above all so as to guarantee the equal rights of all countries while at the same time ensuring efficient use of the frequency spectrum.

M. OUHADJ
Chairman of Working Group 5A

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

CAMR POUR LA RADIODIFFUSION A ONDES DÉCAMÉTRIQUES

PREMIÈRE SESSION, GENÈVE, JANVIER/FÉVRIER 1984

Addendum 1 to 1
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GROUPE DE TRAVAIL 4B
WORKING GROUP 4B
GRUPO DE TRABAJO 4B

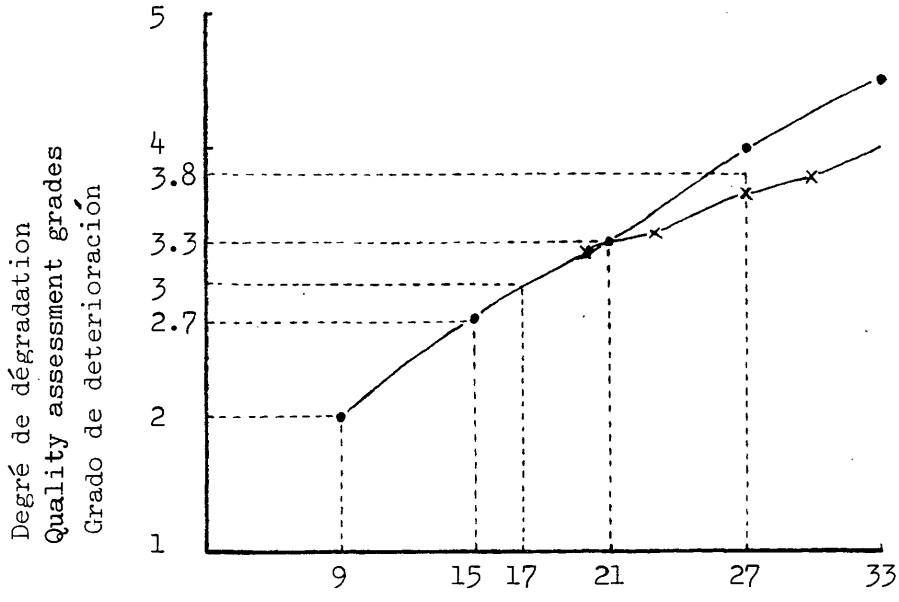

FIGURE /B/

FIGURA /B/

L.L. BRADLEY
Le Président du Groupe de rédaction 4B-1
Chairman of Drafting Group 4B-1
El Presidente del Grupo de redacción 4B-1

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-1

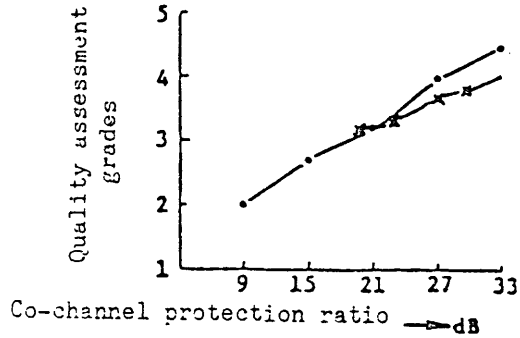
TO WORKING GROUP 4B

/3.3/ Radio-frequency protection ratios

After a careful review of Administrations proposals and the extensive study of this matter by the CCIR, the Conference adopted recommendations which consider the subjective tests comparing quality of listener satisfaction with various levels of protection ratios. The decisions were also made with a recognition that the number of requirements and the limited amount of allocated spectrum space would require a reduction of the desired protection ratio comensurate with the number of requirements to be satisfied. With these considerations in mind the following decisions were made.

/3.3.1/ Co-channel protection ratios and frequency tolerances

For stable conditions where the frequency difference between wanted and unwanted carriers does not exceed 100 Hz the value of 27 dB is adopted as a value to be achieved if feasible. If this value is unobtainable the values in figure /B/ provide planners with advice on the resultant quality of service when protection ratios are reduced from the level of 27 dB.



/This Figure will be republished in a larger scale./

FIGURE /B/

Relationship between reception quality and co-channel RF protection ratio

Figure /C/ provides a description of the five levels of quality assessment grades.

Quality	Impairment
5 Excellent 4 Good 3 Fair 2 Poor 1 Bad	5 Imperceptible 4 Perceptible, but not annoying 3 Slightly annoying 2 Annoying 1 Very annoying

FIGURE /C/

/3.3.2/ Relative values of protection ratio as a function of carrier frequency separation

Once a value for the co-channel radio-frequency protection ratio (which is equal to the audio-frequency protection ratio) has been determined, then the radio-frequency protection ratio, expressed as a function of the carrier frequency spacing, can be determined by adding the value given in the curve in Fig. /D/ to the value of the co-channel RF protection ratio. The curve in Fig. (____) shall be used for planning purposes.

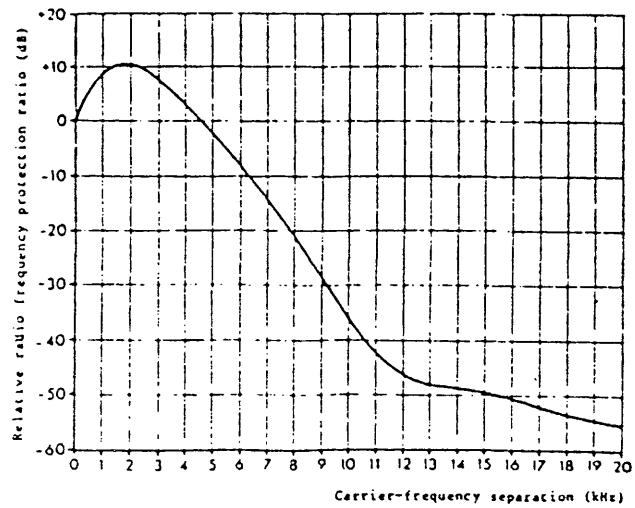


FIGURE /D/

Relative value of the radio-frequency protection ratio as a function of the carrier-frequency separation

/3.6/ Use of synchronized transmitters

/3.6.1/ The use of synchronized transmitters, where appropriate, is an efficient means of economizing frequency spectrum. When synchronized transmitters are utilized the carrier frequency difference shall be 0.1 Hz or less for broadcasting the same programme to partially overlapping or non-overlapping service areas.

/3.6.2/ Protection ratios in the range of 3 to 11 dB give satisfactory reception with a carrier frequency difference of 0.1 Hz or less. For planning purposes a value of 8 dB shall be used.

When the synchronized transmitters are driven by a common oscillator and use antennas which have similar vertical radiation characteristics a lower protection ratio of 3 dB shall be adopted for planning.

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Chairman of Drafting Group 4B-1

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 4A

REPORT TOPICS 3.2.2 and 3.2.3

3.2.2 Atmospheric and man-made radio noise data

3.2.2.1 Atmospheric radio noise data

The hourly median values of atmospheric noise intensity as contained in CCIR Report 322-2 are adopted.

The method of implementation of the data may be :

- a direct calculation as required based upon a numerical representation of the maps;
- a grid representation similar to that currently in use by the IFRB, except that the grid should have a size of 10° latitude by 15° longitude in all parts of the world;
- the precalculation of values appropriate for each test point.

The choice from these options should be such as to minimize the calculation time required during the operation of the planning method.

3.2.2.2 Man-made radio noise data

The median value of man-made noise power F_{am} expressed in dB above thermal noise at T_o = 288K, to be adopted is given by :

$$F_{am} = 67.2 - 27.7 \log f$$

$$F_{am} = 60.4 - 28.15 \log f$$

where f is the frequency in MHz.

3.2.2.3 The combination of atmospheric and man-made noise

In each case the values of atmospheric noise and man-made noise intensities shall be compared and the greater one shall be used.

3.2.3 Signal fading

3.2.3.1 Short-term (within the hour) fading

The upper-decile amplitude deviation from the median of a single signal is to be taken as 5 dB and the lower-decile deviation is to be taken as 8 dB.

3.2.3.2 Long-term (day-to-day) fading

The magnitude of the long-term fading, as determined by the ratio of operating frequency to basic MUF is given in Table 3.3.3-I.

TABLE 3.3.3-I

Decile deviations from the predicted monthly median value of signal field strength, in dB, arising from day-to-day variability

Corrected geomagnetic latitude(1)	< 60°		≥ 60°	
Transmitting frequency/ predicted basic MUF	Lower decile	Upper decile	Lower decile	Upper decile
≤ 0.8	-8	6	-11	9
1.0	-12	8	-16	11
1.2	-13	12	-17	12
1.4	-10	13	-13	13
1.6	-8	12	-11	12
1.8	-8	9	-11	9
2.0	-8	9	-11	9
3.0	-7	8	-9	8
4.0	-6	7	-8	7
≥ 5.0	-5	7	-7	7

(1) If the great circle between transmitter and receiver touches or crosses the corrected geomagnetic latitude of 60° the values for ≥ 60° have to be used. The relationship of corrected geomagnetic latitude to geographical coordinates is shown in Figs. 1 and 2 of Report 886.

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INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

Draft

SECOND REPORT OF WORKING GROUP 5A

DEFINITIONS

Document 88 was referred by Committee 4 to Committee 5, which was requested to study and define the terms contained in it. These are set out below.

1. Broadcasting requirement

Ad hoc Group 5A-2 has already submitted a definition to Working Group 5A, which agreed to defer consideration of the matter. The definition is found in Document DT/13.

2. National broadcasting station
International broadcasting station

Working Group 5A considers that neither term serves a useful purpose and, consequently, that it is not necessary to produce definitions.

3. National HF broadcasting
International HF broadcasting

These terms gave rise to a lengthy discussion, following which Working Group 5A decided to defer consideration of the definition.

4. Required service area

After a long discussion, the definition in Document 88 was amended as follows :

"The area within which an administration requests to operate a broadcasting service conforming to the planning method [and the technical criteria] adopted."

Most of the delegations which took part in the discussion stated that they were in favour of the above text. The words between square brackets are associated with the principle regarding proportionately reduced protection, which has been referred to ad hoc Group 5A-2 for consideration.

The French delegation stated that it had difficulty in accepting the definition and reserved its right to revert to the matter.

The IFRB requested that the following two paragraphs be included in this report :

"1) When applying Article 17, the IFRB has sometimes encountered difficulties arising from the fact that there is no limit to the number of CIRAF zones which may be entered in a notice. At times, this results in extremely large service areas.

2) Although Document 101 was not part of Working Group 5A's terms of reference, the definition of the "required service area" cannot be treated as an isolated matter, but must be considered in conjunction with the definitions of "coverage area" and "service area". It is necessary to know the relationship which exists between these three definitions."

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Corrigendum 1 to
Document DT/21-E
23 January 1984
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WORKING GROUP 4A

3.2.1 The method to be used to determine sky-wave field strength for HF broadcast planning purposes

1. Add the following as a new section 3.2.1.2.1.3 :

"E-layer screening frequency (f_s)

The foE value at the middle point of the path (for paths up to 2,000 km), or the higher one of the foE values at the two control points 1,000 km from each end of the path (for paths longer than 2,000 km), is taken for calculation of E-layer screening frequency.

$$f_s = 1.05 \text{ foE sec } \varphi_s$$

in which $\varphi_s = \arcsin \left[\frac{R \cos \Delta_F}{R + 110} \right]$

R is the radius of the Earth, 6,371 km,

Δ_F is the vertical radiation angle for F2-layer mode (see section 3.2.1.2.3)"

2. In section 3.2.1.2.3 :

a) change reference to section 3.4.1 in the equation for h' to read section 3.2.1.3.1.1;

b) delete R = 6,371 km;

c) in the last paragraph of this section, replace reference to section 3.1 with section 3.2.1.3.1 and reference to section 3.2 with section 3.2.1.3.2.

3. Add to section 3.2.1.3.1, second paragraph the following text :

"... obtained by power addition. In circumstances where a low-order F2 mode is screened by the E-layer, as determined in the ray-path calculations, or where an antenna is specified which only radiates sufficiently at high angles, the next higher-order mode must be considered."

4. In section 3.2.1.3.1.2, replace the reference to section 2.3 with section 3.2.1.2.3.

5. In Tables 1 and 2 :

a) add the words "in the Northern Hemisphere" after February and add a line "May, June, July, August in the Southern Hemisphere";

b) add the words "in the Northern Hemisphere" after August and add a line "November, December, January and February in the Southern Hemisphere".

6. Change section 3.2.1.3.1.3 last paragraph to read : "Local mean time, and the geomagnetic latitude and the locations at which it is applied."

7. In section 3.2.1.3.1.4, replace reference to sections 3.1.2 and 3.1.3 with 3.2.1.3.1.2 and 3.2.1.3.1.3.

8. In section 3.2.1.3.1.5, replace reference to section 2.3 with section 3.2.1.2.3 and replace reference to section 3.1.3 with section 3.2.1.3.1.3.

9. Change section 3.2.1.3.1.7 to read :

"The resultant of combining the field strengths of the two strongest F2 modes and the strongest E mode is obtained by calculating the square root of the sum of the squares of the numerical values of the field strengths."

10. In section 3.2.1.3.2 change the last sentence in paragraph 1 to read :

"In this method the antenna gain term, G_{t1}, is the greatest value of antenna gain in dBi which occurs in the range of vertical radiation angles from 0^{o} to 10^{o} at the appropriate azimuth."

11. In section 3.2.1.3.2, the definition of the term G_{ap} change the first sentence to read "G_{ap} is the increase in field strength due to focussing at long distances." ...

12. In section 3.2.1.3.2 in the description of f_g, change the wording that defines f_g to read :

"f_g is the basic MUF for the hop length and is determined by the method given in section 3.2.1.2.2.2.1. This value is only used in the calculation f_M."

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4A

REPORT TOPIC 3.2.1

3.2.1 The method to be used to determine the sky-wave field strength for HF broadcast planning purposes

3.2.1.1 Introduction

The field strength prediction method is in two parts : for ranges up to 7,000 km and for ranges beyond 9,000 km. In the overlapping interval, 7,000 to 9,000 km, an interpolation procedure is used.

3.2.1.2 Ionospheric parameters

Values of selected ionospheric parameters (foE, foF2 and M(3000)F2) are needed together with the derived parameters (E-layer basic MUF and F-layer basic MUF) in order to determine the field strength of sky-wave modes reflected from the ionosphere. For total path lengths between 0 and 4,000 km, the basic MUF of an E mode is predicted. For all path lengths the basic MUF for the F2 mode is predicted. Where appropriate the higher of the two values gives the basic MUF for the path.

The vertical radiation angle is also needed in the calculation of sky-wave field strength. The vertical radiation angle is used to determine the appropriate mode of propagation and is also used in conjunction with the antenna gain to determine the proper field strength.

The transmitting antennas in use will have gains which vary with the vertical radiation angle and some antennas, intended for shorter distance broadcasting, radiate very poorly at low angles. It is important to associate the antenna gain at the appropriate radiation angle with the propagation prediction for that particular mode.

3.2.1.2.1 E-layer parameters

3.2.1.2.1.1 E-layer data

For paths up to 2000 km foE is evaluated at the path mid-point. For ranges greater than 2000 km foE is evaluated at two control points, each 1000 km along the path from the transmitter and receiver respectively. At these points the solar zenith angle χ, in degrees, is determined, then :

$$foE = 0.9\left[(180 + 1.44R_{12})\cos\chi'\right]^{0.25} \text{ MHz}$$

where : $\chi' = \chi$ for $0 \leq \chi \leq 80$; $\chi' = 90 - \frac{e^{0.13(116-\chi)}}{10.8}$ for $80 < \chi < 116$

$\chi' = 89.907$ for $\chi \geq 116$

R_{12} is the 12 month running mean sunspot number

3.2.1.2.1.2 E-layer basic MUF prediction (E(D) MUF)

The foE value at the mid-point of the path (for paths up to 2000 km) or the lower of the foE values at the two control points (for paths longer than 2000 km) is taken for the computation of the E-layer basic MUF.

The MUF for a path of length D is given as :

$$E(D)MUF = foE.\ \sec i_{110}$$

With i_{110} = angle of incidence at a height of 110 km evaluated in accordance with Report 252.

3.2.1.2.2 F-layer parameters

3.2.1.2.2.1 F2-layer data

Numerical maps of the parameters foF2 and M(3000)F2, for solar index values R_{12} = 0 and 100, and for each month are presented in Report 340. This prediction method uses the Oslo coefficients to determine the values of foF2 and M(3000)F2 for the required locations and times. It may be desirable to calculate in advance, values of these parameters at specific grid intervals of latitude, longitude and times and to use an interpolation procedure to obtain values for the required location and time between appropriate grid points as the use of a grid may be appropriate for other ionospheric parameters as well.

3.2.1.2.2.2 F2-layer basic MUF prediction (F2(D)MUF)

3.2.1.2.2.2.1 For paths up to 4,000 km

F2-layer basic MUF is calculated from

$$F2(ZERO)MUF = foF2 + f_H/2$$

$$F2(4000)MUF = 1.1\ foF2.M(3000)F2$$

where f_H is the electron gyro-frequency given in terms of parameters of the Earth's magnetic field. A numerical representation is available in Report 340.

At the midpoint of the great-circle path between the transmitter and receiver determine the above values for the solar index values R_{12} = 0 and R_{12} = 100. Interpolate or extrapolate linearly for required index values between R_{12} = 0 and 150. For higher sunspot activity use R_{12} = 150.

Interpolate for the length of the path using the relationship :

$$F2(D)MUF = F2(ZERO)MUF + \left[F2(4000)MUF - F2(ZERO)MUF\right] \cdot M(D)$$

where $M(D) = 1.64 \cdot 10^{-7}D^2$ for $0 \leq D < 800$ and

$$M(D) = 1.26 \cdot 10^{-14}D^4 - 1.3 \cdot 10^{-10}D^3 + 4.1 \cdot 10^{-7}D^2 - 1.2 \cdot 10^{-4}D$$

for $800 \leq D \leq 4000$.

where D is in km.

This gives the median F2-layer basic MUF.

3.2.1.2.2.2.2 For paths longer than 4,000 km

For these paths (which may be the longer great-circle path), control points are taken at 2,000 km from each end of the path. At these points, values of F2(4000)MUF, interpolating for sunspot number, are determined and the lower value is selected. This gives the median F2-layer basic MUF.

3.2.1.2.3 Vertical radiation angle

Radiation angle is taken into account in the prediction of field strength. It is given, approximately, by :

$$\Delta = \arctan\left(\cot\frac{d}{2R} - \frac{R}{R+h'}\operatorname{cosec}\frac{d}{2R}\right)$$

where

d = hop length of an n hop mode given by $d = D/n$

h' = 110 km for the E-layer or h' is as given in § 3.4.1 for the F2-layer.

R = 6,371 km

In the method for shorter path lengths (section 3.1) the radiation angles calculated are used in the determination of antenna gain. For the longer path lengths the appropriate procedure is described in section 3.2.

3.2.1.3 The prediction of the median field strength

3.2.1.3.1 Method for path lengths of 0 to 7,000 km

CCIR Report 252-2 details the geometrical considerations, the reflection areas used and the method of performing ray-path calculations.

The procedure is based on the ray-path geometry with mirror reflections in the ionosphere. The method determines the field strengths of the two strongest modes propagated via the F2 region and the strongest mode propagated via the E region. The resultant field strength from these modes is obtained by power addition.

It is recognized that multi-hop E region propagation suffers substantial absorption losses and E modes are not considered at ranges beyond 4,000 km.

The appropriate inclusion of these concepts into a computer implementation for practical planning purposes is in accordance with the following procedure.

3.2.1.3.1.1 For the path length, d(km), determine the minimum number of hops for an F2 region mode. This is given approximately as ((the integer part of d ÷ 4,000) + 1) or better, by calculating the ray-path geometry using the reflection height hpF2 given by :

$$hpF2 = \frac{1490}{M(3000)F2} - 176 \text{ km}$$

The reflection height h', which is a function of time, location and path length, is used for the ray-path calculations for F2-modes. It is given by :

$$h' = 358 - (11 - 100a)\left(18.8 - \frac{320}{x^5}\right) + ad\left(0.03 + \frac{14}{x^4}\right) \quad km$$

or 500 km, whichever is the smaller,

a = 0.04 or (1/M(3000)F2) - 0.24, whichever is the larger and

x = foF2/foE, determined at the control point with the lowest value of foF2, or 2, whichever is the larger.

3.2.1.3.1.2 For the given mode, determine the vertical radiation angle from section 2.3 and then determine the transmitting antenna gain G_t at that angle and the appropriate azimuth, relative to an isotropic antenna.

3.2.1.3.1.3 Compute the median field strength for that mode using the formula :

$$E_{ts} = 136.6 + P_t + G_t + 20 \log f - L_{bf} - L_i - L_m - L_g - L_h - 12.2^* \text{ dB}(1\mu V/m)$$

where f is the transmitting frequency in MHz and P_t is the transmitter power in dB relative to 1 kW. L_{bf} is the basic free space transmission loss in dB, given by :

$$L_{bf} = 32.45 + 20 \log f + 20 \log P'$$

P' is the virtual slant range in km

$$P' = \left[2R \sum_{n} \frac{\sin \frac{d}{2R}}{\cos\left(\Delta + \frac{d}{2R}\right)}\right]$$

L_i is the absorption loss in dB given in CCIR Report 252-2. It is determined for each hop and the results are added. For frequencies above the basic MUF, it continues to vary with frequency and is calculated assuming ray paths similar to those at the MUF.

L_m is the "above-the-MUF" loss. For frequencies, f, above the basic MUF (f_b) of a given mode :

$$L_m = 130\left(\frac{f}{(f_b)} - 1\right)^2 \quad \text{dB}$$

---

* This term contains those effects of sky-wave propagation not otherwise included in this fast simple method. A value of 12.2 dB is recommended based upon data available. It is noted, however, that the value may need to be changed by those implementing this procedure to take account of additional calibrated data which are now available.

TABLE 1

L_h for paths less than 2,500 km

G.M. LAT.	01-04LMT	04-07LMT	07-10LMT	10-13LMT	13-16LMT	16-19LMT	19-22LMT	22-01LMT
				WINTER (NOVEMBER, DECEMBER, JANUARY, FEBRUARY)				
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
45-50	0.1	0.3	0.6	0.0	0.1	0.1	0.3	0.1
50-55	0.6	0.8	1.6	0.1	0.3	0.6	1.0	0.3
55-60	1.5	2.1	4.4	0.7	0.8	2.2	2.5	1.3
60-65	4.8	8.2	10.5	2.7	1.6	5.7	7.3	5.2
65-70	6.7	11.0	13.5	3.0	1.7	5.8	8.6	6.0
70-75	5.7	7.9	10.7	1.7	0.9	3.6	4.1	4.0
75-80	2.5	5.0	7.1	0.9	0.3	1.9	2.3	2.0
				EQUINOX (MARCH, APRIL, SEPTEMBER, OCTOBER)				
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.0	0.1	0.2	0.1	0.1	0.3	0.2	0.1
45-50	0.4	0.4	0.9	0.6	0.4	1.3	0.9	0.8
50-55	1.0	1.0	2.7	1.8	1.2	2.7	2.1	2.1
55-60	2.0	3.0	6.2	3.7	2.6	4.5	4.0	5.0
60-65	4.7	5.0	12.0	7.5	5.6	7.8	9.0	11.8
65-70	6.8	11.6	19.6	8.8	6.3	7.8	10.3	14.6
70-75	4.9	11.7	20.0	6.2	3.3	4.9	7.7	9.5
75-80	2.0	7.5	9.2	3.9	1.6	3.0	4.2	4.1
				SUMMER (MAY, JUNE, JULY, AUGUST)				
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.0
45-50	0.5	0.4	0.5	0.4	0.5	1.1	1.0	0.4
50-55	1.3	1.1	1.4	1.0	1.1	3.0	2.9	0.7
55-60	2.9	2.4	3.0	2.6	2.9	5.8	5.8	1.8
60-65	6.0	4.1	6.0	5.3	4.3	8.4	7.6	4.3
65-70	6.0	4.6	7.3	5.0	4.2	7.2	8.8	5.0
70-75	3.7	3.8	5.0	3.5	3.2	4.8	6.0	3.4
75-80	2.4	2.8	3.1	2.7	2.3	3.8	4.3	2.1

TABLE 2

L_h for paths greater than 2,500 km

G.M. LAT.	01-04LMT	04-07LMT	7-10LMT	10-13LMT	13-16LMT	16-19LMT	19-22LMT	22-01LMT
			WINTER (NOVEMBER, DECEMBER, JANUARY, FEBRUARY)					
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45-50	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.2
50-55	0.4	0.4	0.2	0.0	0.4	0.4	0.9	0.8
55-60	1.1	1.8	0.9	0.2	1.2	1.4	2.0	2.3
60-65	3.3	6.2	2.6	1.3	2.6	3.4	3.6	7.6
65-70	5.5	6.4	4.1	2.0	4.1	3.6	4.4	9.9
70-75	3.9	4.6	3.3	1.3	4.0	2.2	3.1	8.0
75-80	2.2	3.2	1.9	0.7	2.7	1.2	1.2	2.9
			EQUINOX (MARCH, APRIL, SEPTEMBER, OCTOBER)					
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
45-50	0.2	0.2	0.3	0.2	0.1	0.5	0.6	0.4
50-55	0.5	0.6	0.5	0.6	0.5	1.6	1.8	1.1
55-60	1.0	1.3	1.3	1.7	1.3	3.4	3.8	2.4
60-65	2.9	3.8	4.2	4.1	2.9	6.3	8.4	7.3
65-70	4.3	5.6	6.4	5.1	4.4	6.3	9.2	9.3
70-75	3.0	4.7	5.0	3.0	2.4	3.4	5.4	4.8
75-80	1.3	1.9	2.2	0.8	0.8	0.8	1.2	1.1
			SUMMER (MAY, JUNE, JULY, AUGUST)					
00-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-45	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
45-50	0.5	0.3	0.4	0.2	0.4	0.1	0.6	0.5
50-55	1.1	1.1	1.1	0.6	1.2	0.4	1.9	1.3
55-60	2.5	2.9	2.6	1.1	2.5	1.2	3.8	2.9
60-65	4.9	7.5	6.2	2.2	3.8	2.6	5.2	5.0
65-70	5.0	7.8	6.1	2.3	3.8	2.7	4.8	5.0
70-75	3.2	5.4	3.4	1.5	2.2	0.9	2.6	3.2
75-80	2.0	4.3	1.5	1.1	0.8	0.1	0.9	1.4

L_m is independent of the number of hops, but is limited to a value of 81 dB.

L_g is the ground reflection loss at intermediate reflection points. It is given as 2 dB for each intermediate ground reflection, i.e. :

for one hop paths $L_g = 0$;

two hop paths $L_g = 2$ dB;

three hop paths $L_g = 4$ dB.

L_h is the factor to allow for auroral and other signal losses and is given in Tables 1 and 2 using the methods given in Report 252-2 to determine the local mean time and the geomagnetic latitude.

3.2.1.3.1.4 Repeat the procedure of 3.1.2 and 3.1.3 using successively higher order modes (increasing the number of hops by one each time) until the predicted mode field strength reaches a maximum. Select the two strongest F2 region modes, noting the field strength and radiation angles.

3.2.1.3.1.5 For the E region the lowest order mode is 1E for ranges 0 - 2,000 km and 2E for ranges 2,000 to 4,000 km. The E mode radiation angle and field strength are again obtained as in section 2.3 and section 3.1.3.

