Documents of the World Administrative Radio Conference (WARC-79)
(Geneva, 1979)

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INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 601-E
10 November 1979
Original : English

COMMITTEE 6

NOTE FROM THE CHAIRMAN OF COMMITTEE 4
TO THE CHAIRMAN OF COMMITTEE 6

With reference to your request for advice on certain matters as communicated in Documents Nos. 370 and 371, Committee 4 recommends as follows :

1. Increase in equivalent satellite link noise temperature (Document No. 370)

For the purpose of establishing if coordination is required between geostationary satellite networks sharing the same frequency bands, a value of 4 % increase in equivalent satellite link noise temperature has been included in the proposed revision of Appendix 29 (Section 3). This is proposed as a definitive value and you will notice that it is described as a "threshold value" instead of a limit to more clearly establish its role in the coordination process.

You should also note that this "threshold value" is now to be expressed as a percentage increase in the equivalent noise temperature rather than a "predetermined increase in noise temperature" and, hence, the text of Article N11/9A should be modified accordingly.

2. "In the same band" (Document No. 371)

Committee 4 has examined the request from Committee 6 (Document No. 371) for a definition of the phrase "in the same band". It is recommended that this expression not be used in No. 4114A (Document No. 440), since it is open to differing interpretations; therefore, it is recommended that the first indent of No. 4114A be replaced by

"whose assigned frequency bands overlap that of the new frequency assignment, and".

Committee 4 has examined a similar problem raised in 4138/639AN and sees no problem, from a technical point of view, in the interpretation of this provision.

With respect to the Committee 6 request contained in paragraph 3 of Document No. 371, Committee 4 is not in a position to define a specific numerical value of the frequency separation between frequency assignments such that coordination would not be necessary.

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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10 November 1979
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COMMITTEE 5

NOTE FROM THE CHAIRMAN OF WORKING GROUP 5E
TO THE CHAIRMAN OF COMMITTEE 5

Working Group 5E wishes to report that it has completed a review of all the proposals and Recommendations assigned to it for the bands above 40 GHz, as stated in Document No. 212(Rev.1), page 19.

Dr. A.W. ADEY
Chairman of Working Group 5E

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 603-E

11 November 1979

Original: French
English

WORKING GROUP 6A

FOURTH REPORT OF DRAFTING GROUP 6A1

The Drafting Group has considered the existing Resolutions Nos. Spa2 - 3, Sat 5 and Sat 6, which had been referred to it by Working Group 6A.

Amendments consequential to those made in Articles N11 and N13 have been made to Resolution No. Spa2 - 3. Resolutions Nos. Sat 5 and Sat 6, which Working Group 6A had decided to maintain, have been left unchanged. Consequential changes in the references to Articles of the Radio Regulations and other Resolutions should be left to the Editorial Committee. The texts of these Resolutions, as agreed by the Drafting Group, are given in the Annexes.

J.K. BJORNSJO
Chairman of Drafting Group 6A1

Annexes: 3

ANNEX 1

RESOLUTION No. /‾Spa2 - 3_7

Relating to the Bringing into Use of Space Stations in the Broadcasting Satellite Service, prior to the Entry into Force of Agreements and Associated Plans for the Broadcasting-Satellite Service

Geneva, 1979,

MOD The World Administrative Radio Conference, ~~for Space Telecommunications (Geneva, 1971),~~

considering

/‾Spa2 - 2_7

MOD *a)* that while Resolution No. ~~Spa2 – 2 has been adopted by this Conference, envisaging~~ envisages plans for the broadcasting-satellite service, some administrations might nevertheless feel the need to bring stations in that service into use prior to such plans being established;

b) that administrations should, as far as possible, avoid proliferation of space stations in the broadcasting-satellite service before such plans have been established;

c) that a space station in the broadcasting-satellite service may cause harmful interference to terrestrial stations operating in the same frequency band, even if the latter are outside the service area of the space station;

MOD *d)* that the procedures specified in Article ~~9A~~ /‾N11_7 of the Radio Regulations contains no provisions for co-ordination between space stations in the broadcasting-satellite service and terrestrial stations and between space stations in that service and space systems of other administrations;

resolves

~~1. that the following procedure shall be applied until agreements and associated plans pursuant to Resolution No. Spa2 – 2 enter into force:~~

MOD 1. that, except in those cases where agreements and associated plans for the broadcasting-satellite service have been established and entered into force, the following procedure shall be applied :

Section A: Co-ordination Procedure between Space Stations in the Broadcasting-Satellite Service and Terrestrial Stations

2.1 Before an administration notifies to the I.F.R.B. or brings into use any frequency assignment to a space station in the broadcasting-satellite service in a frequency band where this frequency band is allocated, with equal rights, to the broadcasting-satellite service and to a terrestrial radiocommunication service, either in the same Region or sub-Region or in different Regions or sub-Regions, it shall co-ordinate the use of this assignment with any other administration whose terrestrial radiocommunication services may be affected. For this purpose, it shall inform the Board of all the technical characteristics of the station, as listed in the relevant sections of Appendix 1A to the Radio Regulations, which are necessary to assess the risk of interference to a terrestrial radiocommunication service[1].

2.2 The Board shall publish this information in a special section of its weekly circular and shall also, when the weekly circular contains such information, so advise all administrations by circular telegram.

MOD **2.3** Any administration which considers that its terrestrial radiocommunication services may be affected shall forward its comments to the administration seeking co-ordination and, in any case, to the Board. These comments must be forwarded within ~~one hundred and twenty days~~ four months from the date of the relevant I.F.R.B. weekly circular. It shall be deemed that any administration which has not forwarded comments within that period considers that its terrestrial radiocommunication services are unlikely to be affected.

~~[1] The technical data to be used in effecting co-ordination should be based on the most recent C.C.I.R. Recommendations as accepted by the administrations concerned under the terms of Resolution No. Spa2-6. In the absence of relevant C.C.I.R. Recommendations, the technical data to be used in effecting co-ordination shall be determined by agreement among the administrations concerned.~~

MOD [1] The calculation methods and the interference criteria to be employed in evaluating interference [levels] shall be based upon relevant CCIR Recommendations [accepted in application of Resolution No. Spa2 - 6,] [unless otherwise agreed between the Administrations concerned]. ~~or in~~ In the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

(Note : same text as No. 4124.1 in Article N11)

MOD

2.4 Any administration which has forwarded , with a copy to the Board, comments on the projected station shall either give its agreement or, if this is not possible, send to the administration seeking co-ordination all the data on which its comments are based as well as any ~~such~~ suggestions ~~as~~ it may be able to offer with a view to a satisfactory solution of the problem.

2.5 The administration which plans to bring into use a space station in the broadcasting-satellite service as well as any other administration which believes that its terrestrial radiocommunication services are likely to be affected by the station in question may request the assistance of the Board at any time during the co-ordination procedure.

~~2.6 If the assistance of the Board has been sought and there is a continuing disagreement between the administration seeking co-ordination and the administration which has forwarded its comments, the administration seeking co-ordination may, after a total period of one hundred and eighty days, from the date of the relevant I.F.R.B. weekly circular, send to the Board its notice concerning the frequency assignment in question.~~

MOD

2.6 In the event of continuing disagreement between one Administration seeking to effect coordination and one with which coordination has been sought, the Administration seeking coordination shall, except in the cases where the assistance of the Board has been requested, defer the submission of its notice concerning the proposed assignment by six months from the date of publication of the information under paragraph 2.2 ~~request-for-coordination-under No.-4118D,-taking-into-consideration-the-provisions-of No.-4580/639BE~~.

(Note : same text as No. 4136 in Article N11 slightly modified).

Section B: Co-ordination Procedure between Space Stations in the Broadcasting-Satellite Service and Space Systems of other Administrations

MOD 3. An administration intending to bring into use a space station in the broadcasting-satellite service shall, for the purpose of co-ordination with space systems of other administrations, apply the following provisions of Article ~~9A~~ /‾N11_7 of the Radio Regulations:

MOD 3.1 Nos. ~~639AA to 639AI inclusive.~~ 4099 to 4112 inclusive.

MOD 3.2.1 ~~No. 639AJ[1].~~ Nos. 4114 and 4114A[1].

~~[1] The technical data to be used in effecting co-ordination should be based on the most recent C.C.I.R. Recommendations as accepted by the administrations concerned under the terms of Resolution No. Spa2-6. In the absence of relevant C.C.I.R. Recommendations, the technical data to be used in effecting co-ordination shall be determined by agreement among the administrations concerned.~~

[1] The calculation methods and the interference criteria to be employed in evaluating interference /‾levels_7 shall be based upon relevant CCIR Recommendations /‾accepted in application of Resolution No. Spa2 - 6,_7 /‾unless otherwise agreed between the Administrations concerned_7. ~~or, in~~ In the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

(Note : same text as No. 4124.1 in Article N11)

3.2.2 No co-ordination under paragraph 3.2.1 is required when an administration proposes to change the characteristics of an existing assignment in such a way as not to increase the probability of harmful interference to stations in the space radiocommunication service of other administrations

/ 4118 / to 4136 inclusive.

MOD 3.2.3 Nos. ~~639AL, 639AM, 639AO, 639AS a), c), e), f), 639AT, 639AU, 639AV, 639AW, 639AX, 639AY, 639AZ~~.

Section C: Notification, Examination and Recording in the Master Register of Assignments to Space Stations in the Broadcasting-Satellite Service dealt with under this Resolution

MOD 4.1 Any frequency assignment[1] to a space station in the broadcasting-satellite service shall be notified to the Board. The notifying administration shall apply for this purpose the provisions of Nos. ~~639BE, 639BF~~ and ~~639BG~~ of the Radio Regulations. 4579, 4580 4581

MOD 4.2 Notices made under paragraph 4.1 shall initially be treated in accordance with No. ~~639BH~~ of the Radio Regulations. 4582

5.1 The Board shall examine each notice with respect to:

MOD 5.2 *a)* its conformity with the Convention, the Table of Frequency Allocations and the other provisions of the Radio Regulations ~~(with~~ the exception of those relating to the co-ordination procedures and to the probability of harmful interference~~)~~; which are the subject of the following sub-paragraphs

[1] The expression *frequency assignment*, wherever it appears in this Resolution, shall be understood to refer either to a new frequency assignment or to a change in an assignment already recorded in the Master International Frequency Register (hereinafter called *Master Register*).

5.3 *b)* its conformity, where applicable, with the provisions of paragraph 2.1 of Section A above, relating to co-ordination of the use of the frequency assignment with the other administrations concerned;

5.4 *c)* its conformity, where applicable, with the provisions of paragraph 3.2.1 of Section B above, relating to co-ordination of the use of the frequency assignment with the other administrations concerned;

5.5 *d)* where appropriate, the probability of harmful interference to the service rendered by a station in a space or terrestrial radiocommunication service for which a frequency assignment has already been recorded in the Master Register in 4296
conformity with the provisions of No. ~~501~~ or ~~639BM~~ of
MOD the Radio Regulations as appropriate, if that assignment has 4587
not, in fact, caused harmful interference to the service rendered by a station for which an assignment has been previously recorded in the Master Register and which itself is in conformity with No. ~~501~~ or ~~639BM~~ as appropriate.
4296 4587

6.1 Depending upon the findings of the Board subsequent to the examination prescribed in paragraphs 5.2, 5.3, 5.4 and 5.5, further action shall be as follows:

6.2 Where the Board reaches an unfavourable finding with respect to paragraph 5.2 the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding
MOD together ~~and~~ with such suggestions as the Board ~~may be~~ able to offer with a view to a satisfactory solution of the problem.
is

6.3 Where the Board reaches a favourable finding with respect to paragraph 5.2, or where it reaches the same finding after resubmission of the notice, it shall examine the notice with respect to the provisions of paragraphs 5.3 and 5.4.

6.4 Where the Board finds that the co-ordination procedures mentioned in paragraphs 5.3 and 5.4 have been successfully completed with all administrations whose services may be affected, the assignment shall be recorded in the Master Register. The date of receipt by the Board of the notice shall be entered in Column 2d of the Master Register with an entry in the Remarks column indicating that such recording does not prejudge in any way the decisions to be included in the agreements and associated plans referred to in Resolution No./Spa2–2./

6.5 Where the Board finds that the co-ordination procedures mentioned in paragraph 5.3 or 5.4 have not, as appropriate, been applied or have been unsuccessfully applied, the notice shall be returned immediately by airmail to the notifying administration with the reason for its return

MOD together ~~and~~ with such suggestions as the Board ~~may be~~ is able to offer with a view to a satisfactory solution of the problem.

6.6 Where the notifying administration resubmits the notice and the Board finds that the co-ordination procedures have been successfully completed with all administrations whose services may be affected, the assignment shall be treated as indicated in paragraph 6.4.

6.7 Where the notifying administration resubmits the notice and states that it has been unsuccessful in endeavouring to effect the co-ordination, the notice shall be examined by the Board with respect to paragraph 5.5.

6.8 Where the Board reaches a favourable finding with respect to paragraph 5.5, the assignment shall be recorded in the Master Register. The appropriate symbol indicating the finding by the Board shall indicate that the co-ordination procedures, as appropriate, referred to in paragraph 2.1 or 3.2.1 were not successfully completed. The date of receipt by the Board of the notice shall be entered in Column 2d of the Master Register, with the remark mentioned in paragraph 6.4.

MOD 6.9 **Where the Board reaches an unfavourable finding with respect to paragraph 5.5, the notice shall be returned immediately by airmail to the notifying administration with the reasons for the Board's finding ~~and~~ together with such suggestions as the Board ~~may be~~ is able to offer with a view to a satisfactory solution of the problem.**

MOD 6.10 **If the administration resubmits the notice unchanged with the insistence that it be reconsidered, but should the Board's unfavourable finding under paragraph 5.5 remain unchanged, the assignment shall be recorded in the Master Register. However, this entry shall be made only if the notifying administration informs the Board that the assignment has been in use for at least ~~one hundred and twenty days~~ four months without any complaint of harmful interference having been received. The date of receipt by the Board of the original notice shall be entered in Column 2d of the Master Register, with the remark mentioned in paragraph 6.4. An appropriate remark shall be placed in Column 13 to indicate that the assignment is not in conformity with the provisions of paragraphs [5.2,] 5.3, 5.4 or 5.5, as appropriate. In the event that the administration concerned receives no complaint of harmful interference concerning the operation of the station in question for a period of one year from the commencement of operation, the Board shall review its finding.**

MOD 6.11 **If harmful interference is actually caused to the reception of any space station in the broadcasting-satellite service whose frequency assignment has been recorded in the Master Register as a result of a favourable finding with respect to paragraphs 5.2, 5.3, 5.4 and 5.5 of this Resolution, as appropriate, by the use of a frequency assignment to a space station which has been subsequently recorded in the Master Register in accordance with the provisions of paragraph 6.10 of this Resolution or of No. ~~639CP~~ [4616] of the Radio Regulations, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.**

MOD 6.12 **If harmful interference is actually caused to the reception of any space radiocommunication station using an assignment recorded in the Master Register as a result of a favourable finding with respect to Nos.**

4587, 4588, 4589, 4590 and 4591

~~639BM, 639BN, 639BO, 639BP, 639BQ and 639BR~~ of the Radio Regulations, as appropriate, by the use of an assignment to a space station in the broadcasting-satellite service which has been subsequently recorded in the Master Register in accordance with the provisions of paragraph 6.10 of this Resolution, the station using the latter assignment must, on receipt of advice thereof, immediately eliminate this harmful interference.

MOD 6.13 If harmful interference is actually caused to the reception of any terrestrial station using an assignment recorded in the Master Register as a result of a favourable finding with respect to No. ~~501~~ 4296 of the Radio Regulations, by the use of an assignment to a space station in the broadcasting-satellite service which has been subsequently recorded in the Master Register in accordance with the provisions of paragraph 6.10 of this Resolution, the station using the latter assignment must, on receipt of advice thereof, immediately eliminate this harmful interference.

MOD 6.14 If harmful interference to the reception of any station whose assignment is in accordance with paragraph 5.2 of this Resolution, is actually caused by the use of a frequency assignment which is not in conformity with paragraph 5.2 of this Resolution, or with No. ~~501, 570AB or 639BM~~ 4296, 4370 or 4587 of the Radio Regulations, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

ANNEX 2

RESOLUTION No. Sat – 5

Relating to the coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the broadcasting-satellite service in Region 2

The World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977,

considering

a) that a plan will be established for the broadcasting-satellite service in Region 2 in accordance with Recommendation No. Sat – 8;

b) that in Region 2 the broadcasting-satellite service should be operated on the basis of the principles contained in Article 12 and Annexes 6 and 7 of these Final Acts;

c) that some of the provisions adopted by this Conference concerning the broadcasting-satellite service in Regions 1 and 3 may also be applied in Region 2 prior to the entry into force of the plan for that Region to be established pursuant to Recommendation No. Sat – 8;

d) that, in the interim period, the procedures described in Resolution No. Spa2 – 3 will continue to apply in Region 2;

resolves

MOD 1. that an administration intending to bring into use a space station in the broadcasting-satellite service in Region 2 shall, for the purpose of coordination with space systems of other administrations, apply the relevant provisions of Article ~~9A~~ of the Radio Regulations, i.e. Nos. ~~639AA to 639AI~~ inclusive;
4099 to 4112 [/ N11 /]

2. that the relevant provisions of Resolution No. Spa2 – 3 shall apply to the coordination, notification and recording of stations in the broadcasting-satellite service in Region 2, wherever a station in the broadcasting-satellite service or the fixed-satellite service in Region 2 is involved;

2.1 that an administration notifying a frequency assignment to a space station in the broadcasting-satellite service in Region 2 under paragraph 4.1 of Resolution No. Spa2 – 3 shall also notify a typical receiving earth station;

3. that the coordination, notification and recording procedures for stations in the fixed-satellite service specified in Article 7 of these Final Acts shall also apply to stations in the broadcasting-satellite service in Region 2 with respect to stations in the broadcasting-satellite service for which a frequency assignment appears in the Plan whenever

- any portion of the necessary bandwith of the proposed frequency assignment in Region 2 falls within the necessary bandwith of a frequency assignment in Region 1 or Region 3, and
- the power flux density which would be produced by the proposed broadcasting-satellite frequency assignment in Region 2 exceeds the value specified in Annex 1;

4. that Annex 2 of these Final Acts shall be used in supplying the information referred to in Section B of Resolution No. Spa2 – 3 and Section II of Article 7 of these Final Acts;

5. that an individual notice for each frequency assignment shall be drawn up as prescribed in Annex 2 for any frequency assignment notified under paragraph 4.1 of Resolution No. Spa2 – 3 or paragraph 2.1 of this Resolution or Section III of Article 7 of these Final Acts.

ANNEX 3

RESOLUTION No. Sat – 6

Relating to the coordination, notification and recording in the Master International Frequency Register of assignments to stations in the fixed-satellite service with respect to stations in the broadcasting-satellite service in Region 2

The World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977,

considering

that the Radio Regulations contain no provisions governing the coordination, notification or recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service in the band 11·7-12·2 GHz with respect to stations in the broadcasting-satellite service in Region 2;

resolves

[N11]

that the provisions of Article 9A of the Radio Regulations shall be applied in such cases until the matter is considered by a competent administrative radio conference.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 5

International Air Transport Association

ALLOCATIONS TO THE AERONAUTICAL RADIONAVIGATION SERVICE
IN THE LF/MF BANDS IN REGION 1

1. Non Directional Beacons (NDB) operating in the bands between 200 and 525 kHz are used in the aeronautical radionavigation service for a number of essential safety of life purposes.

2. They provide en route navigational assistance in circumstances where it is not practicable to deploy a VHF navigational aid. In this role they must provide a means of navigation to the aircraft which is accurate enough to maintain the aircraft within the lateral limits of the air routes, and thus receive protection from other types of air traffic operating in adjacent airspace, as well as the avoidance of areas which, for a variety of reasons, are dangerous to flight. They also are used in coastal areas to provide long-range navigational assistance to aircraft to permit an accurate landfall after a long over-water flight.

3. The short range NDB, or locator, is used in areas which surround major airports (terminal areas). Such locators enable aircraft to navigate on the routes within the terminal area, which in many cases are quite complex. In view of the high density of traffic in these areas, accurate navigation is essential to reduce the probability of a mid-air collision to an acceptable value. Locators also provide navigational guidance to aircraft which for one reason or another are unable to complete a landing and have to execute a missed approach procedure. Accurate navigation in such circumstances is essential, particularly when there is high ground in the vicinity of the airport.

4. The requirement for accurate navigation in the conditions described above demand freedom from interference for the facilities concerned. In this respect it must be stressed that errors in NDB bearing information resulting from an interfering signal would not necessarily be apparent to a pilot, who would proceed on the assumption that his navigational information was correct.

5. During recent years there has been a large increase in the number of people travelling by air. This growth is expected to continue and will mean an increase in the number of aircraft, which in turn will demand a more complex air route structure with an associated deployment of navigational aids. The number of NDBs in service must therefore be expected to increase.

6. There are a large number of NDB facilities operating in the bands under consideration. In the European Region alone there are 1800 beacons, of which over 800 are used by aircraft operating on international air routes. There are 346 NDBs operating in bands in which it is now proposed that for Region 1 there will no longer be an allocation to aeronautical radionavigation. A further 134 facilities are operating in frequency bands within which it is now proposed that there will be increased sharing with other services. To date there has been no solution found to providing alternative spectrum for the displaced beacons. It should also be noted that there are many aircraft operations from Regions 2 and 3 into Region 1. The NDBs in Region 1 thus play a vital role for the safety of international flights from countries outside Region 1, and it is therefore in the interests of all Administrations to ensure adequate spectrum is available, to safeguard their current or future aircraft operations into Region 1.

7. In view of the safety factors outlined above IATA would urge that adequate consideration be given to the need to permit the operation, free from interference, of these essential aeronautical radionavigation facilities.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 9

THIRD SERIES OF TEXTS FROM COMMITTEE 5 TO THE EDITORIAL COMMITTEE

1. The texts mentioned in Document No. 606 are hereby submitted to the Editorial Committee in Annexes 1 - 7 to the present document.

2. The map shown in Annex 4, page 14, should be drawn and presented in the form in which regional subdivision is clearly visible.

3. Committee 5 requests the Editorial Committee to align the French and Spanish texts of Radio Regulations No. 7376/429 with the English version.

M. HARBI
Chairman of Committee 5

Annexes : 7
/ Annex 1 /*)

*) For Committee 9 consideration after coordination between Committee 4, 5 and 7.

[ANNEX 1] *)

Article N1/1

Terms and Definitions

ADD 3023A Allotment (of a radio frequency or radio frequency channel) : Entry of a designated frequency channel in an agreed plan, adopted by a competent Conference, for use by one or more Administrations for a radiocommunication service in one or more identified countries or geographical areas and under specified conditions.

ADD 3023B Assignment (of a radio frequency or radio frequency channel) : Authorization given by an Administration for a radio station to use a radio frequency or radio frequency channel under prescribed conditions.

ADD 3023C Allocation (of a frequency band) : Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more radiocommunication services under specified conditions. This term shall also be applied to the frequency band concerned.

ADD 3023X Radiocommunication Service : A service as defined in this Article involving the transmission and/or reception of radio waves for specific telecommunication purposes.

MOD 3024 21C Space Radiocommunication : Any radiocommunication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space.

MOD 3025/21D Terrestrial Radiocommunication : Any radiocommunication other than space radiocommunication or radioastronomy. In these Regulations, unless otherwise stated, any radiocommunication service relates to terrestrial radiocommunication.

SUP 3025.1/21D.1

MOD 3026/45 Radiodetermination : The determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves.

NOC 3027/48 Radionavigation

NOC 3028/54 Radiolocation

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*) For Committee 9 consideration after coordination between Committee 4, 5 and 7.

Article N1/1 (cont.)

MOD 3029/69 Safety Service : Any radiocommunication service used permanently or temporarily for the safe-guarding of human life and property (Conv.)[1].

NOC 3030/84 Special Service

NOC 3031/21 Station

NOC 3032/21A Space Station

MOD 3033/21B ***Earth Station:*** **A station located either on the Earth's surface or within the major portion of the Earth's atmosphere intended for communication:**

- **with one or more space stations;** ***or***
- **with one or more stations of the same kind by means of one or more** reflecting satellites or other objects in space.

NOC 3034/21E Terrestrial Station[2]

NOC 3034.1/21E.1 [2]In these Regulations, unless otherwise stated, any station is a terrestrial station.

NOC 3035/83 Experimental Station

NOC 3036/22 ***Fixed Service:*** **A service of radiocommunication between specified fixed points.**

NOC 3037/23 ***Fixed Station:*** **A station in the fixed service.**

MOD 3038/24 Aeronautical Fixed Service : A radiocommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

NOC 3039/25 Aeronautical Fixed Station : A station in the aeronautical fixed service.

(MOD) 3040/28 *Broadcasting Service:* A radiocommunication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmission. (Conv.)

NOC 3041/29 ***Broadcasting Station:*** A station in the broadcasting service.

3029.1/69.1 1. Convention, Annex 2, Harmful interference

Article N1/1 (cont.)

MOD 3044/78 Amateur service : A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

NOC 3045/79 ***Amateur Station:*** **A station in the amateur service.**

MOD 3046/80 **Standard frequency and time signal service : A radiocommunication service for scientific, technical and other purposes, providing the transmission of specified frequencies, time signals, or both, of stated high precision, intended for general reception.**

MOD 3047/81 **Standard Frequency and Time Signal Station: A station in the standard frequency and time signal service.**

SUP 3048/82 ***Time Signal Service.***

(MOD) 3049/46 Radiodetermination Service : A radiocommunication service for the purpose of radiodetermination.

NOC 3050/47 ***Radiodetermination Station:*** **A station in the radiodetermination service.**

(MOD) 3051/49 Radionavigation Service : A radiodetermination service for the purpose of radionavigation.

NOC 3052/50 ***Radionavigation Land Station:*** **A station in the radionavigation service not intended to be used while in motion.**

NOC 3053/51 ***Radionavigation Mobile Station:*** **A station in the radionavigation service intended to be used while in motion or during halts at unspecified points.**

MOD 3054/52 Aeronautical Radionavigation Service : A radionavigation service intended for the benefit and also for the safe operation of aircraft.

MOD 3055/53 Maritime Radionavigation Service : A radionavigation service intended for the benefit and also for the safe operation of ships.

(MOD) 3056/55 Radiolocation Service : A radiodetermination service for the purpose of radiolocation.

Article N1/1 (cont.)

NOC 3057/56 *Radiolocation Land Station*: A station in the radiolocation service not intended to be used while in motion.

NOC 3058/57 *Radiolocation Mobile Station*: A station in the radiolocation service intended to be used while in motion or during halts at unspecified points.

NOC 3059/58 *Radar*: A radiodetermination system based on the comparison of reference signals with radio signals reflected, or re-transmitted, from the position to be determined.

NOC 3060/59 *Primary Radar*: A radiodetermination system based on the comparison of reference signals with radio signals reflected from the position to be determined.

NOC 3061/60 *Secondary Radar*: A radiodetermination system based on the comparison of reference signals with radio signals re-transmitted from the position to be determined.

MOD 3062/60A Radar beacon (racon) : A receiver-transmitter device associated with a fixed navigational mark which, when triggered by a radar, automatically returns a distinctive signal which can appear on the display of the triggering radar, providing range, bearing and identification information.

NOC 3063/61 *Instrument Landing System (ILS)*: A radionavigation system which provides aircraft with horizontal and vertical guidance just before and during landing and, at certain fixed points, indicates the distance to the reference point of landing.

NOC 3064/62 *Instrument Landing System Localizer*: A system of horizontal guidance embodied in the instrument landing system which indicates the horizontal deviation of the aircraft from its optimum path of descent along the axis of the runway.

NOC 3065/63 *Instrument Landing System Glide Path*: A system of vertical guidance embodied in the instrument landing system which indicates the vertical deviation of the aircraft from its optimum path of descent.

NOC 3066/64 *Marker Beacon*: A transmitter in the aeronautical radionavigation service which radiates vertically a distinctive pattern for providing position information to aircraft.

MOD 3067/65 Radio Altimeter : A radionavigation equipment, on board an aircraft or spacecraft, used to determine the height of the aircraft or the spacecraft above the Earth's surface or another surface.

NOC 3068/66 *Radio Direction-Finding*: Radiodetermination using the reception of radio waves for the purpose of determining the direction of a station or object.

NOC 3069/67 *Radio Direction-Finding Station*: A radiodetermination station using radio direction-finding.

NOC 3070/68 *Radiobeacon Station*: A station in the radionavigation service the emissions of which are intended to enable a mobile station to determine its bearing or direction in relation to the radiobeacon station.

Article N1/1 (cont.)

NOC 3071/68A *Emergency Position-Indicating Radiobeacon Station:* A station in the mobile service the emissions of which are intended to facilitate search and rescue operations.

(MOD) 3072/30 *Mobile Service:* A service of radiocommunication between mobile and land stations, or between mobile stations (Conv.).

NOC 3073/31 *Land Station:* A station in the mobile service not intended to be used while in motion.

NOC 3074/32 *Mobile Station:* A station in the mobile service intended to be used while in motion or during halts at unspecified points.

NOC 3075/41 *Survival Craft Station:* A mobile station in the maritime or aeronautical mobile service intended solely for survival purposes and located on any lifeboat, life-raft or other survival equipment.

MOD 3076/33 **Aeronautical Mobile Service : A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate .** Emergency **position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies.**

MOD 3077/34 **Aeronautical Station : A land station in the aeronautical mobile service. In certain instances an aeronautical station may be** located, for example, on board ship or on a platform at sea.

MOD 3078/35 **Aircraft Station : A mobile station in the aeronautical mobile service located on board an aircraft, other than a survival craft station.**

MOD 3079/36 Maritime Mobile Service : A mobile service between coast stations and ship stations, or between ship stations, or between associated on-board communication stations (see No. 3082/39A); survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.

NOC 3080/38 *Coast Station:* A land station in the maritime mobile service.

MOD 3081/39 Ship Station : A mobile station in the maritime mobile service located on board a vessel, which is not permanently moored, other than a survival craft station.

NOC **3082** 39A *On-Board Communication Station:* A low-powered mobile station in the maritime mobile service intended for use for internal communications on board a ship, or between a ship and its lifeboats and life-rafts during lifeboat drills or operations, or for communication within a group of vessels being towed or pushed, as well as for line handling and mooring instructions.

NOC **3083** 40 *Ship's Emergency Transmitter:* A ship's transmitter to be used exclusively on a distress frequency for distress, urgency or safety purposes.

Article N1/1 (cont.)

NOC 3084 37 *Port Operations Service:* A maritime mobile service in or near a port, between coast stations and ship stations, or between ship stations, in which messages are restricted to those relating to the operational handling, the movement and the safety of ships and, in emergency, to the safety of persons. Messages which are of a public correspondence nature shall be excluded from this service.

NOC 3085 38A *Port Station:* A coast station in the port operations service.

NOC 3086 37A *Ship Movement Service:* A maritime mobile safety service, other than a port operations service, between coast stations and ship stations, or between ship stations, in which messages are restricted to those relating to the movement of ships. Messages which are of a public correspondence nature shall be excluded from this service.

NOC 3087 42 *Land Mobile Service:* A mobile service between base stations and land mobile stations, or between land mobile stations.

MOD 3088 43 *Base Station:* A land station in the land mobile service.

NOC 3089 44 *Land Mobile Station:* A mobile station in the land mobile service capable of surface movement within the geographical limits of a country or continent.

NOC 3090/84AF *Space System:* Any group of co-operating Earth and/or space stations employing space radiocommunication for specific purposes.

NOC 3091/84AFA *Satellite System:* A space system using one or more artificial Earth satellites.

NOC 3092/84AFB *Satellite Network:* A satellite system or a part of a satellite system, consisting of only one satellite and the co-operating Earth stations.

MOD 3093/84AFC Satellite Link : A radio link between a transmitting Earth station and a receiving Earth station through one satellite.

A satellite link comprises one ~~up-path~~ up-link and one ~~down-path~~ down-link.

MOD 3094/84AFD *Multi-Satellite Link:* A radio link between a transmitting Earth station and a receiving Earth station through two or more satellites, without any intermediate Earth station.

A multi-satellite link comprises one ~~up-path~~ up-link, one or more satellite-to-satellite ~~paths~~ links and one ~~down-path~~ down-link.

ADD 3094A Feeder Link : A radio link from an Earth station at a specified fixed point [or a transportable Earth station] to a space station, or vice versa, conveying information for a ~~satellite~~ space radiocommunication service other than the fixed-satellite service.

NOC 3098/84AZ *Space Tracking:* Determination of the orbit, velocity or instantaneous position of an object in space by means of radiodetermination, excluding primary radar, for the purpose of following the movement of the object.

Article N1/1 (cont.)

NOC 3099/84ATD *Space Research Service:* A radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes.

NOC 3100/84ATE *Space Operation Service:* A radiocommunication service concerned exclusively with the operation of spacecraft, in particular tracking, telemetry and telecommand.

These functions will normally be provided within the service in which the space station is operating.

NOC 3101/84ATF *Inter-Satellite Service:* A radiocommunication service providing links between artificial earth satellites.

MOD 3102/84AG Fixed-Satellite Service : A radiocommunication service between Earth stations at specified fixed points /or transportable Earth stations/ when one or more satellites are used; in some cases this service includes satellite-to-satellite links, which may also be effected in the inter-satellite service : this service may also include feeder links for other ~~satellite~~ space radiocommunication services (see ~~ADD~~ No. 3094A).

NOC 3103/84AP *Broadcasting-Satellite Service:* A radiocommunication service in which signals transmitted or re-transmitted by space stations are intended for direct reception[1] by the general public.

NOC 3103.1/84AP.1 [1] In the broadcasting-satellite service, the term "direct reception" shall encompass both individual reception and community reception.

NOC 3104/84APA *Individual reception* (in the broadcasting-satellite service): The reception of emissions from a space station in the broadcasting-satellite service by simple domestic installations and in particular those possessing small antennae.

NOC 3105/84APB *Community reception* (in the broadcasting-satellite service): The reception of emissions from a space station in the broadcasting-satellite service by receiving equipment, which in some cases may be complex and have antennae larger than those used for individual reception, and intended for use:

- by a group of the general public at one location; *or*
- through a distribution system covering a limited area.

Article N1/1 (cont.)

MOD 3106/84ASA *Earth Exploration-Satellite Service:* A radiocommunication service between earth stations and one or more space stations [or between space stations] in which:

- information relating to the characteristics of the Earth and its natural phenomena is obtained from [active or] passive sensors on Earth satellites;
- similar information is collected from air-borne or earth-based platforms;
- such information may be distributed to earth stations within the system concerned;
- platform interrogation may be included.

This service may also include feeder links necessary for its operation (see No. 3094A).

NOC 3107/84AT *Meteorological-Satellite Service:* An earth exploration-satellite service for meteorological purposes.

NOC 3108/84ATA *Amateur-Satellite Service:* A radiocommunication service using space stations on earth satellites for the same purposes as those of the amateur service.

MOD 3109/84ATB Standard Frequency and Time Signal-Satellite Service : A radiocommunication service using space stations on Earth satellites for the same purposes as those of the standard frequency and time signal service. This service may also include feeder links necessary for its operation (See No. 3094A).

SUP 3110/84ATC Time Signal-Satellite Service

MOD 3111/84APC Radiodetermination-Satellite Service : A radiocommunication service ~~involving the use~~ for the purpose of radiodetermination and involving the use of one or more space stations.

MOD 3112/84AQ Radionavigation-Satellite Service : A radiodetermination-satellite service used for the ~~same~~ purpose ~~as the~~ of radionavigation ~~service; in certain cases this service includes transmission or retransmission of supplementary information necessary for the operation of radionavigation systems~~. This service may also include feeder links necessary for its operation. (See ~~ADD~~ No. 3094A.)

(MOD) 3113/84AQA *Aeronautical Radionavigation-Satellite Service:* A radionavigation-satellite service in which ~~mobile~~ earth stations are located on board aircraft.

Article N1/1 (cont.)

(MOD) 3114/84AQB *Maritime Radionavigation-Satellite Service:* A radionavigation-satellite service in which ~~mobile~~ earth stations are located on board ships.

MOD 3115/84AGA *Mobile-Satellite Service:* A radiocommunication service:

– between mobile earth stations and one or more space stations, ~~;~~ or between space stations used by this service;

– or between mobile earth stations by means of one or more space stations ~~;~~.

~~– and if the system so requires, for connection between these space stations and one or more earth stations at specified fixed points.~~

This service may also include feeder links necessary for its operation. (See ADD 3094A)

ADD 3115A Mobile Earth Station : An Earth station in the mobile-satellite service intended to be used while in motion or during halts at unspecified points.

NOC 3116/84AGB *Aeronautical Mobile-Satellite Service:* A mobile-satellite service in which mobile earth stations are located on board aircraft. Survival craft stations and emergency position indicating radiobeacon stations may also participate in this service.

ADD 3116A **Aircraft Earth Station : A mobile earth station in the aeronautical mobile-satellite service located on board an aircraft.**

NOC 3117/84AGC *Maritime Mobile-Satellite Service:* A mobile-satellite service in which mobile earth stations are located on board ships. Survival craft stations and emergency position indicating radiobeacon stations may also participate in this service.

NOC 3118/84AGCA *Ship Earth Station:* A mobile earth station in the maritime mobile-satellite service located on board ship.

ADD 3118A Coast Earth Station : ~~An Earth station in the maritime mobile-satellite service or in the fixed-satellite service located at a specified point on land to provide a feeder link for the maritime mobile-satellite service~~.

NOC 3119 84AGD *Land Mobile-Satellite Service:* A mobile-satellite service in which mobile earth stations are located on land.

An Earth station in the Fixed-satellite service located at a specified fixed point on land or in some cases in the maritime mobile-satellite service to provide a feeder link for the maritime mobile-satellite service.

ANNEX 2

ARTICLE N5/3

General Rules for the Assignment and Use of Frequencies

ADD 3276 Members shall endeavour to limit the number of frequencies and the spectrum space used to the minimum essential to provide in a satisfactory manner the necessary services. To that end they shall endeavour to apply the latest technical advances as soon as possible (CONV).

(MOD) **3277/113** The Members ~~and Associate Members~~ of the Union ~~agree~~ undertake that in assigning frequencies to stations which are capable of causing harmful interference to the services rendered by the stations of another country, such assignments are to be made in accordance with the Table of Frequency Allocations and other provisions of these Regulations.

NOC **3278/114** Any new assignment or any change of frequency or other basic characteristic of an existing assignment (see Appendix 1 or Appendix 1A) shall be made in such a way as to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations in this Chapter and the other provisions of these Regulations, the characteristics of which assignments are recorded in the Master International Frequency Register.

(MOD) **3279/115** Administrations of the Members of the Union shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations.

NOC **3280/116** The frequency assigned to a station of a given service shall be separated from the limits of the band allocated to this service in such a way that, taking account of the frequency band assigned to a station, no harmful interference is caused to services to which frequency bands immediately adjoining are allocated.

3281
3281A } To follow

NOC **3282/117** Where, in adjacent Regions or sub-Regions, a band of frequencies is allocated to different services of the same category (see Sections I and II of Article N7/5), the basic principle is the equality of right to operate. Accordingly, the stations of each service in one Region or sub-Region must operate so as not to cause harmful interference to services in the other Regions or sub-Regions.

ADD 3283 No provision of these Regulations prevents the use by a station in distress of any means of radiocommunications at its disposal to attract attention, make known its condition and location, and obtain assistance.

ADD 3284 No provision of these Regulations prevents the use by a station, in the exceptional circumstances described in No. 3283, of any means of radiocommunications at its disposal to assist a station in distress.

ANNEX 3

ARTICLE N6/4

Special Agreements

(MOD) 3308/118 Two or more Members ~~or Associate Members~~ of the Union may, in accordance with Article 31 of the Convention, conclude special agreements regarding the sub-allocation of bands of frequencies to the appropriate services of the participating countries.

(MOD) 3309/119 Two or more Members ~~or Associate Members~~ of the Union may, in accordance with Article 31 of the Convention, conclude special agreements, as a result of a Conference to which all those Members ~~and Associate Members~~ of the Union concerned ~~affected~~ have been invited, regarding the assignment of frequencies to those of their stations which participate in one or more specific services within the frequency bands allocated to these services by Article N7/5, either below 5 060 kHz or above 27 500 kHz, but not between those limits.

(MOD) 3310/120 The Members ~~and Associate Members~~ of the Union may, in accordance with Article 31 of the Convention, conclude, on a world-wide basis, and as a result of a Conference to which all Members ~~and Associate Members~~ of the Union have been invited, special agreements concerning the assignment of frequencies to those of their stations participating in a specific service, on condition that such assignments are within the frequency bands allocated exclusively to that service in Article N7/5.

NOC 3311/121 Special agreements concluded in accordance with the provisions of Nos. **3308**/118 to **3310**/120 shall not be in conflict with any of the provisions of these Regulations.

NOC 3312/122 The Secretary General shall be informed, in advance, of any Conference to be convened to conclude such an agreement: he shall also be informed of the terms of the agreement when concluded: and he shall inform the Members and Associate Members of the Union of the existence of such agreements.

NOC 3313/123 In accordance with the provisions of Article N9/8 the International Frequency Registration Board may be invited to send representatives to participate in an advisory capacity in the preparation of these agreements and in the proceedings of the Conferences, it being recognized that in the majority of cases such participation is desirable.

(MOD) 3314/124 If, besides the action they may take in accordance with No. 3309/119, two or more Members ~~or Associate Members~~ of the Union co-ordinate the use of individual frequencies in any of the frequency bands covered by Article N7/5 before notifying the frequency assignments concerned, they shall in all appropriate cases inform the Board of such co-ordination.

ANNEX 4

ARTICLE N7/5

MOD Frequency Allocations /̄ 9 kHz to _7

SUP A.N7/5 Spa2

ADD Preamble 3023A to 3023C

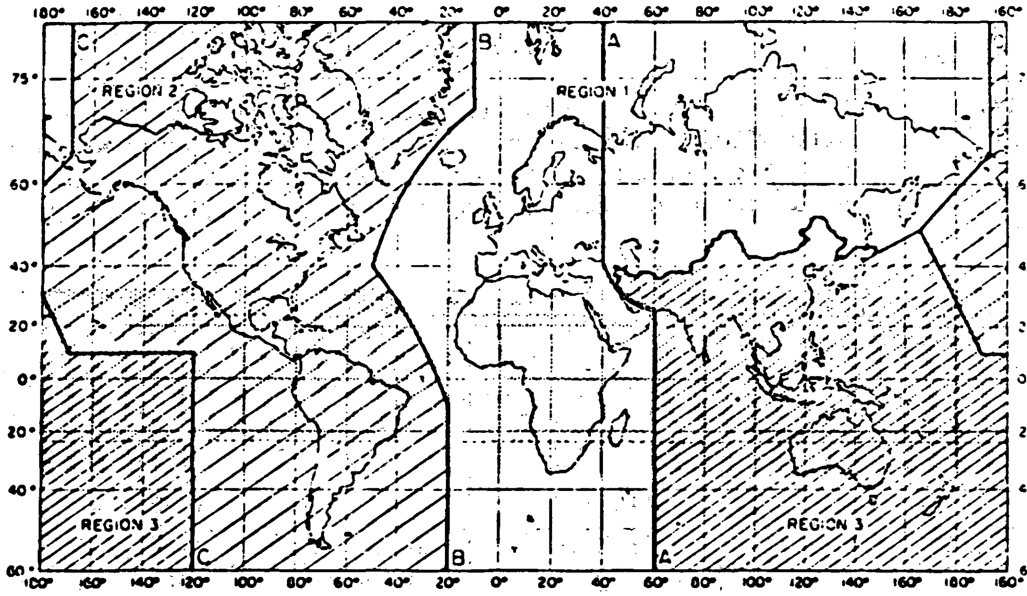
ADD 3414A In all documents of the Union where the term ALLOCATION, ALLOTMENT and ASSIGNMENT are to be used, they shall have the meaning given them in Nos. /̄ _7, the terms used in the various working languages being as follows :

Frequency distribution to:	French	English	Spanish
Services	Attribution (attribuer):	Allocation (to allocate)	Atribución (atribuir)
Areas or countries	Allotissement (allotir)	Allotment (to allot)	Adjudicación (adjudicar)
Stations	Assignation (assigner)	Assignment (to assign)	Asignación (asignar)

Article N7/5 (cont.)

NOC Section I. Regions and Areas

MOD 3415/125 §1. For the allocation of frequencies the world has been divided into three Regions[1] as shown in the following chart * and described in Nos. 3416/126 to 3422/132:



The shaded part represents the Tropical Zone as defined in Nos. 3425/135 and 3426/136.

(MOD) 3415.1/125.1 Spa2 [1] It should be noted that where the words "regions" or "regional" are without a capital "R" in these Regulations, they do not relate to the three Regions here defined for purposes of frequency allocation.

NOC **3416/126** ***Region 1:***

Region 1 includes the area limited on the East by line A (lines A, B and C are defined below) and on the West by line B, excluding any of the territory of Iran which lies between these limits. It also includes that part of the territory of Turkey and the Union of Soviet Socialist Republics lying outside of these limits, the territory of the Mongolian People's Republic, and the area to the North of the U.S.S.R. which lies between lines A and C.

Article N7/5 (Cont.)

NOC 3417/127 ***Region 2:***

Region 2 includes the area limited on the East by line B and on the West by line C.

NOC 3418/128 ***Region 3:***

Region 3 includes the area limited on the East by line C and on the West by line A, except the territories of the Mongolian People's Republic, Turkey, the territory of the U.S.S.R. and the area to the North of the U.S.S.R. It also includes that part of the territory of Iran lying outside of those limits.

NOC 3419/129 **The lines A, B and C are defined as follows:**

NOC 3420/130 ***Line A:***

Line A extends from the North Pole along meridian 40° East of Greenwich to parallel 40° North; thence by great circle arc to the intersection of meridian 60° East and the Tropic of Cancer; thence along the meridian 60° East to the South Pole.

NOC 3421/131 ***Line B:***

Line B extends from the North Pole along meridian 10° West of Greenwich to its intersection with parallel 72° North: thence by great circle arc to the intersection of meridian 50° West and parallel 40° North; thence by great circle arc to the intersection of meridian 20° West and parallel 10° South; thence along meridian 20° West to the South Pole.

NOC 3422/132 ***Line C:***

Line C extends from the North Pole by great circle arc to the intersection of parallel 65° 30′ North with the international boundary in Behring Strait; thence by great circle arc to the intersection of meridian 165° East of Greenwich and parallel 50° North; thence by great circle arc to the intersection of meridian 170° West and parallel 10° North; thence along parallel 10° North to its intersection with meridian 120° West; thence along meridian 120° West to the South Pole.

ADD 3422A § 2. For the purposes of these Regulations, the term "African Broadcasting Area" means :

a) African countries, parts of countries, territories and groups of territories situated between the parallels 40° South and 30° North.

b) Islands in the Indian Ocean west of meridan 60° East, situated between the parallel 40° South and the great circle arc joining the points 45° East, 11° 30' North and 60° East, 15° North.

c) Islands in the Atlantic Ocean east of Line B defined in No. 3421/131 of these Regulations, situated between the parallels 40° South and 30° North.

Article N7/5 (cont.)

MOD 3423/133 The "European Broadcasting Area" is bounded on the West by the Western Boundary of Region 1, on the East by the meridian 40° East of Greenwich and on the South by the parallel 30° North so as to include the western part of the USSR, the northern part of Saudi Arabia and the part of countries bordering the Mediterranean. In addition, Iraq and Jordan are included in the European Broadcasting Area.

NOC **3424/134** **The "European Maritime Area" is bounded on the North by a line extending along parallel 72° North from its intersection with meridian 55° East to its intersection with meridian 5° West, then along meridian 5° West to its intersection with parallel 67° North, thence along parallel 67° North to its intersection with meridian 30° West; on the West by a line extending along meridian 30° West to its intersection with parallel 30° North; on the South by a line extending along parallel 30° North to its intersection with meridian 43° East; on the East by a line extending along meridian 43° East to its intersection with parallel 60° North, thence along parallel 60° North to its intersection with meridian 55° East and thence along meridian 55° East to its intersection with parallel 72° North.**

MOD 3425/135 The "Tropical Zone" (see chart in No. 3415/125) is defined as :

a) the whole of that area in Region 2 between the Tropics of Cancer and Capricorn;

b) the whole of that area in Regions 1 and 3 contained between the parallels 30° North and 35° South with the addition of :

1) the area contained between the meridian 40° East and 80° East of Greenwich and the parallels 30° North and 40° North;

2) that part of Libya north of parallel 30° North.

MOD 3426/136 In Region 2, the Tropical Zone may be extended to parallel 33° North, subject to appropriate special agreements between the countries concerned in that Region. (See Article N6/4.)

ADD 3426A A sub-Region is an area consisting of two or more countries in the same Region.

Article N7/5 (cont.)

NOC — Section II. Categories of Services and Allocations

MOD 3427 — **Primary, Permitted and Secondary Services**

MOD 3428/137 — Where, in a box of the Table in Section IV of this Article, a band is indicated as allocated to more than one service, either on a worldwide or regional basis, such services are listed in the following order :

a) Services, the names of which are printed in "capitals" (example : FIXED); these are called "primary" services.

b) Services, the names of which are printed in capitals between oblique strokes (example : /RADIOLOCATION/); these are "permitted" services (see No. 3429/138).

c) Services, the names of which are printed in "normal characters" (example : Mobile); these are "secondary" services (see No. 3430/139).

d) Additional remarks shall be printed in normal characters (example : MOBILE except aeronautical mobile).

NOC **3429/138** — **Permitted and primary services have equal rights, except that, in the preparation of frequency plans, the primary service, as compared with the permitted service, shall have prior choice of frequencies.**

NOC 3430/139 — Stations of a secondary service :

a) shall not cause harmful interference to stations of primary or permitted services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

b) cannot claim protection from harmful interference from of a primary or permitted service to which frequencies are assigned or may be assigned at a later date;

c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

(MOD) **3431/140** — **Where a band is indicated in a footnote ~~to~~ of the Table as allocated to a service "on a secondary basis" in an area smaller than a Region, or in a particular country, this is a secondary service (see No. 3430/139).**

(MOD) **3432/141** — **Where a band is indicated in a footnote ~~to~~ of the Table as allocated to a service "on a primary basis", or "on a permitted basis" in an area smaller than a Region, or in a particular country, this is a primary service or a permitted service only in that area or country (see No. 3429/138).**

Article N7/5 (cont.)

MOD 3433 Additional allocations

MOD 3434/142 Where a band is indicated in a footnote ~~to~~ of the Table as "also allocated" to a service in an area smaller than a Region, or in a particular country, this is an "additional" allocation, i.e. an allocation which is added in this area or in this country to the service or services which are indicated in the Table (see No. 3435/143).

MOD 3435/143 If the footnote does not include any restriction on the service or services concerned apart from the restriction to operate only in a particular area or country, stations of this service or these services shall have equality of right to operate with stations of the other primary service or services indicated in the Table.

MOD 3436/144 If restrictions are imposed on an additional allocation in addition to the restriction to operate only in a particular area or country, this is indicated in the footnote ~~to~~ of the Table.

NOC **3437** ***Alternative Allocations***

(MOD) **3438 145** **Where a band is indicated in a footnote ~~to~~ of the Table as "allocated" to one or more services in an area smaller than a Region, or in a particular country, this is an "alternative" allocation, i.e. an allocation which replaces, in this area or in this country, the allocation indicated in the Table (see No. 3439/146).**

MOD 3439/146 If the footnote does not include any restriction on stations of the service or services concerned, apart from the restriction to operate only in a particular area or country, these stations of such a service or services shall have an equality of right to operate with stations of the primary service or services, indicated in the Table, to which the band is allocated in other areas or countries.

NOC **3440 147** **If restrictions are imposed on stations of a service to which an alternative allocation is made, in addition to the restriction to operate only in a particular country or area, this is indicated in the footnote.**

NOC **3441** ***Miscellaneous Provisions***

NOC 3442/148 Where it is indicated in these Regulations that a service may operate in a specific frequency band subject to not causing harmful interference this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated under Chapter NIII/II of these Regulations.

NOC **3443 149** **Except if otherwise specified in a footnote, the term "fixed service", where appearing in Section IV of this Article, does not include systems using ionospheric scatter propagation.**

Article N7/5 (cont.)

NOC **Section III. Description of the Table of Frequency Allocations**

NOC **3444 150** **The heading of the Table in Section IV of this Article includes three columns, each of which corresponds to one of the Regions (see No. 3415/125). Where an allocation occupies the whole of the width of the Table or only one or two of the three columns, this is a world-wide allocation or a Regional allocation, respectively.**

MOD 3445/151 The frequency band referred to in each allocation is indicated in the left-hand top corner of the part of the Table concerned.

NOC **3446 152** **Within each of the categories specified in No. 3428/137, services are listed in alphabetical order according to the French language. The order of listing does not indicate relative priority within each category.**

ADD 3446A In the case where there is a parenthetical attachment to an allocation in the Table, the intent is to restrict that service allocation to the type of operation so indicated.

NOC **3447 153** **The footnote references which appear in the Table below the allocated service or services apply to the whole of the allocation concerned.**

NOC **3448 154** **The footnote references which appear to the right of the name of a service are applicable only to that particular service.**

NOC **3449 155** **In certain cases, the names of countries appearing in the footnotes have been simplified in order to shorten the text.**

MOD Section IV. Table of Frequency Allocations /̄ 9 kHz to _/

MOD 3450/156 In the Table of Frequency Allocations frequencies are indicated as follows :

- Frequencies up to and including 3 000 kHz, in kilohertz (kHz);
- thereafter, up to and including 3 000 MHz, in megahertz (MHz);
- thereafter, up to and including 3 000 GHz, in gigahertz (GHz);
- /̄ thereafter, up to and including 3 000 THz, in terahertz (THz) _/.

This Table is shown on pages /̄ _/ following.

SUP Appendix 24.

SUP Resolution No. 6

ANNEX 5

ARTICLE N8/6

Special Rules for the Assignment and Use of Frequencies

ADD 3916 Members of the Union recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies.

(MOD) **3917/413** **Members ~~and Associate Members~~ of the Union recognize that among frequencies which have long-distance propagation characteristics, those in the bands between 5 000 and 30 000 kHz are particularly useful for long-distance communications: they agree to make every possible effort to reserve these bands for such communications. Whenever frequencies in these bands are used for short or medium-distance communications, the minimum power necessary shall be employed.**

NOC **3918/414** **To reduce requirements for frequencies in the bands between 5 000 and 30 000 kHz and thus to prevent harmful interference to long-distance radiocommunications, administrations are encouraged to use, whenever practicable, any other possible means of communication.**

MOD **3919/415** **When special circumstances make it indispensable to do so, an administration may, as an exception to the normal methods of working authorized by these Regulations, have recourse to the special methods of working enumerated below, on the sole condition that the characteristics of the stations still conform to those inserted in the Master International Frequency Register:**

a) a fixed station in the fixed service or an Earth station in the fixed-satellite service may, under the conditions defined in No. 3430/139, transmit to mobile stations on its normal frequencies;

b) a land station may communicate, ~~on a secondary basis~~ under the conditions defined in No. 3430/139, with fixed stations in the fixed service or Earth stations in the fixed-satellite service or other land stations of the same category.

NOC 3920/416 **(2) However, in circumstances involving the safety of life, or the safety of a ship or aircraft, a land station may communicate with fixed stations or land stations of another category.**

NOC **3921/417** **Any administration may assign a frequency in a band allocated to the fixed service or allocated to the fixed-satellite service to a station authorized to transmit, unilaterally, from one specified fixed point to one or more specified fixed points provided that such transmissions are not intended to be received directly by the general public.**

NOC 3922/418 **§ 4. Any mobile station using an emission which satisfies the frequency tolerance applicable to the coast station with which it is communicating may transmit on the same frequency as the coast station on condition that the latter requests such transmission and that no harmful interference is caused to other stations.**

Article N8/6 (cont.)

NOC 3923/419 **§ 5. In certain cases provided for in Articles N35/32 and [N56/35], aircraft stations are authorized to use frequencies in the bands allocated to the maritime mobile service for the purpose of communicating with stations of that service (see No. 7973/952).**

MOD 3924/419A **§ 6.** Aircraft earth stations **are authorized to use frequencies in the bands allocated to the maritime mobile-satellite service for the purpose of communicating, via the stations of that service, with the public telegraph and telephone networks.**

MOD 3925/421 Any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the international distress and emergency frequencies established for this purpose by these Regulations is prohibited. Supplementary distress frequencies available on less than the world-wide basis should be afforded ~~suitable~~ adequate protection.

ANNEX 6

ARTICLE N28/7

Broadcasting Service and Broadcasting-Satellite Service

NOC **6214/422** **The establishment and use of broadcasting stations (sound broadcasting and television broadcasting stations) on board ships, aircraft or any other floating or airborne objects outside national territories is prohibited.**

NOC **6215/423** **In principle, except in the frequency band 3 900-4 000 kHz broadcasting stations using frequencies below 5 060 kHz or above 41 MHz shall not employ power exceeding that necessary to maintain economically an effective national service of good quality within the frontiers of the country concerned.**

NOC **6217/424** **In these Regulations, the expression "broadcasting in the Tropical Zone" indicates a type of broadcasting for internal national use in countries in the zone defined in Nos. 3425/135 and 3426/136, where it may be shown that because of the difficulty of high atmospheric noise level and propagation it is not possible to provide economically a more satisfactory service by using low, medium, or very high frequencies.**

NOC **6218 425** **The use by the broadcasting service of the bands listed below is restricted to the Tropical Zone:**

2 300 - 2 498 kHz (Region 1)
2 300 - 2 495 kHz (Regions 2 and 3)
3 200 - 3 400 kHz (All Regions)
4 750 - 4 995 kHz (All Regions)
5 005 - 5 060 kHz (All Regions)

ADD 6218A (2A) The carrier power of the transmitter operating in this service in the bands listed in No. 6218/425 shall not exceed 50 kW.

NOC **6219/426** **Within the Tropical Zone, the broadcasting service has priority over the other services with which it shares the bands listed in No. 6218/425.**

NOC **6220/427** **However, in that part of Libya north of parallel 30° North the broadcasting service in the bands listed in No. 6218/425 has equal rights to operate with other services in the Tropical Zone with which it shares these bands.**

NOC **6221/428** **The broadcasting service operating inside the Tropical Zone, and other services operating outside the Zone, are subject to the provisions of No. 3282/117.**

ANNEX 7

ARTICLE N47

Special Rules Relating to the Use of Frequencies in the Aeronautical Mobile Service

NOC 7376/429 **§ 1.** Frequencies in any band allocated to the aeronautical mobile (R) service are reserved for communications between any aircraft and those aeronautical stations primarily concerned with the safety and regularity of flight along national or international civil air routes.

NOC 7377/430 **§ 2.** Frequencies in any band allocated to the aeronautical mobile (OR) service are reserved for communications between any aircraft and aeronautical stations other than those primarily concerned with flight along national or international civil air routes.

MOD 7378/431 § 3. Frequencies in the bands allocated to the aeronautical mobile service between 2 850 and /‾22 000_7 kHz (see Article N7/5) shall be assigned in conformity with the provisions of Appendices 26 and 27 Aer 2 and the other relevant provisions of these Regulations.

(MOD) 7379/432 **§ 4.** Administrations shall not permit public correspondence in the frequency bands allocated exclusively to the aeronautical mobile service, unless permitted by special aeronautical regulations adopted by a Conference of the Union to which all interested Members of the Union are invited. Such regulations shall recognize the absolute priority of safety and control messages.

MOD 7380/1162 § 5. In order to reduce interference, aircraft stations shall, within the means at their disposal, endeavour to select for calling the band with the most favourable propagational characteristics for effecting reliable communication. In the absence of more precise data, an aircraft station shall, before making a call, listen for the signals of the station with which it desires to communicate. The strength and intelligibility of such signals are useful as a guide to propagational conditions and indicate which is the preferable band for calling.

NOC 7381/1207 § 6. Governments may, by agreement, decide the frequencies to be used for call and reply in the aeronautical mobile service.

SUP Rec. Aer2 - 6.

SUP Rec. Aer2 - 9.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 606-E
13 November 1979
Original : English
French
Spanish

PLENARY MEETING

THIRD REPORT OF COMMITTEE 5

1. Committee 5 has adopted :

Article N1/1 - Terms and Definitions

Article N5/3 - General Rules for the Assignment and Use of Frequencies

Article N6/4 - Special Agreements

Article N7/5 - Frequency Allocations /̄ 9 kHz _/
Sections I, II and III

Article N8/6 - Special Rules for the Assignments and Use of Frequencies

Article N28/7 - Broadcasting Service and Broadcasting-Satellite Service

Article N47/ - Special Rules relating to the Use of Frequencies in the Aeronautical Mobile Service

2. The texts of these Articles have been submitted to the Editorial Committee for subsequent submission to the Plenary Meeting. (See Document No. 605.)

3. The Delegations of Singapore and Switzerland reserved their positions in respect of the action proposed by Committee 5 regarding 7379/432 and Recommendation No. Aer2 - 9.

M. HARBI
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 607-E
12 November 1979
Original : English

PLENARY MEETING

ELEVENTH REPORT OF COMMITTEE 4

Committee 4 has discussed Documents 460, 500 (pages 1 to 4) and 554 and adopted definitions on technical terms to be included in Article N1. The texts have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 608).

These texts were adopted unanimously, with the exception of the term "accepted interference", for which the delegation of the United Kingdom has expressed its reservation.

N. MORISHIMA
Chairman of Committee 4

UNION INTERNATIONALE DES TELECOMMUNICATIONS

CONFERENCE ADMINISTRATIVE MONDIALE DES RADIOCOMMUNICATIONS

(Genève, 1979)

Corrigendum No. 1 au
Document No. 608-F/E/S
14 Novembre 1979

/¯COMMISSION 9_7 *)
/¯COMMITTEE 9_7 *)
/¯COMISIÓN 9_7 *)

ONZIEME SERIE DE TEXTES SOUMIS PAR LA COMMISSION 4 A LA COMMISSION DE REDACTION

page 3 : 3143.1 Dans les formules le symbole p indique la puissance en watts et le symbole P la puissance en décibels relative à un niveau de référence.