3.2.1.3.1.6 Repeat the E mode calculations for successively higher modes until a maximum is found.

3.2.1.3.1.7 Combine the field strengths of the two strongest F2 modes and the strongest E mode to obtain the resultant.

3.2.1.3.2 <u>Method for path lengths greater than 9,000 km</u>

At long ranges, generally with low radiation angles, the method of prediction using geometric ray-hops is inadequate at present. The method used for long distances is based on an empirical fit of observations. In this method the antenna gain term, G_{tl} is the highest value of antenna gain which occurs in the range of vertical radiation angles from 0° to 10°.

The overall median field strength is given by :

$$E_{tl} = E_o\left(1 - \frac{(f_M+f_H)^2}{(f_M+f_H)^2 + (f_L+f_H)^2}\left(\frac{(f_L+f_H)^2}{(f+f_H)^2} + \frac{(f+f_H)^2}{(f_M+f_H)^2}\right)\right) - 36.4 + P_t + G_{tl} + G_{ap} - 0.8^{*} \text{ dB}\left(\frac{1\mu V}{m}\right)$$

It is assumed within this procedure that there is a hypothetical ray path with a number of equal length hops, each less than 4,000 km.

$E_o = 139.6 - 20 \log P'$, and the height used in the determination of P' is 300 km.

G_{tl} is the antenna gain for the appropriate azimuth and vertical radiation angle between 0° and 10° yielding the highest gain.

---

* This term contains those effects of sky-wave propagation not otherwise included in the method. A value of 0.8 dB is recommended based upon data available. It is noted however that this value may need to be changed by those implementing this procedure to take account of additional calibrated data which are now available.

G_{ap} is the gain in field strength due to focussing at long distances. In the case of propagation to very long distances with D, the great-circle distance between transmitter and receiver, greater than $\pi R/2$, this focussing is taken into account by means of the following provisional formula :

$$G_{ap} = -20 \log \left(\left| 1 - \frac{n\pi R}{D} \right| \right) \quad \text{dB}$$

for $$\left(\frac{2n-1}{2}\right) \pi R \leq D \leq \left(\frac{2n+1}{2}\right) \pi R \quad \text{with } n = 1 \text{ and } 2.$$

As G_{ap} tends to infinity for $D = n\pi R$ it is limited arbitrarily to the value of 30 dB.

f_M is the upper limit frequency. It is determined separately for the first and last hops of the path and the lower value is taken.

$$f_M = K \cdot f_g \quad \text{MHz}$$

$$K = 1.2 + W \frac{f_g}{f_{g,\,noon}} + X\left(\sqrt[3]{\frac{f_{g,\,noon}}{f_g}} - 1\right) + Y\left(\frac{f_{g,\,min}}{f_{g,\,noon}}\right)^2$$

f_g is the particular form of basic MUF used in this procedure. It is the basic MUF for the hop length determined by the method given in section 2.2.2.1.

$f_{g,\,noon}$ is the value of f_g for a time corresponding to local noon at the control point

$f_{g,\,min}$ is the lowest value of f_g for the hop which occurs during the 24 hours

W, X and Y are given in Table 3. The azimuth of the great-circle path is determined at the centre of the whole path and this angle is used for linear interpolation in angle between the east-west and north-south values.

TABLE 3

Values W, X, Y used for the determination of the correction factor K

	W	X	Y
East-west	0.1	1.2	0.6
North-south	0.2	0.2	0.4

f_L is the lower limit frequency when the path is in daylight

$$f_L = (5.3 \cdot I \left[\frac{(1 + 0.009R_{12}) \sum_{2N} \cos^{\frac{1}{2}} \chi}{\cos i_{90} \ln \left(\frac{9.5 \cdot 10^6}{P}\right)} \right]^{\frac{1}{2}} - f_H) \cdot A_W \quad \text{MHz}$$

In the summation, χ is determined for each traverse of the ray path through the height of 90 km.

when $\chi > 90^\circ$, $\cos^{\frac{1}{2}}\chi$ is taken as zero

i_{90} is the angle of incidence at a height of 90 km

I is given in Table 4.

A_W is a winter-anomaly factor determined at the path mid-point which is unity for geographic latitudes 0 to 30° and at 90° and reaches the maximum values given in Table 5 at 60°. The values at intermediate latitudes are found by linear interpolation.

As the path progressively becomes dark the values of f_L are calculated until the time t_n when $f_L \leq 2f_{LN}$ where $f_{LN} = \sqrt{\frac{D}{3000}}$ (MHz). During the subsequent three hours f_L is calculated from $f_L = 2f_{LN}e^{-0.23t}$ where t is the time in hours after t_n. For the remainder of the night hours $f_L = f_{LN}$ until the time when the daylight equation gives a higher value.

TABLE 4

Values of I used in the equation for f_L

Latitudes		Month											
Terminal 1	Terminal 2	J	F	M	A	M	J	J	A	S	O	N	D
>35°N	>35°N	1.1	1.05	1	1	1	1	1	1	1	1	1.05	1.1
>35°N	35°N-35°S	1.05	1.02	1	1	1	1	1	1	1	1	1.02	1.05
>35°N	>35°S	1.05	1.02	1	1	1.02	1.05	1.05	1.02	1	1	1.02	1.05
35°N-35°S	35°N-35°S	1	1	1	1	1	1	1	1	1	1	1	1
35°N-35°S	>35°S	1	1	1	1	1.02	1.05	1.05	1.02	1	1	1	1
>35°S	>35°S	1	1	1	1	1.05	1.1	1.1	1.05	1	1	1	1

TABLE 5

Values of the winter-anomaly factor, A_W, at 60° geographic latitude used in the equation for f_L

Month

hemisphere	J	F	M	A	M	J	J	A	S	O	N	D
Northern	1.30	1.15	1.03	1	1	1	1	1	1	1.03	1.15	1.30
Southern	1	1	1	1.03	1.15	1.30	1.30	1.15	1.03	1	1	1

3.2.1.3.3 Method for path lengths between 7,000 and 9,000 km

In this range of distances, the field strengths E_{ts} and E_{tl} are determined by both of the above procedures and the resultant is found by appropriate mathematical interpolation. One such interpolation procedure is given as :

$$E_{ti} = E_{ts} + \frac{D-7000}{2000}(E_{tl} - E_{ts}) \quad dB(1\mu V/m)^{*}$$

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* Taking account of the data now available those charged with implementing this procedure may consider an alternative form for this interpolation.

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-1 TO WORKING GROUP 4B

3.1 Double sideband (DSB) system specifications

After a review of administrations' proposals and the study of this matter by the CCIR, the Conference adopted the following Double Sideband (DSB) System specifications.

3.1.1 Transmission characteristics

3.1.1.1 Audio-frequency bandwidth

The upper limit of the audio bandwidth of the transmitter shall not exceed 4.5 kHz and the lower limit shall be 150 Hz with lower frequencies attenuated at a slope of 6 dB per octave.

3.1.1.2 Necessary bandwidth

The necessary bandwidth is twice the audio-frequency bandwidth.

3.1.1.3 Characteristics of modulation processing

The audio signal shall be processed such that the modulating signal retains a dynamic range of not less than 20 dB. Excessive amplitude compression, together with improper peak limitation, will lead to excessive out-of-band radiation and thus to adjacent channel interference, and shall therefore be avoided.

3.1.2 Channel spacing

(For the text already adopted see Document 93, Annex 4.)

3.1.3 Nominal carrier frequencies

(For the text already adopted see Document 93, Annex 4.)

3.1.4 Receiver characteristics

3.1.4.1 Overall selectivity of the receiver

The overall selectivity of the receiver as shown in Figure [1] below, shall be used for planning purposes.

3.1.4.2 Noise limited sensitivity of the receiver

(To be concluded.)

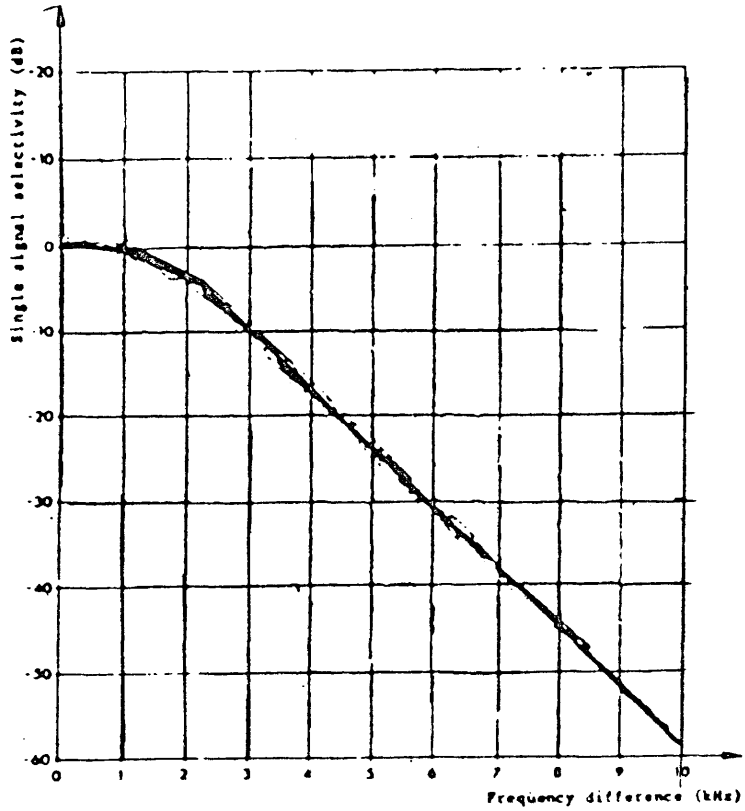

FIGURE [1]

Overall frequency response of the reference receiver

3.5 Antennas and power

The combined effects of transmitter power and antenna characteristics which determine the effective radiated power (e.r.p.) are the overall consideration which is significant in computations for HF broadcasting planning purposes. The selection of power and associated antennas should be based on the use of the most directional antenna appropriate to the broadcasting requirement. The power required must be as low as possible to achieve broadcasting objectives.

3.5.1 Characteristics of antennas to be used for planning

(Text will follow.)

3.5.2 Transmitter power and effective radiated power appropriate for satisfactory service

The propagation prediction method described in section 3.3.1 shall be used to determine the appropriate transmitter power to achieve satisfactory service. The appropriate transmitter power varies with the propagation conditions which in turn are functions of diurnal, seasonal, and solar cycle period and geographic location.

(Additional texts will follow pending Committee 4 actions.)

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WORKING GROUP 4A

FIRST REPORT OF DRAFTING GROUP 4A-2

FIRST PROPOSAL : BASIC CIRCUIT RELIABILITY USING SIGNAL-TO-NOISE RATIO

The process for calculating basic circuit reliability is indicated in Table 1. The median value of field strength for the wanted signal at step (1) is provided by the field strength prediction method. The upper and lower decile values at steps (2) through (5) are also determined, taking account of long-term (day-to-day) and short-term (within the hour) fading. From steps (6) to (10) consideration is given to atmospheric noise, man-made noise, and intrinsic receiver noise, and at step (11) the median value of field strength for the noise is taken as the greatest of the three components. The values of signal and noise determined at steps (1) and (11) are then combined at step (12) in order to derive the median signal-to-noise ratio, SNR(50).

At step (13), $D(N_T)$ describes the variability of the radio noise and a value of $\overline{X}$ dB is taken for both the upper and lower decile. The upper and lower deciles of signal-to-noise ratio are then calculated in steps (14) and (15) in order to derive the signal-to-noise ratios exceeded for 10% and 90% of the time at steps (16) and (17). The signal-to-noise ratio probability distribution may now be produced, as is shown by Figure 1, where the ratio is plotted in decibels versus the probability that the value of signal-to-noise ratio is exceeded, plotted on a normal probability scale.

Finally, Figure 1 is used to derive the basic circuit reliability (19), which is the value of probability corresponding to the required signal-to-noise ratio (18).

A mathematical treatment of the calculation can be given in terms of probability density functions of the signal and the noise. These functions are taken to be log normal, as is the resulting distribution for the signal-to-noise ratio.

TABLE 1

Parameters used to compute basic circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
(1)	$E_W(50)$ dB (μV/m)	Median field strength of wanted signal	Prediction method (Chapter [3])
(2)	$D_U(S)$ dB	Upper decile of slow fading signal (day-to-day)	(Chapter [4]), (Table [4-1])
(3)	$D_L(S)$ dB	Lower decile of slow fading signal (day-to-day)	(Chapter [4]), (Table [4-1])
(4)	$D_U(F)$ dB	Upper decile of fast fading signal (within the hour)	5 dB (section [4.1.2.1])
(5)	$D_L(F)$ dB	Lower decile of fast fading signal (within the hour)	8 dB (section [4.1.2.1])
(6)	$F_a(A)$	Noise factor for atmospheric noise	Atmospheric noise maps (Report 322)
(7)	N_A dB (μV/m)	Median field strength of atmospheric noise	$N_A = F_a(A) - 65.5 + 20 \log f + 10 \log \ell$ f in MHz, ℓ in kHz (Report 322)
(8)	$F_a(M)$	Noise factor for man-made noise	(section [ ]) (curve [ ], Report 258-4)
(9)	N_M dB (μV/m)	Median field strength of man-made noise	As in (7) above
(10)	N_R dB (μV/m)	Intrinsic receiver noise field strength	[ ] dB (μV/m) (section [ ])
(11)	N_T dB (μV/m)	Median field strength of total radio noise	Greatest of N_A, N_M, N_R (section [4.1.4])
(12)	SNR(50) dB	Median signal-to-noise ratio	$E_W - N_T$
(13)	$D_U(SNR)$ dB	Upper decile of signal-to-noise ratio	$\sqrt{D_U(S)^2 + D_U(F)^2}$
(14)	$D_L(SNR)$ dB	Lower decile of signal-to-noise ratio	$\sqrt{D_L(S)^2 + D_L(F)^2}$
(15)	SNR(10) dB	Signal-to-noise ratio exceeded 10% of time	$SNR(50) + D_U(SNR)$
(16)	SNR(90) dB	Signal-to-noise ratio exceeded 90% of time	$SNR(50) - D_L(SNR)$
(17)	G dB	Required RF signal-to-noise ratio	[section 7.2.2]
(18)	BCR%	Basic circuit reliability	[Figure 1]

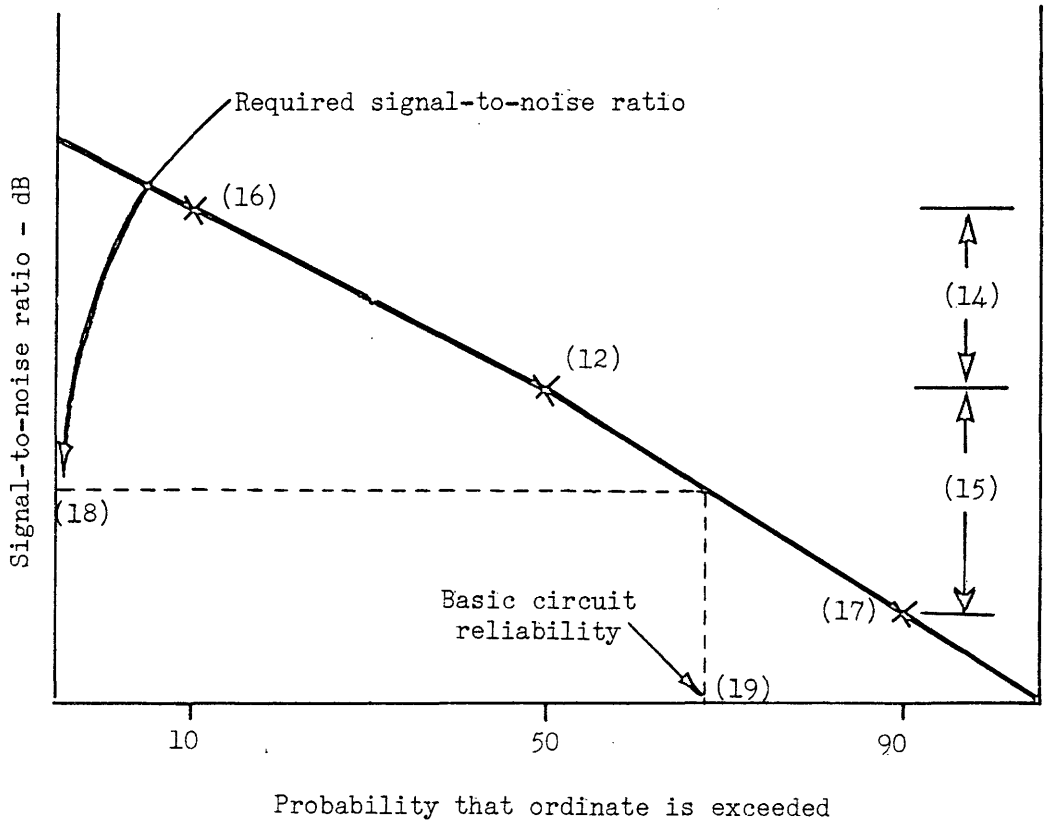
Required signal-to-noise ratio
(16)
(12)
(14)
(15)
(18)
Basic circuit reliability
(17)
(19)
Signal-to-noise ratio - dB
10
50
90
Probability that ordinate is exceeded

FIGURE 1

The basic circuit reliability is given by the expression :

$$\text{when } E_W - N_T > G : \quad BCR = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^{2}/2)\, d\tau \qquad \text{dB}$$

$$\gamma = \frac{E_W - N_T - G}{\sigma_L}$$

$$\sigma_L = D_L(SNR)/1.282$$

$$\text{when } E_W - N_T \leq G : \quad BCR = 0.5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \exp(-\tau^{2}/2)\, d\tau \qquad \text{dB}$$

$$\gamma = \frac{E_W - N_T - G}{\sigma_U}$$

$$\sigma_U = D_U(SNR)/1.282$$

SECOND PROPOSAL : BASIC CIRCUIT RELIABILITY USING MINIMUM USABLE FIELD STRENGTH

The process for calculating basic circuit reliability is indicated in Table 1. The median value of field strength for the wanted signal at step (1) is provided by the field strength prediction method. The upper and lower decile values (2) through (5) are also determined, taking account of long-term (day-to-day) and short-term (within the hour) fading. The combined upper and lower deciles of the wanted signal are then calculated in steps (6) and (7) in order to derive the signal levels exceeded for 10% and 90% of the time at steps (8) and (9).

The wanted signal probability distribution, assumed to be log-normal, is illustrated in Figure 1. The signal level is plotted in decibels versus the probability that the value of signal level is exceeded, plotted on a normal probability scale. This distribution is used to obtain the basic circuit reliability (11), which is the value of probability corresponding to the minimum usable field strength (10).

TABLE 1

Parameters used to compute basic circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
(1)	$E_W(50)$ dB (μV/m)	Median field strength of wanted signal	Prediction method (Chapter 3)
(2)	$D_U(S)$ dB	Upper decile of slow fading signal (day-to-day)	(Chapter 4), (Table 4-1)
(3)	$D_L(S)$ dB	Lower decile of slow fading signal (day-to-day)	(Chapter 4), (Table 4-1)
(4)	$D_U(F)$ dB	Upper decile of fast fading signal (within the hour)	5 dB (section 4.1.2.1)
(5)	$D_L(F)$ dB	Lower decile of fast fading signal (within the hour)	8 dB (section 4.1.2.1)
(6)	$D_U(E_W)$ dB	Upper decile of wanted signal	$\sqrt{D_U(S)^2 + D_U(F)^2}$
(7)	$D_L(E_W)$ dB	Lower decile of wanted signal	$\sqrt{D_L(S)^2 + D_L(F)^2}$
(8)	$E_W(10)$ dB (μV/m)	Wanted signal exceeded 10% of the time	$E_W + D_U(E_W)$
(9)	$E_W(90)$ dB (μV/m)	Wanted signal exceeded 90% of the time	$E_W - D_L(E_W)$
(10)	E_{min} dB (μV/m)	Minimum usable field strength	(section Chapter [ ])
(11)	BCR%	Basic circuit reliability	Figure [1]

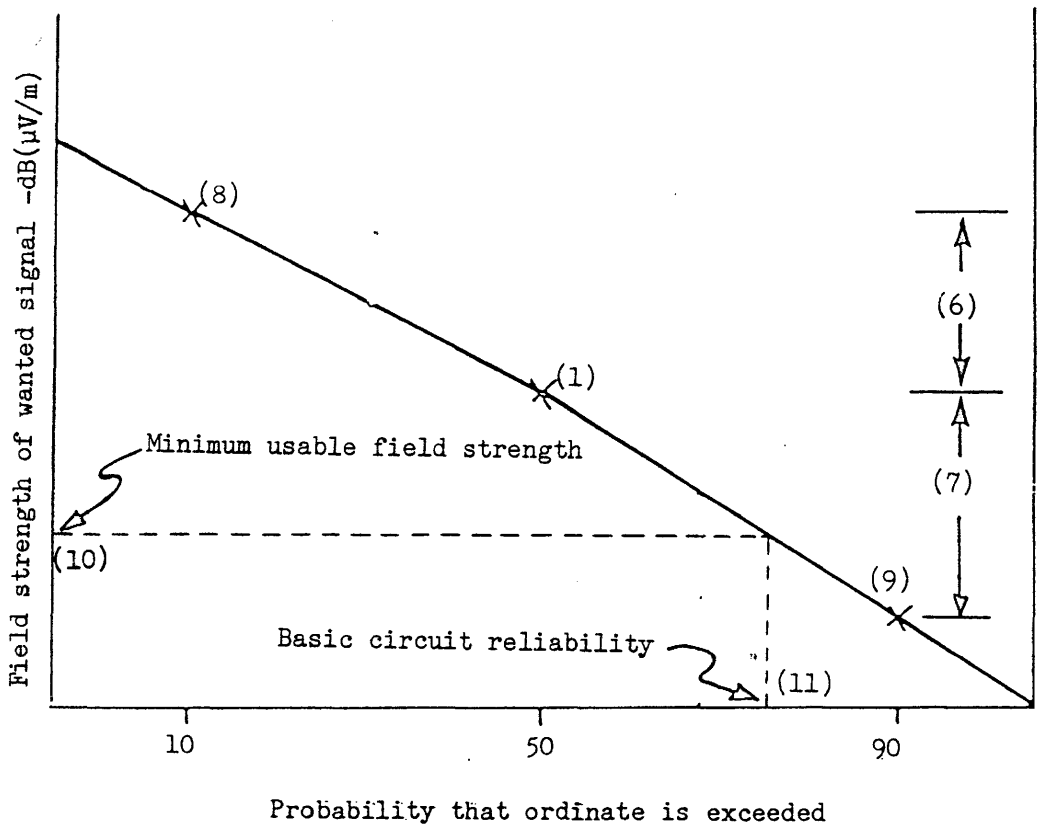
Field strength of wanted signal -dB(μV/m)
(8)
(1)
(6)
(7)
Minimum usable field strength
(10)
(9)
Basic circuit reliability
(11)
10
50
90
Probability that ordinate is exceeded

FIGURE 1

The basic circuit reliability is given by the expression :

when $E_W > E_{min}$

$$R_c = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^2/2)\, d\tau \quad \text{dB}$$

$$\gamma = \frac{E_W - E_{min}}{\sigma_L}$$

$$\sigma_L = D_L(E_W)/1.282$$

when $E_W \leq E_{min}$

$$R_c = 0.5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \exp(-\tau^2/2)\, d\tau \quad \text{dB}$$

$$\gamma = \frac{E_W - E_{min}}{\sigma_U}$$

$$\sigma_U = D_U(E_W)/1.282$$

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WORKING GROUP 4A

FIRST REPORT OF DRAFTING GROUP 4A-2

FIRST PROPOSAL : BASIC CIRCUIT RELIABILITY USING SIGNAL-TO-NOISE RATIO

The process for calculating basic circuit reliability is indicated in Table 1. The monthly median of hourly median wanted signal level at step (1) is provided by the signal strength prediction method. The upper and lower decile values ((2) through (5)) are also provided, taking account of long-term (day-to-day) and short-term (within the hour) fading. From steps (6) to (10) consideration is given to :

i) atmospheric noise;

ii) man-made noise;

iii) intrinsic receiver noise;

and at step (11) the monthly median field strength of hourly median noise intensity is taken as the greatest of the three components. The values of signal and noise desired at steps (1) and (11) are then combined at step (12) in order to derive the monthly median of hourly median signal-to-noise ratio, SNR(50).

At step (13), $D(N_T)$ describes the variability of the radio noise and a value of $\lceil X \rceil$ dB is taken for both the upper and lower decile. The upper and lower deciles of signal-to-noise ratio are then calculated in steps (14) and (15) in order to derive the signal-to-noise ratios exceeded for 10% and 90% of days (steps (16) and (17)). The signal-to-noise ratio probability distribution may now be produced, as is shown by Figure 1, where the ratio is plotted in decibels versus the probability that the value of signal-to-noise ratio is exceeded, plotted on a normal probability scale.

Finally, Figure 1 is used to derive the basic circuit reliability (19), which is the value of probability corresponding to the required signal-to-noise ratio (18).

A mathematical treatment of the calculation can be given in terms of probability density functions of the signal and the noise. These functions are taken to be log normal, as is the resulting distribution for the signal-to-noise ratio.