ELEVENTH SERIES OF TEXTS FROM COMMITTEE 4 TO THE EDITORIAL COMMITTEE

page 3 : 3143.1 For use in formulae,the symbol p denotes power expressed in watts and the symbol P denotes power expressed in decibels relative to a reference level.

DÉCIMOPRIMERA SERIE DE TEXTOS SOMETIDOS POR LA COMISIÓN 4 A LA COMISIÓN DE REDACCIÓN

page 3 : 3143.1 En las formulas el símbolo p indica la potencia en vatios y el símbolo P la potencia en decibelios relativa a un nivel de referencia.

N. MORISHIMA
Chairman of Committee 4

*) Pour examen par la Commission 9 après coordination entre les Commissions 4,5,et7.
For Committee 9 consideration after coordination between Committees 4,5 and 7.
Se somete a la consideración de la Comisión 9 previa coordinación de las Comisiones 4, 5, y 7.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 608-E
12 November 1979
Original : English

/[COMMITTEE 9]/ *)

ELEVENTH SERIES OF TEXTS FROM COMMITTEE 4
TO THE EDITORIAL COMMITTEE

The texts mentioned in Document No. 607 (definitions discussed in Committee 4 as contained in Documents 460, 500 (pages 1 to 4) and 554) are hereby submitted to the Editorial Committee.

N. MORISHIMA
Chairman of Committee 4

Annex : 1

*) for Committee 9 consideration after coordination between Committees 4,5 and 7.

A N N E X E

A N N E X

A N E X O

ADD Brouillage accepté : Brouillage, supérieur à celui défini comme admissible, qui a fait l'objet d'un accord entre deux ou plusieurs administrations intéressées sans préjudice aux autres administrations.

ADD Accepted Interference : Interference at a higher level than that defined as permissible interference and which has been agreed upon between two or more Administrations without prejudice to other Administrations.

ADD Interferencia aceptada : Interferencia de nivel más elevado que el definido como admisible, y que ha sido acordada entre dos o más administraciones, sin perjuicio para otras administraciones.

MOD 3143/94 Puissance[1] : Chaque fois que la puissance d'un émetteur radioélectrique, ~~etc.~~ est mentionnée, elle doit être exprimée sous l'une des formes ci-dessous, selon la classe d'émission :

- puissance en crête (PX ou pX);
- puissance moyenne (PY ou pY);
- puissance de la porteuse (PZ ou pZ).

Pour différentes classes d'émission, les rapports entre la puissance en crête, la puissance moyenne et la puissance de la porteuse, dans les conditions de fonctionnement normal et en l'absence de modulation, sont indiqués dans des Avis du CCIR, lesquels peuvent être utilisés comme guides.

MOD 3143/94 Power[1] : Whenever the power of a radio transmitter ~~etc.~~ is referred to it shall be expressed in one of the following forms, according to the class of emission :

- peak envelope power (PX or pX);
- mean power (PY or pY);
- carrier power (PZ or pZ).

For different classes of emissions, the relationships between peak envelope power, mean power and carrier power, under the conditions of normal operation and of no modulation, are contained in Recommendations of CCIR which may be used as a guide.

MOD 3143/94 Potencia[1]: Siempre que se haga referencia a la potencia de un transmisor radioeléctrico, ~~etc.~~ se expresará en una de estas formas, según la clase de emisión:

- potencia en la cresta de la envolvente (PX o pX);
- potencia media (PY o pY);
- potencia de la portadora (PZ o pZ).

Las relaciones entre la potencia en la cresta de la envolvente, la potencia media y la potencia de la portadora, para las distintas clases de emisiones, en condiciones normales de funcionamiento y en ausencia de modulación, se indican en las Recomendaciones del CCIR que pueden tomarse como guía para determinar tales relaciones.

3143.1 Dans les formules le symbole p indique la puissance en watts et le symbole P la puissance en décibels.

3143.1 For use in formula, the symbol p denotes power expressed in watts and the symbol P denotes power expressed in decibels.

3143.1 En las formulas el símbolo p indica la potencia en vatios y el símbolo P la potencia en decibelios.

MOD 3144/95 Puissance en crête (d'un émetteur radioélectrique) : Moyenne de la puissance fournie à la ligne d'alimentation de l'antenne par un émetteur en fonctionnement normal, au cours d'un cycle de radiofréquence correspondant à l'amplitude maximale de l'enveloppe de modulation.

MOD 3144/95 Peak envelope power (of a radio transmitter) : The average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope under normal operating conditions.
taken

MOD 3144/95 Potencia en la cresta de la envolvente (de un transmisor radioeléctrico): La media de la potencia suministrada por un transmisor en condiciones normales de funcionamiento, a la línea de alimentación de la antena durante un ciclo de radiofrecuencia, tomado en la cresta más elevada de la envolvente de modulación.

MOD 3145/96 Puissance moyenne (d'un émetteur radioélectrique) : Moyenne de la puissance fournie à la ligne d'alimentation de l'antenne par un émetteur en fonctionnement normal, évaluée pendant un intervalle de temps relativement long par rapport à la période de la composante de plus basse fréquence de la modulation.

radio
MOD 3145/96 Mean power (of a transmitter) : The average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions.

MOD 3145/96 Potencia media (de un transmisor radioeléctrico): La media de la potencia suministrada por un transmisor en condiciones normales de funcionamiento, a la línea de alimentación de la antena, evaluada durante un intervalo de tiempo suficientemente largo comparado con el periodo correspondiente a la frecuencia más baja que existe realmente como componente de modulación.

MOD 3146/97 Puissance de la porteuse (d'un émetteur radioélectrique) Moyenne de la puissance fournie à la ligne d'alimentation de l'antenne par un émetteur au cours d'un cycle de radiofréquence en l'absence de modulation.

MOD 3146/97 Carrier power (of a radio transmitter) : The average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle taken under the condition of no modulation.

MOD 3146/97 Potencia de la portadora (de un transmisor radioeléctrico): La media de la potencia suministrada por un transmisor radioeléctrico a la línea de alimentación de la antena durante un ciclo de radiofrecuencia en ausencia de modulación.

dans la direction du maximum de rayonnement.

MOD 3149/99 Gain d'une antenne : Rapport généralement exprimé en décibel, entre la puissance nécessaire à l'entrée d'une antenne de référence sans pertes et la puissance fournie à l'entrée de l'antenne donnée, pour que les deux antennes produisent dans une direction donnée le même champ ou la même puissance surfacique, à la même distance. ~~Sauf~~ En l'absence d'indication contraire, ~~le chiffre donné pour le gain d'une antenne désigne le~~ s'il s'agit du gain de l'antenne ~~dans la direction du lobe principal maximum de rayonnement.~~ ~~Dans les services utilisant les modes de propagation par diffusion, il se peut que le gain total de l'antenne ne soit pas réalisable en pratique et que le gain apparent varie dans le temps.~~ On peut éventuellement considérer le gain pour une polarisation spécifiée.

Suivant l'antenne de référence choisie ~~Suivant le cas~~ on distingue :

Le Gain isotrope ~~ou absolu d'une antenne : (Gis) Gain (Gis) (G) d'une antenne dans une direction donnée lorsque~~ (G_i) : lorsqe l' ~~L~~'antenne de référence est une antenne isotrope ~~sans pertes~~ isolée dans l'espace.

Le ~~Gain relatif d'une antenne~~ Gain par rapport à un doublet demi-onde (G_d) : ~~Gain (G_d) d'une antenne dans une direction donnée lorsque~~ lorsque l' ~~L~~'antenne de référence est un doublet demi-onde ~~sans pertes~~, isolé dans l'espace, ~~et~~ dont le plan équatorial contient la ~~cette~~ direction donnée.

Le Gain par rapport à une antenne verticale courte (G_v) : ~~Gain (G) d'une antenne dans une direction donnée lorsque~~ lorsque l' ~~L~~'antenne de référence est une ~~antenne verticale parfaite~~ conducteur rectiligne beaucoup plus courte que le quart de la longueur d'onde, ~~placée~~ normal à la surface d'une ~~terre plane~~ plan parfaitement ~~conductrice~~ conducteur qui contient la direction donnée.

MOD 3149/99 Gain of an Antenna : The ratio, usually expressed in decibels, of the power required at the input of a loss free reference antenna to the power supplied to the input of the given antenna to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not specified otherwise, ~~the figure expressing the gain of an antenna it~~ the gain refers to the direction of maximum radiation ~~gain in the direction of the maximum radiation main lobe. In gain of the antenna services using scattering modes of propagation the full gain of an antenna may not be realizable in practice and the apparent gain may vary with time.~~ The gain may be considered for a specified polarization.

Depending on the choice of the reference antenna, a distinction is made between :

~~Isotropic or~~ Absolute Gain (G_i) : ~~of an Antenna : (Gis) The gain (Gis) (Ga) of an antenna in a given direction when~~ the reference antenna is an isotropic ~~loss-free~~ antenna isolated in space.

~~Relative Gain of an Antenna~~ Gain Relative to a Half-Wave Dipole (G_d) : ~~Dipole (Gd) : The gain (Gd) of an antenna in a given direction when~~ the reference antenna is a ~~loss-free~~ half-wave ~~loss-free~~ dipole isolated in space and the equatorial plane of which contains the given ~~that~~ direction.

Gain Relative to a Short Vertical Antenna (G_v): ~~The gain of an antenna in a given direction when~~ the reference antenna is a ~~perfect vertical antenna~~ linear conductor, much shorter than one quarter of the wavelength, ~~placed on~~ normal to the surface of a perfectly conducting plane ~~earth~~ which contains the given direction.

~~The gain is usually expressed in decibels.~~

Salvo que se indique lo contrario, se refiere a la dirección de máxima radiación

MOD 3149/99 Ganancia de una antena: La relación generalmente expresada en decibelios, que debe existir entre la potencia necesaria a la entrada de una antena de referencia sin pérdidas y la potencia suministrada a la entrada de la antena en cuestión, para que ambas antenas produzcan, en una dirección dada, el mismo campo, o la misma densidad de flujo de potencia, a la misma distancia. ~~Salvo indicación en contrario~~, ~~la cifra que expresa~~ de la ganancia ~~de una antena se refiere a en la dirección del lóbulo principal de máxima radiación~~ de la antena. ~~En los servicios que utilicen los modos de propagación por dispersión, es posible que no se consiga en la práctica la ganancia total de una antena y que la ganancia aparente varíe con el tiempo.~~ Eventualmente puede tomarse en consideración la ganancia para una polarización especificada.

Según la antena de referencia elegida, ~~Según el caso~~ se distingue entre:

Ganancia isótropa o absoluta ~~de una antena:~~ (G_i) : ~~Ganancia (Gis) (Gis) (Ga) de una antena en una dirección dada, si~~ La antena de referencia es una antena isótropa ~~sin pérdidas~~ aislada en el espacio.

Ganancia con relación a un dipolo de media onda ~~(Gd)~~ (G_d) : ~~relativa de una antena: Ganancia (Gd) de una antena en una dirección dada, cuando si~~ La antena de referencia es un dipolo de media onda ~~sin pérdidas~~ aislado en el espacio y cuyo plano ecuatorial contiene ~~la~~ esa dirección dada.

Ganancia con relación a una antena vertical corta (G_v) : ~~Ganancia (G_v) de una antena en una dirección dada, cuando si~~ La antena de referencia es un conductor rectilíneo mucho menor que un cuarto de longitud de onda y perpendicular a una superficie perfectamente conductora que contiene la dirección dada.

SUP 3150/100

SUP 3151/101

SUP 3152/102

MOD 3157 <u>Zone de coordination</u> : Zone associée à une station terrienne à l'extérieur de laquelle une autre station de Terre / ou une autre station terrienne_7 partageant la même bande de fréquences, ne peut produire ni subir aucun brouillage supérieur à la valeur admissible.

earth

MOD 3157 <u>Coordination Area</u> : The area associated with an Earth station, outside of which, a terrestrial / or another ~~Earth~~ / station sharing the same frequency band, neither causes nor is subject to ~~more~~ than a permissible level of interference.

interfering emissions greater

MOD 3157 <u>Zona de coordinación</u>: Zona asociada a una estación terrena fuera de la cual otra estacion terrenal / u otra estación terrena_7 que comparte la misma banda de frecuencias no puede producir ni sufrir ninguna interferencia superior al valor admisible.

MOD 3156 <u>Contour de coordination</u> : Ligne limitant la zone de coordination.

MOD 3156 <u>Coordination Contour</u> : The line enclosing the coordination area.

MOD 3156 <u>Contorno de coordinación</u>: Línea que limita la zona de coordinación.

Distance de coordination :

MOD 3155 Distance à partir de la position d'une station terrienne dans un azimut donné et au-delà de laquelle une station de Terre / ou une autre station terrienne_7 partageant la même bande de fréquences, ne peut produire ni subir aucun brouillage supérieur à la valeur admissible.

earth in a given azmith

MOD 3155 <u>Coordination Distance</u> : Distance from an Earth station beyond which a terrestrial / or another ~~Earth~~ 7 station sharing the same frequency band, neither causes nor is subject to ~~more~~ than a permissible level ~~of interference.~~

interfering emissions greater

MOD 3155 <u>Distancia de coordinación</u>: Distancia a partir de la posición de una estación terrena en un acimut determinado más allá de la cual una estación terrenal / u otra estación terrena_7 que comparte la misma banda de frecuencias no puede producir ni sufrir ninguna interferencia superior al valor admisible.

MOD 3138

Bande de fréquences assignée : ~~Canal assigné :~~ Bande de fréquences à l'intérieur de laquelle l'émission d'une station donnée est autorisée; la largeur de cette bande est égale à la largeur de bande nécessaire, augmentée du double de la valeur absolue de la tolérance de fréquence. Dans le cas des stations spatiales ~~radio électriques~~, la bande de fréquences assignée ~~comprend~~ le double du décalage dû à l'effet Doppler pouvant se produire par rapport à un point quelconque à la surface de la Terre.

inclut

MOD 3138

Assigned frequency band : The frequency band within which the emission of a station is authorized; the width of the band equals the necessary bandwidth plus twice the absolute value of the frequency tolerance. Where space ~~radio~~ stations are concerned, the assigned frequency band ~~comprises~~ twice the maximum Doppler shift that may occur in relation to any point of the Earth's surface.

includes

MOD 3138

Banda de frecuencias asignada : Banda de frecuencias en el interior de la cual se autoriza la emisión de una estación determinada; la anchura de esta banda es igual a la anchura de banda necesaria más el doble del valor absoluto de la tolerancia de frecuencia. Cuando se trata de estaciones ~~de radiocomunicaciones~~ espaciales, la banda de frecuencia asignada ~~comprende~~ dos veces la desviación Doppler máxima que puede ocurrir con relación a un punto cualquiera de la superficie de la Tierra.

incluye

NOC 3134/85

Fréquence assignée : Centre de la bande de fréquences assignée à une station.

NOC 3134/85

Assigned frequency : The centre of the frequency band assigned to a station.

NOC 3134/85

Frecuencia asignada : Centro de la banda de frecuencias asignada a una estación.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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12 November 1979
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PLENARY MEETING

TWELFTH REPORT OF COMMITTEE 4

Committee 4 has adopted the texts for two new Recommendations (Documents 548 and 549).

The texts have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 610).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 9

TWELFTH SERIES OF TEXTS FROM COMMITTEE 4
TO THE EDITORIAL COMMITTEE

The texts mentioned in Document No. 609 (two new Recommendations contained in Documents 548 and 549) are hereby submitted to the Editorial Committee.

N. MORISHIMA
Chairman of Committee 4

Annex : 1

ANNEX

RECOMMENDATION NO. /¯ _7

To the CCIR Relating to Studies of
Maximum Permitted Levels of Spurious Emissions

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that Appendix 4 to these Regulations specifies maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line, for the frequency bands below /¯17.7_7 GHz;

b) that the principal objective of this Appendix is to provide maximum permitted levels of spurious emissions that, while being achievable, provide protection against harmful interference;

c) that excessive levels of spurious emissions may give rise to harmful interference;

d) that while this Appendix applies only to the mean power of the transmitter and the spurious emissions, there is a variety of emissions where the interpretation of the term "mean power" and its consequential measurement is difficult;

e) that whilst CCIR is studying this problem, it has not yet furnished adequate Recommendations pertaining to this Appendix for frequency bands above /¯960_7 MHz;

f) that spurious emissions from transmitters operating in space stations may cause harmful interference, particularly in regard to intermodulation components from wideband amplifiers which cannot be adjusted after launch;

g) that spurious emissions from Earth stations also require particular study;

h) that no information is available from the CCIR regarding spurious emissions from stations employing digital modulation techniques in the frequency bands above /¯960_7 MHz; and,

noting

that in large metropolitan areas radio spectrum usage above /¯960_7 MHz is extensive and rapidly growing and that much of this growth in urban areas is now taking place above 10 GHz;

recommends that the CCIR

1. studies on an urgent basis, the question of spurious emissions resulting from space services transmissions, and, based on those studies, develops Recommendations for maximum permitted levels of spurious emissions in terms of mean power of spurious components supplied by the transmitter to the antenna transmission line;

2. continues the study of spurious emission levels in all frequency bands, emphasizing study of those frequency bands, services and modulation techniques not presently covered by Appendix 4;

3. establishes appropriate measurement techniques for spurious emissions, including the determination of reference levels for wide band transmissions as well as applicability of reference measurement bandwidths;

4. studies the categorizing of emissions and spurious emissions in terms of "mean power" and develops appropriate Recommendations to facilitate the interpretation and measurement of this term as it applies to the various classes of emissions.

RECOMMENDATION No. [ ]

To the CCIR Relating to the Provision of Formulae and Examples for the Calculation of Necessary Bandwidths

The World Administrative Radio Conference, Geneva 1979,

considering

a) that Article N3 of these Regulations requires that the necessary bandwidth be part of the full designation of emissions;

b) that Appendix 5, Part B, gives a partial list of examples and formulae for the calculation of the necessary bandwidth of some typical emissions;

c) that sufficient information is not available for the determination of the K-factors used throughout the table of examples of the necessary bandwidth in Appendix 5;

d) that especially in view of the efficient utilization of the radio frequency spectrum, of monitoring and of notification of emissions it is required that necessary bandwidths for the individual classes of emission be known;

e) that for reasons of simplification and international uniformity it is desirable that measurements for determining the necessary bandwidth be made as seldom as possible;

recommends that the CCIR

1. provides additional formulae for the determination of necessary bandwidth for common classes of emission and provides examples to supplement those given in Appendix 5, Part B, from time to time;

2. studies and provides values for supplementary K-factors required for the calculation of the necessary bandwidth for common classes of emission.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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12 November 1979
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COMMITTEE 7

NOTE FROM THE CHAIRMAN OF COMMITTEE 6

TO THE CHAIRMAN OF COMMITTEE 7

Having further examined Appendices 6, 7 and 8, Committee 6 considers that the definitions /̲ or provisions_7 relating to the use of general terms, date and time should be inserted by Committee 7 in the Radio Regulations with a view to their general application. It was generally agreed that UTC should be adopted as the reference time (see CCIR Recommendation No. 535 and WARC-79 Document No. 492) and that it should be presented as a four-digit group (0001 - 2400).

It is proposed that the date should be defined as follows :

1. The Gregorian calendar should be specified as the standard to be adopted. International Standard ISO 2014 - 1976 of the International Organization for Standardization recommends the universal use of this calendar.

2. Whenever a date is used in relation to UTC time, it should be that of the prime meridian for that time, which corresponds to 0°.

3. A given sequence of figures representing the day and the month should be used, the last two figures representing the year. The figures 01 to 12 may be used to indicate the position of the month.

Dr. M. JOACHIM
Chairman of Committee 6

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 612-E
12 November 1979
Original : English

COMMITTEE 5

TENTH REPORT OF WORKING GROUP 5A TO COMMITTEE 5

1. The Working Group 5A presents the texts, annexed hereto, for the approval of Committee 5.

2. The delegation of Japan had difficulty in accepting the definition of the term Transportable Earth Station for regulatory reasons.

3. The delegation of the Federal Republic of Germany doubted the completeness of the definition because it appeared to limit the transportable Earth stations to two particular services. The Working Group, therefore, decided to keep the definition in square brackets until Committee 6 decides on Document No. 527.

V. QUINTAS
Chairman of Working Group 5A

Annex : 1

A N N E X

ARTICLE N1

Terms and Definitions

ADD [3033A Transportable Earth Station : An Earth station located on the Earth's surface intended to be used in the fixed-satellite service or mobile-satellite service, at unspecified fixed points in a determined area.]

NOC **3042**/76 *Meteorological Aids Service:* A radiocommunication service used for meteorological, including hydrological, observations and exploration.

NOC **3043**/77 *Radiosonde:* An automatic radio transmitter in the meteorological aids service usually carried on an aircraft, free balloon, kite or parachute, and which transmits meteorological data.

NOC **3120**/74 *Radio Astronomy:* Astronomy based on the reception of radio waves of cosmic origin.

NOC **3121**/75 *Radio Astronomy Service:* A service involving the use of radio astronomy.

NOC **3122**/75A *Radio Astronomy Station:* A station in the radio astronomy service.

ARTICLE N29

NOC

Fixed Service

Section I. General

MOD 6323/465 Administrations are urged to discontinue, in the fixed service, the use of double sideband radiotelephone (class /_A3_7) transmissions~~, in the bands below 30 MHz, if possible as from 1 January 1970.~~

(MOD) 6324/466 Class /F3/ emissions are prohibited in the fixed service in the bands below 30 MHz.

Section II. Frequencies for the International Exchange of Police Information

NOC 6325/467 The frequencies necessary for the international exchange of information to assist in the apprehension of criminals shall be selected from the bands allocated to the fixed service, if necessary by special agreement among interested administrations, in accordance with Article 31 of the Convention.

NOC 6326/468 To obtain economy in the use of frequencies, the International Frequency Registration Board should be consulted by the administrations concerned whenever such agreements are under discussion on a regional or world-wide basis.

Section III. Frequencies for the International Exchange of Synoptic Meteorological Information

NOC 6327/469 The frequencies necessary for the international exchange of synoptic meteorological information shall be selected from the bands allocated to the fixed service, if necessary by special agreement among interested administrations, in accordance with Article 31 of the Convention.

NOC 6328/470 To obtain economy in the use of frequencies, the International Frequency Registration Board should be consulted by the administrations concerned whenever such agreements are under discussion on a regional or world-wide basis.

ARTICLE N33A

Radio Astronomy Service

Section I. General Provisions

§ 1. Administrations shall cooperate in protecting the radio astronomy service from interference, bearing in mind

a) the exceptionally high sensitivity of radio astronomy stations,

b) the frequent need for long periods of observation without harmful interference, and

c) that the small number of radio astronomy stations in each country and their known locations often make it practicable to give special consideration to the avoidance of interference.

§ 2. The locations of the radio astronomy stations to be protected and their frequencies of observation shall be notified to the Secretary-General for communication to Members of the Union.

Section II. Measures to be taken in the Radio Astronomy Service

§ 3. The locations of radio astronomy stations shall be selected with due regard to the possibility of harmful interference to these stations.

§ 4. All practicable technical means shall be adopted at radio astronomy stations to reduce their susceptibility to interference. The development of improved techniques for reducing susceptibility to interference shall be pursued, including participation in cooperative studies through the CCIR.

Section III. Protection of the Radio Astronomy Service

§ 5. The status of the radio astronomy service in the various frequency bands is specified in the Table of Frequency Allocations, Article N7/5. Administrations shall provide protection from interference to stations in the radio astronomy service at least in accordance with its status in those bands. (See also No. 3281/116A).

§ 6. In providing protection from interference to the radio astronomy service on a permanent or temporary basis, Administrations, shall use appropriate means such as geographical separation, site shielding, antenna directivity and the use of time-sharing and the minimum practicable transmitter power.

§ 7. In bands adjacent to those in which observations are carried out in the radio astronomy service, operating in accordance with the Radio Regulations, Administrations shall, when assigning frequencies to stations of other services, take all practicable steps to protect the radio astronomy service from harmful interference. In addition to the measures referred to in § 6, technical means for minimizing the power radiated at frequencies within the band used for radio astronomy shall be given special consideration. (See also No. 3281/116A).

§ 8. When assigning frequencies to stations in other bands, Administrations shall, as far as practicable, avoid harmonic and other spurious emissions which could cause harmful interference to the radio astronomy service operating in accordance with the Radio Regulations. (See also No. 3281/116A).

§ 9. In applying the measures outlined in this section, Administrations shall bear in mind that the radio astronomy service is extremely susceptible to interference from space and airborne transmitters.

§ 10. Administrations shall take note of the relevant CCIR Recommendations with the aim of limiting interference to the radio astronomy service from other services.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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Corrigendum No. 1 to
Document No. 613
14 November 1979

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B.12

PLENARY MEETING

12th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

Page B.12-9 Replace the text of Recommendation J by the following:

RECOMMENDATION J

Relating to the Use of the Term "Channel" in the Radio Regulations

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the term "channel" has been used extensively in the Radio Regulations in the frequency allotment plans of Appendices **15A**, **15B**, **15C**, **17**, **18**, **25**, **26** and **27**;

b) that the term "channel" has a different meaning in other provisions of the Radio Regulations and for the various radiocommunication services;

c) that there should not be any ambiguity in the meaning of the term "channel" in its usage throughout the Radio Regulations;

invites

the CCIR to define the term "channel" so that it may be used consistently and without confusion in the Radio Regulations in all working languages of the ITU.

INTERNATIONAL TELECOMMUNICATION UNION

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WORLD ADMINISTRATIVE RADIO CONFERENCE

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B.12

PLENARY MEETING

12th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	564 + 565	Art. 2
C.4	570 + 571	Art. 17, Art. 33 Recommendation K
C.4	567 + 568	Resolution AJ Recommendation J

P. BASSOLE
Chairman of the
Editorial Committee

Annex: 9 pages

ARTICLE N2

NOC

Nomenclature of the Frequency and Wavelength Bands Used in Radiocommunication

MOD 3183 112 Spa2

§ 1. The radio spectrum shall be subdivided into nine frequency bands, which shall be designated by progressive whole numbers in accordance with the following table. As the unit of frequency is the hertz (Hz), frequencies shall be expressed:

- in kilohertz (kHz) up to and including 3 000 kHz
- in megahertz (MHz) thereafter up to and including 3 000 MHz
- in gigahertz (GHz) thereafter up to and including 3 000 GHz.

For bands above 3 000 GHz, i.e. centimillimetric waves, micrometric waves, decimicrometric waves, it would be appropriate to use "terahertz (THz)".

However, where adherence to these provisions would introduce serious difficulties, for example in connection with the notification and registration of frequencies, the lists of frequencies and related matters, reasonable departures may be made.

Band Number	Symbols	Frequency Range (lower limit exclusive, upper limit inclusive)	Corresponding Metric Subdivision	Metric Abbreviations
4	VLF	3 to 30 kHz	Myriametric waves	0.Mam
5	LF	30 to 300 kHz	Kilometric waves	0.km
6	MF	300 to 3 000 kHz	Hectometric waves	0.hm
7	HF	3 to 30 MHz	Decametric waves	0.dam
8	VHF	30 to 300 MHz	Metric waves	0.m
9	UHF	300 to 3 000 MHz	Decimetric waves	0.dm
10	SHF	3 to 30 GHz	Centimetric waves	0.cm
11	EHF	30 to 300 GHz	Millimetric waves	0.mm
12		300 to 3 000 GHz	Decimillimetric waves	

Note 1: "Band Number N" (N = band number) extends from 0.3×10^N Hz to 3×10^N Hz.

Note 2: Prefix : k = kilo (10^3), M = mega (10^6), G = giga (10^9), T = tera (10^{12}).

ADD **3183A** § 1A. In communications between administrations and the ITU no names, symbols or abbreviations should be used for the various frequency bands other than those specified in **3183**/112.

3184 to **3208** NOT allocated.

ARTICLE N17

NOC **Tests**

NOC **5029** 700 § 1. (1) Before authorizing tests and experiments in any station, each administration, in order to avoid harmful interference, shall prescribe the taking of all possible precautions such as the choice of frequency and of time and the reduction or, in all cases where this is possible, the suppression of radiation. Any harmful interference resulting from tests and experiments shall be eliminated with the least possible delay.

MOD **5030** 701 (2) For the identification of transmissions made during tests, adjustments or experiments, see Article **N23**/19.

ADD **5030A** (2A) In the aeronautical radionavigation service, it is undesirable, for safety reasons, to transmit the normal identification during emissions conducted to check or adjust equipment already in service. Unidentified emissions should however be restricted to a minimum.

NOC **5031** 702 (3) Signals for testing and adjustment shall be chosen in such a manner that no confusion will arise with a signal, abbreviation, etc., having a special meaning defined by these Regulations or by the International Code of Signals.

NOC **5032** 703 (4) For testing stations in the mobile service see Nos. **7523**/1061, **7524**/1062 and **8814**/1293 to **8816**/1295.

5033 to **5057** NOT allocated.

ARTICLE N33

NOC **Radiodetermination Service and Radiodetermination-Satellite Service**

NOC **Section IV. Radiobeacon Stations**

NOC **6475** B. Aeronautical Radiobeacons

MOD **6476** 433 § 15. (1) The assignment of frequencies to aeronautical radiobeacons operating in the bands between [160 and 415] kHz shall be based on a protection ratio against interference of at least 15 dB for each beacon throughout its service area. [ ]

MOD **6477** 434 (2) The radiated power should be kept to the minimum value necessary to give the desired field strength at the service range.

NOC **6478** 435 (3) The daylight service range of radiobeacons referred to in No. **6476**/433 shall be based on the following field strengths:

NOC **6479** 436 (4) Regions 1 and 2

- 70 microvolts per metre for radiobeacons north of 30° N.
- 120 microvolts per metre for radiobeacons between 30° N and 30° S.
- 70 microvolts per metre for radiobeacons south of 30° S.

NOC **6480** 437 (5) Region 3

- 70 microvolts per metre for radiobeacons north of 40° N.
- 120 microvolts per metre for radiobeacons between 40° N and 50° S.
- 70 microvolts per metre for radiobeacons south of 50° S.

RECOMMENDATION K 1

Supplementing the Additional Characteristics for Classifying Emissions and Providing Additional Examples for the Full Designation of Emissions, Both as Given in Appendix 5

The World Administrative Radio Conference, Geneva, 1979

considering

a) that this Conference has adopted in Article **N3** a new method for designating emissions based on CCIR Recommendation 507, Kyoto, 1978;

b) that an essential part of this new method is the classification of emissions;

c) that the new method of classifying emissions distinguishes between basic characteristics (first, second and third symbol) the use of which is mandatory, and additional characteristics (fourth and fifth symbol) the use of which is optional;

d) that the full classification of emissions consists of all of these five symbols;

e) that the list of the additional characteristics given in Appendix **5**, Part A, may not be sufficiently complete to take account of future new technologies and may require relatively frequent supplementing;

f) that a CCIR Recommendation would provide a suitable means for such supplementing;

considering further

a) that a list of examples for the full designation of emissions is given in Appendix **5**, Part B;

b) that this list, however, is not exhaustive and that for this reason No. **3209**/104 of these Regulations stipulates that further examples may appear in the latest CCIR Recommendations and that these examples may also be published in the Preface to the International Frequency List;

invites the CCIR

1. to continue its studies on the classification of emissions with a view to supplementing the list of additional characteristics in order to cater for new technologies without, however, changing those additional characteristics which have already been agreed upon and which are contained in Appendix **5**, Part A.