TABLE 1

Parameters used to compute basic circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
(1)	$E_W(50)$ dB (μV/m)	Median field strength of wanted signal	Prediction method (Chapter [3])
(2)	$D_U(S)$ dB	Upper decile of slow fading signal (day-to-day)	(Chapter [4]), (Table [4-1])
(3)	$D_L(S)$ dB	Lower decile of slow fading signal (day-to-day)	(Chapter [4]), (Table [4-1])
(4)	$D_U(F)$ dB	Upper decile of fast fading signal (within the hour)	5 dB (section [4.1.2.1])
(5)	$D_L(F)$ dB	Lower decile of fast fading signal (within the hour)	8 dB (section [4.1.2.1])
(6)	$F_a(A)$	Noise factor for atmospheric noise	Atmospheric noise maps (Report 322)
(7)	N_A dB (μV/m)	Median field strength of atmospheric noise	$N_A = F_a(A) - 65.5 + 20 \log f + 10 \log \ell$ f in MHz, ℓ in kHz (Report 322)
(8)	$F_a(M)$	Noise factor for man-made noise	(section [ ]) (curve [ ], Report 258-4)
(9)	N_M dB (μV/m)	Median field strength of man-made noise	As in (7) above
(10)	N_R dB (μV/m)	Intrinsic receiver noise field strength	[ ] dB (μV/m) (section [ ])
(11)	N_T dB (μV/m)	Median field strength of total radio noise	Greatest of N_A, N_M, N_R (7), (9), (10). (section [4.1.4])
(12)	SNR(50) dB	Median signal-to-noise ratio	$E_W - N_T$
(13)	$D(N_T)$ dB	Decile of total radio noise	[X] dB
(14)	$D_U(SNR)$ dB	Upper decile of signal-to-noise ratio	$\sqrt{D_U(S)^2 + D_U(F)^2 + D(N_T)^2}$
(15)	$D_L(SNR)$ dB	Lower decile of signal-to-noise ratio	$\sqrt{D_L(S)^2 + D_L(F)^2 + D(N_T)^2}$
(16)	SNR(10) dB	Signal-to-noise ratio exceeded 10% of time	$SNR(50) + D_U(SNR)$
(17)	SNR(90) dB	Signal-to-noise ratio exceeded 90% of time	$SNR(50) - D_L(SNR)$
(18)	Q dB	Required RF signal-to-noise ratio	[section 7.2.2]
(19)	R_c%	Basic circuit reliability	[Figure 1]

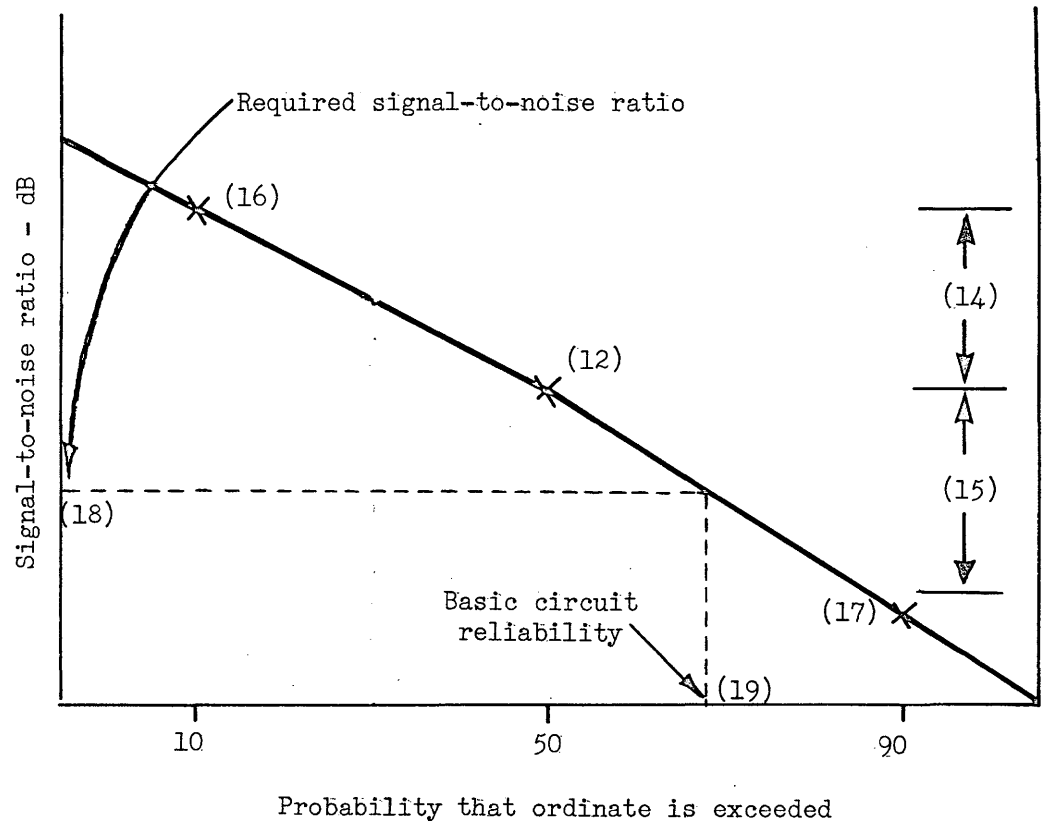
Required signal-to-noise ratio
(16)
(12)
(14)
(15)
(18)
Basic circuit
reliability
(17)
(19)
Signal-to-noise ratio - dB
10
50
90
Probability that ordinate is exceeded

FIGURE 1

The basic circuit reliability is given by the expression :

when $E_W - N_T \leq G$: $$R_c = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \ell^{-t2/2} \text{ dB}$$

$$\gamma = \frac{E_W - N_T - G}{\sigma_L}$$

$$\sigma_L = D_L(SNR)/1.282$$

when $E_W - N_T > G$: $$R_c = .5 + \frac{1}{\sqrt{2\pi}} \int_{o}^{\gamma} \ell^{-t^2/2} \text{ dB}$$

$$\gamma = \frac{E_W - N_T - G}{\sigma_U}$$

$$\sigma_U = D_U(SNR)/1.282$$

SECOND PROPOSAL : BASIC CIRCUIT RELIABILITY USING MINIMUM USABLE FIELD STRENGTH

The process for calculating basic circuit reliability is indicated in Table 1. The monthly median of hourly median wanted signal level at step (1) is provided by the signal strength prediction method. The upper and lower decile values (2) through (5) are also determined, taking account of long-term (day-to-day) and short-term (within the hour) fading. The combined upper and lower deciles of the wanted signal are then calculated in steps (6) and (7) in order to derive the signal levels exceeded for 10% and 90% of the time at steps (8) and (9).

The wanted signal probability distribution, assumed to be log-normal, is illustrated in Figure 1. The signal level is plotted in decibels versus the probability that the value of signal level is exceeded, plotted on a normal probability scale. This distribution is used to obtain the basic circuit reliability (11), which is the value of probability corresponding to the minimum usable field strength (10).

TABLE 1

Parameters used to compute basic circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
(1)	$E_W(50)$ dB (μV/m)	Median field strength of wanted signal	Prediction method (Chapter 3)
(2)	$D_U(S)$ dB	Upper decile of slow fading signal (day-to-day)	(Chapter 4), (Table 4-1)
(3)	$D_L(S)$ dB	Lower decile of slow fading signal (day-to-day)	(Chapter 4), (Table 4-1)
(4)	$D_U(F)$ dB	Upper decile of fast fading signal (within the hour)	5 dB (section 4.1.2.1)
(5)	$D_L(F)$ dB	Lower decile of fast fading signal (within the hour)	8 dB (section 4.1.2.1)
(6)	$D_U(E_W)$ dB	Upper decile of wanted signal	$\sqrt{D_U(S)^2 + D_U(F)^2}$
(7)	$D_L(E_W)$ dB	Lower decile of wanted signal	$\sqrt{D_L(S)^2 + D_L(F)^2}$
(8)	$E_W(10)$ dB (μV/m)	Wanted signal exceeded 10% of the time	$E_W + D_U(E_W)$
(9)	$E_W(90)$ dB (μV/m)	Wanted signal exceeded 90% of the time	$E_W - D_L(E_W)$
(10)	E_{min} dB (μV/m)	Minimum usable field strength	(section Chapter [ ])
(11)	R_c%	Basic circuit reliability	Figure [1]

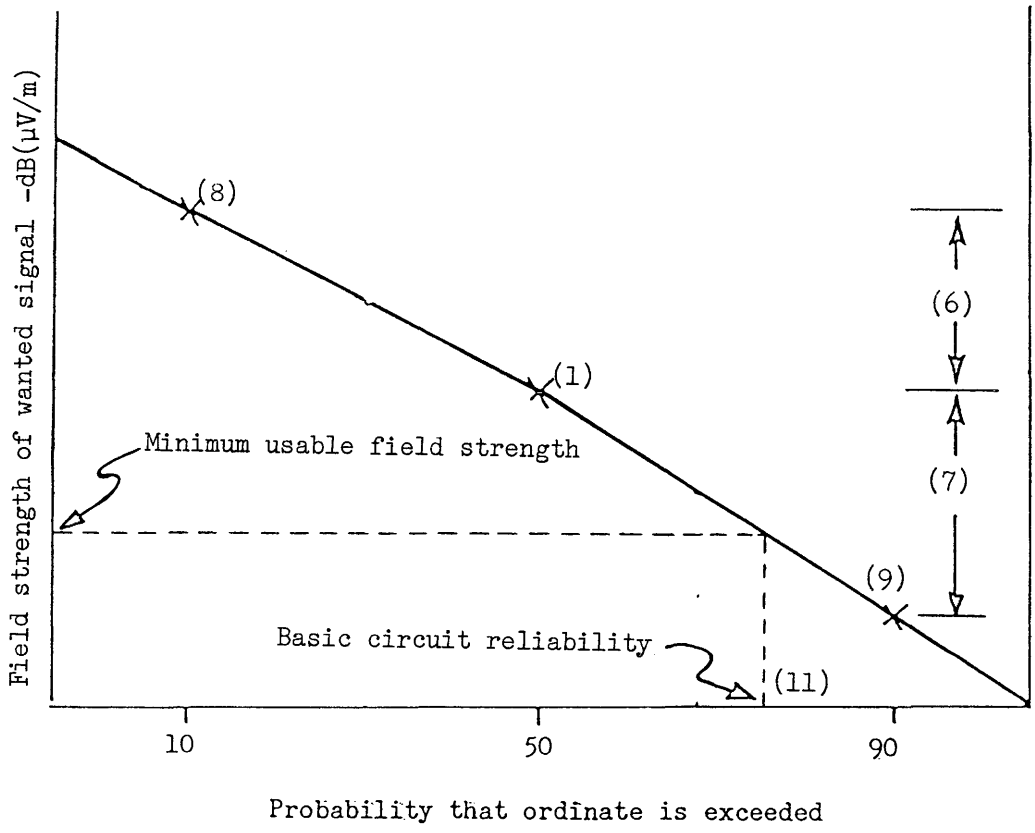
Field strength of wanted signal -dB(μV/m)
(8)
(1)
(6)
(7)
(9)
Minimum usable field strength
Basic circuit reliability
(11)
10
50
90
Probability that ordinate is exceeded

FIGURE 1

The basic circuit reliability is given by the expression :

when $E_W \leqslant E_{min}$

$$R_c = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \ell^{-t^2/2} \text{ dB}$$

$$\gamma = \frac{E_W - E_{min}}{\sigma_L}$$

$$\sigma_L = D_L(E_W)/1.282$$

when $E_W > E_{min}$

$$R_c = .5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \ell^{-t^2/2} \text{ dB}$$

$$\gamma = \frac{E_W - E_{min}}{\sigma_U}$$

$$\sigma_U = D_U(E_W)/1.282$$

L. PETRIE
Chairman of Drafting Group 4A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/24-E
23 January 1984
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COMMITTEE 4

FOR INFORMATION

PROGRESS REPORT

on the activities of Committee 4 (22 January 1984)

(by items of the Report of the First Session)

according to Document 90(Rev.1))

Report item		Discussions concluded	Texts drafted	Texts approved
1.	-			
2.	Definitions	+	4A + 4B	Doc. 93 Doc. 107
3.	Technical criteria			
3.1	DSB system specifications			
3.1.1	Transmission characteristics			
3.1.1.1	Audio frequency bandwidth	+	4B-1	
3.1.1.2	Necessary bandwidth	+	(DT/22)	
3.1.1.3	Characteristics of modulation processing	+		
3.1.2	Channel spacing	+	4B	Doc. 93
3.1.3	Nominal carrier frequencies	+	4B	Doc. 93
3.1.4	Receiver characteristics			
3.1.4.1	Overall selectivity of receiver	+	4B-1 (DT/22)	
3.1.4.2	Noise limited sensitivity of the receiver (Document 99)	- (C4)		
3.2	Propagation, radio noise and solar index			
3.2.1	Method for the prediction of field strength, optimum frequency	-	(DT/21)	

3.2.2	Atmospheric and man-made noise data	+	4A (Doc. 110)	
3.2.3	Signal fading	+		
3.2.4	Reliability	-	(DT/23)	
3.2.5	Values of the appropriate solar index and seasonal periods ...			
3.2.5.1.	Seasonal divisions ...	+	4A	Doc. 93 (Corr.1)
3.2.5.2	Values of appropriate solar index and seasonal periods	+	4A	Doc. 107
3.3	Radio frequency protection ratios			
3.3.1	Co-channel protection ratio	+	4B (Doc. 109)	
3.3.2	Relative values of protection ratio as a function of carrier sep.	+		
3.4	Minimum usable and nominal values of field strength required for satisfactory service	-		
3.5	Antennas and power	-	(DT/22)	
3.5.1	Characteristics of antennas	- (4B-2)		
3.5.2	Transmitter power and effective radiated power ...	- (4B)		
3.6	Use of synchronized transmitters	+	4B (Doc. 109)	
3.7	Reception zones	-		
3.8	Maximum number of frequencies required for broadcasting ...	-		
3.9	Specification and progressive introduction of an SSB system	-		
*	Theoretical capacity of any given HFBC band (not contained in Document 90)	-		
4.	-			
5.	-			

J. RUTKOWSKI
Chairman of Committee 4

Annex : 1

ANNEX

WORKING GROUP 4B

REMAINING TASKS IN WORKING GROUP 4B

(23 January 1984)

1. Minimum usable and nominal values of field strength required for satisfactory service

Ref. Chapter 7 of Document 22(CCIR)

Documents : PHL/3/18
CAN/4/7
G/5/5
AUS/13/13
URS/14/8
BGD/21/1
DDR/27/7
USA/24/13 to 24/15
KEN/29/16, 29/17
IND/33/15, 33/16
MEX/42/5
YUG/43/14 to 43/18
CHN/45/3
B/55/15
CHN/45/4
IRN/56/16 to 56/26
J/57/3
EQA/69/3
URS/73 + Corr.1

2. Antennas and power

a) Antennas : Sub-Working Group 4B-2

b) On conclusions already taken, some texts are already available from Drafting Group 4B-1 (DT/22, 3.5), but further decisions are needed from Working Group 4B concerning the factors on the basis of which the power is to be determined.

Ref. Chapter 8 of Document 22(CCIR)

Documents : PHL/3/19
CAN/4/8
AUS/13/14, 13/15
URS/14/10, 14/17
BGD/19/1
PNG/23/5
USA/24/16
DDR/27/8
ALG/28/17 to 28/19
KEN/29/18, 29/19
IND/33/19, 33/20
PRG/35/2
MEX/42/6
YUG/43/19
CHN/47/1, 9(Rev.3)
F/54/1
B/55/16
IRN/56/22
EQA/69/4
BOL/70/5
ARG/71/1

3. Reception zones

Ref. Chapter 11 of Document 22(CCIR)

Documents : CAN/4/11, 4/26
G/5/8
AUS/13/17
URS/14/11
USA/24/19
DDR/27/10
IND/33/25, 33/26
MEX/42/9
YUG/43/21
VEN/51/3
B/55/6
IRN/56/25
J/57/4
EQA/69/7

4. Number of frequencies required for broadcasting of the same programme to the same zone

Ref. Chapter 9 of Document 22(CCIR)

Documents : PHL/3/20
CAN/4/9
AUS/13/16
URS/14/10
HOL/17/1
BGD/19/2
PNG/23/6
USA/24/17
DDR/27/9
ALG/28/12 to 28/15
KEN/29/20
ARG/32/1 to 32/3
IND/33/21, 33/22
PRG/35/3
MEX/42/7
YUG/43/20
VEN/51
B/55/18
EQA/69/6

5. Specification and progressive introduction of an SSB system

Ref. Chapter 13 of Document 22(CCIR)

Documents : PHL/3/22
CAN/4/12, 4/16
G/5/10
URS/14/12, 14/16
HOL/16/1 to 16/4
PNG/23/7
USA/24/20, 24/22
DDR/27/11
KEN/29/22
D/30/4
AUS/31/1, 31/2
IND/33/27
PRG/34/2
MEX/42/10, 42/12
YUG/43/22, 43/25
VEN/51/8
B/55/20
F/54/1
IRN/56/26
J/57/5

6. Theoretical capacity of any given high frequency broadcasting band

Documents : CAN/4/18
J/75

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4A

SECOND REPORT OF DRAFTING GROUP 4A-2

OVERALL CIRCUIT RELIABILITY

The method for calculating overall circuit reliability is outlined in Table 2. The median wanted signal level at step (1) is computed by the signal strength prediction method. The upper and lower decile values (2) through (5) take into account long-term (day-to-day) and short-term (within the hour) fading.

The median field strength of interference for each interfering source is obtained from the prediction method in step (6). For a single source of interference the median predicted field strength is used in step (7). For multiple sources of interference, the median field strength is calculated as follows. The field strengths of the interfering signals E_i are listed in decreasing order. Successive r.s.s. additions of the field strengths E_i are computed, stopping when the difference between the resultant field strength and the next field strength is greater than 6 dB. In step (7), the resultant field strength I is taken as the last computed value. The upper and lower decile values (8) through (11) of the strongest interference are selected to take into account short and long-term fading.

The values of the wanted signal and interference determined at steps (1) and (7) are combined at step (12) to derive the median signal-to-interference ratio. The upper and lower deciles of the signal-to-interference ratio are computed in steps (13) and (14) in order to derive the signal-to-interference ratio exceeded for 10% and 90% of the time at steps (15) and (16).

The probability distribution for the signal-to-interference ratio may now be produced as shown in Figure 2. The ratios are presented in decibels on a linear scale with the probability that the value of the signal-to-interference ratio is exceeded on a normal probability scale. In Figure 2, the value of probability corresponding to the required signal-to-interference ratio (17) is the circuit reliability in the presence of only interference (ICR). The overall circuit reliability is the minimum value (20) of ICR (18) and the basic circuit reliability BCR (19).

A mathematical treatment of the calculation of ICR can be given in terms of the probability density distribution of the wanted signal and the interference. These functions are taken to be log normal, as is the resulting distribution of the signal-to-interference ratio.

The parameter ICR is given by the following expression :

when $E_W - I \leqslant RSI$

$$ICR = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^2/2)\, d\tau \qquad dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_L}$$

$$\sigma_L = D_L(SIR)/1.282$$

when $E_W - I > RSI$

$$ICR = 0.5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \exp(-\tau^2/2)\, d\tau \qquad dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_U}$$

$$\sigma_U = D_U(SIR)/1.282$$

Values of the various parameters in the above expressions are found on the indicated lines in Table 2.

E_W	line 1
I	line 7
$D_U(SIR)$	line 13
$D_L(SIR)$	line 14
RSI	line 17

TABLE 2

Overall circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
1	E_W dB (μV/m)	Median field strength of wanted signal	Prediction Method Chapter 3
2	D_U(S)dB	Upper decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
3	D_L(S)dB	Lower decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
4	D_U(F)dB	Upper decile of fast fading signal (within the hour)	5 dB (section 4.1.2.1)
5	D_L(F)dB	Lower decile of fast fading signal (within the hour)	8 dB (section 4.1.2.1)
6	E_i dB (μV/m)	Median field strength of interfering signals E_1, E_2,...E_i	Prediction Method Chapter 3
7	I dB (μV/m)	Resultant field strength of interference	see text
8	D_U(IS)dB	Upper decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
9	D_L(IS)dB	Lower decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
10	D_U(IF)dB	Upper decile of fast fading interference	5 dB (section 4.1.2.1)
11	D_L(IF)dB	Lower decile of fast fading interference	8 dB (section 4.1.2.1)
12	SIR(50)dB	Median signal to interference ratio	E_W - I
13	D_U(SIR)dB	Upper decile of signal-to-interference	$\left[\sqrt{D_U(S)^2+D_U(F)^2+D_L(IS)^2+D_L(IF)^2}\right]$
14	D_L(SIR)dB	Lower decile of signal-to-interference	$\left[\sqrt{D_L(S)^2+D_L(F)^2+D_U(IS)^2+D_U(IF)^2}\right]$
15	SIR(10)dB	Signal-to-interference ratio exceeded 10% of the time	SIR(50) + D_U(SIR)
16	SIR(90)dB	Signal-to-interference ratio exceeded 90% of the time	SIR(50) - D_L(SIR)
17	RSI dB	Required S/I ratio	[ ] (section 6.1.2)
18	ICR	Circuit reliability in presence of interference only (noise neglected)	See Figure 2
19	BCR	Basic circuit reliability	See Figure 1
20	OCR	Overall circuit reliability	Min(ICR, BCR)

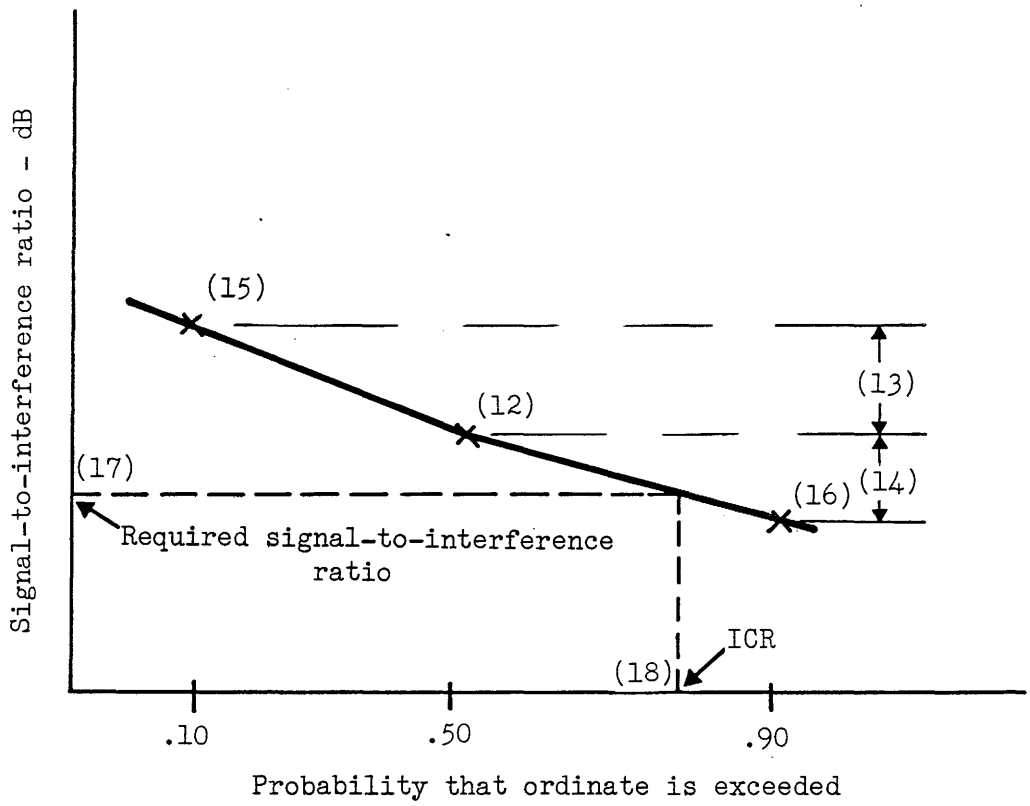

FIGURE 2

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Chairman of Drafting Group 4A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 4A

SECOND REPORT OF DRAFTING GROUP 4A-2

OVERALL CIRCUIT RELIABILITY

The method for calculating overall circuit reliability is outlined in Table 2. The median wanted signal level at step (1) is computed by the signal strength prediction method. The upper and lower decile values (2) through (5) take into account long-term (day-to-day) and short-term (within the hour) fading.

The median field strength of interference for each interfering source is obtained from the prediction method. For a single source of interference the median predicted field strength is used in step (6). For multiple sources of interference, the median field strength is approximated by performing an r.m.s. addition of the predicted field strengths from each source as described in section 3, item 2, CCIR Report 616-2 MOD I. The upper and lower decile values (7) through (10) of the strongest interference are selected to take into account short and long-term fading.

The values of the wanted signal and interference determined at steps (1) and (6) are combined at step (11) to derive the median signal-to-interference ratio. The upper and lower deciles of the signal-to-interference ratio are computed in steps (12) and (13) in order to derive the signal-to-interference ratio exceeded for 10% and 90% of the time at steps (14) and (15).

The probability distribution for the signal-to-interference ratio may now be produced as shown in Figure 2. The ratios are presented in decibels on a linear scale with the probability that the value of the signal-to-interference ratio is exceeded on a normal probability scale. In Figure 2, the value of probability corresponding to the required signal-to-interference ratio (16) is the circuit reliability in the presence of only interference (ICR). The overall circuit reliability is the minimum value (19) of ICR (17) and the basic circuit reliability (18).

A mathematical treatment of the calculation of ICR can be given in terms of the probability density distribution of the wanted signal and the interference. These functions are taken to be log normal, as is the resulting distribution of the signal-to-interference ratio.

The overall circuit reliability is the minimum value of BCR and OCR where

BCR = Basic circuit reliability
ICR = Circuit reliability in presence of interference.

The parameter ICR is given by the following expression :

when $E_W - I > RSI$

$$ICR = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^{2}/2)\, d\tau \qquad dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_L}$$

$$\sigma_L = D_L(SIR)/1.282$$

when $E_W - I \leqslant RSI$

$$ICR = .5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \exp(-\tau^{2}/2)\, d\tau \qquad dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_U}$$

$$\sigma_U = D_U(SIR)/1.282$$

Values of the various parameters in the above expressions are found on the indicated lines in Table 2.

E_W	line 1
I	line 6
$D_U(SIR)$	line 12
$D_L(SIR)$	line 13
RSI	line 16

TABLE 2

Overall circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
1	E_W dB (μV/m)	Median field strength of wanted signal	Prediction Method Chapter 3
2	D_U(S)dB	Upper decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
3	D_L(S)dB	Lower decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
4	D_U(F)dB	Upper decile of fast fading signal (within the hour)	5 dB (section 4.1.2.1)
5	D_L(F)dB	Lower decile of fast fading signal (within the hour)	8 dB (section 4.1.2.1)
6	I	Median field strength of interference	Prediction Method Chapter 3 CCIR Report 616-2 MOD I $I = \sqrt{I_1^2+I_2^2+I_3^2+}$
7	D_U(IS)dB	Upper decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
8	D_L(IS)dB	Lower decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
9	D_U(IF)dB	Upper decile of fast fading interference	5 dB (section 4.1.2.1)
10	D_L(IF)dB	Lower decile of fast fading interference	8 dB (section 4.1.2.1)
11	SIR(50)dB	Median signal to interference ratio	E_W - I
12	D_U(SIR)dB	Upper decile of signal-to-interference	$\sqrt{D_U(S)^2+D_U(F)^2+D_L(IS)^2+D_U(IF)^2}$
13	D_L(SIR)dB	Lower decile of signal-to-interference	$\sqrt{D_L(S)^2+D_L(F)^2+D_U(IS)^2+D_U(IF)^2}$
14	SIR(10)dB	Signal-to-interference ratio exceeded 10% of the time	SIR(50) + D_U(SIR)
15	SIR(90)dB	Signal-to-interference ratio exceeded 90% of the time	SIR(50) - D_L(SIR)
16	RSI dB	Required S/I ratio	[ ] (section 6.1.2)
17	ICR	Circuit reliability in presence of interference only (noise neglected)	See Figure 2
18	BCR	Basic circuit reliability	See Figure 1
19	OCR	Overall circuit reliability	Min(ICR, BCR)

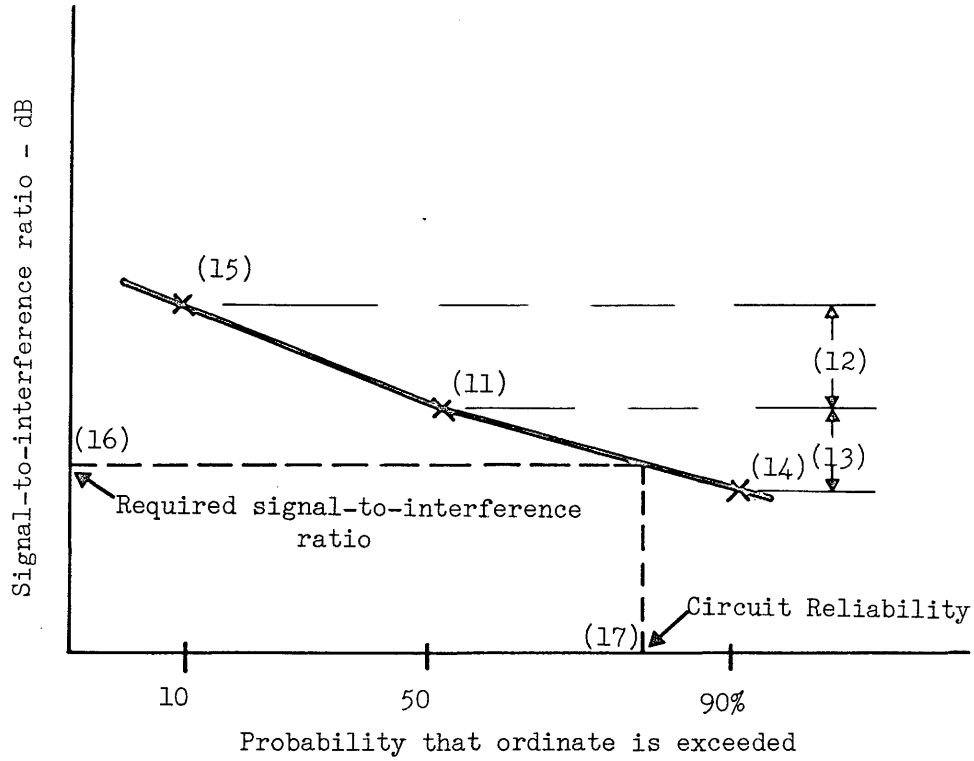

FIGURE 2

L. PETRIE
Chairman of Drafting Group 4A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 4A

SECOND REPORT OF DRAFTING GROUP 4A-2

OVERALL CIRCUIT RELIABILITY

The method for calculating overall circuit reliability is outlined in Table 2. The median wanted signal level at Step (1) is computed by the signal strength prediction method. The upper and lower decile values (2) through (5) take into account long-term (day-to-day) and short-term (within the hour) fading.