---

1 Replaces Recommendation No. 8 of the Administrative Radio Conference, Geneva, 1959.

2. to provide examples for the full designation of emissions which are not contained in Appendix 5, Part B, also taking account of the supplementing mentioned in 1. above;

<u>requests the International Frequency Registration Board</u>

to publish the supplementary additional characteristics and the additional examples mentioned in 1. and 2. above in the Preface to the International Frequency List as soon as they are available in relevant CCIR Recommendations;

<u>and recommends</u>

that Administrations use the additional characteristics referred to in 1. above where appropriate.

RESOLUTION AJ

Relating to the Propagation Information Used in the Determination of the Co-ordination Area (see Appendix 28)

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that Appendix **28** to the Radio Regulations provides a method for the determination of the co-ordination area which incorporates certain material concerned with radio wave propagation;

b) that the propagation information contained in Appendix **28** is based directly or indirectly on propagation data given in the texts of the CCIR;

c) that CCIR studies of radio wave propagation are continuing, and therefore the conclusions of these studies are subject to change and may in future show the need to revise those sections of Appendix **28** which incorporate the propagation information;

recognizing

a) that a period of several years is generally required to accumulate sufficient data to form reliable conclusions concerning radio wave propagation;

b) that for administrative reasons it is desirable that the propagation information used for the determination of the co-ordination area should not be revised very frequently and, in any case, should be revised only if the effect of such revision on the size of the co-ordination area is significant;

c) that in Appendix **28** the co-ordination area is determined without the need for detailed knowledge of the propagation characteristics of individual paths, and it is desirable that this approach be maintained;

invites

the CCIR to continue to study propagation data concerned with the determination of the co-ordination area, and to maintain the relevant CCIR texts is a format which would permit direct insertion into Appendix **28** in place of the existing sections 3, 4, 6 or Annex II;

resolves

1. that each Plenary Assembly of the CCIR should come to a conclusion as to whether, according to the propagation information given in the most recent CCIR Recommendations, any revision of Sections 3, 4, 6 or Annex II of Appendix **28** to the Radio Regulations is warranted;

2. that when a Plenary Assembly of the CCIR has come to the conclusion that a revision of Sections 3, 4, 6 or Annex II of Appendix **28** is warranted, the Director of the CCIR shall so inform the Secretary-General of the ITU and transmit to him the proposed amendments to Appendix **28**;

requests

1. that the Administrative Council then place, as an extraordinary item, on the agenda of the next World Administrative Radio Conference, the consideration of the conclusion of the CCIR;

2. that if the said World Administrative Radio Conference decides that Appendix **28** is to be revised, the Secretary-General, in consultation with the IFRB, incorporate the amendments agreed at the said Conference in a document which contains the new text of Sections 3, 4, 6 or Annex II of Appendix **28** in a form suitable for direct substitution in the version of Appendix **28** then in force, and send this document to all administrations and to the IFRB; and

decides

that from a date established by the said Conference, the revised text shall form the basis of all subsequent determinations of the co-ordination area using Appendix **28**.

RECOMMENDATION J

Relating to the Use of the Term "Channel" in the Radio Regulations

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the term "channel" has been used extensively in the Radio Regulations in the frequency allotment plans of Appendices **15**, **17**, **18**, **25**, **26** and **27**;

b) that the term "channel" has a different meaning in other provisions of the Radio Regulations and for the various radiocommunication services;

c) that there should not be any ambiguity in the meaning of the term "channel" in its usage throughout the Radio Regulations;

invites

the CCIR to define the term "channel" so that it may be used consistently and without confusion in the Radio Regulations in all working languages of the ITU.

INTERNATIONAL TELECOMMUNICATION UNION

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WORLD ADMINISTRATIVE RADIO CONFERENCE

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B.13

PLENARY MEETING

13th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	570 + 571	Appendix 4

P. BASSOLE
Chairman of the
Editorial Committee

Annex: 5 pages

APPENDIX 4

MOD

Table of Maximum Permitted Spurious Emission Power Levels

(See Article N4)

MOD 1. The following table indicates the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line.

MOD 2. Spurious emission from any part of the installation other than the antenna and its transmission line shall not have an effect greater than would occur if this antenna system were supplied with the maximum permitted power at that spurious emission frequency.

MOD 3. These levels shall not, however, apply to emergency position-indicating radiobeacon (EPIRB) stations, emergency locator transmitters, ships' emergency transmitters, lifeboat transmitters, survival craft stations or maritime transmitters when used in emergency situations.

MOD 4. For technical or operational reasons, specific services may demand more stringent levels than those specified in the table. The levels applied to these services shall be those agreed upon by the appropriate World Administrative Radio Conference. The more stringent levels may also be fixed by specified agreement between the Administrations concerned.

MOD 5. For radiodetermination stations, until acceptable methods of measurement exist, the lowest practicable power of spurious emission should be achieved.

SUP
(transferred
to Column A
of the table)

MOD

Frequency band containing the assignment (lower limit exclusive, upper limit inclusive)	For any spurious component the attenuation (mean power within the necessary bandwidth relative to the mean power of the spurious component concerned) shall be at least that specified in Columns A and B below and the absolute mean power levels given shall not be exceeded (Note 1).	
	A	B
	Levels applicable until 1 January 1994 to transmitters now in use and to those installed before 2 January 1985	Levels applicable to transmitters installed after 1 January 1985 and to all transmitters after 1 January 1994
9 kHz to 30 MHz	40 decibels 50 milliwatts (Notes 2,3,4)	40 decibels 50 milliwatts (Notes 4, 7, 8)
30 to [235] MHz - mean power above 25 watts	 60 decibels 1 milliwatt (Note 5)	 60 decibels 1 milliwatt (Note 9)
- mean power 25 watts or less	40 decibels 25 microwatts (Notes 5,6)	40 decibels 25 microwatts

[ ]

[235] to [960] MHz - mean power above 25 watts - mean power 25 watts or less	No level is specified for transmitters operating on assigned frequencies above 235 MHz. For these transmitters the power of spurious emissions shall be as low as practicable.	60 decibels 20 milliwatts (Notes 10,11) 40 decibels 25 microwatts (Notes 10,11)	[ ]
[960] MHz to [17.7] GHz - mean power above 10 watts - mean power 10 watts or less		50 decibels 100 milliwatts (Notes 10,11,12,13) 100 microwatts (Notes 10,11,12,13)	[ ]
Above [17.7] GHz		Due to the diverse nature of technologies employed by services operating above [17.7] GHz, further study by the CCIR is required prior to the specification of levels. To the extent possible, the values to be observed should be those shown in appropriate CCIR Recommendations. Until suitable Recommendations have been adopted, the lowest possible values achievable shall be employed (see Recommendation L).	[ ] [ ]

ADD

Notes in the Table of Maximum Permitted Spurious Emission Power Levels

MOD 1. When checking compliance with the provisions of the table, it shall be verified that the bandwidth of the measuring equipment is sufficiently wide to accept all significant components of the spurious emission concerned.

MOD 2. For transmitters of mean power exceeding 50 kilowatts and which operate below 30 MHz over a frequency range approaching an octave or more, a reduction below 50 milliwatts is not mandatory, but a minimum attenuation of 60 decibels shall be provided and every effort should be made to comply with the level of 50 milliwatts.

MOD 3. For hand-portable equipment of mean power less than 5 watts which operates below 30 MHz, the attenuation shall be at least 30 decibels, but every effort should be made to attain 40 decibels attenuation.

MOD 4. For mobile transmitters which operate below 30 MHz any spurious component shall have an attenuation of at least 40 decibels without exceeding the value of 200 milliwatts, but every effort should be made to comply with the level of 50 milliwatts wherever practicable.

ADD 5. For frequency modulated maritime mobile radiotelephone equipment which operates above 30 MHz, the mean power of any spurious emission falling in any other international maritime mobile channel, due to products of modulation, shall not exceed a level of 10 microwatts and the mean power of any other spurious emission on any discrete frequency within the international maritime mobile band shall not exceed a level of 2.5 microwatts. Where, exceptionally, transmitters of mean power above 20 watts are employed, these levels may be increased in proportion to the mean power of the transmitter.

ADD 6. For transmitters having a mean power of less than 100 milliwatts, it is not mandatory to comply with an attentuation of 40 decibels provided that the mean power level does not exceed 10 microwatts.

ADD 7. For transmitters of a mean power exceeding 50 kilowatts which can operate on two or more frequencies covering a frequency range approaching an octave or more, whilst a reduction below 50 milliwatts is not mandatory, a minimum attenuation of 60 decibels shall be provided.

ADD 8. For hand-portable equipment of mean power less than 5 watts, the attenuation shall be 30 decibels, but every practicable effort should be made to attain 40 decibels attenuation.

ADD 9. Administrations may adopt a level of 10 milliwatts provided that harmful interference is not caused.

ADD 10. Where several transmitters feed a common antenna or closely spaced antennae on neighbouring frequencies, every practicable effort should be made to comply with the levels specified.

ADD 11. Since these levels may not provide adequate protection for receiving stations in the radio astronomy and space services, more stringent levels might be considered in each individual case in the light of the geographical position of the stations concerned.

ADD 12. These levels are not applicable to systems using digital modulation techniques, but may be used as a guide. Values for these systems may be provided by the relevant CCIR Recommendations (see Recommendation L).

ADD 13. These levels are not applicable to stations in the space services, but the levels of their spurious emissions should be reduced to the lowest possible values compatible with the technical and economic constraints to which the equipment is subject. Values for these systems may be provided by the relevant CCIR Recommendations when available (see Recommendation L).

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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12 November 1979
Original : English

COMMITTEE 6

Note from France and USA

DRAFT AMENDMENTS TO APPENDIX 29

Following a proposal made in Sub-Working Group 6A3 by the delegate of France and supported by the delegate of the USA, and consequential to decisions taken in Sub-Working Group 6A3 in connection with Appendix 1B, further subject to confirmation of this decision by Committee 6, the following amendment to Appendix 29 should be made :

"ADD 2.4 Use of information furnished under Appendix 1B

When an Administration elects to use information furnished under Appendix 1B with the calculation procedures of Sections 2.2.1.1 and 2.2.2.1 in order to formulate comments to the advance publication of a new network, the calculations need to be made for both sets of values of γ and T furnished. The greater of the two values of $\Delta T/T$ resulting from these calculations is the one to be used."

INTERNATIONAL TELECOMMUNICATION UNION

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COMMITTEE 5

United States of America

SHARING BETWEEN THE BROADCASTING AND FIXED SERVICES

INFORMATION PAPER

Introduction

Since 1959 there has been a steadily increasing need for short-wave frequencies to satisfy the requirements of users in this portion of the spectrum. Much of the demand has been by broadcasters using Band 7 for their domestic and international services, and by developing countries to satisfy their fixed service requirements. It is clear that to accommodate the needs of all Administrations more efficient methods of utilizing this portion of the spectrum are required.

There are two basic methods of allocating the high frequency portion of the spectrum : exclusivity, and sharing. Exclusivity may have certain advantages to facilitate implementation, and for many applications exclusive bands are essential. However, the feasibility of some sharing between the domestic fixed, and international broadcasting services has been demonstrated to be practical, both theoretically, and operationally. SPM Document P/209, the FCC Report H79-4 (Haydon) and NTIA-TM-78-252 conclude that under certain conditions sharing between these services is feasible.

There are two basic methods of sharing : time sharing and geographical sharing.

Time sharing

In time sharing, the same frequency bands are used by different services during different hours of the day.

The choice of an optimum short-wave frequency for propagation via the ionosphere depends upon many factors, including time of day, season of the year, and phase of the sunspot cycle. In addition, the optimum working frequency over any given path is a function of distance between the transmitter and the receiver : the greater the distance between transmitter and receiver, the higher the optimum working frequency. Consequently, a long distance broadcasting service and a short distance fixed service will usually be operating in different frequency bands. Thus, a daytime broadcast operation will generally be operating in higher short-wave bands, while a domestic fixed operation will be working on lower frequencies during the same hours.

Sharing in time is also facilitated by the different times during which the services tend to operate. Generally, domestic fixed services are in more demand during local daylight hours, while long distance broadcasting services operate principally during prime morning hours, and again during the evening and night-time hours.

It can be concluded that sharing between long distance broadcasting services (target areas are greater than 1,500 km from the transmitter) and short distance fixed services (reception points are less that 800 km from the transmitter) is one way of making more efficient use of this very limited portion of the frequency spectrum. (See FCC Report H79-4 (Haydon) and NTIA-TM-78-252.)

Geographic sharing

Geographic sharing is the simultaneous use of the same frequency in different areas. It involves the separation of reception areas or points by a sufficient distance so that the signals from one service are sufficiently weak at the receiving location of the second service to permit satisfactory operation.

Recent experimental work has been carried out within the United Sates (Lucas et al., 1979) to determine the operational feasibility of sharing between the national short distance fixed service, and high power long distance international broadcasting service. It was determined experimentally that fixed circuit operations are possible when no broadcast operation is directed toward the fixed service reception areas, and that even in the presence of a nearby high power broadcast transmitter, the fixed service could be operated satisfactorily if the broadcast signal is directed by means of specialized antenna away from the receiving area of the fixed operation. Similar principles have been applied by broadcasters for many years. Experimental results also show that operation on an adjacent channel improves the sharing feasibility.

REFERENCES

SPM Report P/209, Sharing Considerations Between the High Frequency Broadcasting and Fixed Services.

HAYDON, G.W., Administrative Practices and Procedures for Sharing of the High Frequency Radio Bands FCC Report H79-E.

HAYDON, G.W. [1978], Theoretical Compatibility Between High Frequency Broadcasting and High Frequency Fixed Services, OT-TM:78:252, Institute for Telecommunication Sciences, Boulder, Colorado.

LUCAS, D.L. and CARROLL, J.C. [1979], Experimental Feasibility of Sharing High Frequencies Between Short-Haul Fixed and Broadcast Services, NTIA-TM-79-23, Institute for Telecommunication Sciences, Boulder, Colorado.

INTERNATIONAL TELECOMMUNICATION UNION

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WORLD ADMINISTRATIVE RADIO CONFERENCE

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B.14

PLENARY MEETING

14th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

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C.7	574 + 575	Art. 37, Art. 39 No. 6362 (Art. 30) No. 6427 (Art. 32)

P. BASSOLE
Chairman of the
Editorial Committee

Annex: 6 pages

ARTICLE N37

Title PENDING

NOC **Section I. Urgency Signal and Messages**

MOD **Section IA. Medical Transports**

ADD **6885A** § 6A. The term "medical transports", as defined in the 1949 Geneva Conventions and Additional Protocols, refers to any means of transportation by land, water or air, whether military or civilian, permanent or temporary, assigned exclusively to medical transportation and under the control of a competent authority of a Party to a conflict.

ADD **6885B** § 6B. For the purpose of announcing and identifying medical transports which are protected under the above-mentioned Conventions, a complete transmission of the urgency signals described in Nos. **6873** and **6874** shall be followed by the addition of the single group "YYY" in radiotelegraphy and by the addition of the single word MAY-DEE-CAL, pronounced as in French, "médical", in radiotelephony.

ADD **6885C** § 6C. The frequencies specified in No. **6878** may be used by medical transports for the purpose of self-identification and to establish communications. As soon as practicable, communications shall be transferred to an appropriate working frequency.

ADD **6885D** § 6D. The use of the signals described in **6885B** indicates that the message which follows concerns a protected medical transport. The message shall convey the following data:

a) the call sign or other recognized means of identification of the medical transport;

b) position of the medical transport;

c) number and type of medical transports;

d) intended route;

e) estimated time en route and of departure or arrival, as appropriate;

f) any other information, such as flight altitude, radio frequencies guarded, languages used and secondary surveillance radar modes and codes.

ADD **6885E** § 6E. The provisions of Section I of this Article shall apply as appropriate to the use of the urgency signal by medical transports.

ADD **6885F** § 6F. The use of radiocommunications for announcing and identifying medical transports is optional; however, if they are used, the provisions of the Radio Regulations and particularly of this Section and of Articles **N34** and **N35** shall apply.

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ARTICLE N39

NOC **Special Services relating to Safety**

NOC **Section I. Meteorological Messages**

NOC **6981** 1596 § 1. (1) Meteorological messages comprise:

NOC **6982** 1597 a) messages addressed to meteorological services officially entrusted with weather forecasts, more specifically for the protection of maritime and air navigation;

NOC **6983** 1598 b) messages from these meteorological services intended specially for:

NOC **6984** 1599 – ship stations;

NOC **6985** 1600 – protection of aircraft;

NOC **6986** 1601 – the public.

NOC **6987** 1602 (2) The information contained in these messages may be:

NOC **6988** 1603 a) observations taken at fixed times;

NOC **6989** 1604 b) warnings of dangerous phenomena;

NOC **6990** 1605 c) forecasts and warnings;

NOC **6991** 1606 d) statements of the general meteorological situation.

NOC **6992** 1607 § 2. (1) The various national meteorological services mutually agree to prepare common [transmission] programmes so as to use the transmitters best situated to serve the regions concerned. [ ]

MOD **6993** 1608 (2) The meteorological observations contained in the classes mentioned in Nos. **6982**/1597 to **6985**/1600 should be drawn up in an international meteorological code, whether they are transmitted by or intended for mobile stations.

MOD **6994** 1609 § 3. For observation messages intended for an official meteorological service, use shall be made of the frequencies made available for meteorological purposes, in conformity with regional agreements made by the services concerned for the use of these frequencies.

NOC **6995** 1610 § 4. (1) Meteorological messages specially intended for all ship stations shall in principle be sent in accordance with a definite timetable, and, as far as possible, at times when they can be received by ship stations with only one operator. In radiotelegraphy the transmission speed shall not exceed sixteen words a minute.

NOC **6996** 1611 (2) During the [transmission] "to all stations" of meteorological messages intended for stations of the maritime mobile service, all stations of this service whose [transmission] might interfere with the reception of these messages, shall keep silent in order to permit all stations which desire to do so to receive these messages. [ ] [ ]

MOD **6997** 1612 Mar2* (3) Meteorological warning messages for the maritime mobile service shall be transmitted without delay. They shall be repeated at the end of the first silence period which follows their receipt (see Nos. **6696**/1130 and **6708**/1335A) as well as during the next appropriate broadcast as indicated in the List of Radiodetermination and Special Service Stations. They shall be preceded by the safety signal and sent on the appropriate frequencies (see No. **6889**/1491).

NOC **6998** 1613 (4) In addition to the regular information services contemplated in the preceding sub-paragraphs, administrations shall take the necessary steps to ensure that certain stations shall, upon request, communicate meteorological messages to stations in the maritime mobile service.

NOC **6999** 1614 (5) The provisions of Nos. **6995**/1610 to **6998**/1613 are applicable to the aeronautical mobile service, in so far as they are not contrary to more detailed special arrangements which ensure at least equal protection to air navigation.

NOC **7000** 1615 § 5. (1) Messages originating in mobile stations and containing information concerning the presence of cyclones shall be transmitted, with the least possible delay, to other mobile stations in the vicinity and to the appropriate authorities at the first point of the coast with which contact can be established. Their transmission shall be preceded by the safety signal.

NOC **7001** 1616 (2) Any mobile station may, for its own use, listen to messages containing meteorological observations sent out by other mobile stations, even those which are addressed to a national meteorological service.

NOC **7002** 1617 (3) Stations of the mobile services which transmit meteorological observations addressed to a national meteorological service are not required to repeat them to other stations. However, the exchange between mobile stations, on request, of information relating to the state of the weather is authorized.

NOC **Section II. Notices to Mariners**

NOC **7003** 1618 § 6. The provisions of Nos. **6995**/1610 to **6999**/1614 shall apply to notices to mariners.

NOC **7004** 1619 § 7. Messages containing information concerning the presence of dangerous ice, dangerous wrecks, or any other imminent danger to marine navigation, shall be transmitted as soon as possible to other ship stations in the vicinity, and to the appropriate authorities at the first point of the coast with which contact can be established. These transmissions shall be preceded by the safety signal.

NOC **7005** 1620 § 8. When thought desirable, and provided the sender agrees, administrations may authorize their land stations to communicate information concerning maritime damage or casualties or information of general interest to navigation, to the marine information agencies approved by them and subject to the conditions fixed by them.

NOC **Section III. Medical Advice**

NOC **7006** 1621 § 9. Mobile stations requiring medical advice may obtain it through any of the land stations shown as providing this service in the List of Radiodetermination and Special Service Stations.

NOC **7007** 1622 § 10. Radiotelegrams and radiotelephone calls concerning medical advice may be preceded by the appropriate urgency signal (see Nos. **6875**/1479 to **6885**/1487).

7008 to **7107** NOT allocated.

ARTICLE N30

NOC **6362** 1567A Spa2

§ 6. Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference are reported in accordance with the procedure laid down in Article **N20**/15. Administrations authorizing such space stations shall inform the IFRB and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference might be reported can be terminated by the authorizing administration (see No. **6105**/470N).

ARTICLE N32

NOC **6427** 1575

§ 5. Where there is no risk of an experimental station causing harmful interference to a service of another country, the administration concerned may, if considered desirable, adopt different provisions from those contained in this Article.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 7

Republic of Cuba

REQUEST FOR ALLOCATION OF ADDITIONAL CALL SIGN SERIES

Due to the development of telecommunications in the Republic of Cuba, the call sign series allocated to our Administration have been used up.

Therefore, the Administration of the Republic of Cuba requests that two new call sign series should be allocated to it.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 6

NOTE BY THE CHAIRMAN OF WORKING GROUP 6A

Working Group 6A has agreed on the following draft note, which it requests Committee 6 to transmit to the Chairman of Committee 7.

DRAFT

NOTE FROM THE CHAIRMAN OF COMMITTEE 6 TO THE CHAIRMAN OF COMMITTEE 7

During the examination of Article N13, Committee 6 has considered proposals relating to the inclusion of the principles of Resolution No. 5 in the body of Articles N11, N12 and N13, together with the text of a footnote relating to the notification by an administration of frequency assignments to stations situated in the territory of the country of another administration.

These draft texts, which are still under consideration, together with the text of the footnote are shown in the Annex for your information.

During the discussion, the question of territories over which there is dispute of sovereignty and of occupied territories was raised. It was agreed that, for radiocommunication stations situated in a territory over which there is a dispute of sovereignty or in occupied territories, the application of the above-mentioned Articles of the Radio Regulations would not signify recognition by the Union of the sovereignty over the territory in question for the country concerned. Proposals were made to include, at the beginning of the Radio Regulations, a Preamble which would cover this subject.

Committee 7 is requested to consider the possibility of including a Preamble to that effect in the Radio Regulations, in a suitable position so that it would be applicable to all the relevant provisions of the Radio Regulations.

After Committee 7 has taken a decision on this matter, Committee 6 will examine the possible implications in Articles N11, N12 and N13.

J.K. BJÖRNSJÖ
Chairman of Working Group 6A

Annex : 1

ANNEX

DRAFT TEXTS TO BE ENTERED IN ARTICLE N13

(AS WELL AS IN ARTICLES N11 AND N12)

ADD 4577A (3A) Frequency assignments to an Earth station shall be notified by the Administration of the country on whose territory [1] the Earth station is located, unless specifically stipulated otherwise by special arrangements in accordance with Article 31 of the Convention communicated to the Union by the Administrations. Frequency assignments to a space station shall be notified by the Administration (or one acting on behalf of a group of named Administrations) for which the space station is to be brought into use.

/ ADD 4577A.1 [1] If a notice is received from an Administration for a frequency assignment to an Earth station situated on a territory over which there is a dispute of sovereignty, an entry in the Master Register, after examination by the Board, does not signify recognition of the sovereignty of a country over the territory in question. /

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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WORKING GROUP 6A

REPORT BY WORKING GROUP 6A3 TO WORKING GROUP 6A

Appendix 1B Advance Publication Information to be furnished for a Satellite Network

Working Group 6A3 considered all proposals concerning the above subject and unanimously agreed to submit the attached texts to Working Group 6A for consideration. The only exception was in Section D, Item 6, Characteristics of receiving Earth stations, where the revised text was agreed by a majority.

A.M. CORRADO
Chairman of Working Group 6A3

Annex: 1

APPENDIX 1B

Advance Publication Information to be furnished for a Satellite Network

(see Article N11/9A)

Section A. General Instructions

Item 1 Information shall be provided separately for each satellite network.

Item 2 Information to be furnished for each satellite network shall include general characteristics (Section B), and, as applicable, characteristics in the Earth-to-space direction (Section C), characteristics in the space-to-Earth direction (Section D), and characteristics for space-to-space relay (Section E).

ADD In addition, the administration or group of administrations submitting the advance information may provide as supplementary information, data for interference calculations for the purpose of inter-network co-ordination (Section F).

Section B. General Characteristics to be furnished for a Satellite Network

Item 1 Identity of the satellite network

Clearly identify the satellite network and, if applicable, identify the satellite system of which it will form a part.

Item 2 Date of bringing into use

Indicate the date by which the satellite network is expected to be brought initially into use.

ADD /Item 2bis Period of operation

Indicate the proposed period of operation of the space station(s) of the satellite network. This period shall be limited to the period for which the satellite network is designed. During that period, replacement satellites may be used, provided that the technical characteristics of the frequency assignments remain unchanged./

N.B. ADD Item 2bis Consideration of F/57A/660(Corr.3) was deferred to Working Group 6A depending upon related output of Working Group 6 Ad Hoc2.

AP1B Section B. General Characteristics (cont.)

Item 3 Administration or group of administrations submitting the advance information

Give the name of the administration or the names of the administrations in the group submitting the advance information on the satellite network and the postal and telegraphic addresses of the administration(s) to which any communication should be sent.

Item 4 Orbital information relating to the space station(s)

a) In the case of a space station aboard a geostationary satellite, give the planned nominal geographical longitude on the geostationary satellite orbit and the planned longitudinal and inclination tolerances. Indicate also:

1) the arc of the geostationary satellite orbit over which the space station is visible, at a minimum angle of elevation of 10° at the Earth's surface, from its associated earth stations or service areas;

2) the arc of the geostationary satellite orbit within which the space station could provide the required service to its associated earth stations or service areas; and

3) in the event that the arc defined in paragraph 2) above is less than the arc defined in paragraph 1) above, provide the reasons therefor.

Note: The arcs specified in 1) and 2) will be indicated by the geographical longitude of the extremes of these arcs on the geostationary satellite orbit.

b) In the case of space station(s) aboard non-geostationary satellite(s), indicate the angle of inclination of the orbit, the period, the altitudes in kilometres of the apogee and perigee

AP1B Section B. General Characteristics (cont.)

of the space station(s) and the number of satellites used having the same characteristics.

Section C. Characteristics of the Satellite Network in the Earth-to-Space direction

Item 1 Earth-to-space service area(s)

Indicate the service area(s) on the Earth associated with each receiving antenna of the space station.

Item 2 Class of stations and nature of service

For each Earth-to-space service area, indicate the class of the stations in the satellite network and the nature of the service to be performed, using the symbols shown in Appendix [10.]

Item 3 Frequency range

For each Earth-to-space service area, indicate the frequency range within which the carriers will be located.

Item 4 Power characteristics of the transmitted wave

MOD *a)* For each Earth-to-space service area indicate the maximum spectral power density (in dBW/Hz)[1] to be delivered to the antenna of the transmitting earth stations (the bandwidth over which this is averaged depends on the nature of the service con-

ADD cerned) for each size of transmitting earth station antenna and, if available, the total peak power (in dBW) and the necessary bandwidth of this emission.

b) If available, indicate, for each Earth-to-space service area, the actual radiation pattern (relative to isotropic) of the transmitting earth station antenna having the highest off beam equiv-

ADD alent isotropically radiated spectral power density for each size of transmitting earth station antenna.

c) If available, for television carriers and for each Earth-to-space service area, indicate the peak envelope power to be delivered to the input of the earth station transmitting antenna.

ADD d) If available, indicate the minimum carrier power delivered to the antenna of the earth station for narrow bandwidth carriers.

ADD [1] The most recent version of the relevant CCIR Report should be used to the extent applicable in calculating the maximum power density per Hz.

AP1B Section C. Characteristics, Earth-to-space direction (cont.)

Item 5 **Characterisitcs of space station receiving antennae**

For each Earth-to-space service area:

a) **in the case of a space station aboard a geostationary satellite, indicate the estimated gain of the space station receiving antenna by means of gain contours plotted on a map of the**
ADD **Earth's surface** preferably in a radial projection from the satellite in a plane perpendicular to the axis from the centre of the Earth to the satellite. **The isotropic gain at each contour which corresponds to a gain of 2, 4, 6, 10 and 20 dB and at 10 dB intervals thereafter as necessary, below the maximum gain,**
ADD **shall be indicated.** Whenever possible the estimated gain contours of the space station receiving antenna should also be provided in the form of a numerical equation or in a tabular form;

b) **in the case of a space station aboard a non-geostationary satellite, indicate the estimated isotropic gain of the space station receiving antenna in the main direction of reception and indicate the antenna radiation pattern in those directions which can intersect with the Earth's surface, taking the gain in the main direction of radiation as a reference;**

ADD c) if available, for each space station receiving antenna, indicate the type of polarization of the antenna. In the case of circular polarization, indicate the direction of polarization (see /N3153C/ and /N3153D/);

ADD d) in the case of a space station aboard a geostationary satellite operating in a band allocated in the earth-to-space direction and in the space-to-earth direction, also indicate the estimated gain of the space station receiving antenna in the direction of those parts of the geostationary satellite orbit which are not obstructed by the earth by means of a diagram showing estimated antenna gain versus orbit longitude.

Item 6 **Noise temperature of the receiving space station**

For each Earth-to-space service area, when other than a simple frequency changing transponder is used aboard the space station
ADD **indicate the lowest total receiving system noise temperature** referred to the output of the receiving antenna.

ADD Item 7 Necessary bandwidth

If available, in the case of narrow bandwidth carriers, indicate the necessary bandwidth.

ADD Item 8 Modulation characteristics

If available, in the case of television carriers, indicate the characteristics of energy dispersal such as the peak-to-peak frequency deviation (in MHz) and the sweep frequency (in kHz) of the energy dispersal waveform.

AP1B **Section D. Characteristics of the Satellite Network in the Space-to-Earth Direction**

Item 1 Space-to-Earth service area(s)

Indicate the service area(s) on the Earth associated with each transmitting antenna of the space station.

Item 2 Class of stations and nature of service

For each space-to-Earth service area, indicate the class of the stations in the satellite network and the nature of the service to be performed, using the symbols shown in Appendix [10.]

Item 3 Frequency range

For each space-to-Earth service area, indicate the frequency range within which the carriers will be located.

Item 4 Power characteristics of the transmission

a) For each space-to-Earth service area, indicate the maximum
MOD spectral power density (dBW/Hz)[1] to be delivered to the transmitting antenna of the space station (the bandwidth over which this is
ADD averaged depends on the nature of the service concerned), and, if available, the total peak power (in dBW) and the necessary bandwidth of this emission.