The median field strength of interference for each interfering source is obtained from the prediction method. For a single source of interference the median predicted field strength is used in step (6). For multiple sources of interference, the median field strength is approximated by performing an r.m.s. addition of the predicted field strengths from each source as described in CCIR Report 794. The upper and lower decile values (7) through (10) of the strongest interference are selected to take into account short and long-term fading.

The values of the wanted signal and interference determined at steps (1) and (6) are combined at step (11) to derive the median signal-to-interference ratio. The upper and lower deciles of the signal-to-interference ratio are computed in steps (12) and (13) in order to derive the signal-to-interference ratio exceeded for 10% and 90% of the time at Steps (14) and (15).

The probability distribution for the signal-to-interference ratio may now be produced as shown in Figure 2. The ratios are presented in decibels on a linear scale with the probability that the value of the signal-to-interference ratio is exceeded on a normal probability scale. In Figure 2, the value of probability corresponding to the required signal-to-interference ratio (16) is the circuit reliability in the presence of only interference (ICR). The overall circuit reliability is the minimum value (19) of ICR (17) and the basic circuit reliability (18).

A mathematical treatment of the calculation can be given in terms of the probability density distribution of the wanted signal and the interference. These functions are taken to be log normal, as is the resulting distribution of the signal-to-interference ratio.

The overall circuit reliability is the minimum value of BCR and OCR where

BCR = Basic circuit reliability
ICR = Circuit reliability in presence of interference.

The parameter ICR is given by the following expression :

when $E_W - I > RSI$

$$ICR = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma} \exp(-\tau^2/2)\, dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_L}$$

$$\sigma_L = D_L(SIR)/1.282$$

when $E_W - I \leqslant RSI$

$$ICR = .5 + \frac{1}{\sqrt{2\pi}} \int_{0}^{\gamma} \exp(-\tau^2/2)\, dB$$

$$\gamma = \frac{E_W - I - RSI}{\sigma_U}$$

$$\sigma_U = D_U(SIR)/1.282$$

Values of the various parameters in the above expressions are found on the indicated lines in Table 2.

E_W	line 1
I	line 6
$D_U(SIR)$	line 12
$D_L(SIR)$	line 13
RSI	line 16

TABLE 2

Overall circuit reliability

STEP	PARAMETER	DESCRIPTION	SOURCE
1	E_W dB (μV/m)	Median field strength of wanted signal	Prediction Method Chapter 3
2	D_U(S)dB	Upper decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
3	D_L(S)dB	Lower decile of slow fading signal (DAY-TO-DAY)	Chapter 4 Table 4-1
4	D_U(F)dB	Upper decile of fast fading signal (within the hour)	5 dB (section 4.1.2.1)
5	D_L(F)dB	Lower decile of fast fading signal (within the hour)	8 dB (section 4.1.2.1)
6	I	Median field strength of interference	Prediction Method Chapter 3 CCIR Report 794 $I = \sqrt{I_1^2+I_2^2+I_3^2+}$
7	D_U(IS)dB	Upper decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
8	D_L(IS)dB	Lower decile of slow fading interference (Decile of strongest interference)	Chapter 4 Table 4-1
9	D_U(IF)dB	Upper decile of fast fading interference	5 dB (section 4.1.2.1)
10	D_L(IF)dB	Lower decile of fast fading interference	8 dB (section 4.1.2.1)
11	SIR(50)dB	Median signal to interference ratio	$E_W - I$
12	D_U(SIR)dB	Upper decile of signal-to-interference	$\sqrt{D_U(S)^2+D_U(F)^2+D_L(IS)^2+D_U(IF)^2}$
13	D_L(SIR)dB	Lower decile of signal-to-interference	$\sqrt{D_L(S)^2+D_L(F)^2+D_U(IS)^2+D_U(IF)^2}$
14	SIR(90)dB	Signal-to-interference ratio exceeded 90% of the time	SIR(50) - D_L(SIR)
15	SIR(10)dB	Signal-to-interference ratio exceeded 10% of the time	SIR(50) + D_U(SIR)
16	RSI dB	Required S/I ratio	[ ] (section 6.1.2)
17	ICR	Circuit reliability in presence of interference only (noise neglected)	See Figure 2
18	BCR	Basic circuit reliability	See Figure 1
19	OCR	Overall circuit reliability	Min(ICR, BCR)

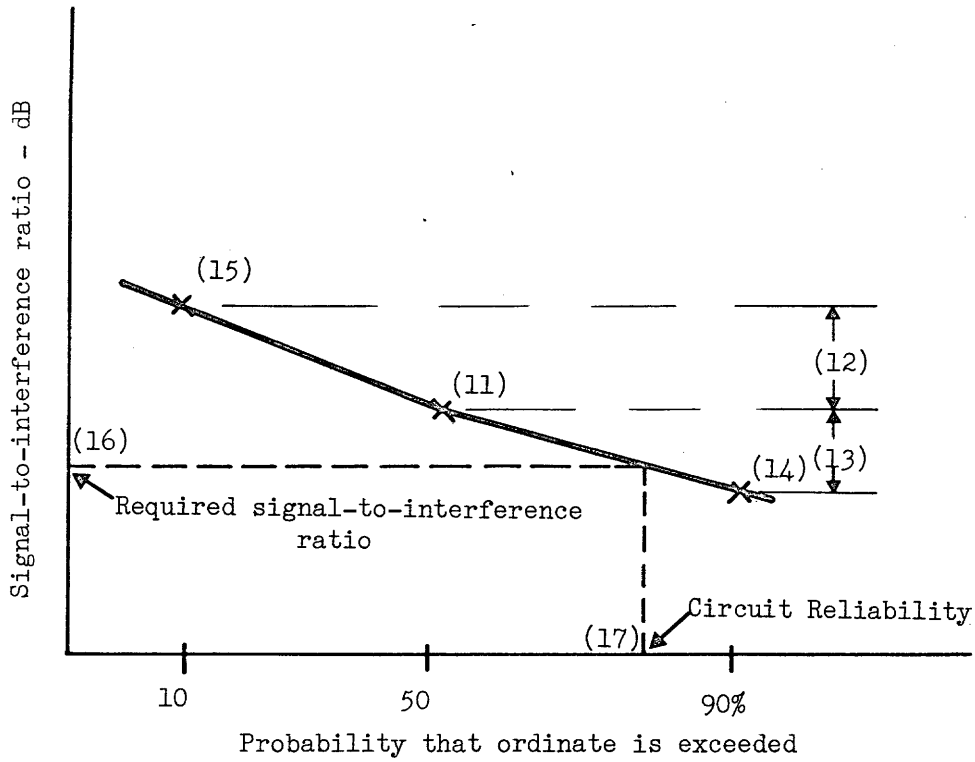

FIGURE 2

L. PETRIE
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INTERNATIONAL TELECOMMUNICATION UNION

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FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 5A

Draft

Third Report of Working Group 5A

SUMMARY OF DISCUSSION ON THE INTRODUCTION OF SSB

1. It emerged from the long discussion held in Working Group 5A that all administrations agree to the eventual changeover to SSB for the efficient utilization of the spectrum. Voluntary SSB transmissions may, however, be permitted in lieu of planned DSB transmissions, without increasing the level of interference caused to DSB transmissions appearing in the Plan.

With regard to the dates of the beginning and end of the transition period, most of the administrations which expressed their views, taking account of the fact that the criteria of compatibility between DSB and SSB are not yet completely known and of the economic implications, agreed on the following two points :

1.1 The second session of the Conference should fix the date of the beginning of the transition period.

1.2 The duration of the transition period may be fixed at 20 years, and consideration must be given to the timely availability of necessary receivers.

The date of the cessation of DSB emissions will thus become known when the second session fixes the date referred to in 1.1 above.

2. Working Group 5A decided that point 2.1 of Document DT/26, on the operation of SSB transmitters, should be discussed by Committee 4.

Moreover, Working Group 5A considers that SSB should be introduced in the same bands as are used for DSB and that no channels should be reserved exclusively for SSB.

M. OUHADJ
Chairman of Working Group 5A

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WORKING GROUP 5A

Draft

Third Report of Working Group 5A

SUMMARY OF DISCUSSION ON THE INTRODUCTION OF SSB

1. It emerged from the long discussion held in Working Group 5A that all administrations agree to the introduction of SSB for the efficient utilization of the spectrum. Administrations will continue to introduce SSB on a voluntary basis.

With regard to the dates of the beginning and end of the transition period, most of the administrations which expressed their views, taking account of the fact that the criteria of compatibility between DSB and SSB are not yet known and of the economic implications, agreed on the following two points :

1.1 The second session of the Conference should fix the date of the beginning of the transition period.

1.2 The duration of the transition period may be fixed at 20 years.

The date of the cessation of DSB emissions will thus become known when the second session fixes the date referred to in 1.1 above.

2. It remains to be specified how these SSB emissions, once introduced, will operate during the transition period. In this connection, Working Group 5A will have to decide on the following two possibilities :

2.1 SSB transmitters will operate with reduced carriers.

2.2 Channels will be reserved exclusively for SSB use.

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 4A

REPORT OF DRAFTING GROUP 4A-5

TO WORKING GROUP 4A

The optimum frequency band for a high frequency broadcasting service is that which has the highest median value of /basic circuit reliability/ /radio-frequency signal-to-noise ratio/ in the intended service area.

The optimum combination of bands, if needed by the planning method, is that combination which has the highest /median value of basic reception reliability/ /value of basic broadcast reliability/ in the intended service area.

D. FRASER
Chairman of Drafting Group 4A-5

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WORKING GROUP 4B

Report of Chairman of Drafting Group 4B-6

THEORETICAL CAPACITY OF THE HFBC BANDS

The theoretical capacity of the HFBC bands is dependent on a variety of factors. These include the radio-frequency protection ratio, transmitter powers, the antenna directivities and the assignment method.

Also important for the channel capacity is the time period and the frequency band considered. Based on calculations accomplished by several administrations and utilizing the data of the IFRB, the average capacity (available number of stations/channel at a given time) was generally found to be in the range of three to four.

The capacity decreases in the higher frequency bands and for higher RF protection ratios. The range of capacity is from one to seven.

In general no single value for the capacity of any band can be determined since the capability to accommodate requirements is subject to factors which would vary from one schedule to another.

C. TERZANI
Chairman of Drafting Group 4B-6

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WORKING GROUP 4A

THIRD REPORT OF DRAFTING GROUP 4A-2

Note - In this document procedures are given for calculating reception and broadcast reliability in various circumstances. The inclusion of these calculation procedures does not prejudge or comment on the desirability of these circumstances.

Basic reception reliability

The method for computing basic reception reliability is outlined in Table 3. For a single frequency, basic reception reliability (BRR) is the same as the basic circuit reliability (BCR) described in the previous section. For multiple frequencies, the interdependence between propagation conditions on different frequencies results in the computation method given in Table 3. In steps 4 and 6, BCR (n) is the basic circuit reliability for frequency n, where n = F_1, F_2, etc. The basic reception reliability is given in step (2) for a single frequency, in step (4) for a set of two frequencies and in step (6) for a set of three frequencies.

TABLE 3

Basic reception reliability

The following parameters are involved :

One frequency operation

Step	Parameter	Description	Source
(1)	BCR (F_1) %	Basic circuit reliability for frequency F_1	Line 18, Table 1
(2)	BRR (F_1) %	Basic reception reliability	BCR (F_1)

Two frequency operation

(3)	BCR (F_2) %	Basic circuit reliability for frequency F_2 where $F_1 < F_2$	Line 18, Table 1
(4)	BRR (F_1) (F_2)	[Basic reception reliability (a) where $F_1/F_2 \geqslant 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_2}(1-BCR(n))+Max(BCR(F_1); BCR(F_2))\right)$]
		(b) where $F_1/F_2 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-BCR(n))$

TABLE 3 (continued)

Basic reception reliability

Three frequency operation

Step	Parameter	Description	Source
(5)	BCR (F_3)	Basic circuit reliability for F_3 where $F_1 < F_2 < F_3$	Line 18, Table 1
(6)	BRR (F_1) (F_2) (F_3)	(a) Basic reception reliability for $F_1/F_3 \geq 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_3}(1-BCR(n))+Max(BCR(F_1), BCR(F_2), BCR(F_3))\right)$
		(b) $F_1/F_2 < 0.9$; $F_2/F_3 < 0.9$	$1-\prod_{n=F_1}^{F_3}(1-BCR(n))$
		(c) $F_1/F_2 \geq 0.9$; $F_2/F_3 < 0.9$ or $F_1/F_2 < 0.9$; $F_2/F_3 \geq 0.9$	$\frac{(a)+(b)}{2}$

Overall reception reliability

The method for computing overall reception reliability is outlined in Table 4. For a single frequency, overall reception reliability (ORR) is the same as the overall circuit reliability (OCR) described in the previous section. For multiple frequencies, the interdependence between propagation conditions on different frequencies results in the computation method given in Table 4. In steps (4) and (6), OCR (n) is the overall circuit reliability for frequency n, where n = F_1, F_2 etc. The overall circuit reliability is given in step (2) for a single frequency, in step (4) for a set of two frequencies and in step (6) for a set of three frequencies.

TABLE 4

Overall reception reliability

The following parameters are involved :

One frequency operation

Step	Parameter	Description	Source
(1)	OCR (F_1) %	Overall circuit reliability for frequency F_1	Line 19, Table 2
(2)	ORR (F_1) %	Overall reception reliability	OCR (F_1)

Two frequency operation

(3)	OCR (F_2) %	Overall circuit reliability for frequency F_2	Line 19, Table 2
(4)	ORR (F_1) (F_2)	Overall reception reliability (a) where $F_1/F_2 > 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_2}(1-OCR(n))+Max(OCR(F_1); OCR(F_2))\right)$
		(b) where $F_1/F_2 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-OCR(n))$

TABLE 4 (continued)

Overall reception reliability

Three frequency operation

Step	Parameter	Description	Source
(5)	OCR (F_3)	Overall circuit reliability for F_3 where $F_1 < F_2 < F_3$	Line 19, Table 2
(6)	ORR (F_1) (F_2) (F_3)	(a) Overall reception reliability for $F_1/F_3 \geq 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_3}(1-OCR(n))+Max(OCR(F_1), OCR(F_2), OCR(F_3))\right)$
		(b) $F_1/F_2 < 0.9$; $F_2/F_3 < 0.9$	$1-\prod_{n=F_1}^{F_3}(1-OCR(n))$
		(c) $\frac{F_1/F_2 \geq 0.9;\ F_2/F_3 < 0.9}{F_1/F_2 < 0.9;\ F_2/F_3 \geq 0.9}$ or	$\frac{(a)+(b)}{2}$

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WORKING GROUP 4A

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Basic reception reliability

Note - In this document procedures are given for calculating reception and broadcast reliability in various circumstances. The inclusion of these calculation procedures does not prejudge or comment on the desirability of these circumstances.

The method for computing basic reception reliability is outlined in Table 3. For a single frequency, basic reception reliability (BRR) is the same as the basic circuit reliability (BCR) described in the previous section. For multiple frequencies, the interdependence between propagation conditions on different frequencies results in the computation method given in Table 3. In steps 3 and 7, BCR (n) is the basic circuit reliability for frequency n. Where n = F_1, F_2, etc. the basic reception reliability is given in step (2) for a single frequency, in step (4) for a set of two frequencies and in step (6) for a set of three frequencies.

TABLE 3

Basic reception reliability

The following parameters are involved :

One frequency operation

Step	Parameter	Description	Source
(1)	BCR (F_1) %	Basic circuit reliability for frequency F_1	Line 18, Table 1
(2)	BRR (F_1) %	Basic reception reliability	BCR (F_1)

Two frequency operation

(3)	BCR (F_2) %	Basic circuit reliability for frequency F_2	Line 18, Table 1
(4)	BRR (F_1) (F_2)	Basic reception reliability (a) where $F_1/F_2 \geqslant 0.9$	$\frac{1}{2}(1-\prod_{n=F_1}^{F_2}(1-BCR(n))+Max(BCR(F_1), BCR(F_2))$
		(b) where $F_1/F_2 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-BCR(n))$

TABLE 3 (continued)

Basic reception reliability

Three frequency operation

Step	Parameter	Description	Source
(5)	BCR (F_3)	Basic circuit reliability for F_3 where $F_1 < F_2 < F_3$	Line 18, Table 1
(6)	BRR (F_1) (F_2) (F_3)	[(a) Basic reception reliability for $F_1/F_3 \geq 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_2}(1-BCR(n))+Max(BCR(F_1), BCR(F_2))\right]$
		(b) $F_1/F_2 < 0.9$; $F_2/F_3 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-BCR(n))$
		(c) $\frac{F_1/F_2 \geq 0.9;\ F_2/F_3 < 0.9}{F_1/F_2 < 0.9;\ F_2/F_3 \geq 0.9}$ or	$\frac{(a)+(b)}{2}$

Overall reception reliability

The method for computing overall reception reliability is outlined in Table 4. For a single frequency, overall reception reliability (ORR) is the same as the overall circuit reliability (OCR) described in the previous section. For multiple frequencies, the interdependence between propagation conditions on different frequencies results in the computation method given in Table 4. In steps (3) and (7), OCR (n) is the overall circuit reliability for frequency n where n = F_1, F_2 etc. The overall circuit reliability is given in step (2) for a single frequency, in step (4) for a set of two frequencies and in step (6) for a set of three frequencies.

TABLE 4

Overall reception reliability

The following parameters are involved :

One frequency operation

Step	Parameter	Description	Source
(1)	OCR (F_1) %	Overall circuit reliability for frequency F_1	Line 19, Table 2
(2)	ORR (F_1) %	Overall reception reliability	OCR (F_1)

Two frequency operation

(3)	OCR (F_2) %	Overall circuit reliability for frequency F_2	Line 19, Table 2
(4)	ORR (F_1) (F_2)	Overall reception reliability **(a) where $F_1/F_2 > 0.9$**	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_2}(1-OCR(n))+Max(OCR(F_1), OCR(F_2))\right)$
		(b) where $F_1/F_2 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-OCR(n))$

TABLE 4 (continued)

Overall reception reliability

Three frequency operation

Step	Parameter	Description	Source
(5)	OCR (F_3)	Overall circuit reliability for F_3 where $F_1 < F_2 < F_3$	Line 19, Table 2
(6)	ORR (F_1) (F_2) (F_3)	[(a) Overall reception reliability for $F_1/F_3 \geq 0.9$	$\frac{1}{2}\left(1-\prod_{n=F_1}^{F_2}(1-OCR(n))+Max(OCR(F_1), OCR(F_2))\right]$
		(b) $F_1/F_2 < 0.9$; $F_2/F_3 < 0.9$	$1-\prod_{n=F_1}^{F_2}(1-OCR(n))$
		(c) $\frac{F_1/F_2 \geq 0.9;\ F_2/F_3 < 0.9}{F_1/F_2 < 0.9;\ F_2/F_3 \geq 0.9}$ or	$\frac{(a)+(b)}{2}$

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WORKING GROUP 4A

Fourth Report of Drafting Group 4A-2

BASIC AND OVERALL BROADCAST RELIABILITY

The determination of basic broadcast reliability involves sample points within the geographical area of the desired broadcast reception. The basic broadcast reliability is an extension of the basic reception reliability concept to an area instead of a single reception point. The method for computing basic broadcast reliability is outlined in Table 5. In step (1), the basic reception reliabilities BRR (L_1), BRR (L_2), --- BRR (L_N) are computed as described in Table 3 at each sample point L_1, L_2 -- L_N. These values are ranked in step (2) and the basic broadcast reliability is that value associated with a specified percentile.

In a similar way the overall broadcast reliability is computed as described in Table 6 and it is the value associated with a specified percentile X. Broadcast reliability is associated with the expected performance of a broadcast service at a given hour. For longer periods, computation at one hour intervals is required.

L. PETRIE
Chairman of Drafting Group 4A-2

TABLE 5

Basic broadcast reliability

The following parameters are involved :

Step	Parameter	Description	Source
(1)	BRR (L_1), BRR (L_2) --- BRR (L_N)	Basic reception reliability at all receiving locations considered in the broadcast area	Line (2), (4) or (6) as appropriate from Table 3
(2)	BRR (X)	Basic broadcast reliability associated with percentile X	Any percentile chosen from the ranked values from (1)

Note - The broadcast reliability associated with the percentile X depends upon the density and distribution of the test points in the service area.

TABLE 6

Overall broadcast reliability

The following parameters are involved :

Step	Parameter	Description	Source
(1)	ORR (L_1), ORR (L_2) --- ORR (L_N)	Overall reception reliability at all reception locations considered in the broadcast area	Line (2), (4) or (6) as appropriate from Table 4
(2)	OBR (X)	Overall broadcast reliability associated with percentile X	Any percentile chosen from ranked values from (1)

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WORKING GROUP P-4B

REPORT OF DRAFTING GROUP 4B-4

3.9 Specifications and progressive introduction of an SSB system

Considering the advantages of SSB transmission, such as :

- a more efficient utilization of the frequency spectrum by a reduction of interference;
- the capability of improving the required protection ratio between adjacent channels in the case of a sufficient carrier reduction;
- the capability of improving the quality of reception, in particular under poor propagation conditions (selective fading), with SSB receivers;
- the possiblity to produce the same sideband power as a current DSB transmitter with less capital and operational costs,

the Conference adopted the following Single Sideband (SSB) system specifications unde the assumption of a progressive introduction of receivers with synchronous demodulati With respect to a necessary transition period from DSB to SSB, some consideration must also be given to the reception of SSB signals with reduced carrier by receivers with envelope detection. At the end of the transition, all of the advantages of SSB transmissions mentioned above could then be realized.

3.9.1 SSB system specification

3.9.1.1 Audio-frequency bandwidth

The upper limit of the audio bandwidth of the transmitter shall not exceed 4.5 kHz with a further slope of attenuation of 35 dB/kHz and the lower limit shall be 150 Hz with lower frequencies attenuated at a slope of 6 dB per octave.

3.9.1.2 Necessary bandwidth

The necessary bandwidth is equal to the audio-frequency bandwidth.

3.9.1.3 Characteristics of modulation processing

The audio signal shall be processed such that the modulating signal retains a dynamic range of not less than 20 dB. Excessive amplitude compression, together with improper peak limitation, will lead to excessive out-of-band radiation and thus to adjacent channel interference, and shall therefore be avoided.

3.9.1.4 Channel spacing

During the transition period, the channel spacing for SSB shall be 10 kHz.

With geographical separation, 5 kHz spacing can be used (interleaving). After the end of the transition period the channel spacing shall be 5 kHz.

3.9.1.5 Nominal carrier frequencies

Carrier frequencies for SSB shall be integral multiples of 5 kHz.

3.9.1.6 Sideband to be emitted

The upper sideband shall be used.

3.9.1.7 Suppression of the unwanted sideband

With respect to the relative RF protection ratio, the degree of suppression of the unwanted sideband (lower sideband) and of intermodulation products in that part of the transmitter spectrum shall be at least 35 dB relative to the wanted sideband signal level. [Because of the large difference of signal amplitudes in adjacent channels in practice, however, a greater suppression is recommended.]

3.9.1.8 Degree of carrier reduction (relative to peak envelope power)

During the transition period the carrier reduction of the SSB emission shall be 6 dB, to allow SSB transmissions to be received by conventional DSB receivers with envelope detection without significant deterioration of the reception quality.

At the end of the transition period the carrier reduction of the SSB emission shall become 12 dB.

3.9.1.9 Frequency tolerance

The frequency tolerance of the SSB carriers shall be 10 Hz*.

*Note - This frequency tolerance is acceptable only under the assumption that future SSB receivers will be equipped with a device locking the locally re-inserted carrier for synchronous demodulation to the carrier of the SSB emission. (See also paragraph 3.9.1.11.)

3.9.1.10 Overall selectivity of the receiver

The reference receiver shall have an overall bandwidth of 4 kHz, with a slope of attenuation of 35 dB/kHz*.

*Note - Other combinations of bandwidth and slope of attenuation are possible with the same relative RF protection ratio of about -27 dB at 5 kHz carrier difference.

3.9.1.11 Detection system of the SSB receiver

SSB receivers shall be equipped with a synchronous demodulator, using for the carrier acquisition a method whereby a carrier is regenerated by means of a suitable control loop which pulls the receiver to the incoming carrier. Such receivers must work equally well with conventional DSB transmissions and with SSB transmissions having a carrier reduced to 6 or 12 dB relative to peak envelope power.

3.9.1.12 Equivalent sideband power

During the transition period an equivalent SSB emission is one giving the same loudness level as the corresponding DSB emission, when it is received by a DSB receiver with envelope detection. This is achieved when the sideband power of the SSB emission is 3 dB larger than the total sideband power of the DSB emission. (The peak envelope power of the equivalent SSB emission as well as the carrier power are the same as that of the DSB emission.)

After the end of the transition period, the equivalent sideband power can be reduced by 3 dB.

3.9.1.13 RF protection ratios

Assuming that the SSB and DSB emissions correspond to the technical characteristics specified above the following RF protection ratios shall be applied :

- during the transition period :

RF co-channel protection ratio

Due to the need to increase the radiated sideband power by 3 dB in the case of equivalent SSB emissions, there is a consequent need to make an allowance of the same 3 dB in the co-channel protection ratio for the case of a wanted DSB signal interfered with by an SSB signal, if the same quality of reception is to be maintained.

Relative RF protection ratios :

(For the following protection ratios SSB emissions with equivalent sideband power are assumed.)

a) If a wanted DSB signal is received by a conventional DSB receiver with envelope detection which is interfered with by an SSB emission.

According to the resulting RF protection ratio, reception of the wanted DSB signal in the lower channel at for example $\Delta F = -5$ kHz shall be impaired by about 1 dB, while under the same conditions reception of the wanted DSB signal in the upper adjacent channel at $\Delta F = +5$ kHz shall be impaired by about 4 dB in comparison to the present RF protection ratios, as specified in Figure [C] of paragraph 3.3.2.

b) For the case of a wanted SSB signal interfered with by a DSB signal, values of Figure [C] of paragraph 3.3.2 shall be used.

c) In case of a wanted SSB signal interfered with by an SSB signal, the values mentioned in a) above shall be applied.

- after the end of the transition period (both wanted and interfering signals are SSB signals)

RF co-channel protection ratio :

The RF protection ratio is the same as that applied for the DSB system.