ADD b) If available, for narrow bandwidth carriers and for television carriers, indicate the peak envelope power to be delivered to the input of the space station transmitting antenna.

ADD c) If available, indicate the minimum carrier powers delivered to the antenna of the satellite station for narrow bandwidth carriers.

Item 5 Characteristics of space station transmitting antennae

For each space-to-Earth service area:

a) in the case of a space station aboard a geostationary satellite, indicate the estimated gain of the space station transmitting antenna by means of gain contours plotted on a map of the
ADD Earth's surface, preferably in a radial projection from the satellite in a plane perpendicular to the axis from the centre of the Earth to the satellite. The isotropic gain at each contour which corresponds to a gain of 2, 4, 6, 10 and 20 dB and at 10 dB intervals thereafter as necessary, below the maximum gain,
ADD shall be indicated. Whenever possible, the estimated gain contours of the space station transmitting antenna should also be provided in the form of a numerical equation or in tabular form;

b) in the case of space station aboard a non-geostationary satellite, indicate the estimated isotropic gain of the space station transmitting antenna in the main direction of transmission and indicate the antenna radiation pattern in those directions which can intersect with the Earth's surface, taking the gain in the main direction of transmission as a reference;

ADD [1] The most recent version of the relevant CCIR Report should be used to the extent applicable in calculating the maximum power density per Hz.

AP1B Section D. Characteristics, Space-to-Earth direction (cont.)

ADD c) if available, for each space station transmitting antenna, indicate the type of polarization of the antenna. In the case of circular polarization, indicate the direction of polarization (see /N3153C/ and /N3153D/);

ADD d) in the case of a space station aboard a geostationary satellite operating in a band allocated in the earth-to-space direction and in the space-to-earth direction, also indicate the estimated gain of the space station transmitting antenna in the direction of those parts of the geostationary satellite orbit which are not obstructed by the earth by means of a diagram showing estimated antenna gain versus orbit longitude.

Item 6 **Characteristics of receiving earth stations**

ADD *a)* **For each space-to-Earth service area, when other than a simple frequency changing transponder is used aboard the space station, indicate the lowest total receiving system noise temperature of the earth stations** referred to the output of the receiving antenna.

MOD

ADD **For each space-to-Earth service area and for each projected usage [1]; when simple frequency changing transponders are used on the space station, indicate** 1) **the lowest equivalent satellite link noise temperature and the associated value of transmission gain** and 2) the values of transmission gain and associated equivalent link noise temperature that correspond to the highest ratio of transmission gain to equivalent satellite link noise temperature. The transmission gain is **evaluated from the output of the receiving antenna of the space station to the output of the receiving antenna of the earth station. For each projected usage, indicate also the receiving antenna(e) of the space station to which each simple frequency changing transponder will be connected.**

ADD *b)* **If available, indicate for each space-to-Earth service area the actual radiation pattern (relative to isotropic) of the receiving earth station** for each size of receiving earth station **antenna having the highest off beam level. When simple frequency changing transponders are used on the space station, indicate also, if available, the pattern associated with each equivalent satellite link noise temperature indicated above.**

ADD Item 7 Necessary bandwidth

If available, in the case of narrow bandwidth carriers, indicate the necessary bandwidth.

ADD Item 8 Modulation characteristics

If available, in the case of television carriers, indicate the characteristics of energy dispersal such as the peak-to-peak frequency deviation (in MHz) and the sweep frequency (in kHz) of the energy dispersal waveform.

---

[1] **A different usage will be considered to take place when different types of carriers are employed (different by virtue of maximum power spectral density), or when different types of receiving earth stations are employed (different by virtue of receiving antenna gain).**

AP1B **Section E. Characteristics to be furnished for Space-to-Space Relay**

Where the satellite network is connected to one or more satellite networks by means of space-to-space relay, indicate the following:

a) **identity or identities of the other satellite network(s) to which the satellite network is connected;**

b) **transmit and receive frequency bands;**

c) **classes of emission;**

d) **nominal equivalent isotropically radiated power(s) on the beam axis.**

ADD Section F. Supplementary information (if available)

ADD Item 1 General

Supplementary information may be provided inter alia by an administration or group of administrations who so desire. This information may be used as data for interference calculations associated with the advance notification process. Individual parameters of this supplementary information may be modified either as a result of changes to system specification or as a result of the co-ordination process. The information may consist of part or all the data contained in the following items which are not exhaustive but provide an indication of the type of information which may be supplied.

ADD Item 2 Earth-to-space direction

For each Earth-to-space service area, the following information may be provided:

a) classification of emission, necessary bandwidth and modulation characteristics (including energy dispersal if employed) for each type of carrier transmitted;

b) earth station e.i.r.p. for each type of carrier associated with each type and diameter of earth station antenna;

c) technical description and system parameters of command transmissions (except for coding data).

ADD Item 3 Space-to-Earth direction

For each space-to-Earth service area, the following information may be provided:

a) classification of emissions, necessary bandwidth and modulation characteristics (including energy dispersal if employed) for each type of carrier;

b) satellite transmitter power to be delivered to the satellite transmit antenna for each type of carrier;

c) technical description and system parameters of beacon and telemetry emissions (except for coding data).

ADD Item 4 Any other information an administration or group of administrations may wish to provide.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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PLENARY MEETING

THIRTEENTH REPORT OF COMMITTEE 4

Committee 4 has adopted the texts for Articles N26 and N27.

Concerning Article N26, provisions 6054, 6057, 6060, 6061, the delegation of U.S.S.R. has expressed its reservation.

The texts have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 622).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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COMMITTEE 9

THIRTEENTH SERIES OF TEXTS FROM COMMITTEE 4
TO THE EDITORIAL COMMITTEE

Committee 4 has examined Article N26 (Document No. DT/172) and Article N27 (Document No. DT/186).

The amended texts (mentioned in Document No. 621) are hereby submitted to the Editorial Committee.

N. MORISHIMA
Chairman of Committee 4

Annex : 1

A N N E X

ARTICLE N26

NOC

Space Radiocommunication Services sharing Frequency Bands with Terrestrial Radiocommunication Services above 1 GHz

NOC

Section I. Choice of Sites and Frequencies

NOC **6037** 470E Spa2

§ 1. Sites and frequencies for earth stations, operating in frequency bands shared with equal rights between terrestrial radiocommunication and space radiocommunication services, shall be selected having regard to the relevant Recommendations of the C.C.I.R. with respect to geographical separation from terrestrial stations.

NOC

Section II. Power Limits

NOC **6038** 470F Spa2

§ 2. (1) Earth stations.

(MOD) **6039** 470G Spa2

(2) The equivalent isotropically radiated power $\boxed{\text{e.i.r.p.}}$ transmitted in any direction towards the horizon by an earth station operating in frequency bands between 1 and [15] GHz shall not exceed the following limits except as provided in Nos. **6044**/470H or **6042**/470GC:

+40 dBW in any 4 kHz band for $\theta \leqslant 0°$

+40 + 3 θ dBW in any 4 kHz band for $0° < \theta \leqslant 5°$

where θ is the angle of elevation of the horizon viewed from the centre of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

(MOD) **6040** 470GA Spa2

(3) The equivalent isotropically radiated power $\boxed{\text{e.i.r.p.}}$ transmitted in any direction towards the horizon by an earth station operating in frequency bands above [15] GHz shall not exceed the following limits except as provided in Nos. **6044**/470H or **6043**/470GD:

+64 dBW in any 1 MHz band for $\theta \leqslant 0°$

+64 + 3 θ dBW in any 1 MHz band for $0° < \theta \leqslant 5°$

where θ is as defined in No. **6039**/470G.

(MOD) **6041** 470GB Spa2

(4) For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power $\boxed{\text{e.i.r.p.}}$ transmitted by an earth station towards the horizon.

(MOD) **6042** 470GC Spa2

(5) As an $\boxed{\text{e.i.r.p.}}$ exception to the limits given in No. **6039**/470G, the equivalent isotropically radiated power towards the horizon for an earth station in the space research service (deep-space) shall not exceed +55 dBW in any 4 kHz band.

(MOD) **6043** 470GD Spa2

e.i.r.p.

(6) As an exception to the limits given in No. **6040**/470GA, the equivalent isotropically radiated power towards the horizon for an earth station in the space research service (deep-space) shall not exceed +79 dBW in any 1 MHz band.

NOC **6044** 470H Spa2

(7) The limits given in Nos. **6039**/470G, **6040**/470GA, **6042**/470GC and **6043**/470GD, as applicable, may be exceeded by not more than 10 dB. However, when the resulting co-ordination area extends into the territory of another country, such increase shall be subject to agreement by the administration of that country.

/ MOD / **6045** 470J Spa2

(8) The limits given in No. **6039**/470G apply in the following frequency bands allocated to transmission by earth stations in the [fixed-satellite service and earth exploration satellite service, and in particular the meteorological-satellite service] where these bands are shared with equal rights with the fixed or mobile service:[1]

[
2 655 - 2 690 MHz (Regions 2 and 3)
4 400 - 4 700 MHz
5 800 - 5 850 MHz (for the countries mentioned in No. **3759**/390)
5 850 - 5 925 MHz (Regions 1 and 3)
5 925 - 6 425 MHz
7 900 - 7 975 MHz
7 975 - 8 025 MHz (for the countries mentioned in No. **3766**/392H)
8 025 - 8 400 MHz
10·95 - 11·20 GHz (Region 1)
12·50 - 12·75 GHz (Regions 2 and 3 and for the countries mentioned in No. **3788**/405BD)
14·175 - 14·300 GHz (for the countries mentioned in No. **3792**/407)
14·4 - 14·5 GHz
]

/ MOD / **6046** 470JA Spa2

(9) The limits given in No. **6040**/470GA apply in the following frequency band allocated to transmission by earth stations in the [fixed-satellite service] where this is shared with equal rights with the fixed or mobile service:

[27·5 - 29·5 GHz]

ADD 6045.1

[1] The equality of right to operate when a band of frequencies is allocated in different Regions to different services of the same category is established in 3282/117. Therefore limits concerned with inter-regional interference which may appear in CCIR Recommendations should, as far as practicable, be observed by Administrations.

NOC **Section III. Minimum Angle of Elevation**

NOC **6047** 470K Spa2 § 3. (1) Earth stations.

NOC **6048** 470L Spa2 (2) Earth station antennae shall not be employed for transmission at elevation angles of less than 3° measured from the horizontal plane to the direction of maximum radiation, except when agreed to by administrations concerned and ~~or~~ those whose services may be affected. In case of reception by an earth station, the above value shall be used for co-ordination purposes if the operating angle of elevation is less than that value.

NOC **6049** 470LA Spa2 (3) As an exception to No. 6048/470L, earth station antennae in the space research service (near-earth) shall not be employed for transmission at elevation angles of less than 5°, and earth station antennae in the space research service (deep-space) shall not be employed for transmission at elevation angles of less than 10°, both angles being those measured from the horizontal plane to the direction of maximum radiation. In case of reception by an earth station, the above values shall be used for co-ordination purposes if the operating angle of elevation is less than those values.

NOC **Section IV. Limits of Power Flux Density from Space Stations.**

/ MOD / **6050** 470N Spa2 § 4. (1) Power flux density limits between [1 690 MHz and 1 700 MHz]

MOD **6051** 470NA Spa2 *a)* The power flux density at the Earth's ~~surface~~ surface produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed −133 dBW/m² in any 1·5 MHz band. This limit relates to the power flux density which would be obtained under assumed free-space propagation conditions.

/ MOD / **6052** 470NB Spa2 *b)* The limit given in No. 6051/470NA applies in the frequency band listed in No. 6053/470NC which is allocated to transmission by space stations in the [earth exploration-satellite service and in particular the meteorological-satellite service] where this band is shared with equal rights with the meteorological aids service.

/ MOD / **6053** 470NC Spa2 [1 690 - 1 700 MHz]

MOD 6054 470ND Spa2

(2) Power flux density limits between [1 670 MHz and 2 500 MHz]

MOD 6055 470NE Spa2

a) The power flux density at the Earth's surface produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the following values:

-154 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-154 + 0.5\ (\delta - 5)$ dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

-144 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

NOC 6056 470NF Spa2

b) The limits given in No. **6055**/470NE apply in the frequency bands listed in No. **6057**/470NG which are allocated to transmission by space stations in the following space radiocommunication services:

[MOD]

[
- earth exploration-satellite service and in particular meteorological-satellite service (space-to-Earth)
- space research service (space-to-Earth)
- fixed-satellite service (space-to-Earth)
]

where these bands are shared with equal rights with the fixed or mobile service:

MOD 6057 470NG Spa2

[
1 670 - 1 690 MHz
1 690 - 1 700 MHz (for the countries mentioned in No. **3698**/354A)
1 700 - 1 710 MHz
1 770 - 1 790 MHz (for the countries mentioned in No. **3704**/356AA)
2 200 - 2 290 MHz
2 290 - 2 300 MHz
][1]

NOC 6058 470NGA Spa2

c) The power flux density values given in No. **6055**/470NE are derived on the basis of protecting the fixed service using line-of-sight techniques. Where a fixed service using tropospheric scatter operates in the bands listed in No. **6057**/470NG and where there is insufficient frequency separation, there must be sufficient angular separation between the direction to the space station and the direction of maximum radiation of the antenna of the receiving station of the fixed service using tropospheric scatter to ensure that the interference power at the receiver input of the station of the fixed service does not exceed -168 dBW in any 4 kHz band.

ADD 6057.1 [1] See No. 6045.1

/‾MOD_7	**6059**	470NH Spa2	(3) Power flux density limits between [2 500 MHz and 2 690 MHz.7 and the fixed-satellite service_7
MOD	**6060**	470NI Spa2	*a)* The power flux density at the Earth's surface produced by emissions from a space station in the [broadcasting-satellite service and the fixed-satellite service for all conditions and for all methods of modulation shall not exceed the following values:

−152 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−152 + 0.75 (δ − 5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−137 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD	**6061**	470NJ Spa2	*b)* The limits given in No. **6060**/470NI apply in the frequency band: [2 500 - 2 690 MHz7 which is shared by the [broadcasting-satellite service and the fixed-satellite service with the fixed or mobile service.7
NOC	**6062**	470NK Spa2	*c)* The power flux density values given in No. **6060**/470NI are derived on the basis of protecting the fixed service using line-of-sight techniques. Where a fixed service using tropospheric scatter operates in the band mentioned in No. **6061**/470NJ and where there is insufficient frequency separation, there must be sufficient angular separation between the direction to the space station and the direction of maximum radiation of the antenna of the receiving station of the fixed service using tropospheric scatter to ensure that the interference power at the receiver input of the station of the fixed service does not exceed −168 dBW in any 4 kHz band.

/ MOD / 6063 470NL Spa2

(4) **Power flux density limits between [3 400 MHz and 7 750 MHz]**

MOD 6064 470NM Spa2

a) The power flux density at the Earth's ~~surface~~ produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the following values:

−152 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-152 + 0.5\ (\delta - 5)$ dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−142 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD 6065 470NN Spa2

b) The limits given in No. **6064**/470NM apply in the frequency bands listed in No. **6066**/470NO which are allocated to transmission by space stations in the following space radiocommunication services:

[– fixed-satellite service (space-to-Earth)

– meteorological-satellite service (space-to-Earth)]

where these bands are shared with equal rights with the fixed or mobile service:

/ MOD / 6066 470NO Spa2

[3 400 - 4 200 MHz
7 250 - 7 300 MHz (for the countries mentioned in No. **3765**/392G)
7 300 - 7 750 MHz] 2

/ MOD / 6067 470NP Spa2

(5) **Power flux density limits between /8 025 MHz and 11.7 GHz/**

MOD 6068 470NQ Spa2

a) The power flux density at the Earth's ~~surface~~ produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the following values:

−150 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-150 + 0.5\ (\delta - 5)$ dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−140 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

ADD 6066.1 2 See No. 6045.1

/¯MOD_7 **6069** 470NR Spa2

b) The limits given in No. **6068**/470NQ apply in the frequency bands listed in No. **6070**/470NS which are allocated to transmission by space stations in the following space radiocommunication services:

[– earth exploration-satellite service (space-to-Earth)

– space research service (space-to-Earth)

– fixed-satellite service (space-to-Earth)]

where these bands are shared with equal rights with the fixed or mobile service:

/¯MOD_7 **6070** 470NS Spa2

[8 025 - 8 400 MHz
8 400 - 8 500 MHz
10·95 - 11·20 GHz
11·45 - 11·70 GHz]

/¯MOD_7 **6071** 470NT Spa2

(6) Power flux density limits between /12·50 GHz and 12·75 GHz_7

MOD **6072** 470NU Spa2

a) The power flux density at the Earth's ~~surface~~ produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the following values:

−148 dBW/m² in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-148 + 0.5\ (\delta - 5)$ dBW/m² in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−138 dBW/m² in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

/¯MOD_7 **6073** 470NV Spa2

b) The limits given in No. **6072**/470NU apply in the frequency band indicated in No. **6074**/470NW which is allocated to the /fixed-satellite service_7 for transmission by space stations where this band is shared with equal rights with the fixed or mobile service:

/¯MOD_7 **6074** 470NW Spa2

/12·50 - 12·75 GHz (Region 3 and for the countries mentioned in No. **3788**/405BD)._7

/¯MOD_7 **6075** 470NX Spa2

(7) Power flux density limits between /17·7 GHz and 22·0 GHz_7

MOD **6076** 470NY Spa2

a) The power flux density at the Earth's ~~surface~~ produced by emissions from a space station ~~or reflected from a passive~~ , including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the following values:

−115 dBW/m² in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-115 + 0.5\ (\delta - 5)$ dBW/m² in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

-105 dBW/m² in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

/ MOD / **6077** 470NZ Spa2

b) The limits given in No. **6076**/470NY apply in the frequency bands listed in No. **6078**/470NZA which are allocated to transmission by space stations in the following space radiocommunication services:

[– fixed-satellite service (space-to-Earth)

– earth exploration-satellite service (space-to-Earth)]

where these bands are shared with equal rights with the fixed or mobile service:

/ MOD / **6078** 470NZA Spa2

[17·7 - 19·7 GHz
21·2 - 22·0 GHz] 3

/ MOD / **6079** 470NZB Spa2

[(8) The limits given in Nos. **6051**/470NA, **6055**/470NE, **6060**/470NI, **6064**/470NM, **6068**/470NQ, **6072**/470NU and **6076**/470NY may be exceeded on the territory of any country the administration of which has so agreed.]

ADD 6078.1

3 See No. 6045.1

ADD 6079E

Power flux-density limits between / 38.5 GHz and 40.5 / GHz.

ADD 6079F

The power flux-density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation shall not exceed the values given in 6076.(1)

ADD 6079F.1

The provisions of 6079F shall apply until such time as the CCIR has made a Recommendation as to the values of power flux-density limit which should apply in the frequency band specified in 6079H, at which time all systems shall meet those power flux-density limits recommended by CCIR.

ADD 6079G

The limits given in 6079F apply in the frequency band given in 6079H which is allocated to transmission by space stations in the / fixed-satellite service / where this band is shared with equal rights with the fixed or mobile services.

ADD 6079H

/ 38.5 - 40.5 GHz /

6080 to 6104 **NOT allocated.**

ARTICLE N27

NOC Special Rules Relating to Space Radiocommunication Services

NOC Section I. Cessation of Emissions

NOC 6105/470V Spa2 § 1. Space stations shall be fitted with devices to ensure immediate cessation of their radio emissions by telecommand, whenever such cessation is required under the provisions of these Regulations.

MOD Section II. Control of Interference into ~~between~~ Geostationary-Satellite Systems ~~and-non-synchronous-inclined-Orbit-Satellite-Systems~~

MOD 6106/470VA Spa2 § 2. Non-geostationary space stations shall cease or reduce to a negligible level radio emissions, and their associated earth stations shall not transmit to them whenever there is insufficient angular separation between the non-geostationary satellite and geostationary satellites and unacceptable interference[1] to geostationary satellite space systems in the fixed-satellite service operating in accordance with these Regulations.

ADD 6106A In the frequency band /̄ 27.5 - 30 /̄ GHz space stations in the Earth exploration-satellite service on board geostationary satellites and operating with space stations in the Earth exploration-satellite service on board non-geostationary satellites shall have the following restriction :

Whenever the emissions from the geostationary satellites are directed towards the geostationary satellite orbit and cause unacceptable interference[1] to any geostationary satellite space system in the fixed-satellite service, these emissions shall be reduced to a level at or less than accepted interference[1].

ADD 6106.1 [1]The level of accepted interference shall be fixed by agreement between the Administrations concerned, using the relevant CCIR Recommendations as a guide.

NOC Section III. Station Keeping of Space Stations[1]

MOD 6107/470VB Spa2 § 3.1 Space stations on geostationary satellites which use any frequency band allocated to the fixed-satellite service or the broadcasting-satellite service[2]:

MOD 6108/470VC Spa2 - shall have the capability of maintaining their positions within ± 0.1 degree of the longitude of their nominal positions;

MOD 6109/470VD Spa2 - shall maintain their positions within ± 0.1 degree of longitude of their nominal positions; but

ADD 6109A - experimental stations on geostationary satellites need not comply with No. 6108 nor No. 6109, but shall maintain their positions within ± 0.5 degree of longitude of their nominal positions;

MOD 6110/470VE Spa2 - however, space stations need not comply with No. 6109/470VD nor No. 6109A as appropriate as long as the satellite network to which the space station belongs does not produce unacceptable interference[3] ~~, an unacceptable level of interference[1]~~ into any other satellite network whose space station complies with the limits given in No. 6109/470VD and No. 6109A.

ADD 6110A § 3.2 Space stations on geostationary satellites which do not use any frequency band allocated to the fixed-satellite service or the broadcasting-satellite service :

ADD 6110B - shall have the capability of maintaining their positions within ± 0.5 degree of the longitude of their nominal positions;

ADD 6110C - shall maintain their positions within ± 0.5 degree of longitude of their nominal positions; but

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NOC A.N27 Spa2 S.III [1]In the case of space stations on geosynchronous satellites with orbits having an angle of inclination greater than 5 degrees the positional tolerance shall relate to the nodal point.

ADD 6107.1 [2]Space stations in the broadcasting-satellite service on geostationary satellites operating in the band /̅ 11.7 - 12.5 7̲ GHz are exempted from these provisions but shall maintain their positions in accordance with /̅ the Final Acts of WARC-77 7̲.

MOD 6110.1/470VE.1 Spa2 [3]See No. 6106.1.

ADD 6110D — need not comply with No. 6110C as long as the satellite network to which the space station belongs does not produce an unacceptable level of interference[4] into any other satellite network whose space station complies with the limits given in No. 6110C.

ADD 6110E § 3.3 Space stations[5] on geostationary satellites which are put into service prior to /̲ 5 years from date of entry into force of the Final Acts of WARC-79 /̲ with the advance publication information for the network having been published before /̲ the date of entry into force of the Final Acts of WARC-79 /̲ are exempted from provisions of No. 6107 to No. 6110D inclusive; however they

ADD 6110F — shall have the capability of maintaining their positions within ± 1 degree of the longitude of their nominal positions, but efforts should be made to achieve a capability of maintaining their positions at least within ± 0.5 degree of the longitude of their nominal positions;

ADD 6110G — shall maintain their positions within ± 1 degree of longitude of their nominal positions; but

ADD 6110H — need not comply with No. 6110G as long as the satellite network to which the space station belongs does not produce unacceptable interference[6] into any other satellite network whose space station complies with the limits given in No. 6110G.

ADD 6110D.1 [4]See No. 6106.1.

ADD 6110E.1 [5]See No. 6107.1.

ADD 6110H.1 [6]See No. 6106.1.

NOC

Section IV. Pointing Accuracy of Antennae on Geostationary Satellites

MOD **6111/470VF** Spa2

§ 4. The pointing direction of maximum radiation of any earthward beam of antennae on geostationary satellites[1] shall be capable of being maintained within:

10 % of the half power beamwidth relative to the nominal pointing direction, *or*

$\boxed{0.3}$ ~~0.5~~ degree relative to the nominal pointing direction,

whichever is greater. This provision applies only when such a beam is intended for less than global coverage.

In the event that the beam is not rotationally symmetrical about the axis of maximum radiation, the tolerance in any plane containing this axis shall be related to the half power beamwidth in that plane.

This accuracy shall be maintained only if it is required to avoid unacceptable interference[2] to other systems.

NOC

Section V. Power Flux Density at the Geostationary Satellite Orbit

/ MOD /**6112/470VG** Spa2

§ 5. In the frequency band [8 025 to 8 400] MHz, which the [Earth exploration-satellite service using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space)] the maximum power flux density produced at the geostationary satellite orbit by any earth exploration-satellite service space station shall not exceed -174 dBW/m^2 in any 4 kHz band.

ADD 6111.1 [1] Transmitting antennae of space stations in the broadcasting-satellite service operating in the band / 11.7 - 12.5 / GHz are not subject to these provisions but shall maintain their pointing accuracy in accordance with / paragraph 3.14.1 of Annex 8 of the Final Acts of WARC-77 /.

MOD 6111.2/470VF.1 Spa2 [2] See No. 6106.1.

ADD

Section VI. Radio Astronomy in the Shielded Zone of the Moon

ADD 6113

§ 6. (1) In the shielded zone of the Moon[1] emissions creating harmful interference for radio astronomy observations[2] and other passive users as defined in these Regulations shall be prohibited in the entire frequency spectrum with the following exceptions :

a) the frequency bands allocated to the space research /‾(active)_7 service;

b) the frequency bands allocated to the space operations service, the earth exploration satellite /‾(active)_7 service, and radiolocation stations on spaceborne platforms, that are required for the support of space research, and for radiocommunications and space research transmissions within the lunar shielded zone.

ADD 6114

(2) In frequency bands in which emissions are not prohibited by [ADD 6113], radio astronomy observations and passive space research in the shielded zone of the Moon may be protected from harmful interference by agreement between Administrations concerned.

ADD

Section VII. Earth Station Off-axis Power Limitations

ADD 6115

The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station at angles in the direction of the geostationary satellite orbit off the main-beam axis has a significant impact on interference into other geostationary satellite networks. Enhanced utilization of the geostationary satellite orbit and easier coordination would be attained by minimizing such off-axis radiation and Administrations are encouraged to achieve the lowest values practicable bearing in mind the latest CCIR Recommendations. Minimizing such levels is particularly important in intensively used up-link bands.

ADD 6113.1

[1]The shielded zone of the Moon comprises the area of the Moon's surface and an adjacent volume of space which are shielded from emissions originating within a distance of 100,000 km from the centre of the Earth.

ADD 6113.2

[2]The level of harmful interference is determined by agreement between the Administrations concerned, with the guidance of the relevant CCIR Recommendations.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 623-E
13 November 1979
Original : English

COMMITTEE 5

Japan

RESOLUTION No. /‾ _/

Relating to the Enforcement in Region 1 of the LF Broadcasting Plan of the Regional Administrative Conference, Geneva 1975

The World Administrative Radio Conference, Geneva 1979,

noting

that the use of the LF broadcasting stations in Region 1 could affect the stations of other radiocommunication services to which these bands are allocated in Regions 2 and 3 and particularly stations in the aeronautical radionavigation service involving the safety of human life;

considering

a) that the Plan includes a number of new broadcasting transmitters in these bands and increases in the power of transmitters already in use, thereby considerably increasing the probability of harmful interference to the safety services;

b) the Resolution No. 7 and Recommendation No. 2 of the Regional Administrative LF/MF Broadcasting Conference, Geneva 1975;

c) that the Report of the CCIR Special Preparatory Meeting for the World Administrative Radio Conference, 1979 concluded, in 4.4.4.1, that harmful interference will result to the aeronautical radionavigation service by the sharing of the same band with the broadcasting service, that the possibility of such interference between regions does exist, and that further study of this matter will therefore be necessary to determine the full extent of the problem;

taking into account

the provisions of No. 117 of the Radio Regulations;

resolves

1. that new LF broadcasting transmitters shall not be brought into use nor changes be made to the characteristics of existing LF broadcasting transmitters until CCIR technical standards concerning the interference from LF broadcasting to aeronautical radionavigation are established and coordination between these services are made by IFRB to the satisfaction of all countries concerned;

2. that the CCIR shall develop the required technical standards by the date of /‾ _/;

3. that the IFRB shall coordinate the interference problem utilizing established technical standards and taking into account the provision of Radio Regulations No. 117.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 624-E
13 November 1979
Original : English

WORKING GROUP 6A

Report by Sub-Working Group 6A2 to Working Group 6A

DRAFT RESOLUTION RELATING TO THE BRINGING INTO USE OF STATIONS IN THE AMATEUR-SATELLITE SERVICE

Proposal USA/48/614 has been considered by representatives of the delegations of Australia, United States of America, France and USSR, and an observer from the IARU. The agreed revised text is annexed.

J.A. LEWIS
Chairman of Sub-Working Group 6A2

Annex : 1

ANNEX

RESOLUTION No. [6A2]

Relating to the Bringing into Use of Stations in the Amateur-Satellite Service

The World Administrative Radio Conference, Geneva, 1979,

recognizing

that the procedures of Articles N11 and N13 may be applied to the amateur-satellite service;

recognizing further

a) that the characteristics of Earth stations in the amateur-satellite service vary widely;

b) that space stations in the amateur-satellite service are intended for multiple access by amateur Earth stations in all countries;

c) that coordination among stations in the amateur and amateur-satellite services is accomplished without the need for formal procedures;

d) that the burden of avoiding interference is placed upon the amateur-satellite service pursuant to No. 6362/1567A;

finds

that certain of the information specified in Appendices 1A and 1B cannot reasonably be provided for Earth stations in the amateur-satellite service; and

resolves

that when an Administration (or one acting on behalf of a group of named Administrations) intends to establish a satellite system in the amateur-satellite service and wishes to apply the procedures of Articles N11 and N13, those procedures shall apply with the following modifications :

1. that in the case of Earth stations the submission of as much information as possible in compliance with the provisions of Nos. 4100/639AA, 4114/639AJ, and 4575/639BA in the completion of Appendices 1A and 1B shall be considered complete and shall be published by the IFRB in a special section of its weekly circular with an expiration date for comments;

2. that this information shall include at least the characteristics of a typical Earth station having the facility to transmit signals to the space station to initiate, modify, or terminate the functions of the space station.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 625-E
13 November 1979
Original : English

COMMITTEE 7

NOTE FROM THE CHAIRMAN OF COMMITTEE 6

TO THE CHAIRMAN OF COMMITTEE 7

During the examination of Article N13, Committee 6 has considered proposals relating to the inclusion of the principles of Resolution No. 5 in the body of Articles N11, N12 and N13, together with the text of a footnote relating to the notification by an administration of frequency assignments to stations situated in the territory of the country of another administration.

These draft texts, which are still under consideration, together with the text of the footnote are shown in the Annex for your information.

During the discussion, the question of territories over which there is dispute of sovereignty and of occupied territories was raised. It was agreed that, for radiocommunication stations situated in a territory over which there is a dispute of sovereignty or in occupied territories, the application of the above-mentioned Articles of the Radio Regulations would not signify recognition by the Union of the sovereignty over the territory in question for the country concerned. Proposals were made to include, at the beginning of the Radio Regulations, a Preamble which would cover this subject.