Relative RF protection ratios :

Relative RF protection ratios shall be as shown in Figure [E]

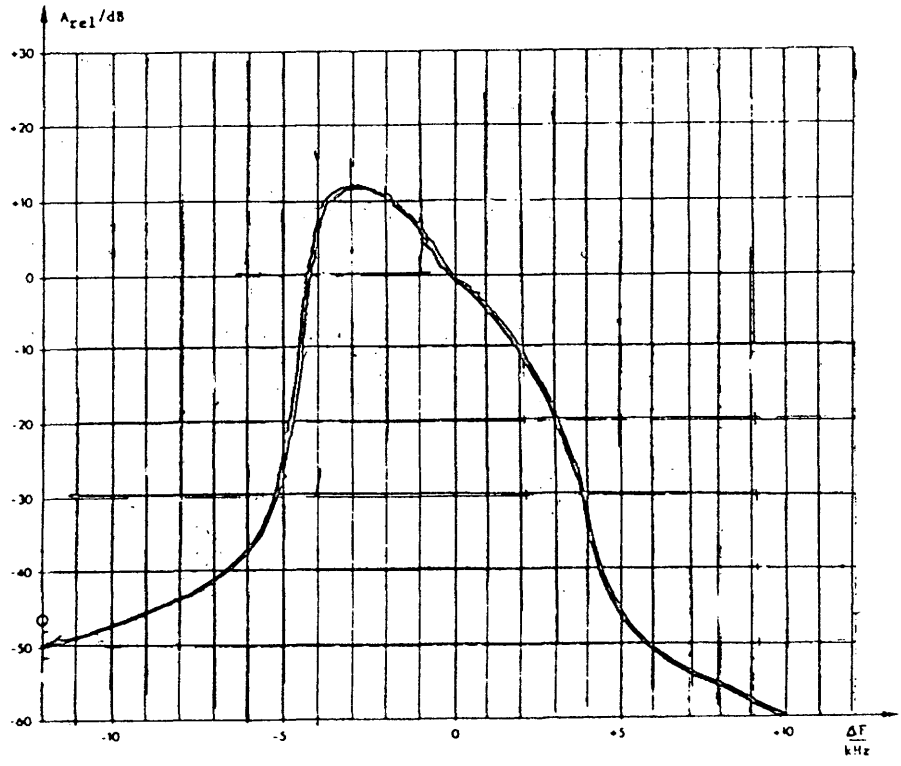

FIGURE [E]

RF protection ratios A_{rel} is given with respect to the frequency difference ΔF between the wanted carrier f_w and the interfering carrier f_i

$$\Delta F = f_w - f_i$$

Thus negative ΔF describes interference from the upper adjacent channel.

..

G. GROSCHEL
Chairman of Working Group 4B-4

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-5
TO WORKING GROUP 4B

After the lengthy discussion, the Group proposes to adopt the method outlined in Document J/57 for the purpose of determining test points.

For short distance coverage, grid resolution should be double of that for long distance coverage.

For areas which are out of CIRAF zones, grid resolution should be a quarter of that for short distance coverage.

Actual division factor n should be determined taking into account computer resources available.

TABLE 1

The number of test points

n	Pr	Dmin (km)	Dmax (km)	(km)	
5	252	1417	1657	1520	0.0133
6	362	1181	1383	1271	0.0109
7	492	1012	1187	1092	0.0092
8	642	886	1039	956	0.0079
9	812	787	924	851	0.0070
10	1002	709	838	767	0.0062
11	1212	644	756	698	0.0056
12	1442	590	694	640	0.0051
13	1692	545	640	591	0.0047
14	1962	506	595	549	0.0043
15	2252	472	555	513	0.0040

n : Division factor of the arc connecting two adjacent vertexes of an icosahedron inscribed to a sphere, whose radius is 6400km

Pr : The number of reference test points ; $Pr = 10\ n^2 + 2$

Dmin : Minimum distance between two adjacent reference test points

Dmax : Maximum distance between two adjacent reference test points

: Mean distance of 1920 arcs

: Standard deviation

J. UCIHARA
Chairman of Drafting Group 4B-5

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WORKING GROUP 4B

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REPORT OF DRAFTING GROUP 4B-2

3.5.1 Antenna characteristics

In HF broadcasting the antenna is the means by which the radio-frequency energy is directed towards the required service area. The selection of the right type of antenna will enhance the signal in the service area, while reducing radiation in unwanted directions. This will protect other users of the RF spectrum operating on the same channel or adjacent channels to another coverage area. The use of directional antennas with well-defined radiation patterns is thus recommended for HF broadcasting.

Omnidirectional antennas should be used only if the transmitter location is in the centre of the coverage area. Distances to be served are relatively short. Frequencies used are at the lower end of the spectrum.

Directional antennas serve a double purpose. The first is to prevent interference to other users of the spectrum by means of their directivity. The second is to provide sufficient field-strength for the listeners' satisfaction by means of their power gains.

Although rhombic antennas are used for broadcasting, their use should be discouraged because of the size and number of their sidelobes, which could create unnecessary interference.

The value of the field-strength in the reception area is influenced by the radiation characteristics of the antennas being used, and this will be optimized if the most suitable type of antenna is used. The direction of radiation of the main lobe of a short-wave antenna, its elevation angle and maximum gain are principally dependent upon the type of array and its height above ground.

3.5.1.1 A set of representative types of antenna

Antenna patterns used for planning purposes need to take account of practical considerations, they should be standardized for reference purposes and they should be representative of the large range of types of antenna in common use. A set of representative antenna types recommended for planning purposes, based on single band antennas, together with their vertical and azimuthal characteristics are summarized together with the gain (dBi) and elevation angle of maximum radiation (Table [A]). Details of the total horizontal beamwidth (between -6 dB points) for the respective types is also given (Table [B]).

Principal characteristics of the set of representative types of antenna

TABLE /A_7

Gain and elevation angle in the direction of maximum radiation

VERTICAL CHARACTERISTIC TYPE OF ANTENNA ---/m/n/h	IN THE DIRECTION OF MAXIMUM RADIATION					
	AZIMUTHAL CHARACTERISTIC					ELEVATION ANGLE θ (DEGREES)
	HR4 GAIN G_i (dB)*	HR2 GAIN G_i (dB)*	HR1 GAIN G_i (dB)*	H2 GAIN G_i (dB)*	H1 GAIN G_i (dB)*	
-/4/1	22	19				7
-/4/0.8	22	19				8
-/4/0.5	21	19				9
-/3/0.5	20	18				12
-/2/0.5	19	16	14		11	17
-/2/0.3	18	15	13		10	20
-/1/0.5		14	12	11	9	28
-/1/0.3		11	10			44
				9	7	47

* $G_i = G_d + 2.2$ dB

TABLE /B/

Total horizontal beamwidth at the elevation angle of maximum radiation (for single band antennas)

TYPE OF ANTENNA ---/m/n/h	TOTAL HORIZONTAL BEAMWIDTH (-6 dB) DEGREES				
	HR4	HR2	HR1	H2	H1
ALL TYPES -/4/1 to -/2/0.5	35	70	108		
-/2/0.3	35	70	110		
-/1/0.5		74	114	78	126
-/1/0.3		90	180	180	180

For antennas not included in Table /A/ an equivalent representative type whose performance is nearest to that of the antenna under consideration can be determined by reference to Table /C/.

TABLE /C/

Determination of the representative antenna having a radiation pattern most similar to that of any non-representative one, on the basis of the value of the parameters n and h

h	HR m/n/h				H m/n/h	
	n=4	n=3	n=2	n=1	n=2	n=1
$h \geq 0.9$	m/4/1	m/4/0.8	m/3/0.5	-	-	-
$0.9 > h \geq 0.65$	m/4/0.8	m/4/0.5	m/3/0.5	-	-	-
$0.65 > h \geq 0.4$	m/4/0.5	m/3/0.5	m/2/0.5	m/1/0.5	m/2/0.5	m/1/0.5
$0.4 > h$	m/3/0.5	m/2/0.5	m/2/0.3	m/1/0.3	m/2/0.3	m/1/0.3

m : number of half-wave elements in each row (m=4, 2 or 1, where appropriate)
n : number of half-wave elements in each stack
h : height above ground of the bottom row of elements, expressed in terms of the wavelength at the operating frequency.

3.5.1.2 Multi-band antennas

In the case of multi-band antennas, (curtain and log periodic) a single value of h, an important parameter with regard to the vertical radiation pattern and the angle of maximum radiation, no longer corresponds to the physical height of the bottom row of elements of the antenna over the range of operating frequencies. The equivalent value h' at the required frequency of operation can be found in the following way : in Figure /_1_/ enter the vertical angle of maximum radiation, taken from the antenna diagram for the respective frequency band, into the ordinate. Choose the curve with the appropriate value of n. For two plane log periodic antenna, n = 2. Read from the abscissa the equivalent height h'. The equivalent type of antenna can then be determined by entering Table /_C_/, taking this new value of h.

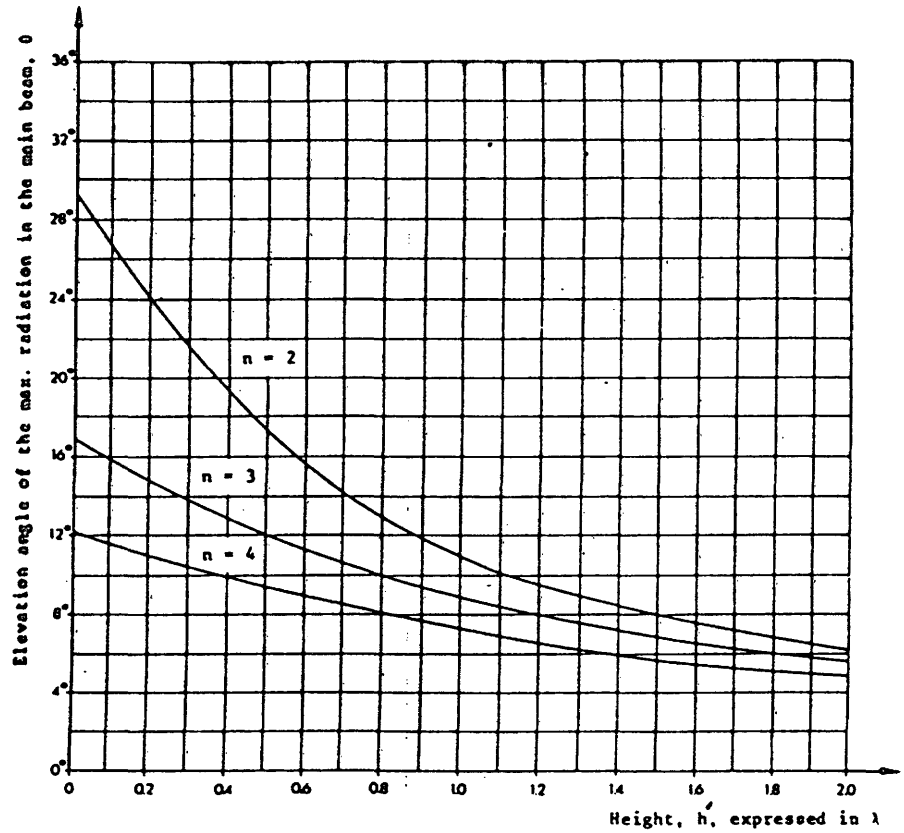

FIGURE /_1_/

Diagram enabling the equivalent value of the parameter h to be determined in the case of a multiband antenna having n half-wave elements in each stack

Additional data particularly concerning the azimuthal performance over the operating range of a multi-band antenna, are required for later inclusion in Table /_D_/ as they become available. To achieve this, administrations are encouraged to submit accurate data in the format given in Table /_D_/ during the intersessional period in order to add supplementary columns in Table /_D_/ to describe the performance of these aerials at the operating frequency limits.

3.5.1.3 A set of simplified antenna patterns for planning purposes

The vertical pattern and azimuthal pattern of the antennas listed in Table /A/ can each be represented by a set of values of the relative attenuation in dB below maximum gain, each value relative to the maximum radiation in both elevation and azimuth, and to the maximum gain of the array. The attenuation, in dB, relative to maximum gain, for the azimuthal pattern are listed in Tables ... and those for the vertical pattern are listed in Tables /E, F, G/.

Values given in Tables D-G have been manually taken from the new provisional CCIR Antenna Handbook. These values will be amended as appropriate with the exact values calculated by the CCIR Secretariat.

When an antenna is slewed horizontally, the main beam may be considered as unchanged in shape. It can, therefore, be assumed that the azimuth of maximum radiation of the main beam in the slewed mode coincides with the horizontal angle $\psi = 0$ (see paragraph 3.5.1.4) in Table /D/. Representation of radiation outside the main beam is required in a similar tabulated form and the CCIR Secretariat is requested to provide the appropriate values based on the data contained in the CCIR Antenna Handbook.

3.5.1.4 Representation of antenna patterns

In forming the 3-dimensional pattern, the vertical angle θ remains unchanged, but it is necessary to modify the horizontal angle φ (angular difference between great circle bearing transmitter to receiver and azimuth of maximum radiation of the antenna) to a value given by :

$$\psi = \text{arc sin } (\cos \theta \sin \varphi) \qquad (1)$$

The azimuthal attenuation at angles of elevation other than that correspondir to zero are derived by converting the angle φ into an angle ψ according to formula (1) before extracting the data from the azimuthal attenuation tables.

The resulting gain in any required direction is then calculated by summing the attenuation for the appropriate values of θ and ψ (Tables /D-G/) and then subtracting the total attenuation, subject to the limitations defined below, from the maximum gain (Table /A/) for the appropriate antenna.

Forward radiation

For angles of elevation below the vertical angle of maximum radiation, the total attenuation should not exceed a value of 30 dB.

For angles of elevation equal to and above the vertical angle of maximum radiation, the resultant antenna gain shall not fall below -8 dBi.

Back radiation

For HR m/n/h antennas the total attenuation should not exceed a value of 30 d

I.E. DAVEY
Chairman of Working Group 4B-2

TABLE /D 7

Antenna attenuation relative to the gain in the direction of maximum radiation, for angles of azimuth relative to the direction of maximum radiation

Angle (ψ) (degrees)	Azimuthal attenuation (dB)				
	HR 4/n/h	HR 2/n/h	HR 1/n/h	H2/n/h	H1/n/h
0	0	0	0	0	0
± 5	0.6	0.2	0	0.4	0.2
± 10	1.9	0.6	0.2	0.8	0.5
± 15	4.3	1.2	0.5	1.3	0.8
± 20	8.1	2.0	0.8	2.2	1.2
± 25	15.4	3.3	1.2	3.4	1.5
± 30	40	4.8	1.8	5.2	2.2
± 35	20	6.4	2.4	6.9	3.0
± 40	16.5	8.5	3.2	9.0	3.8
± 45	15.8	11.2	4.1	12	4.8
± 50	17	14.0	5.3	15	5.6
± 55	19	17	6.3	18	6.9
± 60	22	21	7.9	22	8.5
± 65	26	25	9.5	26	10
± 70	30	30	11	31	11
± 75	36	36	13	36	11
± 80	39	40	16	40	12
± 85	40	40	18	40	10
± 90	40	40	20	40	40
± 95	40	40	20	Bi-directional antennas	
± 100	40	40	19		
± 105	39	39	17		
± 110	35	36	16		
± 115	32	32	15.3		
± 120	29	27	15		
± 125	27	25	14.2		
± 130	26	23	14.2		
± 135	26	22	14.2		
± 140	28	20	14.2		
± 145	34	19	14.5		
± 150	40	18	14.5		
± 155	29	17.5	14.5		
± 160	23	16.8	14.5		
± 165	19	16.0	14.5		
± 170	17	15.7	15		
± 175	15.7	15.3	15		
± 180	15	15	15		

TABLE /E 7

Antenna vertical attenuation relative to the gain in the direction of maximum radiation, for various angles of elevation (antenna type : HR m/4/h)

Elevation angle (θ) (degrees)	Vertical attenuation (dB)		
	h = 0.5	h = 0.8	h = 1.0
0	40	40	40
3	6	4	4
6	1.8	1.0	0.5
9	0	0.1	0.6
12	1.0	2	4
15	3.9	8	16
18	10	30	16
21	17	19	10.6
24	26	14.2	13
27	24	19	20
30	40	40	40
33	20	23	40
36	9	22	28
39	12.8	30	16
42	13.2	20	12.8
45	15.7	14.8	11.5
48	20	12.5	13
51	25	13.5	14.5
54	25	13	24
57	20	15	30
60	18.5	18	26
63	18.5	21	23
66	19	25	22
69	22	33	24
72	23	38	25
75	27	40	28
78	32	40	32
81	36	40	38
84	40	40	40
87	40	40	40
90	40	40	40

TABLE /F 7

Antenna vertical attenuation relative to the gain in the direction of maximum radiation, for various angles of elevation (antenna types : HR m/3/0.5, HR m/2/h, HR m/1/0.5 and HR m/1/0.3)

Elevation angle (θ) (degrees)	Vertical attenuation (dB)				
	m/3/0.5	m/2/h		m/1/0.5	m/1/0.3
		h = 0.3	h = 0.5		
0	40	40	40	40	40
3	8	12	10	13	18
6	3	6	5	8	12
9	1	4	2	6	9
12	0	2	1	4	17
15	1	1	0	2	5
18	3	0	0	1	4
21	6	0	1	1	3
24	10	1	2	0	2
27	18	1	3	0	1
30	25	2	6	0	1
33	20	3	10	0	1
36	20	5	15	1	0
39	25	6	23	1	0
42	40	9	21	2	0
45	23	11	16	3	0
48	17	15	15	5	0
51	15	18	14	6	0
54	14	21	14	7	1
57	15	26	15	9	1
60	15	30	15	11	1
63	16	30	16	13	1
66	18	33	18	15	1
69	20	35	22	15	2
72	23	37	24	15	2
75	25	38	27	15	2
78		40	30	15	3
81		40	38	15	3
84			40	15	4
87				16	4
90					4

TABLE [G 7]

Antenna vertical attenuation relative to the gain in the direction of maximum radiation, for various angles of elevation (antenna type H m/u/h)

Elevation angle (θ) (degrees)	Vertical attenuation (dB)			
	H m/1/0.3	H m/1/0.5	H m/2/0.3	H m/2/0.5
0	40	40	40	40
3	20	14	12	10
6	13	9.1	7.0	5.1
9	8.8	5.7	3.8	2.1
12	7.2	3.6	1.8	0.9
15	5.3	2.1	0.9	0.2
18	3.7	1.1	0.4	0.1
21	3.0	0.8	0.0	0.8
24	2.1	0.4	0.5	2.0
27	1.7	0.0	1.0	3.5
30	1.0	0.3	1.8	6.0
33	0.8	0.6	2.9	10
36	0.6	0.9	4.1	18
39	0.4	1.5	6.4	21
42	0.2	2.0	7.5	21
45	0.0	3.1	11	16
48	0.0	4.5	14	15
51	0.1	6.0	17	14
54	0.2	7.2	21	13
57	0.3	9.5	25	14
60	0.4	11	26	15
63	0.5	12	28	16
66	0.6	14	29	18
69	0.7	16	30	20
72	0.8	16	32	23
75	1.0	16	35	26
78	1.0	15	37	30
81	1.1	15	40	36
84	1.2	15	40	40
87	1.3	14	40	40
90	1.4	14	40	40

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-3
TO WORKING GROUP 4B

1. Signal-to-noise ratio

1.1 The a.f. signal-to-noise ratio adopted is based upon subjective assessment of reception quality under stable signal conditions.

1.2 The r.f. signal-to-noise ratio is related to a.f. signal-to-noise ratio by a factor concerned with modulation depth, and thus this ratio is also for stable signal conditions. It is therefore not appropriate to give a time percentage when discussing r.f. signal-to-noise ratio.

1.3 It is, however, noted that the method for calculating basic circuit reliability includes the fading allowances within the procedure. It seems appropriate therefore to indicate the grade of performance by quoting a percentage reliability associated with either the signal-to-noise ratio or the minimum usable field strength (see the proposals in Document DT/23).

2. Required reliability

2.1 Widely differing views were expressed on the necessary reliability percentage.

2.2 A reliability percentage of 90% is desirable as a starting point in studying the feasibility of a planning method. Further studies are needed during the inter-sessional period.

L.W. BARCLAY
Chairman of Drafting Group 4B-3

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-7

TO WORKING GROUP 4B

Reception zones

In specifying the reception area, this can in general be done by referring to a zone e.g. CIRAF-zone. By subdividing the CIRAF-zones into four divisions, it will be possible to define more precisely the service area of a transmission.

This is achieved by defining an appropriate reference point in each CIRAF-zone with the dividing lines described precisely by the lines of latitude and longitude passing through such a reference point. For maritime areas not currently defined in Appendix 1 of the Radio Regulations, an appropriate notation is required.

In specifying the reception area which is smaller than an entire zone or subdivision of a zone it should be indicated as a country or part of a country using symbols from the Preface to the International Frequency List as far as possible and if necessary the maximum service range in km. See Appendix 2 of the Radio Regulations.

Test points

Based on the recommendation contained in Document 22 (CCIR, page 88), the Group proposes for the purpose of determining test points a uniform grid of points based on an equal spacing in degrees latitude and longitude.

The principle purpose of proposing such a set of points is to ensure that the feasibility of establishing the required service will be evaluated with a prospect of success. If test points only exist outside the intended service area neither the wanted signal nor the ratio of wanted to unwanted signal will be correctly represented.

A basic spacing of 12° latitude and longitude is appropriate.

When setting the datum for the grid of test points, this datum should be selected to ensure minimum coincidence with the CIRAF boundaries. It is recommended that the datum should be 5° West and 5° South. When evaluating circuit performance over a CIRAF area, those test points which coincide with the boundary of the zone are considered to be within the required zone of reception.

To evaluate the service in any compatibility analysis, it is necessary to satisfy a specified performance over a given area. This is achieved by specifying a minimum number $\lceil X \rceil$ of test points within the service area. If a basic grid of 12° does not provide sufficient tests points then an interleaving subset of test points within the service area is necessary, i.e. a grid of 6° latitude and longitude is required.

If the grid of 6° does not provide sufficient test points for a small well defined service area, a resolution of 3° latitude and longitude is required.

I. JOHNSEN
Chairman of Drafting Group 4B-7

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WORKING GROUP 4B

REPORT OF DRAFTING GROUP 4B-7 TO WORKING GROUP 4B

3.9.2 Progressive introduction of SSB transmissions (Technical aspects)

3.9.2.1 Transmitters

It should be recognized that :

a) transfering an existing DSB transmitter to an SSB transmitter which delivers equivalent sideband power with 6 dB carrier reduction is not possible;

b) it is economically unattractive to convert existing conventional DSB transmitters for operation to SSB mode with 6 dB carrier reduction;

c) it is possible and feasible to convert new designed unconventional DSB transmitters to SSB mode with 6 dB carrier reduction and the same sideband power as in DSB mode without significant loss of efficiency;

d) with 12 dB carrier suppression also conventional DSB transmitters can be converted to SSB mode and can provide the necessary equivalent sideband power;

e) the technical and/or economical lifetime of a transmitter can be estimated at twenty years.

3.9.2.2 Receivers

It should be recognized that :

a) current technological progress within the next ten years will make it possible to produce DSB/SSB receivers in mass for reasonable prices;

b) SSB receivers with the possibility to select either the upper or the lower sideband of a DSB transmission is useful during the transition period;

c) the technical and economical lifetime of a receiver is considered to be in the order of ten years.

3.9.2.3 Transition period from technical point of view

Taking into account the lifetime of transmitters and receivers the duration of the transition period could be set at / 15 to 20 / years.

3.9.2.4 Evaluation of compatibility aspects of the proposed SSB-system during the transition period

During the transition period, single-sideband transmissions will be mainly received by conventional DSB receivers using envelope detection. To obtain with a conventional DSB receiver using envelope detection the same loudness level with both SSB and DSB, the sideband power of the SSB emission has to be 3 dB larger (equivalent sideband power) than the total sideband power of the DSB emission. Alternatively, if the sideband power of the SSB emission cannot be increased, one has to accept some reduction of the coverage area. Such an SSB emission, however, could replace any of the DSB emissions in the plan without deteriorating the interference situation.

SSB emissions with equivalent sideband power replacing a DSB emission according to the plan will cause a slight increase in adjacent channel interference (e.g. at ± 10 kHz frequency spacing the relative RF-protection ratio would be changed by 3 dB from -36 dB to -33 dB) if reception is done in the adjacent channels with a conventional DSB receiver having the selectivity of the DSB reference receiver (see paragraph 3.9.1.13).

G. GRÖSCHEL
Chairman of Drafting Group 4B-7

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WORKING GROUP 5A

First report of ad hoc Group 5A-2 to Working Group 5A

STEPS FOR THE SEASONAL PLANNING PROCESS

Ad hoc Group 5A-2 has unanimously agreed on the following text :

In accordance with the planning principles and without imposing constraints on planning, the following shall be applied in the seasonal plans :

1) administrations may notify the preferred frequency;

2) efforts shall be made during the planning process in order to include the preferred frequency in the plan;

3) if not possible, efforts shall be made in order to select a frequency which is as close as possible to the preferred one in the same band;

4) otherwise, the automated system shall be used to select the appropriate frequencies, permitting to accommodate the maximum number of requirements, taking into account the constraints of technical characteristics of equipment.

G.H. RAILTON
Chairman of ad hoc Group 5A-2

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WORKING GROUP 5A

SECOND REPORT OF AD HOC GROUP 5A-2

TO WORKING GROUP 5A

Ad hoc Group 5A-2 gave further consideration to Document DT/13 and considered three possible alternatives. Due to lack of time to give further consideration to these alternatives they are submitted to Working Group 5A for further consideration.

Alternative 1

Broadcast requirement

A requirement notified by an administration to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitter station.

Alternative 2

Broadcast requirement

A requirement notified by an administration to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitter station which includes the basic characteristics as well as supplementary information in accordance with the form decided by this Conference.

Alternative 3

A requirement notified by an administration to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitter station, indicating, as the case may be, any technical constraint and the preferred frequency if any.*

G.H. RAILTON
Chairman of ad hoc Group 5A-2

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* The technical constraints may relate to equipment limitations such as fixed frequency transmitters; the manner in which the frequency will be included in the planning process is indicated in the planning method.

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WORKING GROUP 5A

THIRD REPORT OF AD HOC GROUP 5A-2
TO WORKING GROUP 5A
(Continuation)

4.2.3.4.2.4 Antenna

When the administration indicates that its antenna can operate only in a given frequency band, only frequencies from that band shall be included in the plan.

Option A

For the indicated time block of each requirement, frequency changes should be limited to those necessitated by propagation factors.

4.2.3.4.3 Limitation of frequency change

Option B

[In order to limit the number of frequency changes for each requirement to only those necessitated by propagation factors, the system will start by selecting the frequency band most likely to achieve the required /basic circuit reliability/. If the band so selected permits to achieve the required /basic circuit reliability/ for only a part of the notified hours of operation (part A), this part will be processed to the end in order to calculate the /overall broadcast reliability/. This part A of the requirement will then be reduced only if part of it which is incompatible with other requirements can be appropriately covered in another band together with the remaining part B of the requirement. The same applies if more than two bands are required to cover the requirement with the appropriate criteria.]

4.2.3.4.4 [Rules to be applied to congested areas]

/To be developed./

4.2.3.5 Step 5 - Selection of technical characteristics

The system shall be designed so that in those cases where administrations communicate the power and characteristics which may vary in given ranges, it selects the values for these characteristics to be used within the indicated ranges.

4.2.3.6 Step 6 - Compatibility analysis and frequency selection

/To be developed./

4.2.3.7 Step 7 - Reliability analysis

The method described in section [ ] shall be used to calculate the [overall broadcast reliability].

4.2.3.8 Step 8 - Criteria and requirements met

[The requirements for the season under consideration will be analyzed to determine if they are satisfied with the agreed criteria as contained in section [ ].]

4.2.3.9 Step 9 - Seasonal plan

The timing of publication and the means of securing administrations' comments on seasonal plans will be considered by the second session of the Conference.

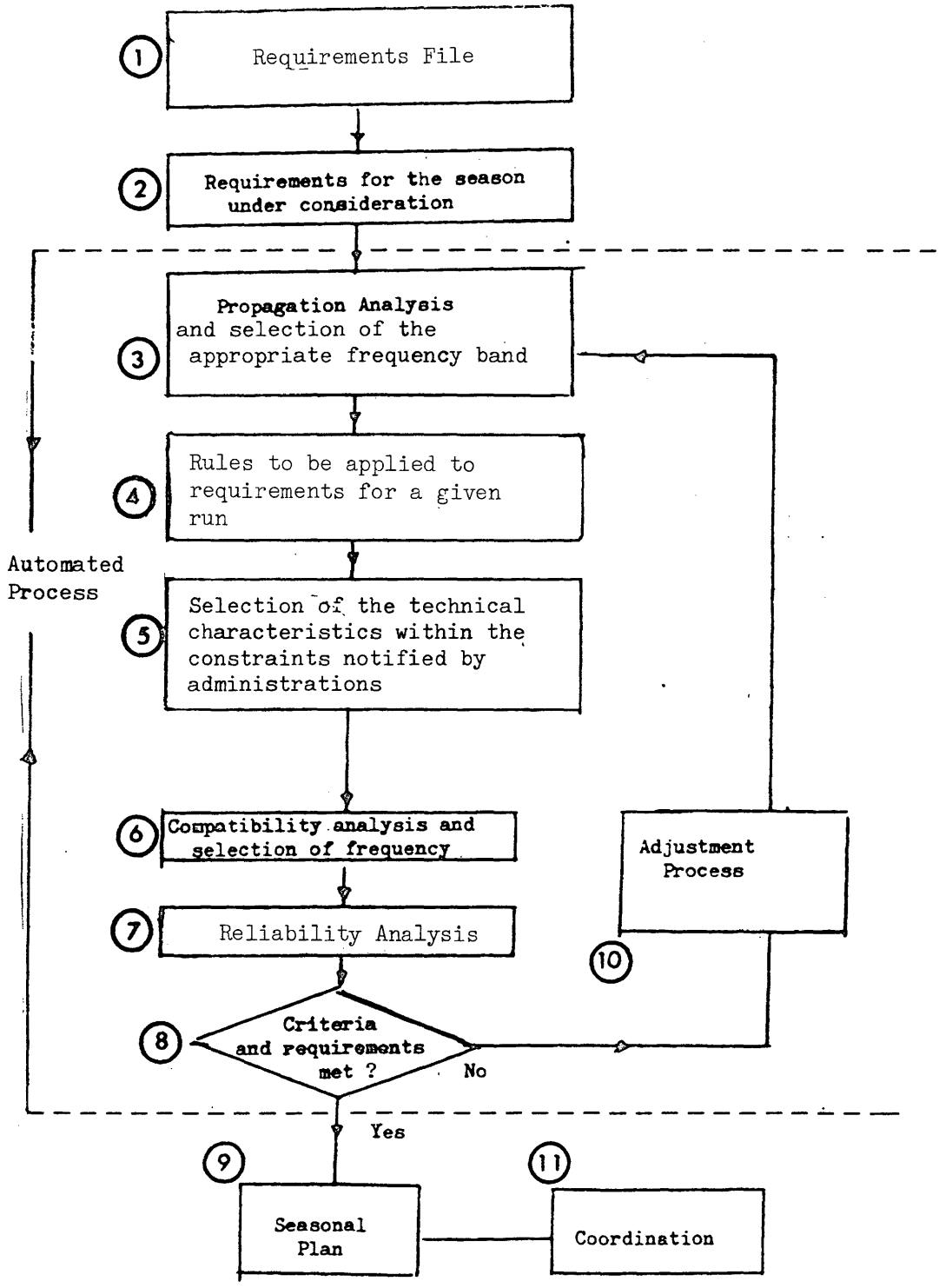

FIGURE [ ]

Flowchart of the automated process

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WORKING GROUP 5A

4.2.3.4.3 Limitation of frequency change

For the indicated time block of each requirement, frequency changes should be essentially limited to those necessitated by propagation factors. Frequency changes due to incompatibilities may also be permitted. In these cases, the number of frequency changes during any contiguous period of operation shall be limited to the minimum necessary.

M. OUHADJ
Chairman of Working Group 5A

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WORKING GROUP 5A

THIRD REPORT OF AD HOC GROUP 5A-2
TO WORKING GROUP 5A
CHAPTER 4

4. Planning principles and method

Having considered the proposals of administrations on planning principles and methods, the first session of the Conference concluded that the planning of the high frequency broadcasting service shall be based on annually or semi-annually seasonal plans to be developed using requirements submitted [periodically] by the administrations. The seasonal plans shall be developed on the basis of the following principles and planning method.

4.1 Planning principles

4.1.1 In accordance with the International Telecommunication Convention and with the Radio Regulations annexed thereto, the planning of the high frequency bands allocated to the broadcasting service shall be based on the principle of equal rights of all countries, large or small to have equitable access to these bands and to utilize them in accordance with the decisions taken by this Conference. Planning shall also attempt to reach an efficient utilization of these frequency bands, while taking into account the technical and economical constraints that may exist in certain cases.

4.1.2 On the basis of the above, the following planning principles shall be applied.

4.1.2.1 All the [requirements], current or future, formulated by the administrations, shall be taken into account and be treated on an equitable basis, so as to guarantee the equality of rights covered in paragraph 1 above and to ensure a satisfactory service to every administration.

4.1.2.2 All the [requirements], national and international, shall be treated on an equal basis, with due consideration of the differences between these two kinds of [requirements].

4.1.2.3 The planning procedure will attempt to ensure, as far as practicable, the continuity of the utilization of a frequency or of a frequency band. However, such frequency continuity should not prevent equal and technically optimum treatment of all [requirements].

4.1.2.4 The periodical planning process shall be based solely on the [requirements] that will become operational during the planning period. It shall furthermore be flexible to take into account new [requirements] and modifications to the existing [requirements], in accordance with the modification procedures to be adopted by the Conference.

4.1.2.5 The planning procedure shall be based on DSB transmissions. Voluntary SSB transmissions may however be permitted in lieu of planned DSB transmissions, without increasing the level of interference caused to DSB transmissions appearing in the Plan.

4.1.2.6 For efficient spectrum utilization, only one frequency should be used, whenever possible, to satisfy a given [requirement] to a given [required service area] and in any case the number of frequencies used should be the minimum necessary to provide satisfactory reception.

4.1.2.7 Further planning principles which have been referred to 5A-2 have yet to be examined and finalized. (See Annex 1.)

4.2 Planning method

4.2.1 Overview of planning method (Option A)

After considering the various proposals to the Conference, the first session decided to adopt for the planning method the method which is described in a summary manner in Figure /7. The detailed description of each step of the process is contained in section 4.2.3.

4.2.1 Overview of planning method (Option B)

After considering the various proposals to the Conference, the first session decided to propose a planning method containing four basic parts :

1) a requirements file containing present and future broadcasting requirements of administrations;

2) an automated process for generating the seasonal schedules;

3) a modification procedure*;

4) a coordination procedure* with administrations for their final action and acceptance of the proposed schedules.

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* These procedures are to be developed at the second session.

4.2.2 Definition of a broadcasting requirement

/ To be placed in the appropriate Chapter / / See Document DT/38 /

4.2.3 Description of the individual steps of the automated system

4.2.3.1 Step 1 - Requirements file

a) A file containing the operational and projected broadcasting requirements and associated facilities from / / to / / shall be created in order to permit the second session to test / evaluate / the planning method, assess the bands loading and, if required, consider solutions to overloading, / which may lead to improvements in the appropriate parts of the planning method /.

This file will be used to create a "requirements file" to be updated on a periodical basis.

Prior to each planning period, administrations shall confirm and, if necessary modify their broadcasting requirement appearing in the "Requirement File" / in accordance with an updating procedure to be developed at the second session /. These confirmed requirements will be used for the preparation of the seasonal plans.

b) The above files shall contain :

Basic characteristics

1) name of the transmitting station

2) geographical coordinates of the transmitting station

3) country symbol or the geographical area in which the station is situated

4) required service area

5) hours of operation (UTC)

6) range of antenna characteristics

7) transmitter power (dBW)

8) class of emission

/ Optional / / supplementary / characteristics

1) preferred frequency (in kHz)

2) preferred frequency band (in MHz)

3) equipment limitations

4) ranges of power capabilities

4.2.3.2 Step 2 - Broadcast requirements for the season under consideration

The broadcast requirements to be used for each season shall be those contained in the Requirements File which are to be operational during the season under consideration and which are confirmed and, if necessary, modified by the administration, in accordance with the modification procedures of / 4.2.3.1 /.

4.2.3.3 Step 3 - Propagation analysis and selection of the appropriate frequency band

[The propagation model described in / paragraph 3.2 / will be used to calculate for each requirement and for the season and the different hours, the / optimum working frequency / and the / basic circuit reliability /. Based on the results of the above calculations, the appropriate frequency band(s) for each requirement at the different times will be selected. However, if an administration has indicated a preferred frequency band as a technical constraint (equipment or antenna) which limits the use of any frequency bands, then this band shall be used in lieu of the calculated band without determining the / basic circuit reliability /. / If the required / basic circuit reliability / cannot be met during any time with a single frequency band, then a second frequency band shall be selected as long as the administration has indicated the capability to operate in two frequency bands simultaneously. /]

4.2.3.4 Step 4 - Rules for the selection of frequencies

4.2.3.4.1 Optimization

The system must be optimized to ensure the maximum possible utilization of all available channels.

4.2.3.4.2 Equipment constraint

The system shall take into account the technical constraints of the equipment, i.e. :

4.2.3.4.2.1 Frequency

a) When the administration indicates that its facilities can operate only on a limited number of fixed specified frequencies the process in steps 5, 6 and 7 shall be applied to one of these frequencies and should the final step result in an incompatibility the adjustment process (step 10) shall try another one of these frequencies. The plan shall contain the frequency from this limited number of frequencies which will have the lesser degree of incompatibilities.

b) If two of such requirements indicate the same frequency which after analysis results in an incompatibility the situation is referred to the administration(s) concerned.

c) Preferred frequency.

In accordance with the planning principles and without imposing constraints on planning, the following shall be applied in the seasonal plans :

1) administrations may indicate the preferred frequency;

2) efforts shall be made during the planning process in order to include the preferred frequency in the plan;

3) if not possible, efforts shall be made in order to select a frequency which is as close as possible to the preferred one in the same band;

4) otherwise, the automated system shall be used to select the appropriate frequencies, permitting to accommodate the maximum number of requirements, taking into account the constraints of technical characteristics of equipment.

4.2.3.4.2.2 Frequency band

a) When the administration indicates that its facilities can operate only in a given frequency band, only frequencies from that band shall be included in the plan.

b) When an administration indicates a preferred frequency band, the system shall try to select a frequency from this preferred frequency band. If this is not possible, frequencies from the closest band shall be tried. Otherwise, the system will select frequencies from the appropriate band taking into account the equipment constraints covered in paragraph /_7.

4.2.3.4.2.3 Power

a) When an administration indicates only a single power level due to equipment constraints, that power shall be used in the planning process.

b) When an administration indicates several possible power values, the appropriate power shall be used to achieve the /_basic circuit reliability_7.

ANNEX 1

PRINCIPLES STILL TO BE DISCUSSED BY 5A-2

1. In a first stage of the equitable application of the planning procedure an attempt will be made to include the highest possible number of the formulated requirements. Limitations could be imposed on the remaining requirements if their inclusion in the planning process leads to a deterioration of the situation.

2. In order to ensure efficient utilization of the HF bands and sufficient flexibility in planning, the agreed planning method should contain appropriate provisions to guarantee the necessary protection for "minimum requirements" of all countries in any of the future plans, irrespective of the overall number of requirements.

3. Proportionally restricted protection

Those requirements for which, through lack of the requisite technical facilities, the agreed reference usable field strength is not ensured in the required service area, could obtain only proportionally reduced protection.

4. Proportionally restricted protection

Those requirements for which, through lack of the requisite technical facilities, the agreed field strength used as a basis for planning (Emin) is not ensured in the required service area, could obtain only proportionally reduced protection. (Provided that the technical criteria would be adopted compatibly with the different economic situation of the countries.)

5. Submission of realistic requirements

All administrations should realistically submit their minimum requirements to the Conference. Necessary limitation may be laid down by the Conference if required.

6. The choice and implementation of a planning method should take into account the fact that the predominance of harmful interference in the HF broadcasting bands may prevent any given frequency assignment from meeting the requirements of administrations. The planning method adopted by the Conference should therefore include procedures to provide administrations with a guarantee of overall broadcast reliability.

Note - The proposal by one delegation for a planning principle aimed at developing planning on the basis of / broadcasting requirements / instead of / frequency requirements / remains to be examined.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/40-E
31 January 1984
Original : French

BUDGET CONTROL
COMMITTEE

DRAFT

REPORT OF THE BUDGET CONTROL COMMITTEE

TO THE PLENARY MEETING

The Budget Control Committee held five meetings during the Conference and examined the questions arising from its terms of reference.

Under Nos. 475 to 479 of the International Telecommunication Convention (Nairobi, 1982), the Committee's terms of reference are :

a) to determine the organization and the facilities available to delegates;

b) to examine and approve the accounts for expenditure incurred throughout the duration of the Conference;

c) to estimate the costs that may be entailed by the execution of the decisions taken by the Conference.

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 examined the Conference budget, amounting to 2,427,000 Swiss francs, which was approved by the Administrative Council at its 38th session, 1983.

The Committee also noted that the Conference budget did not comprise expenditure on common services supernumerary staff salaries, which are charged to a special section of the ordinary budget. The share of this special section relating to the WARC for HF Broadcasting is estimated at 712,000 Swiss francs.

In addition, the Committee noted that the Conference budget has been adjusted to take into account changes in the common system of the United Nations and the specialized agencies with regard to the salaries and allowances of short-term supernumerary staff and fluctuations in the rate of exchange between the US dollar and the Swiss franc, as required by Administrative Council Resolution 647. As a result of these adjustments, the total budget of the WARC for HF Broadcasting stands at 2,556,000 Swiss francs, i.e. an increase of 129,000 Swiss francs.

3. Situation of Conference expenditure

Under No. 478 of the Convention, the Budget Control Committee has to submit a report to the Plenary Meeting showing, as accurately as possible, the estimated total expenditure of the Conference.

Accordingly, a statement will be found in Annex 1, showing the budget of the Conference, together with a breakdown of credits among the budget subheads and items, as well as the actual expenditure incurred as at February 1984. There is also an indication of the expenditure committed up to that date and an estimate of expenditure up to the date of closure of the Conference. The estimated expenditure on intersessional work in 1984 has also been taken into account.

It will be seen from the above-mentioned statement that the total estimated amount to be charged to the ordinary budget for the HFBC-84 Conference is Swiss frances, i.e. Swiss francs less than the credit allocated by the Administrative Council and adjusted in accordance with Administrative Council Resolution 647.

For the information of the Administrative Council, the position with regard to expenditure on preparatory work for the HFBC-84 Conference carried out in 1983 is given in Annex 2.

4. Recognized private operating agencies and international organizations participating in the work of the Conference

Under Article 16 of the Union's Financial Regulations, the report of the Budget Control Committee must list the recognized private operating agencies and international organizations which are contributing to the expenditure of the Conference, and a list must also be provided of the international organizations which have been exempted from any contribution by Administrative Council Resolution 574.

The above information is given in Annex 3 to this document.

5. Additional expenditure to be taken into account for the execution of the decisions of the Conference

It is stated in No. 478 of the International Telecommunication Convention (Nairobi, 1982) that the report of the Budget Control Committee to the Plenary Meeting should show as accurately as possible the costs that may be entailed by the execution of the decisions taken by the Conference. Moreover, Article 80 of the Convention provides, with regard to the financial responsibilities of administrative conferences, that before adopting proposals with financial implications, conferences should take account of all the Union's budgetary provisions with a view to ensuring that these proposals will not result in expenses beyond the credits which the Administrative Council is empowered to authorize. In addition, Resolution 48 of the Nairobi Conference states :

> "that before adopting resolutions or taking decisions which are likely to result in additional and unforeseen demands upon the budgets of the Union, future administrative conferences and Plenary Assemblies of the CCIs, having regard to the need for economy, shall:
>
> 1.1 prepare and take into account estimates of the additional demands made on the budgets of the Union;
>
> 1.2 where two or more proposals are involved, arrange them in an order of priority;

1.3 prepare and submit to the Administrative Council a statement of the estimated budgetary impact, together with a summary of the significance and benefit to the Union of financing the implementation of those decisions, and an indication of priorities where appropriate;"

(text to be completed later)

Under No. 479 of the Convention, this report will be transmitted, together with any comments by the Plenary Meeting, to the Secretary-General for submission to the Administrative Council at its next annual session.

The Plenary Meeting is requested to approve this report.

E.D. DuCHARME
Chairman of the
Budget Control Committee

Annexes : 3 (to be added later)

ANNEX 3

LIST OF RECOGNIZED PRIVATE OPERATING AGENCIES AND INTERNATIONAL ORGANIZATIONS CONTRIBUTING TO THE WORK OF THE CONFERENCE

		Number of contributory units
I.	Recognized private operating agencies	
II.	International organizations	
II.1	United Nations	*
II.2	Specialized agencies	
II.3	Regional organizations	
	- Arab Telecommunication Union	*
II.4	Other international organizations	
	- International Radio and Television Organization	*
	- Asia-Pacific Broadcasting Union	*
	- Arab States Broadcasting Union	*
	- Union of National Radio and Television Organizations of Africa	*
	- European Broadcasting Union	*
	- International Amateur Radio Union	*

* Exempted from any contribution by Administrative Council Resolution 574.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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2 February 1984
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WORKING GROUP 5A

FOURTH REPORT FROM AD HOC GROUP 5A-2

TO WORKING GROUP 5A

4.2.3.1 Step 1 - Requirements file

The operational and projected broadcasting requirements and associated facilities submitted by administrations for a period of [ ] will be used to create the requirement file.

This file will be updated in accordance with the procedures to be developed at the second session (see 4.1.2.4 and 4.2.3.2).

G.H. RAILTON
Chairman of ad hoc Group 5A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/42-E
3 February 1984
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 59.

2. Meetings

The Committee met twice, on 11 January and 6 February 1984.

At its first meeting, it set up a Working Group consisting of the Chairman and Vice-Chairman of the Committee and one delegate from the Federal Republic of Germany, from Malaysia and from Venezuela to verify delegations' credentials in accordance with Article 67 of the International Telecommunication Convention, Nairobi (1982)

3. Conclusions

The conclusions reached by the Committee are reproduced in the Annex attached hereto and submitted to the Plenary Meeting for approval.

4. Final remark

The Committee recommends that the Plenary Meeting authorize the Chairman and Vice-Chairman of Committee 2 to verify the credentials received after the date indicated in the present report and to report to the Plenary Meeting on the matter.

N. TCHIMINA
Chairman of Committee 2

Annex : 1

A N N E X

1. Credentials found to be in order, deposited by the delegations of countries having the right to vote

ALGERIA (People's Democratic Republic of)
GERMANY (Federal Republic of)
ANGOLA (People's Republic of)
SAUDI ARABIA (Kingdom of)
ARGENTINE REPUBLIC
AUSTRALIA
AUSTRIA
BANGLADESH (People's Republic of)
BELGIUM
BENIN (People's Republic of)
BYELORUSSIAN SOVIET SOCIALIST REPUBLIC
BOTSWANA (Republic of)
BRAZIL (Federative Republic of)
BULGARIA (People's Republic of)
BURUNDI (Republic of)
CAMEROON (United Republic of)
CANADA
CHILE
CHINA (People's Republic of)
CYPRUS (Republic of)
VATICAN CITY STATE
COLOMBIA (Republic of)
CONGO (People's Republic of the)
KOREA (Republic of)
IVORY COAST (Republic of the)
CUBA
DENMARK
EGYPT (Arab Republic of)
SPAIN
UNITED STATES OF AMERICA
ETHIOPIA
FINLAND
FRANCE
GABONESE REPUBLIC
GREECE
HUNGARIAN PEOPLE'S REPUBLIC
INDIA (Republic of)
INDONESIA (Republic of)
IRAN (Islamic Republic of)
IRAQ (Republic of)
IRELAND
ISRAEL (State of)
ITALY
JAMAICA
JAPAN
JORDAN (Hashemite Kingdom of)

KENYA (Republic of)
KUWAIT (State of)
LIBYA (Socialist People's Libyan Arab Jamahiriya)
LUXEMBOURG
MALAYSIA
MALAWI
MALI (Republic of)
MOROCCO (Kingdom of)
MEXICO
MONACO
NORWAY
NEW ZEALAND
OMAN (Sultanate of)
PAKISTAN (Islamic Republic of)
PAPUA NEW GUINEA
PARAGUAY (Republic of)
NETHERLANDS (Kingdom of the)
POLAND (People's Republic of)
PORTUGAL
QATAR (State of)
SYRIAN ARAB REPUBLIC
GERMAN DEMOCRATIC REPUBLIC
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
UKRAINIAN SOVIET SOCIALIST REPUBLIC
ROMANIA (Socialist Republic of)
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
RWANDESE REPUBLIC
SINGAPORE (Republic of)
SRI LANKA (Democratic Socialist Republic of)
SWEDEN
SWITZERLAND (Confederation of)
SURINAME (Republic of)
SWAZILAND (Kingdom of)
TANZANIA (United Republic of)
CZECHOSLOVAK SOCIALIST REPUBLIC
THAILAND
TUNISIA
TURKEY
UNION OF SOVIET SOCIALIST REPUBLICS
VENEZUELA (Republic of)
VIET NAM (Socialist Republic of)
YEMEN ARAB REPUBLIC
YEMEN (People's Democratic Republic of)
YUGOSLAVIA (Socialist Federal Republic of)
ZIMBABWE (Republic of)

Conclusion : The delegations of these countries are entitled to vote

2. Provisional credentials found to be in order, deposited by the delegations of countries having the right to vote (see No. 383 of the Convention)

COSTA RICA
PHILIPPINES (Republic of the)

Conclusion : The delegations of these countries are entitled to vote

3. Credentials found to be in order, deposited by the delegations of countries which do not have the right to vote (see Document 40 + Rev.)

ALBANIA (Socialist People's Republic of)
BOLIVIA (Republic of)
COMOROS (Islamic Federal Republic of the)
HONDURAS (Republic of)
LIBERIA (Republic of)
MAURITANIA (Islamic Republic of)

Conclusion : The delegations of these countries are not entitled to vote

4. Delegations attending the Conference which have not deposited credentials

AFGHANISTAN (Democratic Republic of)
*CENTRAL AFRICAN REPUBLIC
EL SALVADOR (Republic of)
*UNITED ARAB EMIRATES
ECUADOR
GAMBIA (Republic of the)
GHANA
GUATEMALA (Republic of)
*GUYANA
*MADAGASCAR (Democratic Republic of)
NIGERIA (Federal Republic of)
*PERU
*SENEGAL (Republic of)
SOMALI DEMOCRATIC REPUBLIC
ZAIRE (Republic of)
ZAMBIA (Republic of)

Conclusion : The delegations of these countries are not entitled to vote

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* Appears in the list of countries which have lost their right to vote (see Document 40 + Rev.)

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 5A

FIFTH REPORT FROM AD HOC GROUP 5A-2 TO WORKING GROUP 5A

RULES FOR DEALING WITH INCOMPATIBLE REQUIREMENTS

/1./ If the automated system cannot satisfy all requirements in a certain band, for a certain CIRAF zone or part of a CIRAF zone in a specific period of time, even after all possibilities of adjustments are exhausted, it shall identify administrations whose requirements cannot be completely satisfied with the agreed overall broadcasting reliability adopted by the Conference.

/2./ In so doing account shall be taken of the principle in 4.1.2.2 /and in particular the need for longer transmission hours for national services/.

/3./ The Board suggests changes which will be useful for the administrations concerned and that would reduce congestion (see 4.1.1).

/4./ Administrations which do not reply within a period to be determined by the second session or which refuse any modification shall be deemed to accept any reduced overall reliability that may result from the planning process.

/5./ The system shall then endeavour to satisfy all requirements with a /lower/ /adopted by the Conference/ overall broadcasting reliability.

ALTERNATIVE A

/ 6. / If all the requirements cannot be satisfied with an overall broadcasting reliability to be adopted by the Conference the system shall guarantee this value to as many requirements as possible, / equally / / proportionally / divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close as possible to the value adopted by the Conference without adversely affecting the requirements satisfied with a value adopted by the Conference.

ALTERNATIVE B

/ 6. / If all the requirements cannot be satisfied with an overall broadcasting reliability of x to be determined the system shall guarantee this value x to as many requirements as possible, / equally / / proportionally / divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close to x as possible, without adversely affecting the requirements already satisfied to the value x.

ALTERNATIVE C

/ 6. / Those administrations which cannot agree to the resulting reduced quality of service may propose improvements or may consolidate their requirements, or may request alternative frequencies in another band or at another time block and their request must where possible be satisfied, without reducing the level of quality of other requirements below the minimum agreed to at the Conference.

G.H. RAILTON
Chairman of ad hoc Group 5A-2

Note: It is the understanding of the Chairman that the following sentence was deleted from / 1 /:

it being understood that the already satisfied requirements have been / equally / / proportionally / distributed among all administrations.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

FIFTH REPORT FROM AD HOC GROUP 5A-2 TO WORKING GROUP 5A

RULES FOR DEALING WITH INCOMPATIBLE REQUIREMENTS

/1./ If the automated system cannot satisfy all requirements in a certain band, for a certain CIRAF zone or part of a CIRAF zone in a specific period of time, even after all possibilities of adjustments are exhausted, it shall identify administrations whose requirements cannot be completely satisfied with the agreed overall broadcasting reliability adopted by the Conference.

/2./ In so doing account shall be taken of the principle in 4.1.2.2 /and in particular the need for longer transmission hours for national services/.

/3./ The Board suggests changes which will be useful for the administrations concerned and that would reduce congestion (see 4.1.1).

/4./ Administrations which do not reply within a period to be determined by the second session or which refuse any modification shall be deemed to accept any reduced overall reliability that may result from the planning process.

/5./ The system shall then endeavour to satisfy all requirements with a /lower/ /adopted by the Conference/ overall broadcasting reliability.

ALTERNATIVE A

/6./ If all the requirements cannot be satisfied with an overall broadcasting reliability to be adopted by the Conference the system shall guarantee this value to as many requirements as possible, / equally / / proportionally / divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close as possible to the value adopted by the Conference with adversely affecting the requirements satisfied with a value adopted by the Conference.

ALTERNATIVE B

/6./ If all the requirements cannot be satisfied with an overall broadcasting reliability of x to be determined the system shall guarantee this value x to as many requirements as possible, /equally/ /proportionally/ divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close to x as possible, without adversely affecting the requirements already satisfied to the value x.