Committee 7 is requested to consider the possibility of including a Preamble to that effect in the Radio Regulations, in a suitable position so that it would be applicable to all the relevant provisions of the Radio Regulations.

After Committee 7 has taken a decision on this matter, Committee 6 will examine the possible implications in Articles N11, N12 and N13.

Dr. M. JOACHIM
Chairman of Committee 6

Annex : 1

ANNEX

DRAFT TEXTS TO BE ENTERED IN ARTICLE N13
(AS WELL AS IN ARTICLES N11 AND N12)

ADD 4577A (3A) Frequency assignments to an Earth station shall be notified by the Administration of the country on whose territory [1] the Earth station is located, unless specifically stipulated otherwise by special arrangements in accordance with Article 31 of the Convention communicated to the Union by the Administrations. Frequency assignments to a space station shall be notified by the Administration (or one acting on behalf of a group of named Administrations) for which the space station is to be brought into use.

/ ADD 4577A.1 [1]If a notice is received from an Administration for a frequency assignment to an Earth station situated on a territory over which there is a dispute of sovereignty, an entry in the Master Register, after examination by the Board, does not signify recognition of the sovereignty of a country over the territory in question. /

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 626-E
12 November 1979
Original : English

COMMITTEE 7

United Kingdom

PROPOSALS FOR THE WORK OF THE CONFERENCE

At its 33rd Session (1978) the Administrative Council adopted Resolution No. 814 (Document No. 6) drawing the attention of this Conference to the need for a general mobile conference to be held as soon as possible to revise those Radio Regulations which could not be revised in substance at this Conference. The need for such a conference has been recognized in discussion in Committees and Working Groups of this Conference and has been endorsed in Plenary in Recommendation C (Document No. 466 - page 58). The revision of those Regulations would complete the revision of the entire Radio Regulations which was the objective indicated by Resolution No. 28 of the Plenipotentiary Conference (Malaga-Torremolinos, 1973).

To enable the Administrative Council to take action on the decisions of this Conference it is now necessary to make an appropriate resolution. The draft in the Annex is therefore submitted for consideration.

Annex : 1

A N N E X

RESOLUTION

Relating to the Convening of a General Mobile Conference

The World Administrative Radio Conference, Geneva, 1979,

considering

a) Resolution No. 814 of the Administrative Council;

b) Recommendation /‾C_7 of the World Administrative Radio Conference, 1979;

recognizing

a) that the agenda of the World Administrative Radio Conference, 1979 provided for partial revision of the Radio Regulations and that complete revision would require an appropriate conference to be convened to revise the substance of the remaining articles, particularly those in Chapters /‾NIX - NXII_7;

b) that substantive changes made by the World Administrative Radio Conference, 1979 within its terms of reference to certain articles of the Radio Regulations, including changes to the Frequency Allocation Table, may need to be taken into account;

c) that, in particular, where changes have been made by the World Administrative Radio Conference, 1979 to the frequency allocations to mobile services it may be necessary for consequential changes to be made to channelling plans and other sub-divisions of those frequency bands for the service concerned;

d) that such changes should be brought into force at the same time as the related changes to the Frequency Allocation Table;

resolves

that the Administrative Council arrange for a general mobile conference to be convened as early as possible and, in any event, not later than 1982 to revise the provisions of the Radio Regulations which relate specifically to the mobile services, and in particular Chapters /‾NIX - NXII_7;

invites

the CCIR to prepare the necessary technical and operating bases for that conference.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 627-E
13 November 1979
Original : English

COMMITTEE 5

NOTE TO THE CHAIRMAN OF COMMITTEE 5

Committee 6 has considered Document No. 376 in which Committee 5 requests the advice of Committee 6 on the definitions of the terms "standard earth station" and "transportable earth station".

Committee 6 has decided that a definition of the term "standard earth station" was not required. It is, however, desirable to have a definition of the term "transportable earth station", it being understood that such types of stations could be part of different satellite services.

Dr. M. JOACHIM
Chairman of Committee 6

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 628-E
13 November 1979
Original : English

PLENARY MEETING

FOURTEENTH REPORT OF COMMITTEE 4

Committee 4 has unanimously adopted the texts for Appendix 28 and Appendix 29 which have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 629).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 629-E
13 November 1979
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COMMITTEE 9

FOURTEENTH SERIES OF TEXTS FROM COMMITTEE 4 TO THE EDITORIAL COMMITTEE

Committee 4 has examined Appendix 28 (Document No. 476) and Appendix 29 (Document No. 334 (Rev.1)).

The amended texts (mentioned in Document No. 628) are hereby submitted to the Editorial Committee.

N. MORISHIMA
Chairman of Committee 4

Annex : 1

A N N E X

APPENDIX 28

Method for the Determination of the Coordination Area around an Earth Station in Frequency Bands between 1 and 40 GHz shared between Space and Terrestrial Radiocommunication Services

1. Objectives

The coordination area /‾see No. 103D_/ is determined by calculating, in all directions of azimuth from the earth station, the coordination distances /‾see No. 103B_/ and drawing to scale on an appropriate map the coordination contour /‾see No. 103C_/.

It must be emphasized that the presence or installation of a terrestrial station within the coordination area of an earth station would not necessarily preclude the successful operation of either the earth station or that terrestrial station, since the method is based on the most unfavourable case assumptions as regards interference.

For the determination of the coordination area two cases may have to be considered :

1) for the earth station when it is transmitting (and hence capable of interfering with terrestrial stations).

2) for the earth station when it is receiving (and hence capable of being interfered with by terrestrial stations);

Where an earth station is intended to transmit a variety of classes of emissions, the earth station parameters to be used in the determination of the coordination contour shall be those which lead to the greatest coordination distances, for each earth station antenna beam and in each allocated frequency band which the earth station proposes to share with the terrestrial services.

Where an earth station is intended to receive a variety of classes of emissions, the earth station parameters to be used in the determination of the coordination contour shall be those which lead to the greatest coordination distances, for each earth station antenna beam and in each allocated frequency band which the earth station proposes to share with the terrestrial services, /‾except in cases where the Administration responsible for the earth station determines that a smaller coordination contour would adequately protect all the transmissions intended to be received by the earth station. When the determination of such a smaller coordination contour is based on a departure from the procedure of this Appendix, the notifying Administration shall indicate, in detail, the nature of such departure.

If subsequently an Administration decides to protect its receiving earth station through notification of a coordination contour which is greater than the one it had notified under a departure from the method of this Appendix, it must recoordinate the earth station. Any resulting greater protection shall be effective from the date of publication of the notice in part II of the weekly circular._/

This Appendix provides methods which are suitable for either graphical or computer determination of the coordination area.

It is suggested to draw, together with the coordination contour, auxiliary contours based on less unfavourable assumptions than those chosen for the determination of the coordination contour. These auxiliary contours may be used during subsequent negotiations between the Administrations concerned with a view to eliminating from the discussions (without the need for more precise calculations) the case of certain existing or planned stations located within the coordination area. The determination and use of these auxiliary contours is explained in Annex III to this Appendix.

2. General considerations

2.1 Concept of minimum permissible transmission loss

The determination of coordination distance as the distance from an earth station beyond which interference from or into a terrestrial station may be considered to be negligible is based on the premise that the attenuation of an unwanted signal is a monotonically increasing function of distance.

The amount of attenuation required between an interfering transmitter and an interfered-with receiver is given by the minimum permissible transmission loss (in dB) for p % of the time, a value which must be exceeded by the predicted transmission loss for all but p % of the time.

$$L(p) = P_{t'} - P_r(p) \qquad (1)$$

where :

$P_{t'}$ *) : maximum available transmitting power level (in dBW) in the reference bandwidth at the input to the antenna of an interfering station;

$P_r(p)$: permissible level of an interfering emission (in dBW) in the reference bandwidth, to be exceeded for no more than p percent of the time at the output of the receiving antenna of an interfered-with station, where the interfering emission originates from a single source.

$P_{t'}$ and $P_r(p)$ are defined for the same radio frequency bandwidth (reference bandwidth) and $L(p)$ and $P_r(p)$ for the same percentage of the time, dictated by the performance criteria of the interfered-with system.

*) Primes refer to the parameters associated with the interfering station.

For the small percentages of the time which are of interest here, it is necessary to distinguish between two significantly different attenuation mechanisms :

- attenuation of signals subject to tropospheric propagation via near-great circle paths; mode (1) see § 3.
- attenuation of signals subject to scatter due to hydrometeors; mode (2) see § 4.

2.2 Concept of minimum permissible basic transmission loss

In the case of propagation mode (1) the transmission loss is defined in terms of separable parameters, viz. : a basic transmission loss, (i.e. attenuation between isotropic antennae) and the effective antenna gains at either end of an interference path. The minimum permissible basic transmission loss may then be expressed as :

$$L_b(p) = P_{t'} + G_{t'} + G_r - P_r(p) \qquad (2)$$

where :

$L_b(p)$: minimum permissible basic transmission loss (in dB) for p % of the time; this value must be exceeded by the predicted basic transmission loss for all but p % of the time.

$G_{t'}$: gain (in dB relative to isotropic) of the transmitting antenna of the interfering station. If the interfering station is an earth station, this is the antenna gain towards the physical horizon on the azimuth considered; in the case of a terrestrial station, the maximum antenna gain is to be used;

G_r : gain (in dB relative to isotropic) of the receiving antenna of the interfered-with station. If the interfered-with station is an earth station, this is the gain towards the physical horizon on the azimuth considered; in the case of a terrestrial station, the maximum antenna gain is to be used.

Annex 1 provides numerical and graphical methods to determine the angle between the earth station antenna main beam and the physical horizon, and of the horizon antenna gain, as functions of azimuth angle.

When considering non-geostationary satellites, $G_{t'}$ or G_r (whichever pertains to the earth-station antenna) is variable with time. In such cases, an equivalent time-invariant earth-station antenna gain is to be used.*) This equivalent gain is either 10 dB less than the maximum horizon antenna gain or is that value of horizon antenna gain exceeded for no more than 10 % of the time (if available), whichever is the greater.

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*) This equivalent antenna gain is not to be used when the earth-station antenna points in the same direction for appreciable periods of time (e.g. when working to space probes or to satellites which are almost geostationary).

2.3 Derivation and tabulation of interference parameters

2.3.1 Permissible level of the interfering emission

The permissible level of the interfering emission (in dBW) in the reference bandwidth, to be exceeded for no more than p percent of the time at the output of the receiving antenna of a station subject to interference, from each source of interference, is given by the general formula below :

$$P_r(p) = 10 \log (kT_eB) + J + M(p) - W \qquad (3)$$

where :

$$M(p) \equiv M(p_0/n) = M_0(p_0) \qquad (4)$$

with :

k : Boltzmann's constant, 1.38×10^{-23} J/K;

T_e : thermal noise temperature of the receiving system (K), at the output of the receiving antenna (see Note 1);

B : reference bandwidth (in Hz) (bandwidth, of the interfered-with system, over which the power of the interfering emission can be averaged);

J : ratio (in dB) of the permissible long term (20 % of the time) interfering emission power to the thermal noise power of the receiving system, referred to the output terminals of the receiving antenna (see Note 2);

p_0 : percentage of the time during which the interference from all sources may exceed the permissible value;

n : number of expected entries of interference, assumed to be uncorrelated;

p : percentage of the time during which the interference from one source may exceed the permissible value; since the entries of interference are not likely to occur simultaneously : $p = p_0/n$;

$M_0(p_0)$: ratio (in dB) between the permissible power of the interfering emission, during p_0 % and 20 % of the time, respectively, for all entries of interference (see Note 3);

$M(p)$: ratio (in dB) between the permissible power of the interfering emission during p % of the time for one entry of interference, and during 20 % of the time for all entries of interference;

W : equivalence factor (in dB) relating inteference from interfering emissions to that caused by the introduction of additional thermal noise of equal power in the reference bandwidth. It is positive when the interfering emissions would cause more degradation than thermal noise (see Note 4).

Tables I and II list values for the above parameters.

In certain cases, an Administration may have reason to believe that, for its specific earth station, a departure from the values associated with the earth station, as listed in Table II, may be justified. Attention is drawn to the fact that for specific systems the bandwidths B or, as for instance in the case of demand assignment systems, the percentages of the time p and p_0 may have to be changed from the values given in Table II. For further information see paragraph 2.3.2.

Note 1 : The noise temperature, in degrees Kelvin, of the receiving system, referred to the output terminals of the receiving antenna, may be determined from :

$$T_e = T_a + (e - 1)\,290 + eT_r \qquad (5a)$$

where T_a = noise temperature, in degrees K, contributed by the receiving antenna;

e = numerical loss in the transmission line (e.g. a waveguide) between antenna and receiver front end;

T_r = noise temperature, in degrees K, of the receiver front end, including all successive stages, referred to the front end input.

For radio-relay receivers and where the wave-guide loss of a receiving Earth station is not known, a value of e = 1.0 is to be used.

Note 2 : The factor J (in dB) is defined as the ratio of total permissible long term (20 % of the time) power of interfering emissions in the system, to the long term thermal radio frequency noise power in a single receiver. In the computation of this factor, the interfering emission is considered to have a flat power spectral density, its actual spectrum shape being taken into account by the factor W (see below). For example, in a 50-hop terrestrial hypothetical reference circuit, the total allowable additive interference power is 1000 pW0p (Recommendation 357-3) and the mean thermal noise power in a single hop may be assumed to be 25 pW0p. Therefore, since in a FDM/FM system the ratio of a flat interfering noise power to the thermal noise power in the same reference band is the same before and after demodulation, J is given by the ratio 1000/25 expressed in dB, i.e. J = 16 dB. In a fixed-service satellite system, the total allowable interference power is also 1000 pW0p (Recommendation 356-4), but the thermal noise contribution of the down path is not likely to exceed 7000 pW0p, hence $J \geqslant -8.5$ dB.

In digital systems interference is measured and prescribed in terms of the bit error rate or its permissible increase. While the bit error rate increase is additive in a reference circuit comprising tandem links, the radio frequency power of interfering emissions giving rise to such bit error rate increase is not additive, because bit error rate is not a linear function of the level of the radio frequency power of interfering emissions. Thus, it may be necessary to protect each receiver individually. For digital radio-relay systems operating above 10 GHz, and for all digital satellite systems, the long term interference power may be of the same order of magnitude as the long term thermal noise, hence J = 0 dB. For digital radio-relay systems operating below 10 GHz, long term interference power should not decrease the receiver fade margin by more than 1 dB. Thus the long term interference power should be about 6 dB below the thermal noise power and hence J = -6 dB.

Note 3 : $M_0(p_0)$ (in dB) is the "interference margin" between the short term (p_0 %) and the long term (20 %) allowable powers of an interfering emission.

For analogue radio-relay and fixed-satellite systems in bands between 1 and 15 GHz, this is equal to the ratio (in dB) between 50000 and 1000 pW0p (17 dB).

In the case of digital systems, system performance at frequencies above 10 GHz can in most areas of the world usefully be defined as the percentage of the time p_0 for which the wanted signal is allowed to drop below its operating threshold, defined by a given bit error rate. During non-faded operation of the system, the desired signal will exceed its threshold level by some margin M_s which depends on the rain climate in which the station operates. The greater this margin, the greater can be the enhancement of the interfering emission which would degrade the system to threshold performance. As a first order estimate it may be assumed that, for small percentages of the time (of the order of 0.001 % to 0.003 %), the level of interfering emissions may be allowed to equal the thermal noise which exists at the demodulator input during faded conditions. Thus, M_0 in Tables I and II of § 2 may, for digital systems operating above 10 GHz, be assumed to be equal to the fading margin M_s of the system. For digital radio-relay systems operating below 10 GHz it is assumed that the short term power of an interfering emission can be allowed to exceed the long term power of the interfering emission by an amount equal to the fade margin of the system minus J, i.e. 41 dB, where J = -6 dB.

Note 4 : The factor W (in dB) is the ratio of radio frequency thermal noise power to the power of an interfering emission in the reference bandwidth when both produce the same interference after demodulation (e.g. in a FDM/FM system it would be expressed for equal voice channel performance : in a digital system it would be expressed for equal bit error probabilities). For FM signals, it is defined as follows :

$$W = 10 \log \left\{ \frac{\text{Interference power in the receiving system after demodulation}}{\text{Thermal noise power in the receiving system after demodulation}} \times \frac{\text{Thermal noise power at the output of the receiving antenna in the reference bandwidth}}{\text{Power of the interfering emission at the radio frequency in the reference bandwidth, at the output of the receiving antenna}} \right\} \quad (5b)$$

The factor W depends on the characteristics of the wanted and the interfering signals. To avoid the need for considering a wide range of characteristics, upper limit values were determined for the factor W. When the wanted signal uses FM modulation with r.m.s. modulation indices which are greater than unity, W is not higher than 4 dB. In such cases, a conservative figure of 4 dB will be used for the factor W in (3), regardless of the characteristics of the interfering signal. For low-index FDM/FM systems a very small reference bandwidth (4 kHz) implies values of W not greater than 0 dB. In such cases, a conservative figure of 0 dB will be used for W in (3) regardless of the characteristics of the interfering signal.

When the wanted signal is digital, W is usually equal to or less than 0 dB, regardless of the characteristics of the interfering signal.

2.3.2 Coordination parameters for very narrow band transmissions (receiving Earth station)

2.3.2.1 General

In the case of an Earth station which receives both broadband and very narrow band transmissions (e.g. SCPC transmissions) it may be desirable to draw two separate coordination contours; one for the narrow band transmissions and one for broadband transmissions, giving the specific sections of frequency bands used for very narrow band transmissions.

2.3.2.2 Pre-assigned narrow band transmissions

For such transmissions, it is appropriate to change the value of the reference bandwidth to the value of the bandwidth occupied by one such narrow band transmission.

2.3.2.3 Demand-assigned narrow band transmissions

For such transmissions, in addition, it may be appropriate to take into account the reduced probability that a particular frequency channel will be suffering interference at the time when it is actually selected for use at an Earth station.

Administrations shall furnish all relevant technical data used in the determination of the coordination contour(s) for such transmissions.

3. Determination of co-ordination distance for propagation mode (1) – Great circle propagation mechanisms

3.1 *Radio-climatic zones*

In the calculation of co-ordination distance for propagation mode (1), the world is divided into three basic radio-climatic regions termed Zones A, B and C. These Zones are defined as follows:

Zone A: Entirely land.

Zone B: Seas, oceans and substantial bodies of inland water (as a criterion of a substantial body of water, one which can encompass a circle of diameter 100 km) at latitudes greater than 23.5° N or S, but excepting the Black Sea and the Mediterranean.

Zone C: Seas, oceans and substantial bodies of inland water (as a criterion of a substantial body of water, one which can encompass a circle of diameter 100 km) at latitudes less than 23.5° N or S, and the Black Sea and the Mediterranean.

3.2 *Calculation of co-ordination distance for paths within a single radio-climatic zone*

3.2.1 *General*

Equation (2) provides the value of minimum permissible basic transmission loss $L_b(p)$ for p percent of the time. From this minimum permissible basic transmission loss, the co-ordination distance in each radio-climatic zone is derived using either of two alternative methods. The first method described in § 3.2.2, is a numerical method comprising several mathematical equations, and is intended principally for use with the aid of a computer. The second method is a graphical method and is described in § 3.2.3.

Where the distance derived in §§ 3.2.2 or 3.2.3 lies entirely within the boundary of the radio-climatic zone appropriate to the earth station, that distance is taken as the actual co-ordination distance for propagation mode (1). If the distance extends beyond the boundary of one radio-climatic zone, the overall co-ordination distance is obtained using the method given in § 3.3.

3.2.2 *Numerical method*

The minimum permissible basic transmission loss is related to co-ordination distance by the following expression:

$$L_b(p) = A_0 + \beta d_1 + A_h \tag{6}$$

in which:

$A_0 = 120 + 20 \log f$ (dB)

β : rate of attenuation (dB/km)

d_1 : co-ordination distance for propagation mode (1), (km)

A_h : horizon angle correction (dB)

f: frequency (GHz)

A_h is given by :

$$A_h = 20 \log (1 + 4.5 f^{\frac{1}{2}}\varepsilon) + f^{1/3}\varepsilon \text{ for } \varepsilon > 0^{\circ} * \tag{7a}$$

* Equation (7a) and thus Figure 1 should be used with caution at frequencies higher than about 20 GHz or for horizon angles above 5° until further studies have been completed by the CCIR in accordance with /̲ Resolution ... /̲.

$A_h = 8\,\varepsilon$ for $-0.5° \leqslant \varepsilon \leqslant 0°$ (7b)

$A_h = -4$ for $\varepsilon \leqslant -0.5°$ (7c)

in which ε = horizon angle * (degrees)

From equation (6) the co-ordination distance d_1 may be found as follows:

$$d_1 = (L_b(p) - A_0 - A_h)/\beta \tag{8}$$

The value of β depends on the radio-climatic zone and the percentage of time p, and is the sum of three components:

$$\beta = \beta_z + \beta_v + \beta_o \tag{9}$$

in which

β_z : rate of attenuation (dB/km) due to all effects except atmospheric gases.

β_v : rate of attenuation (dB/km) due to atmospheric water vapour.

β_o : rate of attenuation (dB/km) due to oxygen.

β_z depends on the radio-climatic zone, frequency and the percentage of time as follows:

for Zone A,

$$\beta_{zA} = 0.154\,(1 + 3.05 \log f)^{0.4}\,(0.9028 + 0.0486 \log p)^2 \tag{10}$$

for Zones B and C,

$$\beta_{zB} = \beta_{zC} = (0.272 + 0.047 \log p)^2 \tag{11}$$

β_V depends on the frequency and the density of water vapour in the air as follows (β_V may be neglected when $f < 15$ GHz):

$$\beta_v = 3.5 \times 10^{-4}\rho\left[\frac{1}{\left(1 - \dfrac{22.3}{f}\right)^2 + \dfrac{9}{f^2}} + \frac{1}{\left(1 + \dfrac{22.3}{f}\right)^2}\right] + 3 \times 10^{-6}\rho\, f^2 \tag{12}$$

where ρ is the water vapour density (g/m^3), and depends on the radio-climatic zone. The following values are to be used :

Zone A, ρ = 1 g/m^3
Zone B, ρ = 2 g/m^3
Zone C, ρ = 5 g/m^3

$$\beta_o = 68 \times 10^{-4} \times f^2 \left\{\frac{1}{(60 - f)^2} + \frac{1}{(60 + f)^2} + \frac{1}{(f^2 + 0.36)}\right\} \tag{13}$$

Thus the co-ordination distance in Zone A is derived for the appropriate frequency, percentage of time and horizon angle using equations (7), (8), (9), (10), (12) and (13). Similarly, the co-ordination distance in Zone B or C is derived using equations (7), (8), (9), (11), (12) and (13).

3.2.3 *Graphical method*

The equations given in § 3.2.2 have been converted into graphical form, to provide a second method of obtaining co-ordination distance for propagation mode (1). It is emphasized that the procedure described in this section is an alternative to that described in § 3.2.2 and each Administration should use the method which is considered most convenient.

* Horizon angle is defined here as, viewed from the centre of the earth-station antenna, the angle between the horizontal plane and a ray that grazes the visible physical horizon in the direction concerned.

The minimum permissible basic transmission loss $L_b(p)$ is obtained from equation (2). The "co-ordination loss", L_1, is obtained from the minimum permissible basic transmission loss by subtraction of the horizon angle correction A_h:

$$L_1 = L_b(p) - A_h \tag{14}$$

Values for the horizon angle correction are obtained from Fig. 1 for the appropriate frequency and horizon angle.*

The co-ordination distance in each radio-climatic zone is to be obtained as follows. Taking Zone A first, the co-ordination distance for 0.01% of the time, d_A (0.01) is obtained with the appropriate value of co-ordination loss L_1 and frequency from Fig. 2. The Zone A co-ordination distance for p% of the time is then obtained by multiplying the distance for 0.01% of the time by the factor Δp_A given in Fig. 3.

$$d_A = d_A(0.01) \times \Delta p_A \tag{15}$$

In a similar manner, the co-ordination distance in Zone B is obtained using values for d_B (0.01) and Δp_{BC} obtained from Figs. 4 and 3 respectively. The co-ordination distance in Zone C is obtained using values for d_C (0.01) and Δp_{BC} obtained from Figs. 5 and 3 respectively.

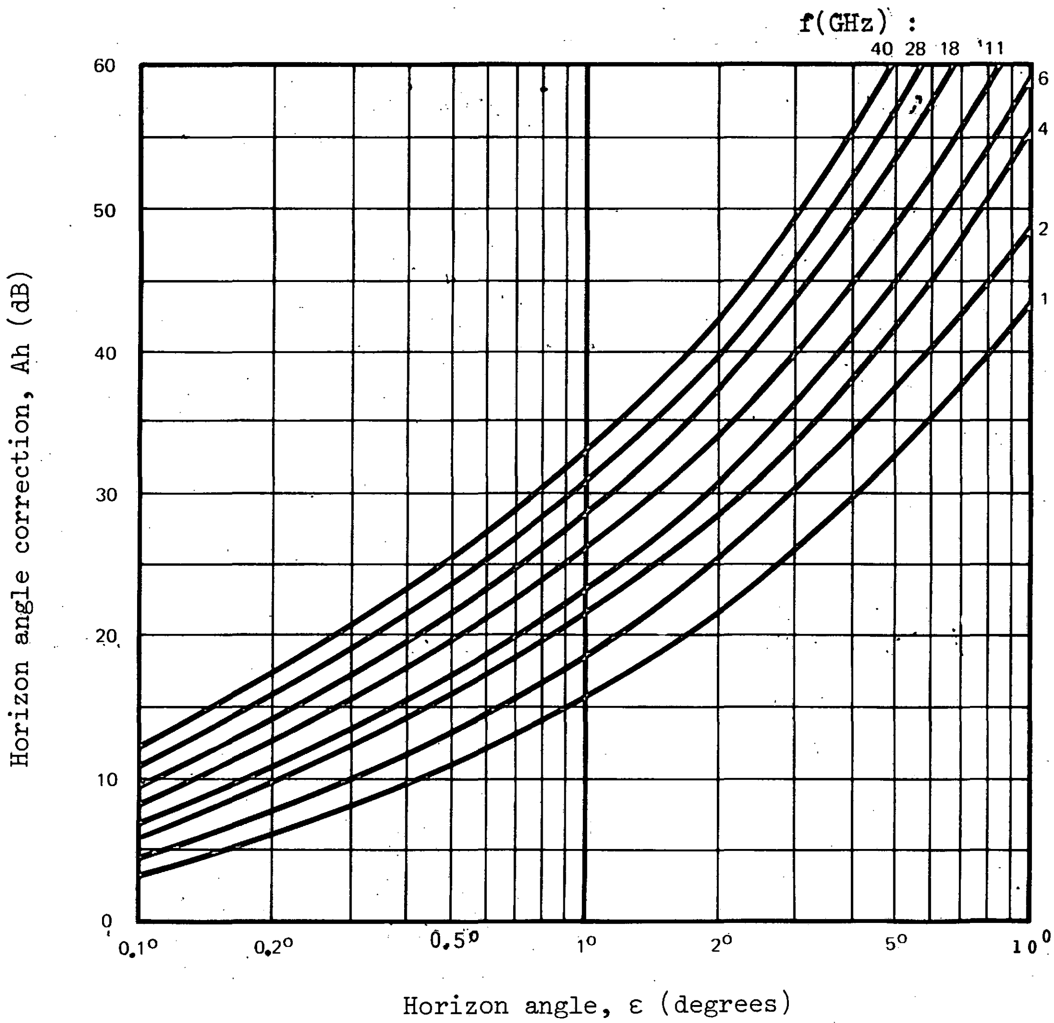

FIGURE 1 - Horizon angle correction Ah as a function of horizon angle and frequency

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* See footnote on page 9.