ALTERNATIVE C

/6./ Those administrations which cannot agree to the resulting reduced quality of service may propose improvements or may consolidate their requirements, or may request alternative frequencies in another band or at another time block and their request must where possible be satisfied, without reducing the level of quality of other requirements below the minimum agreed to at the Conference.

G.H. RAILTON
Chairman of ad hoc Group 5A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5B

Proposal from the Chairman

Draft

RECOMMENDATION COM5/1

CCIR activity between the first and the second session of the Conference

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (first session, Geneva, 1984),

considering

a) that Resolution 874 of the Administrative Council includes in the agenda of the first session of the Conference to identify and to lay down specific guidelines for the preparatory tasks to be carried out before commencement of the second session of the Conference;

b) that the need for further study of certain technical elements is mentioned in the report to the second session of the Conference;

requests the CCIR

1. to provide data necessary to refine the numerical constants referred to in paragraphs /3.2.1.3.1.3/ and /3.2.1.3.2/ as well as to refine the interpolation procedure referred to in paragraph /3.2.1.3.3/ of the report of the Conference, concerning the propagation prediction method adopted by the Conference;

2. to provide the relevant data regarding :

- the inclusion of multiband antennas in the set of representative type of antenna for planning purposes /paragraph 3.5.1.3 of the report of the Conference/;
- the performance of horizontally slewed antennas /paragraph 3.5.1.4 of the report of the Conference/;

3. to present to the second session the results of studies on the allowance needed for co-channel interference between DSB and SSB emissions using coherent detector /in paragraph 3.9.2.4 of the report of the Conference/;

4. to finalize the above studies not later than the end of 1985;

invites administrations

to contribute relevant data to the CCIR studies.

K. OLMS
Chairman of Working Group 5B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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WORKING GROUP 5B

Proposal from the Chairman

Draft

RESOLUTION COM5/2

relevant to the design, development and setting to work of computer programs and test procedures for the preparation of the application of the planning method/s/

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (first session, Geneva 1984),

considering

a) that Resolution 874 of the Administrative Council includes in the agenda of the first session of the Conference to identify and to lay down specific guidelines for the preparatory tasks to be carried out before commencement of the second session of the Conference;

b) the report to the second session of the Conference;

/c) the proposed tentative agenda of the second session of the Conference;/

d) the /planning method adopted/ /the planning approaches considered/ by the first session and the need to develope and test the related computer programs;

resolves

1. that a Panel of Experts be established;

2. that the Panel of Experts be composed of experts in the /planning method adopted/ /planning approaches considered/ and in system analysis from the administrations listed in Annex 1;

3. that the task of the Panel of Experts is :

3.1 to assist the IFRB and under its responsibility, to design, to develop and set to work computer programs for the application of the planning method/s/ considered and the technical criteria adopted by the first session;

3.2 to assist the IFRB in the development of test procedures to demonstrate the application of the planning method/s/, the technical criteria and the rules to be applied to the processing of requirements using simulated requirement data;

3.3 not to consider questions of substance, not take decisions other than those related to tasks outlined in 3.1 and 3.2 above;

4. that the timetable in Annex 2 for the organization and completion of the work to be carried out, shall be observed;

5. that periodically short reports on the progress of the intersessional work shall be sent to all administrations at least around the dates indicated in Annex 2;

6. that a detailed final report shall be sent to all administrations at least six months prior to the beginning of the second session;

7. to invite the administrations which have prepared computer programs applicable to the relevant studies listed in the report of the session 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;

8. to invite the IFRB to perform with the assistance of the Panel of Experts the tasks mentioned above;

9. to draw the attention of the Administrative Council to the facilities deemed necessary to enable the IFRB and the Panel of Experts to carry out the tasks mentioned above.

K. OLMS
Chairman of Working Group 5B

Annexes : 2

ANNEX 1

LIST OF ADMINISTRATIONS

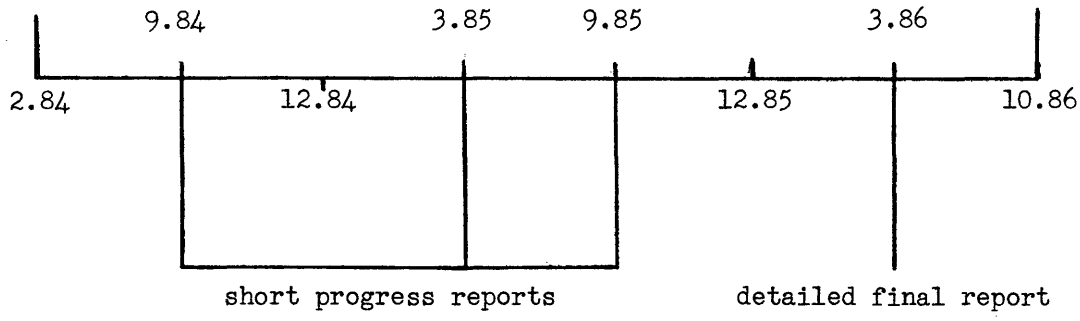
WHO WILL NOMINATE INDIVIDUALS FOR THE PANEL OF EXPERTS

/ To be established. /

ANNEX 2

TIMETABLE TO BE OBSERVED DURING
THE INTERSESSIONAL PERIOD

End of first session — Beginning of second session



INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5B

Proposal from the Chairman

Draft

RESOLUTION COM5/3

relating to the establishment of a requirement file

The World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service (first session, Geneva, 1984),

considering

a) that Resolution 874 of the Administrative Council includes in the agenda of the first session of the Conference to specify the form in which requirements for use in planning should be submitted to the Union;

b) the report to the second session of the Conference;

/ c) the proposed tentative agenda of the second session of the Conference; /

resolves

1. to invite the IFRB to develop the form in which requirements for use in planning should be submitted to the Union, taking into account the structure of the Frequency Management System at present under development in the ITU;

2. that the Panel of Experts established in accordance with Resolution COM5/1 shall assist the IFRB in that work;

3. that the form to be established shall contain :

- the characteristics listed in paragraph 4.2.3.1 of the report; and
- those additional characteristics that may be required for the intersessional work;

4. that the form and the instructions for filling out the form shall be communicated to administrations by / 1 September 1984 /;

5. that administrations shall submit their requirements to the IFRB by [1 March 1985] using the above form;

6. [to be developed; see paragraph 4.2.3.1.]

K. OLMS
Chairman of Working Group 5B

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

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5 February 1984
Original: anglais

WORKING GROUP 5A

SIXTH REPORT OF AD HOC GROUP 5A-2

TO WORKING GROUP 5A

Principles adopted

Those broadcasting requirements for which, through lack of the requisite technical facilities, the agreed reference usable field strength is not ensured in the required service area, could obtain proportionally reduced protection against interference within the limits to be determined by the 2nd session*.

---

* For the purposes of Intersessional work, the protected field strength shall be limited to the minimum field strength. In cases where the Board finds it possible to use a lower value it may do so and indicate in its report, the impact of such a reduction.

Principes still to be adopted

1. **In a first stage of the equitable application of the planning procedure an attempt will be made to include the highest possible number of the formulated requirements. Limitations could be imposed on the remaining requirements if their inclusion in the planning process leads to a deterioration of the situation.**

2. In order to ensure efficient utilization of the HF bands and sufficient flexibility in planning, the agreed planning method should contain appropriate provisions to guarantee the necessary protection for "minimum requirements" of all countries in any of the future plans, irrespective of the overall number of requirements.

G.H. RAILTON
Chairman Ad hoc Group 5A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

DRAFT

NOTE FROM WORKING GROUP 5A TO
WORKING GROUP 5B AND TO THE AD HOC GROUP OF COMMITTEE 5

Working Group 5B is requested to consider 4.2.3.1 (Document DT/41) from the point of view of intersessional activity.

Similarly it requests the ad hoc Group to be set up by Committee 5 (see Document DT/5), to examine this item from the point of view of its terms of reference.

M. OUHADJ
Chairman of Working Group 5A

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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5 February 1984
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WORKING GROUP 5A

SEVENTH REPORT OF AD HOC GROUP 5A-2 TO WORKING GROUP 5A

Ad hoc Group 5A-2 was not able to resolve the basis on which the automated planning should commence.

ALTERNATIVE 1

A given broadcasting requirement should be satisfied by the minimum number of frequencies needed to achieve the quality criteria adopted by the Conference (see 2.6 of Document DT/10(Rev.2)).

ALTERNATIVE 2

Each requirement should be treated and one frequency found for the relevant time block in the appropriate band.

If after reliability evaluations, frequencies for the indicated time blocks do not meet the quality criteria adopted by the Conference, supplementary frequencies should be selected in subsequent rounds without disturbing previous selections.

G.H. RAILTON
Chairman of ad hoc Group 5A-2

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

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WORKING GROUP 5A

EIGHTH REPORT OF AD HOC GROUP 5A-2 TO WORKING GROUP 5A

The following work was not completed on the flowchart due to the lack of resolution on section 4.2.1 of Document DT/39/Document 169.

G.H. RAILTON
Chairman of ad hoc Group 5A-2

4.2.3.10 Step 10 - Adjustment process

The application of steps 3 to 8 indicates adjustments to be applied. These adjustments will be implemented in several loops which will be derived within the software process.

4.2.3.11 Step 11 - Further automated adjustments

This step will identify if there is any requirement for which any further automated adjustments are possible.

4.2.3.12 Step 12 - Requirements meeting criteria

The system will identify all those requirements which meet the agreed criteria. These requirements and their frequency assignment will be entered into the Seasonal plan.

4.2.3.13 Step 13 - Requirements not meeting criteria

The system will identify those requirements where the agreed criteria could not be met by the automated adjustment process.

4.2.3.14 Step 14 - Board action

The Board will analyze the results of step 13 in order to identify the problem areas with the objective of formulating recommendations to administrations.

4.2.3.15 Step 15 - Coordination

The Board will communicate its recommendations from step 14 to the appropriate administrations. The detailed procedure relating to this step should be considered by the second session including the time schedules.

4.2.3.16 Step 16 - Entries in the plan

The requirements for which the criteria cannot be met as identified in step 14 will be entered in the Seasonal plan. However those entries shall be identified as not having satisfied the criteria and are subject to recommendations by the Board to the administrations.

4.2.3.17 Step 17 - Additional procedures

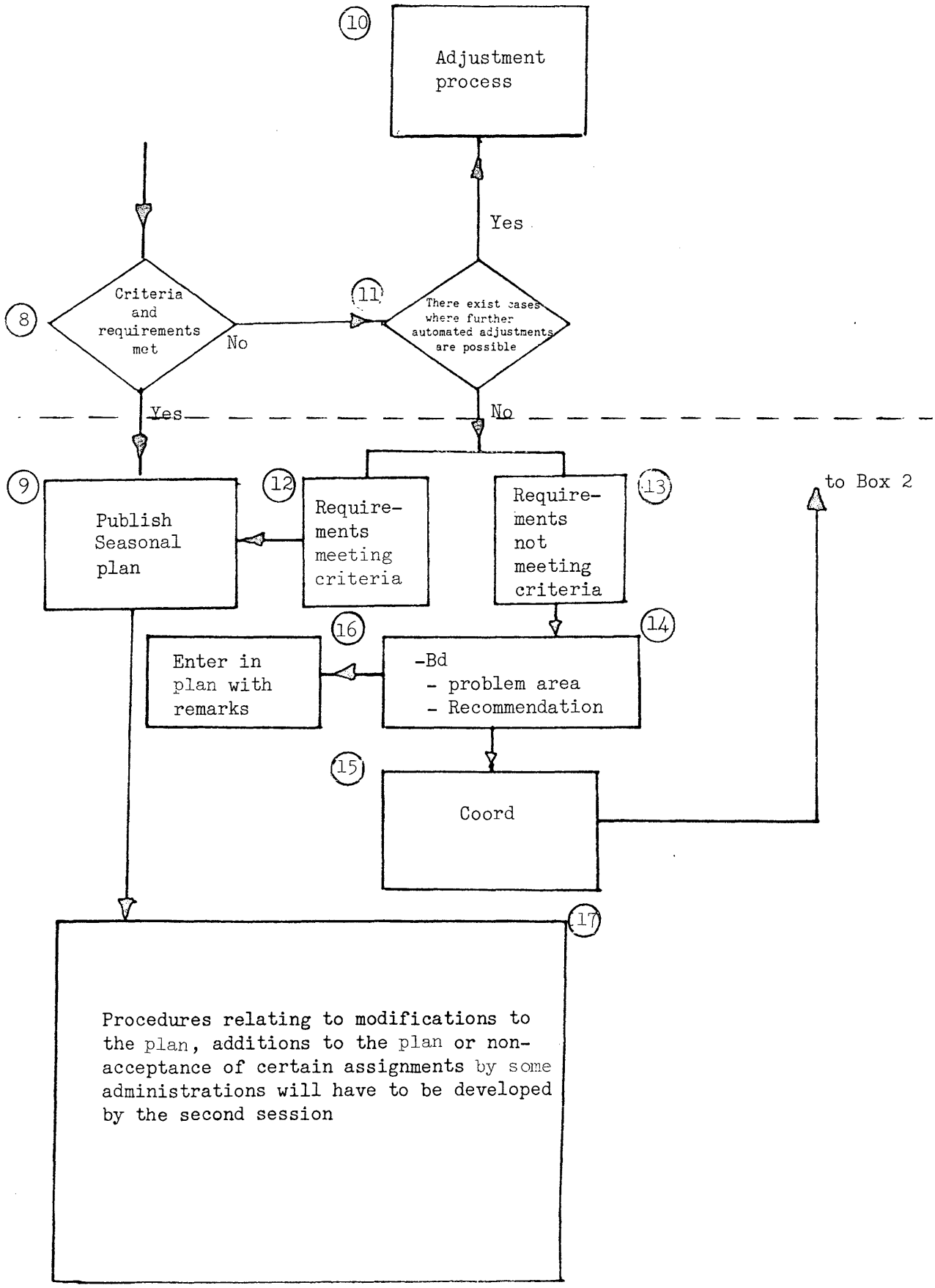
In considering the planning method the first session identified that there may be a need for additional procedures to deal with :

a) modifications to the Seasonal plan after it has been published;

b) the inclusion of additional requirements in the Seasonal plan after it has been published;

c) the situation where certain administrations may be unable to accept the frequency assignments included in the Seasonal plan for some reason.

The first session is of the view that this is a matter for consideration by the second session.


10
Adjustment process
Yes
8
Criteria and requirements met
No
11
There exist cases where further automated adjustments are possible
Yes
No
9
Publish Seasonal plan
12
Require-ments meeting criteria
13
Require-ments not meeting criteria
to Box 2
16
Enter in plan with remarks
14
-Bd
- problem area
- Recommendation
15
Coord
17
Procedures relating to modifications to the plan, additions to the plan or non-acceptance of certain assignments by some administrations will have to be developed by the second session

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/51-E
6 February 1984
Original : French

BUDGET CONTROL COMMITTEE

DRAFT

REPORT OF THE BUDGET CONTROL COMMITTEE TO THE PLENARY MEETING

The Budget Control Committee held meetings during the Conference and examined the questions arising from its terms of reference.

Under Nos. 475 to 479 of the International Telecommunication Convention (Nairobi, 1982), the Committee's terms of reference are :

a) to determine the organization and the facilities available to delegates;

b) to examine and approve the accounts for expenditure incurred throughout the duration of the Conference;

c) to estimate the costs that may be entailed by the execution of the decisions taken by the Conference.

1. Determination of the organization and facilities available to delegates

As there were no comments by delegations on the subject, Committee 3 congratulated the Secretary-General on the efficient organization of and excellent arrangements made for holding the Conference.

2. Conference budget

The Budget Control Committee examined the Conference budget, amounting to 2,427,000 Swiss francs, which was approved by the Administrative Council at its 38th Session, 1983.

The Committee also noted that the Conference budget did not comprise expenditure on common services supernumerary staff salaries, which are charged to a special section of the ordinary budget. The share of this special section relating to the WARC for HF Broadcasting is estimated at 712,000 Swiss francs.

In addition, the Committee noted that the Conference budget had been adjusted to take into account changes in the common system of the United Nations and the specialized agencies with regard to the salaries and allowances of short-term supernumerary staff and fluctuations in the rate of exchange between the US dollar and the Swiss franc, as required by Administrative Council Resolution 647. As a result of these adjustments, the total budget of the WARC for HF Broadcasting stands at 2,556,000 Swiss francs, i.e. an increase of 129,000 Swiss francs.

3. Situation of Conference expenditure

Under No. 478 of the Convention, the Budget Control Committee has to submit a report to the Plenary Meeting showing, as accurately as possible, the estimated total expenditure of the Conference.

Accordingly, a statement will be found in Annex 1, showing the budget of the Conference, together with a breakdown of credits among the budget subheads and items, as well as the actual expenditure incurred as at 3 February 1984. There is also an indication of the expenditure committed up to that date and an estimate of expenditure up to the date of closure of the Conference. The estimated expenditure on intersessional work in 1984 has also been taken into account.

It will be seen from the above-mentioned statement that the total estimated amount to be charged to the ordinary budget for the HFBC-84 Conference is 2,099,000 Swiss francs, i.e. 457,000 Swiss francs less than the credit allocated by the Administrative Council and adjusted in accordance with Administrative Council Resolution 647.

For the information of the Administrative Council, the position with regard to expenditure on preparatory work for the HFBC-84 Conference carried out in 1983 is given in Annex 2.

4. Recognized private operating agencies and international organizations participating in the work of the Conference

Under Article 16 of the Union's Financial Regulations, the report of the Budget Control Committee must list the recognized private operating agencies and international organizations which are contributing to defrayal of the expenditure of the Conference, and a list must also be provided of the international organizations which have been exempted from any contribution by Administrative Council Resolution 574.

The above information is given in Annex 3 to this document.

5. Additional expenditure to be taken into account for the execution of the decisions of the Conference

It is stated in No. 478 of the International Telecommunication Convention (Nairobi, 1982) that the report of the Budget Control Committee to the Plenary Meeting should show as accurately as possible the costs that may be entailed by the execution of the decisions taken by the Conference. Moreover, Article 80 of the Convention provides, with regard to the financial responsibilities of administrative conferences, that before adopting proposals with financial implications, conferences should take account of all the Union's budgetary provisions with a view to ensuring that these proposals will not result in expenses beyond the credits which the Administrative Council is empowered to authorize. In addition, Resolution 48 of the Nairobi Conference states :

> "that before adopting resolutions or taking decisions which are likely to result in additional and unforeseen demands upon the budgets of the Union, future administrative conferences and Plenary Assemblies of the CCIs, having regard to the need for economy, shall:
>
> 1.1 prepare and take into account estimates of the additional demands made on the budgets of the Union;
>
> 1.2 where two or more proposals are involved, arrange them in an order of priority;

1.3 prepare and submit to the Administrative Council a statement of the estimated budgetary impact, together with a summary of the significance and benefit to the Union of financing the implementation of those decisions, and an indication of priorities where appropriate;"

(text to be completed later)

Under No. 479 of the Convention, this report will be transmitted, together with any comments by the Plenary Meeting, to the Secretary-General for submission to the Administrative Council at its next annual session.

The Plenary Meeting is requested to approve this report.

E.D. DuCHARME
Chairman of the
Budget Control Committee

Annexes : 3 (to be added later)

ANNEX 3

LIST OF RECOGNIZED PRIVATE OPERATING AGENCIES AND INTERNATIONAL ORGANIZATIONS CONTRIBUTING TO THE WORK OF THE CONFERENCE

		Number of contributory units
I.	Recognized private operating agencies	
II.	International organizations	
II.1	United Nations	*
II.2	Specialized agencies	
II.3	Regional organizations	
	- Arab Telecommunication Union	*
II.4	Other international organizations	
	- Inter-American Association of Broadcasters	*
	- International Radio and Television Organization	*
	- Asia-Pacific Broadcasting Union	*
	- Arab States Broadcasting Union	*
	- Union of National Radio and Television Organizations of Africa	*
	- European Broadcasting Union	*
	- International Amateur Radio Union	*

* Exempted from any contribution by Administrative Council Resolution 574.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/52-E
7 February 1984
Original : English

(Source : Documents 167, 172, 177, 182, 185, 186, 189, 193, 195, 197, 199, 201, 203, 205 and 214)

COMMITTEE 5

COMPILATION OF RELEVANT TEXTS CONCERNING CHAPTER 4

(Planning principles and methods)

Mr. IRFANULLAH
Chairman of Committee 5

Annexes : 5
(Annex 1 - Note from IFRB)
(Annexes 2, 3 and 4 - Notes from Committee 4 to Committee 5)
(Annex 5 - Document 185)

CHAPTER 4

4. Planning principles and method

4.1 Planning principles

4.2 Planning method

4.2.1 Overview of method

4.2.2 Definition of a broadcasting requirement

4.2.3 Description of the individual steps of the automated system

4.2.3.1 Step 1 - Requirements file

4.2.3.2 Step 2 - Broadcasting requirements for the season under consideration

4.2.3.3 Step 3 - Propagation analysis and selection of the appropriate frequency band

4.2.3.4 Step 4 - Rules to be applied to broadcasting requirements in a given run

4.2.3.4.1 Optimization

4.2.3.4.2 Preferred frequency

4.2.3.4.3 Equipment constraint

4.2.3.4.3.1 Frequency

4.2.3.4.3.2 Frequency band

4.2.3.4.3.3 Power

4.2.3.4.3.4 Antenna

4.2.3.4.4 Limitation of frequency change

4.2.3.4.5 Rules to be applied to congested areas

4.2.3.5 Step 5 - Selection of technical characteristics

4.2.3.6 Step 6 - Compatibility analysis and frequency selection

4.2.3.7 Step 7 - Reliability analysis

4.2.3.8 Step 8 - Criteria and requirements met ?

4.2.3.9 Step 9 - Seasonal plan

4.2.3.10 Step 10 - Adjustment process

4.2.3.11 Step 11 - Additional procedure

4. Planning principles and method

Having considered the proposals of administrations on planning principles and methods, the first session of the Conference concluded that the planning of the high frequency broadcasting service shall be based on four seasonal plans to be developed annually or semi-annually using broadcasting requirements submitted /periodically/ by the administrations. The seasonal plans shall be developed on the basis of the following principles and planning method.

4.1 Planning principles

4.1.1 In accordance with the International Telecommunication Convention and with the Radio Regulations annexed thereto, the planning of the high frequency bands allocated to the broadcasting service shall be based on the principle of equal rights of all countries, large or small to have equitable access to these bands and to utilize them in accordance with the decisions taken by this Conference. Planning shall also attempt to reach an efficient utilization of these frequency bands, while taking into account the technical and economical constraints that may exist in certain cases.

4.1.2 On the basis of the above, the following planning principles shall be applied.

4.1.2.1 All the broadcasting requirements, current or future, formulated by the administrations, shall be taken into account and be treated on an equitable basis, so as to guarantee the equality of rights covered in paragraph 1 above and to ensure a satisfactory service to every administration.

4.1.2.2 All the broadcasting requirements, national* and international, shall be treated on an equal basis, with due consideration of the differences between these two kinds of broadcasting requirements.

4.1.2.3 The planning procedure will attempt to ensure, as far as practicable, the continuity of the utilization of a frequency or of a frequency band. However, such frequency continuity should not prevent equal and technically optimum treatment of all broadcasting requirements.

4.1.2.4 The periodical planning process shall be based solely on the broadcasting requirements that will become operational during the planning period. It shall furthermore be flexible to take into account new broadcasting requirements and modifications to the existing broadcasting requirements, in accordance with the modification procedures to be adopted by the Conference.

4.1.2.5 The planning procedure shall be based on DSB transmissions. Voluntary SSB transmissions may however be permitted in lieu of planned DSB transmissions, without increasing the level of interference caused to DSB transmissions appearing in the Plan.

4.1.2.6 For efficient spectrum utilization, only one frequency should be used, whenever possible, to satisfy a given broadcasting requirement to a given required service area and in any case the number of frequencies used should be the minimum necessary to provide satisfactory reception.

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* An HFBC use is considered for purposes of national coverage when the transmitting station and the associated required service area are both located within the territory of the same country. (This note will be included in the Final Acts of the second session of the Conference.)

(Source : Document 214)

4.1.2.7 Those broadcasting requirements for which, through lack of the requisite technical facilities, the agreed minimum usable field strength is not ensured at any point of the required service area, could obtain proportionally reduced protection against inteference as indicated in paragraph 3.2.4.6.

/ In chapter 3, add a new paragraph after 3.2.4.5 : /

3.2.4.6 Proportionally reduced protection

3.2.4.6.1 The basic circuit reliability is to be calculated at any test point within the required service area where the wanted field strength is equal to or greater than E_{min} (BCR $\geq$ 0.5). Test points where E_{min} is not reached for 50% of the time are disregarded.

3.2.4.6.2 If in any frequency band the basic circuit reliability is less than 0.5 at all the test points of the required service area, a proportionally reduced protection shall be afforded.

For this situation the overall broadcast reliability shall be calculated at all test points where the median wanted field strength is

$$E \geq E_{min} - Z^{*} \text{ (dB)}.$$

In such cases the "required protection ratio" used in the calculations of the overall broadcast reliability (step (9) of Table 4/3.2.4.2 and Figure 4/3.2.4.2 of section 3.2.4.2.2 in the calculation of O.C.R.) shall be reduced by (E_{min} - E) dB.

4.1.2.8 In a first stage of the equitable application of the planning procedure an attempt will be made to include the highest possible number of the submitted requirements so as to satisfy the desired quality level. The remaining requirements would be treated on the understanding that lower quality levels would be acceptable.

[4.1.2.9 The agreed planning method should contain appropriate provisions to guarantee on an equal basis the necessary protection for "minimum requirements" of all countries in any of the future plans, irrespective of the overall number of requirements.]

4.2 Planning method

4.2.1 Overview of planning method

After considering the various proposals to the Conference, the first session decided to establish the planning method which is described in Figure / 7. The detailed description of each step of the process is contained in section 4.2.3. Associated procedures arising from this method will be developed at the second session on the basis of proposals submitted by administrations.

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* Note - The figure Z shall be determined by the second session of the Conference. For the purpose of intersessional work Z will be 5 dB. The Board shall indicate in its report to the second session the results of the applications of this paragraph together with any appropriate recommendation.

4.2.2 Definition of a broadcasting requirement

A requirement indicated by an administration to provide a broadcasting service at specified periods of time to a specified reception area from a particular transmitter station.

4.2.3 Description of the individual steps of the automated system

4.2.3.1 Step 1 - Requirements file

a) The operational and projected broadcasting requirements and the relevant information or associated facilities submitted by administrations for a period of three years* will be used to create the requirements file.

This file will be updated in accordance with the procedures to be developed at the second session (see 4.1.2.4).

b) The above file shall contain :

Basic characteristics

1) name of the transmitting station

2) geographical coordinates of the transmitting station

3) symbol of the country or geographical area in which the transmitting station is located

4) required service area

5) hours of operation (UTC)

6) range of antenna characteristics

7) transmitter power (dBW)

8) class of emission

Optional supplementary characteristics

1) preferred frequency (in kHz)

2) preferred frequency band (in MHz)

3) equipment limitations

4) ranges of power capabilities

5) possible use of synchronized transmitters

---

* The second session could revise this value, if necessary.

4.2.3.2 Step 2 - Broadcast requirements for the season under consideration

The broadcasting requirements to be used for each season shall be those contained in the Requirements File which are to be operational during the season under consideration and which are confirmed and, if necessary, modified by the administration, in accordance with the modification procedures of [4.2.3.1].

4.2.3.3 Step 3 - Propagation analysis and selection of the appropriate frequency band

The propagation prediction method described in [paragraph 3.2] will be used to calculate for each requirement and for the season and the different hours, the [optimum working frequency] and the [basic circuit reliability]. Based on the results of the above calculations, the appropriate frequency band(s) for each requirement at the different times will be selected.

However, if an administration has indicated equipment limitations, these limitations are to be taken into account in the selection of the appropriate frequency band.

If the required [basic circuit reliability] cannot be met during any time with a single frequency band, then a second frequency band shall be selected as long as the administration has indicated the capability to operate in two frequency bands simultaneously. (See Chapter [ ], section [ ].)

4.2.3.4 Step 4 - Rules to be applied to requirements in a given run

4.2.3.4.1 Optimization

The system must be optimized to ensure the maximum possible utilization of all available channels.

4.2.3.4.2 Preferred frequency

In accordance with the planning principles and without imposing constraints on planning, the following shall be applied in the seasonal plans :

1) administrations may indicate the preferred frequency;

2) efforts shall be made during the planning process in order to include the preferred frequency in the plan;

3) if not possible, efforts shall be made in order to select a frequency which is as close as possible to the preferred one in the same band.

Otherwise, the automated system shall be used to select the appropriate frequencies, permitting to accommodate the maximum number of requirements, taking into account the constraints of technical characteristics of equipment.

4.2.3.4.3 Equipment constraint

The system shall take into account the technical constraints of the equipment, i.e. :

4.2.3.4.3.1 Frequency

a) When the administration indicates that its facilities can operate only on a limited number of fixed specified frequencies the process in steps 5, 6 and 7 shall be applied to one of these frequencies and should the final step result in an incompatibility the adjustment process (step 10) shall try another one of these frequencies. The plan shall contain the frequency from this limited number of frequencies which will have the lesser degree of incompatibilities.

b) If two such broadcasting requirements indicate the same frequency which after analysis results in an incompatibility the situation is referred to the administration(s) concerned.

4.2.3.4.3.2 Frequency band

a) When the administration indicates that its facilities can operate only in a given frequency band, only frequencies from that band shall be included in the plan.

b) When an administration indicates a preferred frequency band, the system shall try to select a frequency from this preferred frequency band. If this is not possible, frequencies from the closest band shall be tried. Otherwise, the system will select frequencies from the appropriate band taking into account the equipment constraints covered in paragraph [ ].

4.2.3.4.3.3 Power

a) When an administration indicates only a single power level due to equipment constraints, that power shall be used in the planning process.

b) When an administration indicates several possible power values, the appropriate power shall be used to achieve the [basic circuit reliability]

4.2.3.4.3.4 Antenna

When the administration indicates that its antenna can operate only in a given frequency band, only frequencies from that band shall be included in the plan.

4.2.3.4.4 Limitation of frequency change

For the indicated time block of each broadcasting requirement, frequency changes should be essentially limited to those necessitated by propagation factors. Frequency changes due to incompatibilities may also be permitted. In these cases, the number of frequency changes during any contiguous period of operation shall be limited to the minimum necessary.

4.2.3.4.5 Rules for dealing with incompatible requirements

/1./ If the automated system cannot satisfy all requirements in a certain band, for a certain CIRAF zone or part of a CIRAF zone in a specific period of time, even after all possibilities of adjustments are exhausted, it shall identify administrations whose requirements cannot be completely satisfied with the agreed overall broadcasting reliability adopted by the Conference.

/2./ In so doing account shall be taken of the principle in 4.1.2.2 and in particular the need for longer transmission hours for national* purposes (see IFRB Note in Annex 2).

/3./ The Board will suggest changes which will be useful for the administrations concerned and that would reduce congestion (see 4.1.1).

/4./ Administrations which do not reply within a period to be determined by the second session or which refuse any modification shall be deemed to accept any reduced overall reliability that may result from the planning process.

[/5./ The system shall then endeavour to satisfy all requirements with a /lower/ /adopted by the Conference/ overall broadcasting reliability.]

ALTERNATIVE A

/6./ If all the requirements cannot be satisfied with the overall broadcasting reliability adopted by the Conference the system shall guarantee this value to as many requirements as possible, equally divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close as possible to the value adopted by the Conference without adversely affecting the requirements satisfied with the value adopted by the Conference.

ALTERNATIVE B

/6./ If all the requirements cannot be satisfied with the overall broadcasting reliability of x to be determined the system shall guarantee this value x to as many requirements as possible, /equally/ /proportionally/ divided over all administrations involved and shall include the remaining requirements in the Plan with a lower degree of reliability as close to x as possible, without adversely affecting the requirements already satisfied to the value x.

ALTERNATIVE C

/6./ Those administrations which cannot agree to the resulting reduced quality of service may propose improvements or may consolidate their requirements, or may request alternative frequencies in another band or at another time block and their request must where possible be satisfied, without reducing the level of quality of other requirements below the minimum agreed to at the Conference.

[Note: It is the understanding of the Chairman that the following sentence was deleted from /1/:

it being understood that the already satisfied requirements have been /equally/ /proportionally/ distributed among all administrations.]

* An HFBC use is considered for purposes of national coverage when the transmitting station and its associated required service area are both located within the territory of the same country. (This note will be included in the Final Acts of the second session of the Conference.)

Additional alternatives for 4.2.3.4.5

1. United States of America (Source : Document 189)

ADDITIONAL ALTERNATIVE FOR DEALING WITH INCOMPATIBLE REQUIREMENTS

In the extensive deliberations of ad hoc Group 5A-2, an alternative rule for dealing with incompatible requirements was discussed and received the support of a number of administrations. This proposed rule appeared as Option B in Document DL/17(Rev.1). For reasons that are not clear this option did not appear as an alternative to be considered in Document DT/43(Rev.1).

Since the alternative is based on the principle of equal rights of all countries adopted in planning principle 4.1.1 of Document DT/39, it is vital that this alternative be discussed fully by Committee 5, along with the other alternatives contained in paragraph 6 of Document DT/43(Rev.1). This alternative is as follows.

If in a given frequency band, reception area and time block it is not possible to satisfy all requirements with the quality criteria adopted by the Conference, it is necessary to reduce the criteria to a level that will satisfy all requirements uniformly. Those administrations which cannot agree to the reduced quality of broadcasting may propose improvements or request alternative frequencies in another band or at another time block, and their requests must, where possible, be satisfied without adversely affecting the plan.

2. Federal Republic of Germany, Australia, Denmark, United States of America, Finland, Jamaica, Japan, Norway, Portugal and United Kingdom of Great Britain and Northern Ireland (Source : Document 199)

OBJECTIVE TESTING AND EVALUATION OF PLANNING METHODS

The above-named administrations consider that it would be premature and unwise for this Conference to adopt, against the wishes of many administrations, a single planning method. The absence of any evidence of the practicality or success of a particular method establishes an urgent need for objective testing and evaluation of various methods. Based upon the results obtained, the next session of the Conference can then select and adopt the best planning method. Accordingly the above-named administrations submit the proposal as follows and urge its adoption by the Conference:

STEPS IN THE DEVELOPMENT OF RULES
FOR DEALING WITH UNSATISFIED REQUIREMENTS

2.1 It is highly probable that even with the improved frequency utilization that will result from a changeover from Article 17 to a centralized, automated system of frequency planning there will still be occasions when the broadcasting requirements of administrations will exceed the capacity of the HF broadcasting bands. Rules will be necessary to deal with this situation.

2.2 Recognizing the difficulty of devising rules that would be acceptable to all administrations if they were at this stage to be regarded as definitive, or were to prejudge the success of an automated assignment system that has yet to be developed, or were to breach any point of principle that is important to administrations, an alternative approach is necessary. The alternative suggested for discussion is a set of "Provisional Rules" which could be tested and evaluated during the intersessional period by the IFRB and a Group of Experts from administrations. A report to the second session of the WARC would then help administrations to select and adopt the best set of rules that would serve all administrations equally. A set of "Provisional Rules" if adopted must be on the clear understanding that they do not limit administrations' freedom of action in preparing for or submitting proposals to the second session of the WARC.

2.3 The Provisional Rules proposed are as follows :

2.3.1 If the automated system cannot satisfy all requirements in a certain band, for a certain reception zone or part of a zone, in a specific period of time, even after all possibilities of adjustment within the automated system have been exhausted, the following methods shall be tested and evaluated :

a) Plan to satisfy, with the overall broadcasting reliability adopted by the Conference, as many requirements as possible, divided among all the administrations involved, first on an equal basis and second on a proportional basis. Include the remaining requirements in a Plan with a lower degree of reliability that is as close as possible to the value adopted by the Conference but without adversely affecting those requirements previously satisfied.

b) Plan to satisfy, with an overall broadcasting reliability of $\lceil x \rceil$ (a variable to be evaluated by the system) for as many requirements as possible, divided among all the administrations involved, first on an equal basis, and second on a proportional basis. Include the remaining requirements in a Plan with a lower degree of reliability as close to $\lceil x \rceil$ as possible without adversely affecting the requirements previously satisfied to the value of $\lceil x \rceil$.

c) Progressively reduce the overall broadcasting reliability adopted by the Conference to a level needed to accommodate all requirements in a Plan. In so doing, evaluate the impact of adjusting other variables, e.g. signal/interference protection ratio, any flexibility inherent in the statement of administrations' requirements and the possibility of adjustments in terms of time blocks, frequency bands and other technical characteristics.

d) The impact of different frequency assignment strategies, e.g. segregating high power from low power and long distance from short distance requirements.

e) Such other techniques as the IFRB and experts from administrations may consider potentially useful.

2.3.2 The extent of testing any or all of these possibilities is a matter for technical judgement, however, in the conduct of the tests, the other texts adopted by the first session of the WARC shall be taken into account.

2.3.3 An objective report on the results of these tests and evaluations shall be submitted to the second session of the WARC.

2.3.4 Administrations should be invited to consider this report in preparing for the second session of the WARC.

3. Italy (Source : Document 201)

RULES FOR DEALING WITH INCOMPATIBLE REQUIREMENTS

Alternative rules for dealing with incompatible requirements, contained in point 6 of Document DT/43(Rev.1), were discussed without reaching a general agreement.

A compromise solution has been studied in order to cover most of the problems raised during the discussions. This compromise is as follows.

In Document DT/43(Rev.1), after paragraph 4, add following paragraphs :

"5. If after the above procedure all the requirements cannot be satisfied with the agreed overall broadcasting reliability adopted by the Conference, the system shall adopt the following procedure for the planning of the band :

a) the system shall guarantee the agreed overall broadcasting reliability adopted by the Conference to only one requirement for each administration involved (previous paragraphs 3 and 4 apply);

b) if the system does not succeed in assuring what is foreseen in point a), it will satisfy with the agreed overall broadcasting reliability adopted by the Conference one requirement for each administration involved for the same maximum percentage of the period of time required; remaining period of time, if any, shall be satisfied with an overall broadcasting reliability of X to be evaluated by the system, as close as possible to the value adopted by the Conference;

c) the system shall then try to satisfy a second requirement for each administration involved with an overall broadcasting reliability of Y to be determined by the system itself, as close as possible to the value adopted by the Conference;

d) the system shall then try to satisfy with a lower degree of reliability as close as possible to Y, remaining requirements, proportionally divided over all administrations involved, without adversely affecting those requirements previously satisfied.

6. Those administrations which cannot agree to the resulting reduced quality of service may propose improvements or may consolidate their requirements, or may request alternative frequencies in another band or at another time block and their request must where possible be satisfied, without adversely affecting requirements already satisfied."

4. Algeria (Source : Document 205)

RULES TO BE APPLIED FOR THE SOLUTION OF INCOMPATIBILITIES

If the quality criterion adopted by the Conference does not enable all requirements to be met in a given CIRAF zone, for a given time block and for a given frequency band, incompatibilities should be resolved having regard to the following :

4.1 Each administration may claim a maximum overall broadcasting time with the quality of service adopted by the Conference; this maximum overall time shall be determined by the saturation caused by the zone, the period of time or the frequency band concerned.

4.2 Over and above this maximum overall broadcasting time, it will no longer be possible to meet requirements in the same conditions of quality.

4.3 Other requirements will have to be met at a lower level of quality, provided they do not affect the first group of requirements.

4.4 Administrations which are unable to accept the lower quality level may propose improvements or request other frequencies in another band. Such requests shall be met to the extent possible, provided they do not adversely affect the Plan.

4.5 Where appropriate, priority should be given to the requirements of administrations requesting the shortest overall broadcasting time, in the first stage for the zone under consideration and in the second stage for all the zones, if the incompatibilities have not been resolved in the first stage.

4.6 In applying paragraphs 4.1 to 4.5 above, due account shall be taken of interaction between zones in the same frequency band.

End of additional alternatives.

4.2.3.5 Step 5 - Selection of technical characteristics

The system shall be designed so that in those cases where administrations communicate the power and characteristics which may vary in given ranges, it selects the values for these characteristics to be used within the indicated ranges.

4.2.3.6 Step 6 - Compatibility analysis and frequency selection

[To be developed.]

4.2.3.7 Step 7 - Reliability analysis

The method described in section [ ] shall be used to calculate the [overall broadcast reliability].

4.2.3.8 Step 8 - Criteria and requirements met

The broadcasting requirements for the season under consideration will be analyzed to determine if they are satisfied with the agreed criteria as contained in section [ ].

4.2.3.9 Step 9 - Seasonal plan

The timing of publication and the means of securing administrations' comments on seasonal plans will be considered by the second session of the Conference.

4.2.3.10 Step 10 - Adjustment process

The application of steps 3 to 8 indicates adjustments to be applied. These adjustments will be implemented in several loops which will be derived within the software process.

4.2.3.11 Step 11 - Additional procedures

In considering the planning method the first session identified that there may be a need for additional procedures to deal with :

a) modifications to the Seasonal plan after it has been published;

b) the inclusion of additional requirements in the Seasonal plan after it has been published;

c) the situation where certain administrations may be unable to accept the frequency assignments included in the Seasonal plan for some reason.

The first session is of the view that this is a matter for consideration by the second session.

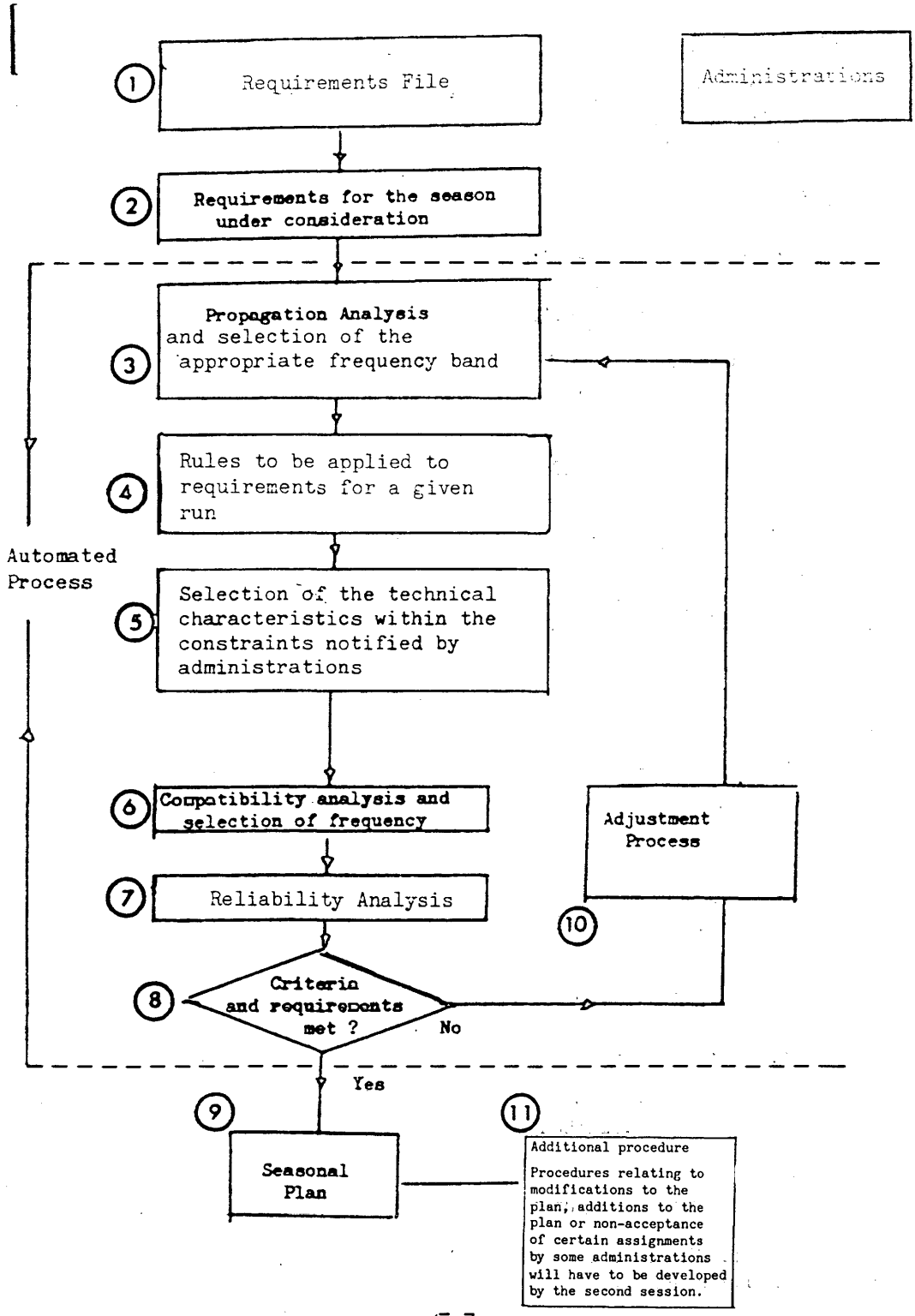

FIGURE [7]

Flowchart of the automated process

ANNEX 1

IFRB NOTE ON POINT 2 OF DOCUMENT DT/43(Rev.1)

Having examined the paragraph 4.1.2.2 of Document 169 the Board considers that national and international uses shall be treated equally. However consideration shall be given to the differences between these two uses of requirements. The proposed point in square brackets in item 2 of Document DT/43(Rev.1) leads to understand that the consideration to be given to the national use is with respect to the longer hours of operation.

1. When applying Document DT/43(Rev.1) together with paragraph 4.1.2.2 in the congested area the Board will act as follows :

2. a) if the duration of the two requirements are equal, and the possible solution would consist in reducing the hours of operation, the two requirements would be treated equally;

b) if a possible solution to resolve an incompatibility would be for one of the requirements to be satisfied in another band, the longer requirement would be given first consideration for not changing the band;

c) in resolving incompatibilities in a given zone and in a given band, the system shall be designated to as far as possible insure a continuity of frequency use for requirements having the longer continuous hours of operation.

3. The Board is of the opinion that if the Conference wants to afford any priority to national uses, it should state it explicitly and indicate the rules to be applied.

(Source : Document 172 and Corrigendum 1)

ANNEX 2

NOTE BY CHAIRMAN OF COMMITTEE 4
TO THE CHAIRMAN OF COMMITTEE 5

In reply to the Note from the Chairman of Committee 5 to the Chairman of Committee 4 (Document 106), and having analyzed various options of minimum values of the technical parameters within the framework of the ad hoc Group 4D, the Chairman of that ad hoc Group presented to Committee 4 the following compromised proposal :

"Minimum values of technical parameters :

- Co-channel RF protection ratio under stable conditions : 17 dB
- Audio-frequency signal/noise ratio : 19 dB
- Overall/basic reliability
  (both broadcast or reception reliability) : 50%
- Quality assessment grade : 3

The above set of parameters should be accompanied by a reference to the diagram of Figure [B/3.3.1] in Document 115(Rev.1) (page 13) showing the relationship between the reception quality and the co-channel RF protection ratio, already adopted, and the diagram contained in Addendum 1 to Document 73 and reproduced in the annex to this note."

"No consensus could be obtained on the proposal; six delegations pronounced in favour of it, and five others strongly opposed to give the fixed values of minimum parameters being of the opinion that their acceptance might harm the planning process but they may agree to show the above-mentioned diagrams."

Committee 4 decided to send a note on this subject to Committee 5 and, for information, to the Plenary Meeting.

(Source : Document 195)

ANNEX 3

NOTE BY THE CHAIRMAN OF THE CONFERENCE AND
THE CHAIRMAN OF COMMITTEE 4 TO THE CHAIRMAN OF COMMITTEE 5

In addition to the request contained in Document 167, Committee 5 is asked to take appropriate actions on the following items :

in section 3.2.4 (Document 181 refers)

- to determine a reference value /~Y%_7 for the overall broadcast reliability as a general criterion for planning purposes;

- to determine a specified percentile /~X_7 of test point within the required service area to be taken into account when considering broadcast reliabilities (both basic and overall) (see pages 19 and 20 of Document 181);

in section 3.2.5.2 (Solar index values)

- to chose one of the options contained in sub-section 3.2.5.2.2 between square brackets (Document 177, page 2);

in section 3.5.2 (Transmitter power ...) (Document 177, page 3)

- to decide whether power calculations are to be included in the planning method; and if yes

- to determine a reference value /~X%_7 of basic circuit reliability for power calculation purposes;

in section 3.9.2 (Progressive introduction of SSB transmissions)
(Document 154(Rev.1), page 3)

- agree to removing the square brackets around the paragraphs 3.9.2.1.e, 3.9.2.2.c and 3.9.2.3; and

- to determine the duration of the transition period mentioned in paragraph 3.9.2.3.

(Source : Document 177)

ANNEX 4

3.7 Reception zones and test points

/ 3.7.1 Reception zones

In specifying the reception area, reference shall be made to a CIRAF zone, or a part thereof.

If necessary, CIRAF zones may be divided into four quadrants NW, NE, SE and SW to define more precisely the service area of a transmission. This is achieved by defining an appropriate reference point in each CIRAF zone with the dividing lines described precisely by the lines of latitude and longitude passing through such a reference point. Any combination of the four quadrants may be used where the service area is greater than one quadrant but less than a whole CIRAF zone.[1]

Ten maritime broadcasting areas (provisionally designated as A to J) are defined as shown in Annex / A/3.7.2 /.[2] /

3.7.2 Test points

For the purposes of the technical examination the IFRB shall determine an adequate number of test points distributed throughout each CIRAF zone and, where appropriate, subdivisions of CIRAF zones. These test points shall form part of the IFRB Technical Standards and will be distributed for comment by administrations (Nos. 1001 and 1001.1 of the Radio Regulations).

As the computer facilities available to the IFRB improve, the Board shall make further improvements by increasing the number of test points.

Note 1 - In exceptional cases when it is necessary to specify a reception area which is smaller than an entire zone or a subdivision of a zone, this may be done by specifying an azimuth and a maximum service range in km. See Appendix 2 of the Radio Regulations.

/ Note 2 - It may be desirable to consider the procedures applicable in examining the compatibility of requirements in these maritime broadcasting areas. /*

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* To be reconsidered by Committee 5 following the decision adopted by the Plenary Meeting.

(Source : Document 185)

ANNEX 5

SUPPLEMENTARY PROPOSAL BY THE KINGDOM OF THE NETHERLANDS AND THE UNITED KINGDOM

Introduction

1. Document 108 was submitted in accordance with item 4.2.5 of the agenda of this Conference. In discussion of the document by Working Group 5A-2 on 5 February the principle of Document 108 - with two amendments that were accepted by the Netherlands and the United Kingdom - was supported by seven delegations, three opposed the principle and one requested clarification to assist understanding. Recognizing the substantial progress made by the Conference since Document 108 was submitted on 20 January, the following clarification and a draft text for adoption by the Conference are now submitted.

Clarification

2. The broadcasting service using the HF bands is unique because, under the new concept being developed by the Conference, it will in future be operated in accordance with seasonal plans to be prepared by a central automated system in the hands of the IFRB. The seasonal plans are expected to be of only two or four months duration, and experience has shown that the general procedures of Article 22 of the Radio Regulations relating to harmful interference cannot react quickly enough within cycles of this short duration. Any administration using a frequency in accordance with a seasonal plan and experiencing harmful interference must, as a matter of urgent operational necessity, be able to seek prompt action to remedy the situation. One such course of action would be to request the assistance of the IFRB in finding another frequency. If another frequency can be found it must not reduce the level of reliability of other assignments in the current seasonal plan. The Netherlands and the United Kingdom therefore propose that a text be included in the report of this Conference in order that this operational necessity be reflected in the intersessional work on the automated system and in the development of procedures by the next session of the Conference.

Proposed text

3. In the event of harmful interference to an HF broadcasting service which is using an assignemnt in accordance with a current seasonal plan, the administration concerned shall have the right to request the prompt assistance of the IFRB in finding another frequency to help restore that service to the level of reliability achieved in the plan. Any new frequency proposed by the IFRB shall not adversely affect the seasonal plan in operation. The central automated system must have the capability to respond, as far as possible, to such requests from administrations and there will be a need for associated provisions in the regulatory procedures which will be developed by the next sesson of the Conference.

INTERNATIONAL TELECOMMUNICATION UNION

WARC FOR HF BROADCASTING

FIRST SESSION, GENEVA, JANUARY/FEBRUARY 1984

Document DT/53-E
8 February 1984
Original : English

COMMITTEE 5

REPORT OF THE AD HOC GROUP OF COMMITTEE 5

1. Delegations of Columbia, India, the USSR and Venezuela participated in the ad hoc Group.

2. Participants underlined the urgency of action by the IFRB and the Administrative Council in order to adequately support the intersessional work.

3. Although sufficient time was not available for substantive discussion, the following draft amendments to Resolution COM5/2 are presented :

3.1 In "requests the IFRB"

3.1.1 Amend 4 to read :

"to invite ... to the IFRB, to be taken into account in the future work as appropriate;"

3.1.2 Add the following two new paragraphs :

"8. to invite administrations to comment on the possibility for them to nominate experts whose services could be made available to the IFRB and indicate relevant details of their area(s) of expertise, together with an indication of the extent to which the administration could support the expert's travel expenses and subsistance allowance;

9. to prepare as soon as possible a report to the Administrative Council in the light of responses from administrations to enable the Administrative Council to urgently take appropriate decisions."

3.2 Replace "resolves" 1 to 4 by one of the following alternatives :

3.2.1 Alternative 1

resolves

1. to provide assistance to the IFRB by making available to it experts from administrations in HF broadcasting planning and/or system analysis;

2. that these experts shall assist the IFRB under its full responsibility to carry out the tasks contained in "requests the IFRB" 1 and 2; /these experts should /preferably/ work as a panel/;

3. to request the Administrative Council to consider the report prepared by the IFRB in accordance with "requests the IFRB" 9 and to decide in the light of this report either

3.1 to establish a panel of experts and decide on the dates, durations of its meeting as well as on any other administrative and financial questions bearing in mind the need :

- to ensure a balanced geographical distribution among the five administrative regions (America, Western Europe, Eastern Europe, Africa and Asia); and

- to ensure a balanced expertise in computer software system analysis and aspects of HF broadcasting planning;

or

3.2 to /~invite administrations to make experts available to the IFRB_7 / /~find other means to assist the IFRB during the intersessional period._7

3.2.2 Alternative 2

is of the opinion :

1. that assistance should be provided to the IFRB (rest as in Alternative 1);

2. (same as in Alternative 1);

3. that the Administrative Council be requested to consider (rest as in Alternative 1).

3.3 The items entitled "invites the Administration Council" and "invites the Secretary-General" remain unchanged.

3.4 Annex II is deleted.

K. OLMS
Chairman of ad hoc Group of Committee 5