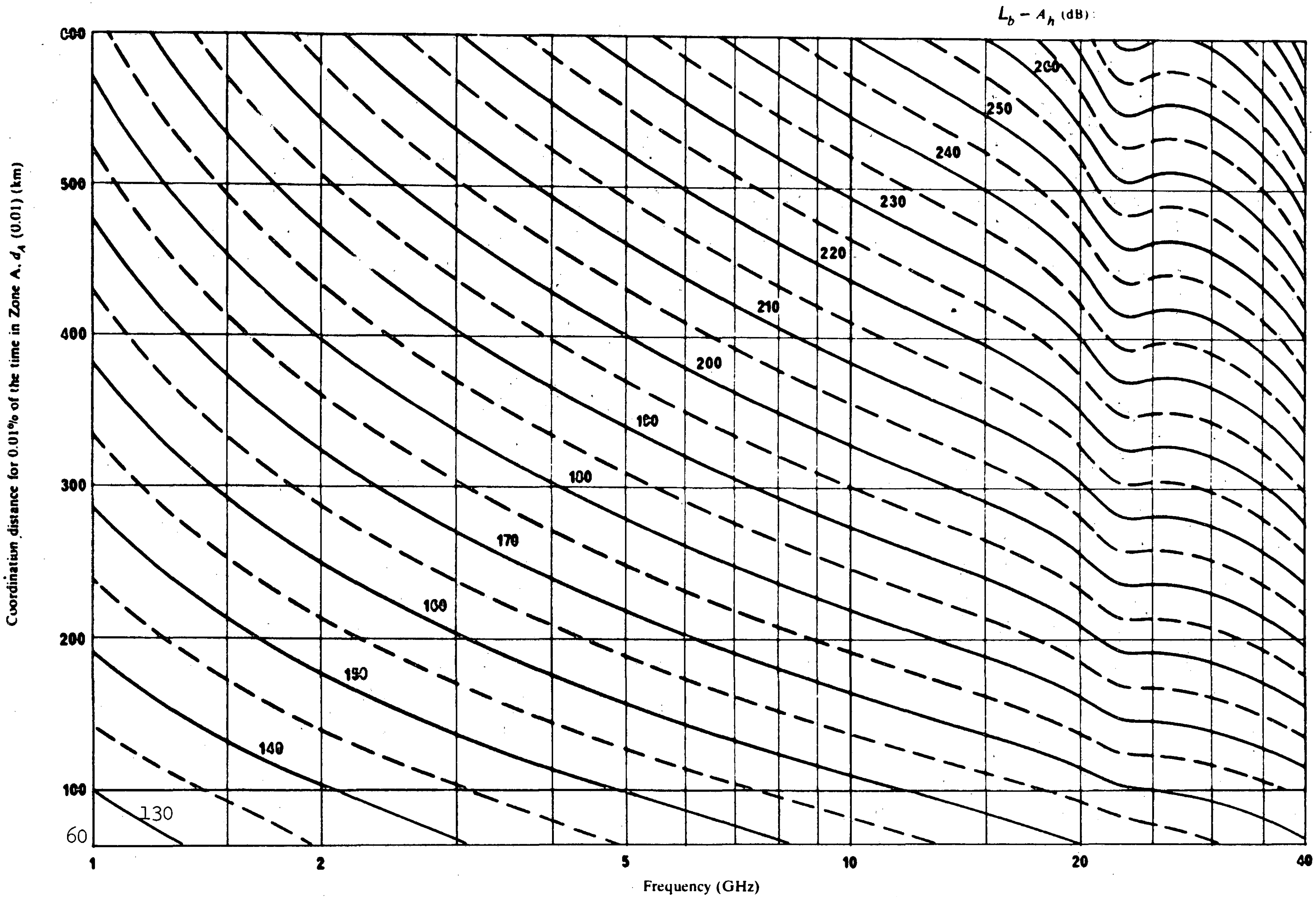

FIGURE 2 – *Coordination distance d_A (0.01) for 0.01% of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone A*

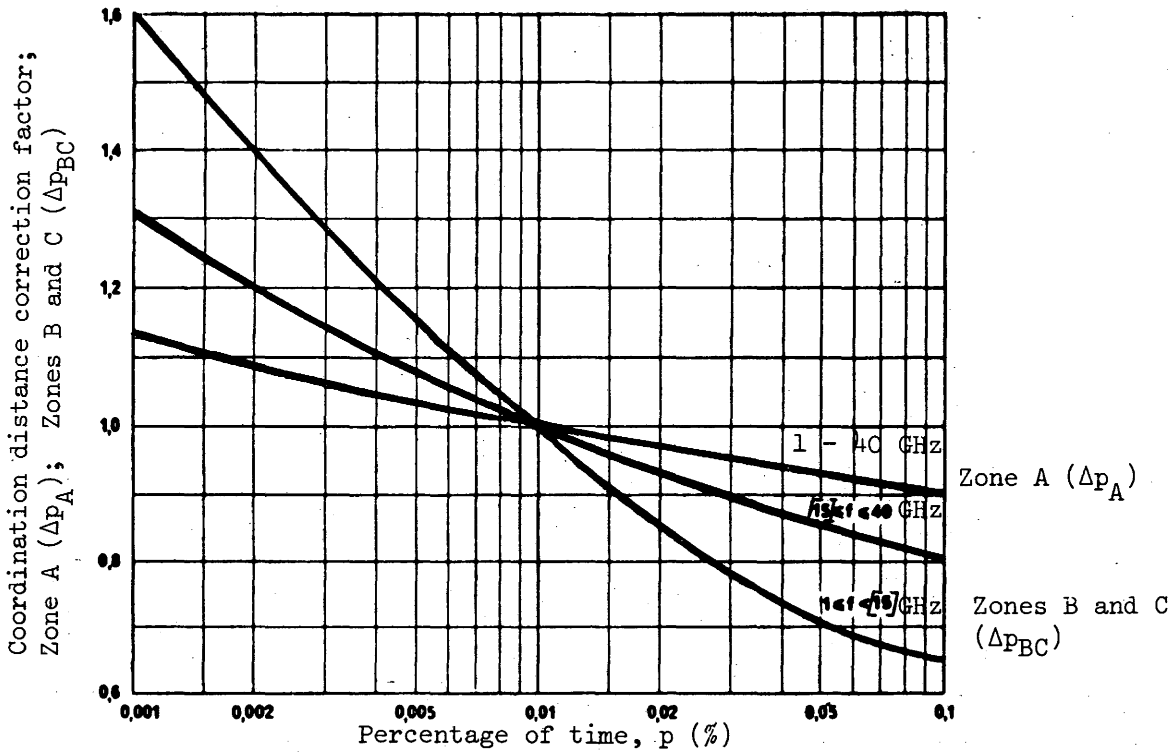

FIGURE 3 - Coordination distance correction factor for propagation mode (1) for percentages of time other than 0.01

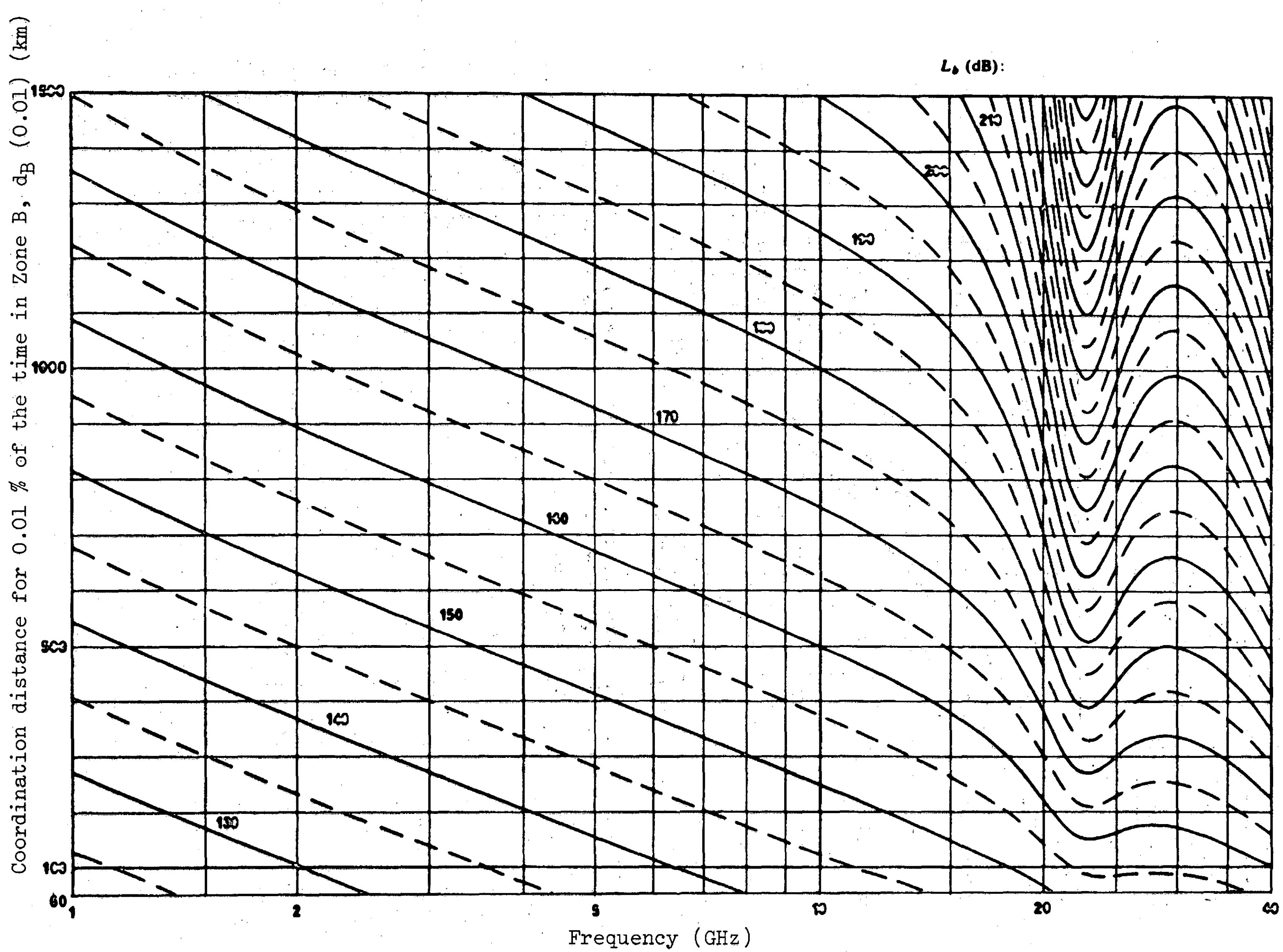

FIGURE 4 - Coordination distance d_B (0.01) for 0.01 % of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone B

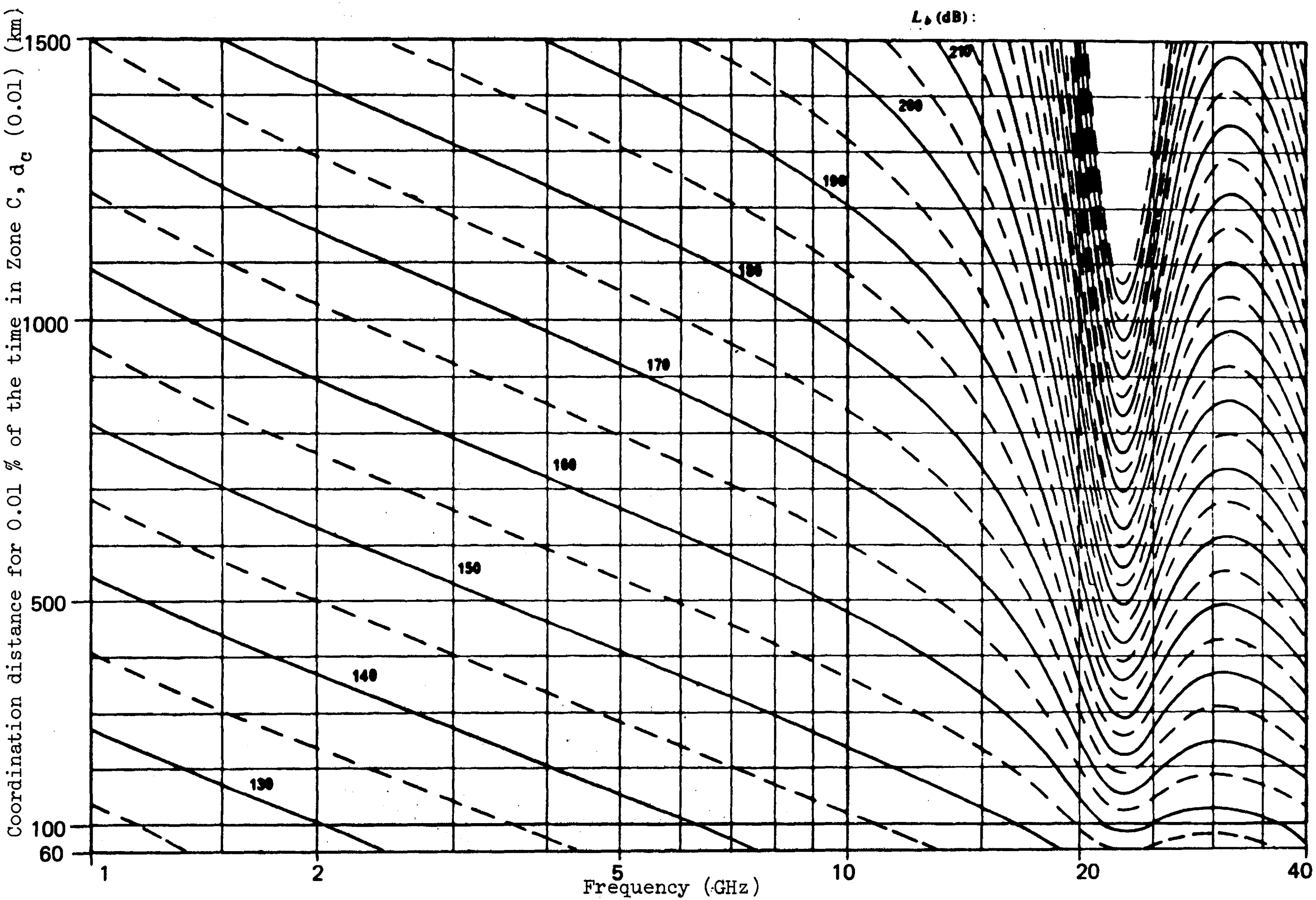

FIGURE 5 - Coordination distance d_c (0.01) for 0.01 % of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone C

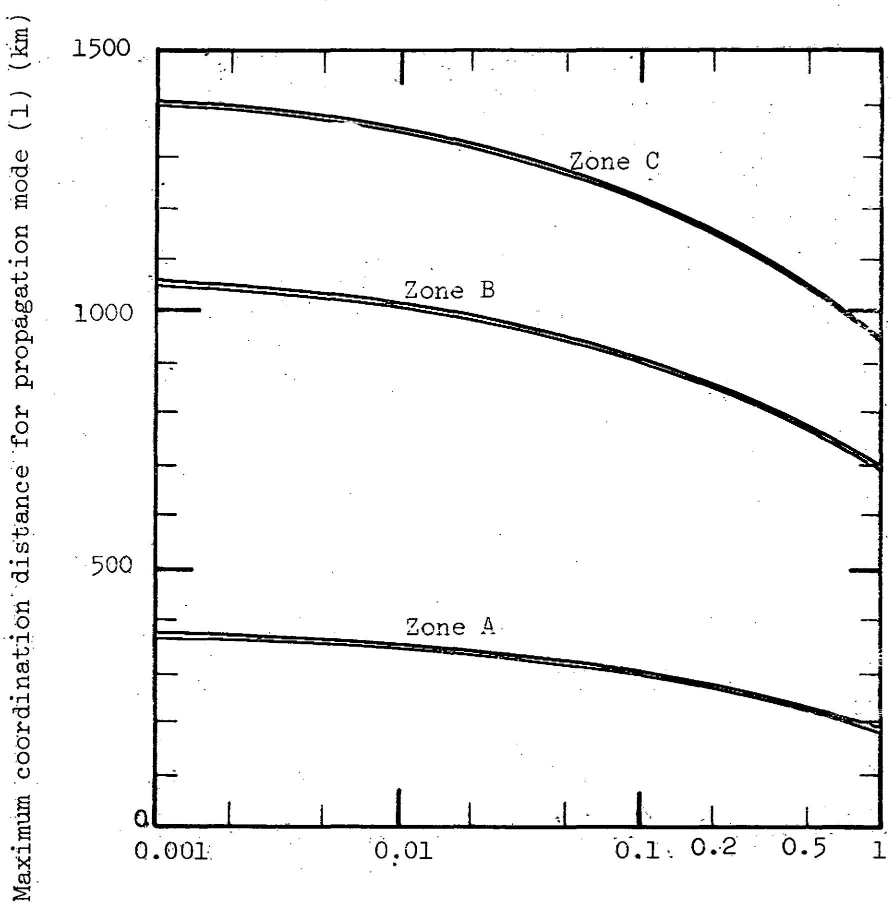

FIGURE 6 - Maximum coordination distance for propagation mode (1) as a function of percentage of time

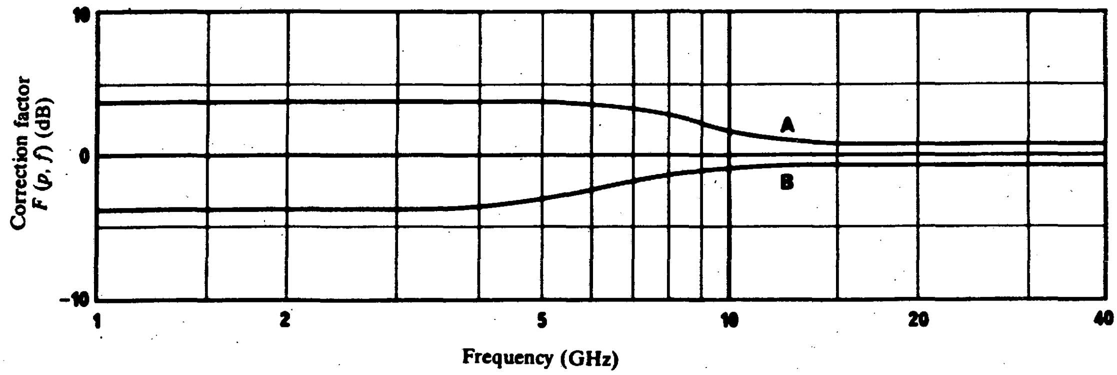

FIGURE 7 – *Correction factor for conversion from 0.01% of the time for all rain climates*

Conversion to 0.1% (Curve A)
Conversion to 0.001% (Curve B)

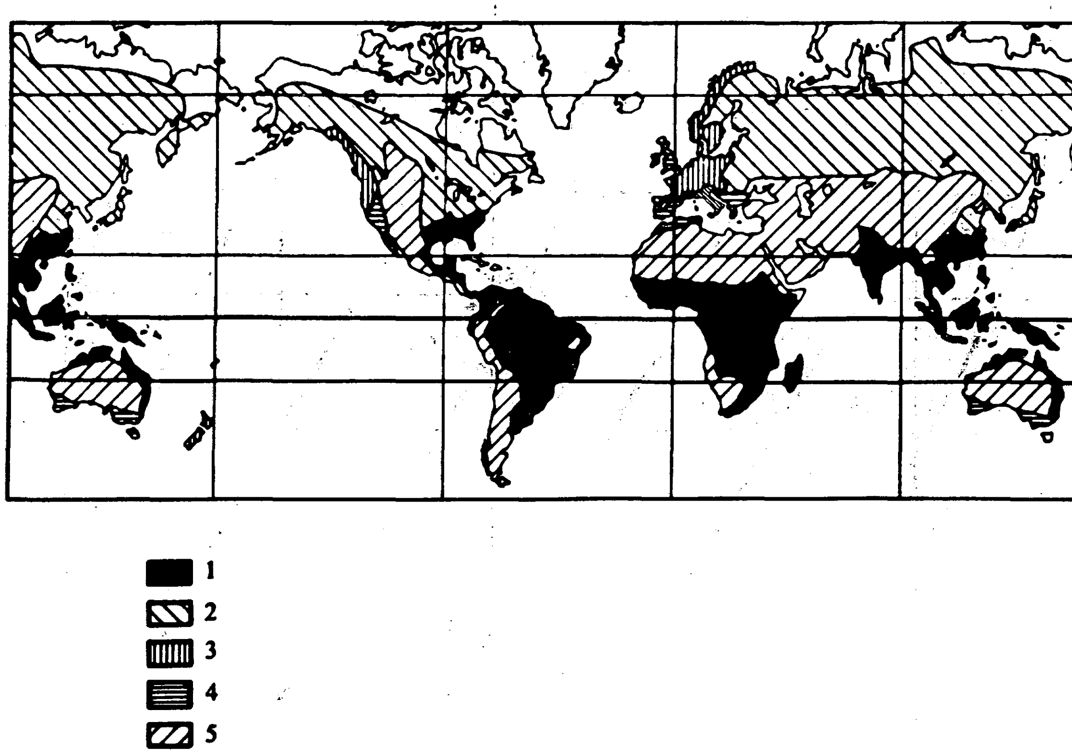

FIGURE 8 – *Regions corresponding to the five rain climates*
(see § 4.2)

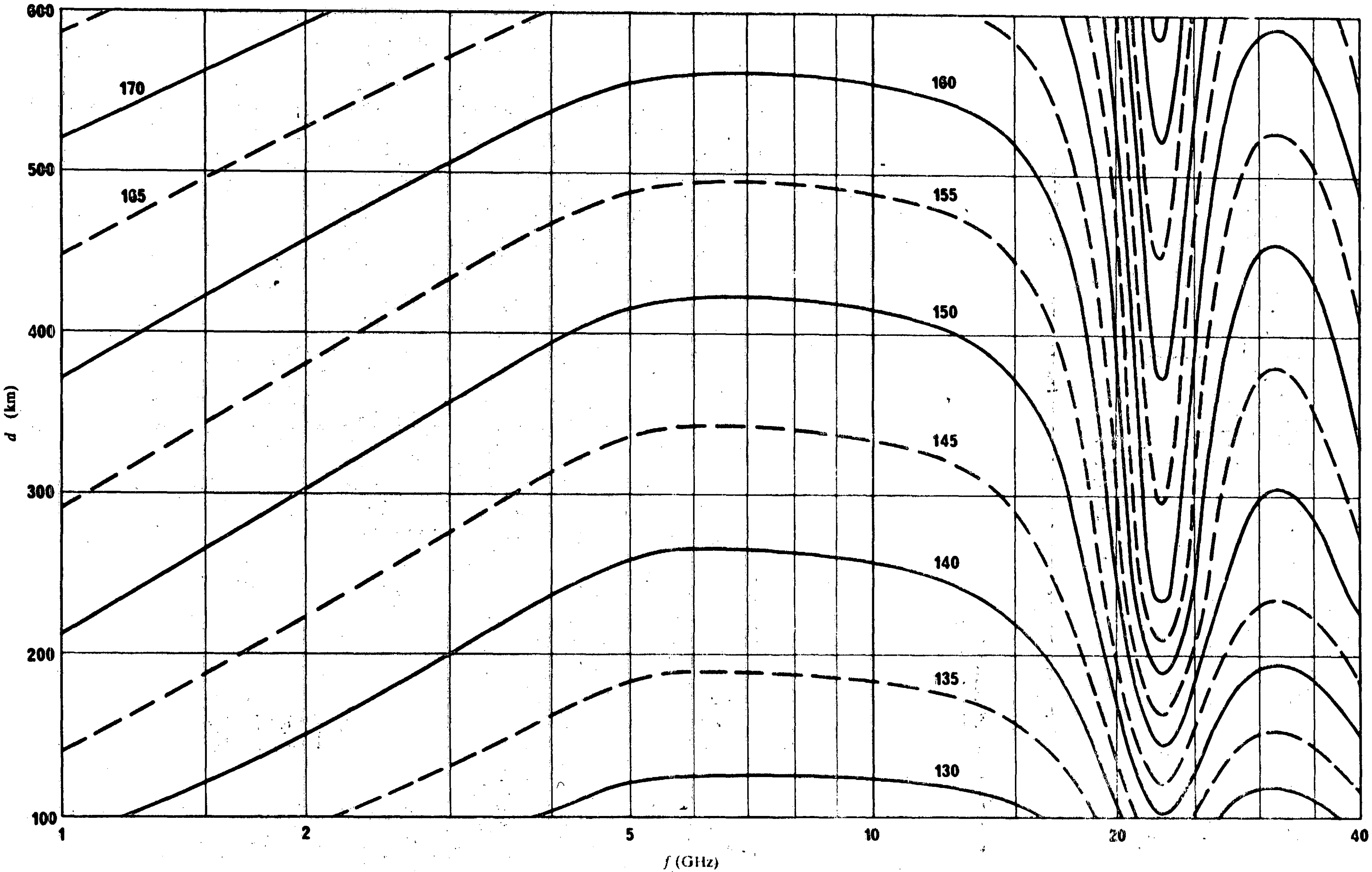

FIGURE 9 – *Rain scatter distance as a function of frequency for 0.01% of the time – Rain Climate 1*

Contours have transmission loss values shown in dB

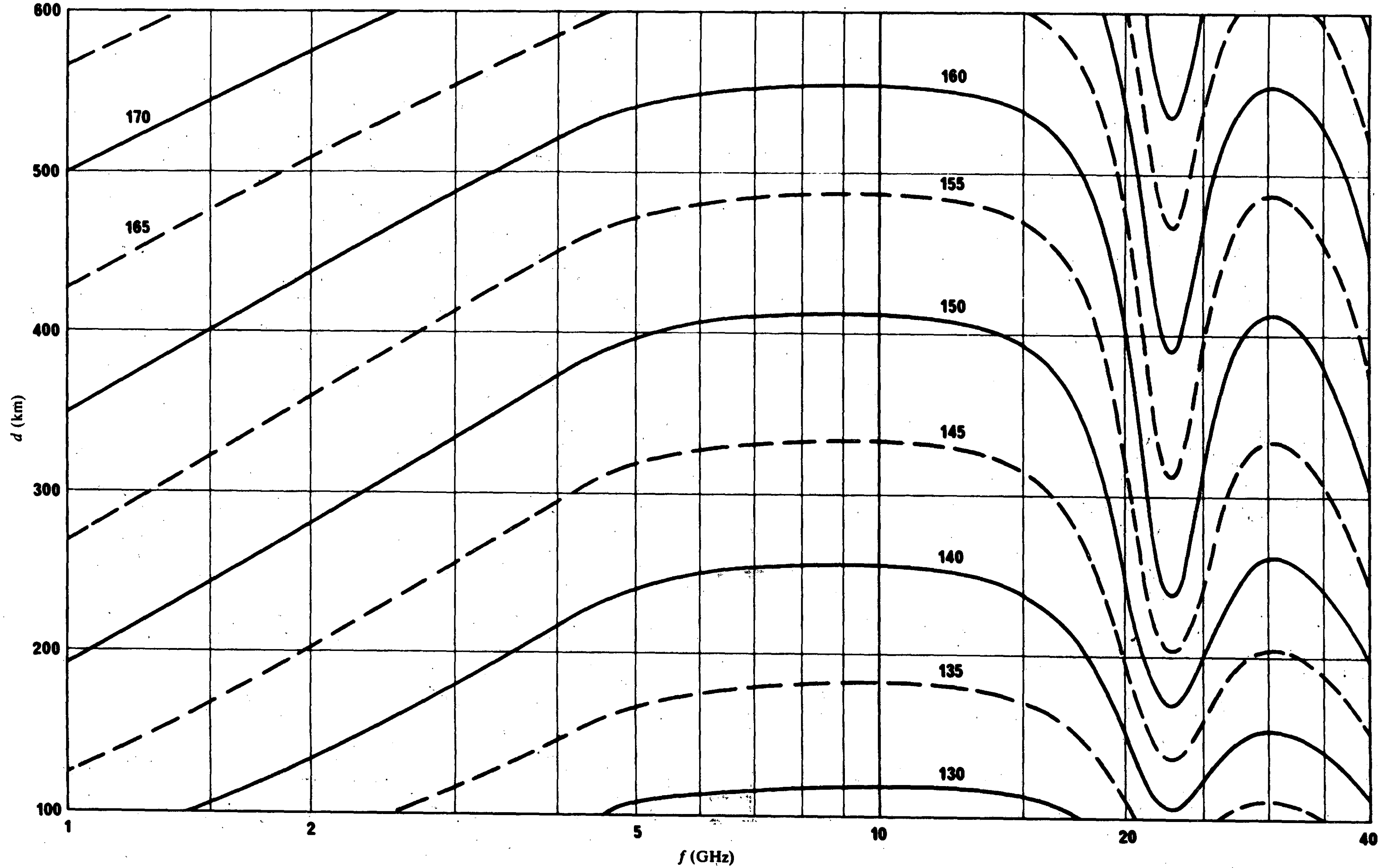

FIGURE 10 – *Rain scatter distance as a function of frequency for 0.01% of the time – Rain Climate 2*

Contours have transmission loss values shown in dB

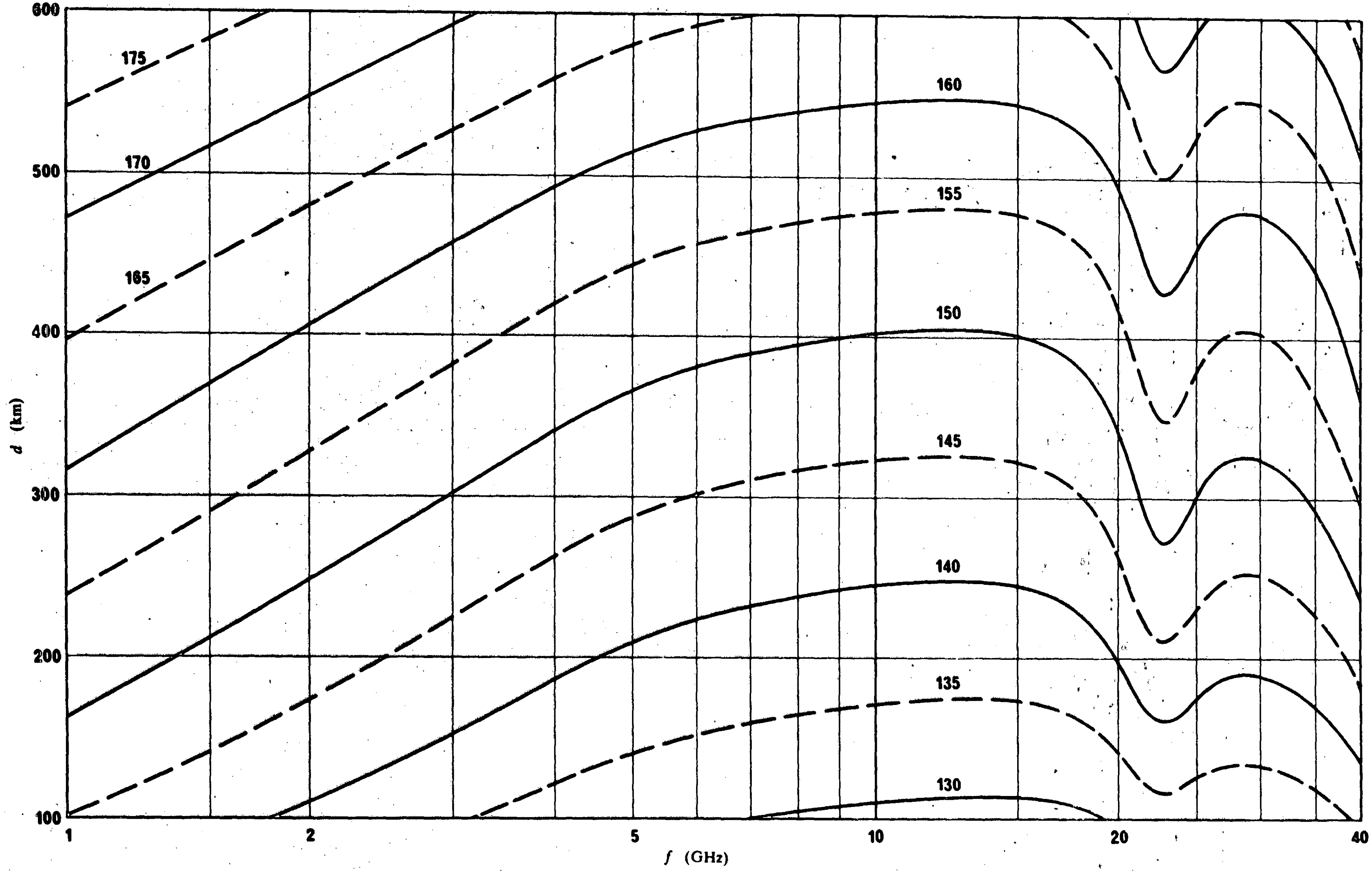

FIGURE 11 – *Rain scatter distance as a function of frequency for 0.01% of the time – Rain Climate 3*

Contours have transmission loss values shown in dB

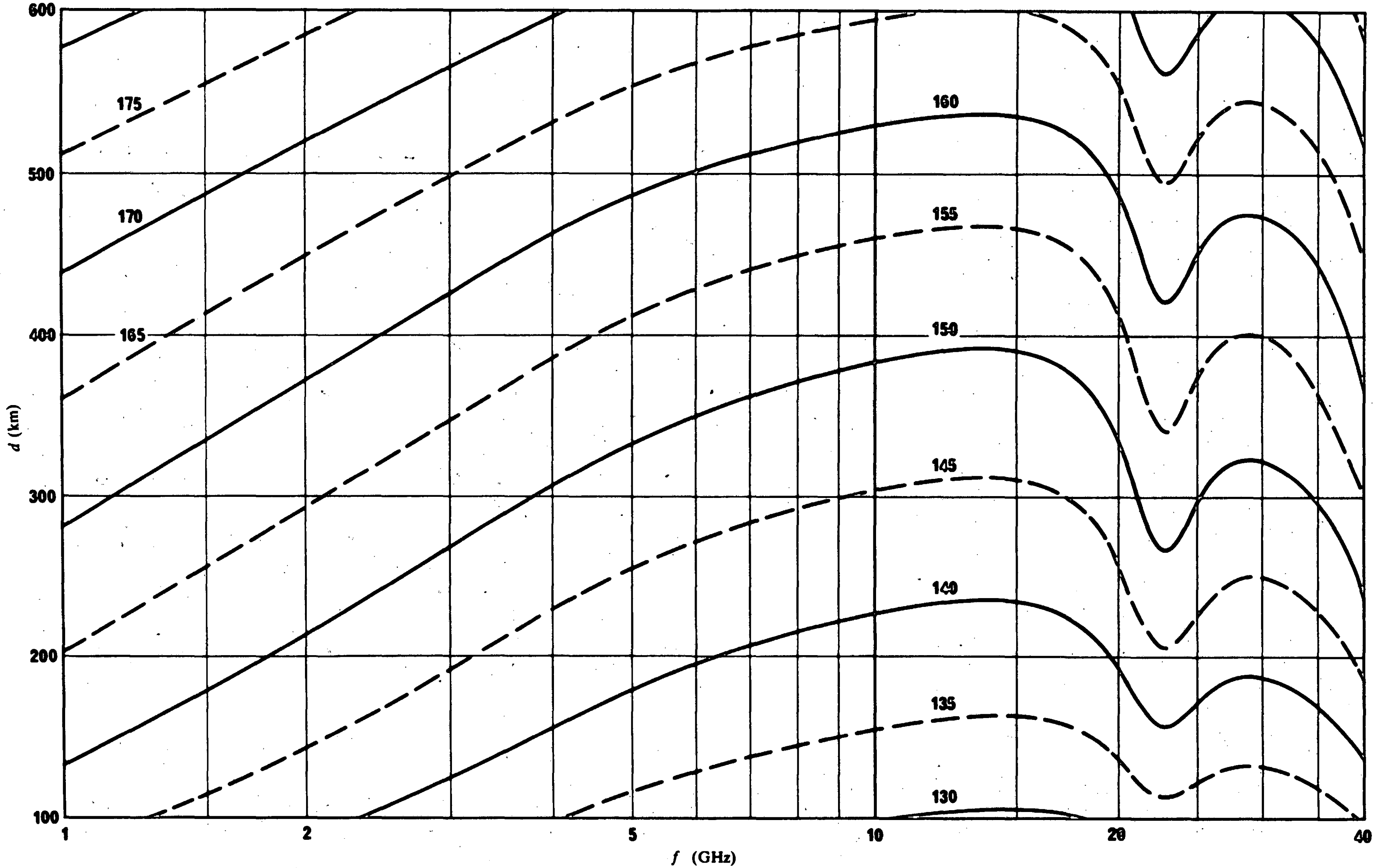

FIGURE 12 – *Rain scatter distance as a function of frequency for 0.01% of the time – Rain Climate 4*

Contours have transmission loss values shown in dB

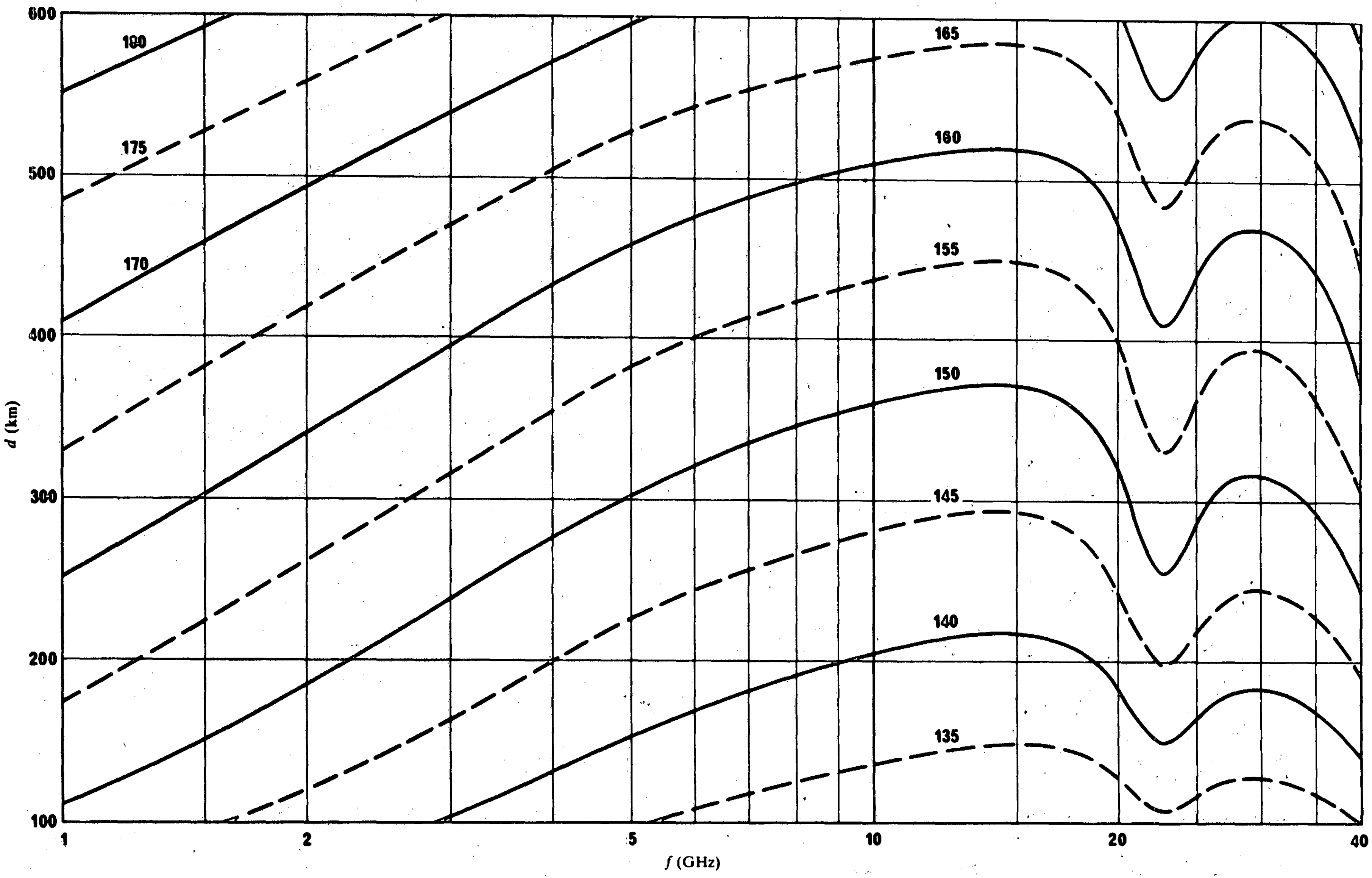

FIGURE 13 – *Rain scatter distance as a function of frequency for 0.01% of the time – Rain Climate 5*

Contours have transmission loss values shown in dB

3.3 *Mixed zone paths*

If the distance being calculated extends through more than one zone (mixed path), the prediction is made as follows:

Designating the successive path sections in different zones by use of the suffixes i, j, k..., it follows that :

$$L_b(p) - A_0 - A_h = \beta_i\ d_i \tag{16}$$

where β_i is the rate of attenuation in the first zone (i).

Now, in the direction considered, if the value d_i is greater than the distance D_i in the first zone (i), it follows that :

$$L_b(p) - A_0 - A_h - \beta_i\ D_i = \beta_j\ d_j \tag{17}$$

and so d_j is found. If the value d_j is greater than the distance D_j of the path in the second zone (j), it can then be stated that :

$$L_b(p) - A_0 - A_h - \beta_i\ D_i - \beta_j\ D_j = \beta_k\ \beta_k \tag{18}$$

from which d_z may be found. This method may be extended as necessary, and in the case given the total distance d_1 may now be expressed as:

$$d_1 = D_i + D_j + d_k \quad \text{km} \tag{19}$$

Annex II provides examples for the graphical application of this procedure.

3.4 *Maximum co-ordination distance for propagation mode (1)*

In the process of determining the coordination distance for propagation mode (1), if values result which exceed the appropriate value given in Figure 6 or in Table III, the coordination distance for propagation mode (1) shall be the value given in Figure 6 or in Table III. In the case of mixed zone paths, the values to be considered are those given for Zones B or C, as appropriate. In the case of mixed zone paths with more than one segment in Zone A, the total distance in Zone A shall not exceed the value given in Figure 6 or in Table III for Zone A.

4. Determination of the coordination contour for propagation mode (2) (scattering from hydrometeors)

The determination of the coordination contour for scattering from hydrometeors (rain scatter) is predicated on a path geometry which is substantially different from that of the great circle propagation mechanisms. To a first approximation, energy is scattered isotropically by rain, so that interference may result for large scattering angles, and for beam intersections away from the great-circle path.

4.1 *Normalized transmission loss L_2 (0.01)*

To determine the coordination contour associated with rain scatter it is necessary to calculate a "normalized transmission loss", given by:

$$L_2(0.01) = P_{t'} + \Delta G - P_r(p) - F(p, f) \quad (20)$$

where:

ΔG: difference (in dB) between the maximum gain of terrestrial station antennae in the frequency band under investigation and the value of 42 dB. When the earth station is a transmitting station, the values shown in Table I should be used; when it is a receiving station, the values shown in Table II should be used.

$F(p, f)$: correction factor (in dB) to relate the effective percentage of the time p to 0.01% in the frequency band under consideration (see Fig. 7).

All other parameters have been defined in § 2. For terrestrial stations, values of $P_{t'}$ are listed in Table. II.

4.2 *Rain-climatic zones*

The world has been divided into five basic rain-climatic zones numbered 1 to 5 as shown in Fig. 8. Characteristics of these climates for 0.01% of the time are given in Table IV.

4.3 Calculation of the rain-scatter distance d_r.

4.3.1 *Numerical method*

The normalized transmission loss is composed of six terms :

$$L_2(0.01) = A_1 - A_2 + A_3 - A_4 - A_5 + A_6 \quad (21)$$

in which:

$$A_1 = 157 + 20 \log d_r - 20 \log f \quad \text{(dB)} \quad (22)$$

where d_r is the rain-scatter distance (km)

$$A_2 = 26 + 14 \log R - 5.88 \times 10^{-5} (d_r - 40)^2 \quad \text{(dB)} \quad (23)$$

where R is the surface rainfall rate in mm/h (Table IV). The horizon distance of the terrestrial station is taken to be 40 km.

$$A_3 = 0.005 (f - 10)^{1.7} R^{0.4} \quad \text{(dB)}, \quad \text{for } 10 < f < 40 \text{ GHz} \quad (24a)$$

$$= 0 \quad \text{(dB)}, \quad \text{for } f \leq 10 \text{ GHz} \quad (24b)$$

$$A_4 = 10 \log \left[\frac{2.17}{\gamma \cdot D} \left(1 - 10^{-(\gamma \cdot D)/5}\right) \right] \quad \text{(dB) for } f > 5 \text{ GHz} \quad (25a)$$

$$= 0 \quad \text{(dB) for } f \leq 5 \text{ GHz} \quad (25b)$$

where D is the diameter of the rain cell in km (Table IV)

and

$$\gamma = 0.008 R (f - 5) \quad \text{for } f > 5 \text{ GHz} \quad (26a)$$

$$= 0 \quad \text{for } f \leq 5 \text{ GHz} \quad (26b)$$

$$A_5 = 10 \log D \quad \text{dB} \quad (27)$$

$$A_6 = d_o \beta_o + d_v \beta_v \quad (28)$$

where

$$d_o = 0.7\, d_r + 32 \text{ km} \quad \text{for } d_r < 340 \text{ km} \quad (29a)$$

$$= 270 \text{ km} \quad \text{for } d_r \geq 340 \text{ km} \quad (29b)$$

$$d_v = 0.7\, d_r + 32 \text{ km} \quad \text{for } d_r < 240 \text{ km} \quad (30a)$$

$$= 200 \text{ km} \quad \text{for } d_r \geq 240 \text{ km} \quad (30b)$$

β_V is given in (12), where ρ is to be replaced by ρ_m (Table IV).

β_o is given in (13).

Thus, for a given rain climate, the parameters in Table IV are used to calculate the rain-scatter distance d_r by an iterative process.

4.3.2 *Graphical method*

The equations of § 4.3.1 have been converted into graphical form to give an alternate method of determining rain-scatter distance d_r.

To obtain the rain-scatter distance for rain-climatic Zone 1, the normalized transmission loss (obtained by solving equation (20)), is used together with the appropriate frequency in Fig. 9 to yield the rain scatter distance d_r.

Figs. 10 to 13 show corresponding curves for rain-climatic Zones 2 to 5. In all cases, the rain climate to be chosen is that which corresponds to the location of the earth station.

4.4 *Maximum rain scatter distances*

In the process of determining the rain scatter distance for propagation mode (2), if values result which exceed the appropriate value given in Table V, the rain scatter distance for propagation mode (2) shall be the value given in that Table.

4.5 Construction of the rain-scatter coordination contour

Due to the peculiar geometry associated with rain-scatter propagation, the location of the centre of the rain-scatter coordination contour does not coincide with the location of the earth station. The distance by which these locations are separated is designated Δd.

The rain scatter distance d_r, together with the elevation angle ε_s of the main beam of the earth station antenna are used to determine Δd using the equation:

$$\Delta d = 5.88 \times 10^{-5} (d_r - 40)^2 \cot \varepsilon_s \quad \text{km}. \tag{31}$$

Alternatively, Δd may be determined from Figure 14.

The distance Δd is measured on a map of appropriate scale from the earth station location along the azimuth of the main beam of the earth station antenna; a circle of radius d_r is drawn around the point so reached. The circle is the rain scatter coordination contour.

The rain scatter coordination distance, to be labelled d_2, is the distance from the earth-station site to the rain scatter coordination contour on the azimuth under consideration.

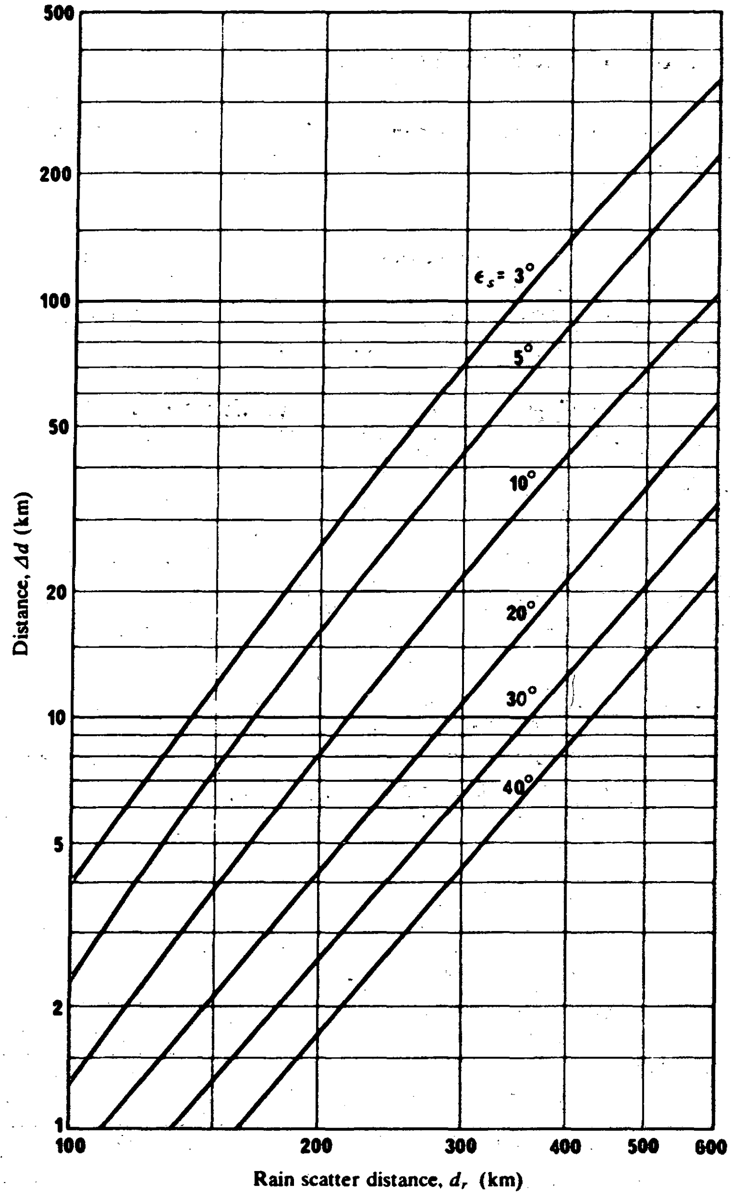

FIGURE 14 – *Distance Δd as a function of rain scatter distance d_r and earth station antenna main beam elevation angle ϵ_s.*

4.6 *Absence of mixed path effects*

As the only significant rain scatter is that occurring in the general area of the earth station, the question of a mixed path does not arise. The rain climate region relevant to the earth station is applied, together with the appropriate maximum rain scatter distance from Table V.

5. Minimum value of co-ordination distance

If the method for determining d_1, the co-ordination distance for propagation mode (1), leads to a result less than 100 km, d_1 shall be taken equal to 100 km. Similarly, if the method for determining the rain scatter distance d_r, leads to a result less than 100 km, d_r shall be taken equal to 100 km.

6. The coordination distance

On any azimuth, the greater of the coordination distances d_1 or d_2 is the coordination distance to be used for the coordination procedure.

An example of a coordination contour is shown in Figure 15.

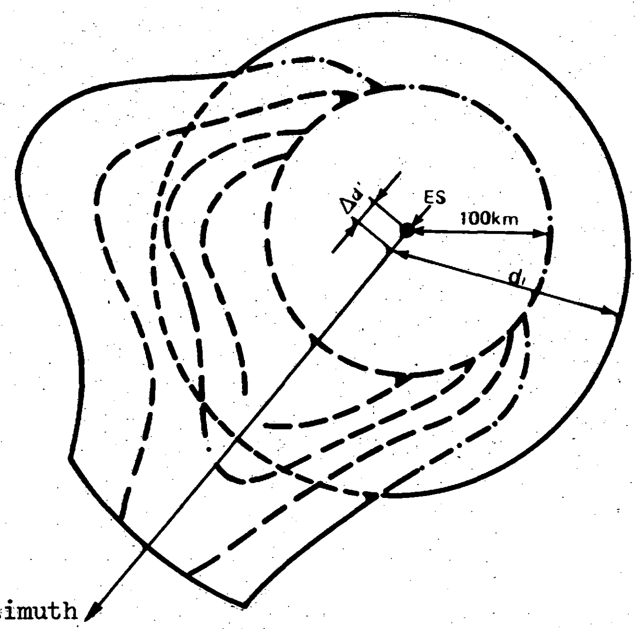

FIGURE 15 - Example of a coordination contour

ES : Earth station

——————— Coordination contour

—·—·—·—·— Contour for propagation mode (1)

- - - - - - - Contour for propagation mode (2)

— — — — — Auxiliary contours for propagation mode (1)

Note : If by using the auxiliary contours it is seen that a terrestrial station can be eliminated with respect to propagation mode (1) then :

- if that terrestrial station is outside the contour for propagation mode (2) it may be eliminated from any further consideration;

- if that terrestrial station is within the contour for propagation mode (2) it must still be considered, but for this mode only.

7. /‾Transportable and ‾/ mobile (except aeronautical mobile) Earth stations

For the purpose of establishing whether prior agreement with another Administration under the provisions of /‾4139/639AR_/ is required, it is necessary to determine the coordination area which would encompass all coordination areas determined for each location within the service area within which operation of the mobile Earth stations is proposed.

The preceding method may be used for this purpose by determining the appropriate individual coordination contours for a sufficiently large number of locations, within and on the periphery of the proposed service area and by determining from those a composite coordination area which contains all possible individual coordination areas.

8. Revision of data relating to propagation

The material contained in Sections 3, 4, 6 and in Annex II of this Appendix is based, directly or indirectly, on propagation data compiled, interpreted and documented in reports and Recommendations of the CCIR. The knowledge regarding propagation is subject to change as new data becomes available, and such change may require or strongly suggest corresponding amendments to the propagation-related material in this Appendix.

/‾Resolution No. ... (Document No. 475) ‾/ provides for the mechanism by which an updating of the propagation related elements of this Appendix is to be implemented.

TABLE I

Parameters required for the Determination of Co-ordination Distance for a Transmitting Earth Station

Space radiocommunication service designation		Space Operation (Telecommand)	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite
Frequency bands (GHz)		1·427–1·429	2·655–2·690	4·400–4·700	5·850–6·425	7·900–7·975 8·025–8·400	10·95–11·20	12·50–12·75	14·4 – 14·5	27·5 – 29·5
Modulation of terrestrial station [1]		A	A	A	A	A	A	A	A	N
Interference parameters and criteria	p_0 (%)	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·003
	n	2	1	1	2	2	2	2	2	1
	p (%)	0·005	0·01	0·01	0·005	0·005	0·005	0·005	0·005	0·003
	J (dB)	16	9	9	16	16	16	16	16	0
	$M_0(p_0)$ (dB)	17	17	17	17	17	17	17	17	30
	W (dB)	0	0	0	0	0	0	0	0	0
Terrestrial station parameters	B (Hz)	4×10^3	4×10^3	4×10^3	4×10^3	4×10^3	4×10^3	4×10^3	4×10^3	1×10^6
	G_r (dB) [2]	35	52 [2]	52 [2]	45	47	50	50	50	50
	ΔG (dB)	−7	10 [2]	10 [2]	3	5	8	8	8	8
	T_r (K)	750	500 [3]	500 [3]	750	750	1500	1500	1500	3200
Auxiliary parameters	S (dBW) (4)	166	192	192	176	178	178	178	178	154
	$P_r(p)$ (dBW) in B	−131	−140	−140	−131	−131	−128	−128	−128	−104

(1) A = analogue modulation; N = digital modulation.
(2) Feeder losses are not included in the values for G_r.
(3) In these bands the parameters for the terrestrial station associated with transhorizon systems have been used.
(4) For a definition of the parameter S see Annex III

TABLE II

Parameters required for the Determination of Co-ordination Distance for a Receiving Earth Station

Space Radiocommunication Service designation		Space Operation (Telemetering) (1)	Meteorological-Satellite (1)	Space Research		Fixed-Satellite		Fixed-Satellite		Fixed-Satellite		Earth Exploration-Satellite (1)	Space Research		Fixed-Satellite		Fixed-Satellite		Fixed-Satellite	Earth Exploration-Satellite (1)
				Near Earth	Deep Space; Manned								Near Earth	Deep Space						
Frequency band (GHz)		1·525–1·535	1·670–1·690	1·700–1·710 2·290–2·300		2·500–2·535		3·400–4·200		7·300–7·750		8·025–8·400	8·400–8·500		10·95–11·20 11·45–11·70		11·70–12·20 12·50–12·75		17·7–19·7	21·2–22·0
Modulation at earth station (2)				—	—	A	N	A	N	A	N		—	—	A	N	A	N	N	
Interference parameters and criteria	p_o (%)			0·1	0·001	0·03		0·03	0·003	0·03	0·003		0·1	0·001	0·03	0·003	0·03	0·003	0·003	
	n			2	1	3		3	3	3	3		2	1	2	1	2	1	1	
	p (%)			0·05	0·001	0·01		0·01	0·001	0·01	0·001		0·05	0·001	0·015	0·003	0·015	0·003	0·003	
	J (dB)			—	—	−8		−8	0	−8	0		—	—	−8	0	−8	0	0	
	$M_o(p_o)$ (dB)			—	—	17		17	5 (3)	17	5 (3)		—	—	17	5 (3)	19	5 (3)	5 (3)	
	W (dB)			—	—	4		4	0	4	0		—	—	4	0	4	0	0	
Terrestrial station parameters	E (dBW) in B (8)	55	55	62 (4)(6)	62 (4)(6)	92 (6)		55	55	55	55		25 (4)	25 (4)	55	55	55	55	35 (5)	
	P_t' (dBW) in B	13	13	10 (4)(6)	10 (4)(6)	40 (6)		13	13	13	13		−17 (4)	−17 (4)	10	10	10	10	10 (5)	
	ΔG (dB)	0	0	10 (6)	10 (6)	10 (6)		0	0	0	0		0	0	3	3	3	3	3	
Reference bandwidth	B (Hz)			1	1	10^6 (7)		10^6 (7)	10^6 (7)	10^6 (7)	10^6 (7)		1	1	10^6 (7)	10^6 (7)	10^6 (7)	10^6 (7)	10^6 (7)	
Permissible interference power	$P_r(p)$ (dBW) in B			−220	−220	—		—	—	—	—		−220	−220	—	—	—	—	—	

(1) Parameters associated with these services may vary over a rather wide range. Further study is required before representative values become available.

(2) A = analogue modulation; N = digital modulation.

(3) See note (3) in Section 2. $M_0(p_0)$ may assume values between 5 and 40 dB, depending on frequency, rain-climatic zone and system design.

(4) These values are estimated for 1 Hz bandwidth and are 30 dB below the total power assumed for emission.

(5) These values assume an r.f. bandwidth of no less than 100 MHz, and are 20 dB below total power assumed per emission.

(6) In these bands, the parameters for the terrestrial stations associated with transhorizon systems have been used.

(7) In certain communication-satellite systems it may be desirable to choose a greater reference bandwidth B when the system requirements indicate that this may be done. However, a greater bandwidth will result in smaller coordination distances and a later decision to reduce the reference bandwidth may require recoordination of the Earth station.

For narrow band transmissions the reference bandwidth B should be assumed to be equal to the bandwidth occupied by the wanted transmissions.

(8) For a definition of the parameter E see Annex III.

TABLE III - Maximum Coordination Distance for Propagation Mode (1)

	Percentage of Time			
	p = 0.001	p = 0.01	p = 0.1	p = 1
Zone A	375	350	300	200
Zone B	1050	1000	900	700
Zone C	1400	1350	1200	950

TABLE IV – *Characteristic values of parameters for the five rain climates (0.01% of the time)*

Parameter	Rain climate					Unit
	1	2	3	4	5	
Surface rainfall rate (R)	75	55	37	26	14	mm/h
Rain cell diameter (D)	2.5	2.8	3	3	4.5	km
Water vapour density (ρ_m)	10	5	2	2	2	g/m³

TABLE V – *Maximum rain scatter distances (km)*

Rain climatic zone	Percentage of time		
	$0.001 \leq p < 0.01$	$0.01 \leq p < 0.1$	$p = 0.1$
1	540	470	390
2	470	390	330
3, 4 and 5	390	330	270

Annexes : I, II, III

Annex I

Antenna gain in the direction of the earth station horizon for geostationary satellites

1. General

The gain component of the earth-station antenna in the direction of the physical horizon around an earth station is a function of the angular separation ϕ between the antenna main beam axis and the horizon direction under consideration. Therefore, knowledge of the angle ϕ is required for each azimuth.

The elevation ε_s and azimuth α_s of geostationary satellites as seen from an earth station at a latitude ζ are uniquely related. Figure I-1 shows the possible location arcs of geostationary satellites in a rectangular elevation/azimuth plot, each arc corresponding to an earth station latitude.

Specific relative satellite longitudes may not be known beforehand, but even when they are, the possibility of the addition of a new satellite, or the repositioning of an existing one suggests that all or a portion of the applicable arc be considered to hold satellites.

2. Graphical method for the determination of ϕ (α)

With the correct arc or segment of arc chosen and suitably marked in Figure I-1, the horizon profile ε (α) is added to the plot of Figure I-1, as shown in Figure I-2, where an example is given for an earth station located at 45° N latitude for a satellite expected to be located somewhere between relative longitudes of 10° E and 45° W.

For each point on the local horizon ε (α) the smallest distance to the arc is determined and measured on the elevation scale. The example of Figure I-2 shows the determination of the off-beam angle ϕ at an azimuth α (= 210°) with a horizontal elevation ε = 4°. The measurement of ϕ yields a value of 26°.

When this is done for all azimuths (in suitable increments, e.g. 5°), a relationship ϕ (α) results.

3. Numerical method for the determination of ϕ (α)

For this purpose the following equations may be used:

$$\psi = \arccos(\cos\zeta \cdot \cos\delta) \qquad (32)$$

$$\alpha'_s = \arccos(\tan\zeta \cdot \cot\psi) \qquad (33)$$

$\alpha_s = \alpha'_s + 180°$ for earth stations located in the northern hemisphere and satellites located west of the earth station. (34a)

$\alpha_s = 180° - \alpha'_s$ for earth stations located in the northern hemisphere and satellites located east of the earth station. (34b)

$\alpha_s = 360° - \alpha'_s$ for earth stations located in the southern hemisphere and satellites located west of the earth station. (34c)

$\alpha_s = \alpha'_s$ for earth stations located in the southern hemisphere and satellites located east of the earth station. (34d)

$$\varepsilon_s = \arctan\left(\frac{K - \cos\psi}{\sin\psi}\right) - \psi \qquad (35)$$

$$\varphi(\alpha) = \arccos\,[\cos\varepsilon \cdot \cos\varepsilon_s \cdot \cos(\alpha - \alpha_s) + \sin\varepsilon \cdot \sin\varepsilon_s] \qquad (36)$$

where:

ζ : latitude of the earth station

δ : difference in longitude between the satellite and the earth station

ψ : great circle arc between the earth station and the sub-satellite point

α_s : satellite azimuth as seen from the earth station

ε_s : satellite elevation angle as seen from the earth station

α : azimuth of the pertinent direction

ε : elevation angle of the horizon in the pertinent azimuth, α

$\varphi(\alpha)$: angle between the main beam axis and the horizon direction corresponding to the pertinent azimuth, α

K : orbit radius/earth radius, assumed to be 6.62

All arcs mentioned above are in degrees.

4. Determination of antenna gain

The relationship ϕ (α) may be used to derive a function for the horizon antenna gain, G (in dB) as a function of the azimuth α, by using the actual earth-station antenna pattern, or a formula giving a good approximation. For example, in cases where the ratio between the antenna diameter and the wavelength is not less than 100, the following equation should be used :

$G(\phi) = G_{max} - 2.5.10^{-3}(\frac{D}{\lambda}\phi)^2$ for $0 < \phi < \phi_m$ (37a)

$G(\phi) = G_1$ for $\phi_m \leqslant \phi < \phi r$ (37b)

$G(\phi) = 32 - 25 \log \phi$ for $\phi_r \leqslant \phi < 48^0$ (37c)

$G(\phi) = -10$ for $48^0 \leqslant \phi < 180^0$ (37d)

where : D = antenna diameter, λ = wavelength } same units

G_1 = gain of the first sidelobe = $2 + 15 \log \frac{D}{\lambda}$

$$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \text{ (degrees)}$$

$$\phi_r = 15.85\ (D/\lambda)^{-0.6} \text{ (degrees)}$$

When it is not possible, for antennae with D/λ of less than 100, to use the above reference antenna pattern and when neither measured data nor a relevant Recommendation of the CCIR can be used instead, then Administrations may use the reference diagram as described below :

$$G(\phi) = G_{max} - 2.5 \cdot 10^{-3} \left(\frac{D}{\lambda}\phi\right)^2 \quad \text{for } 0 \leq \phi < \phi_m \tag{38a}$$

$$G(\phi) = G_1 \quad \text{for } \phi_m \leq \phi < 100\frac{\lambda}{D} \tag{38b}$$

$$G(\phi) = 52 - 10\log\frac{D}{\lambda} - 25\log\phi \quad \text{for } 100\frac{\lambda}{D} \leq \phi < 48^0 \tag{38c}$$

$$G(\phi) = 10 - 10\log\frac{D}{\lambda} \quad \text{for } 48^0 \leq \phi \leq 180^0 \tag{38d}$$

where : D = antenna diameter
λ = wavelength } same units

G_1 = gain of the first sidelobe = $2 + 15\log\frac{D}{\lambda}$

$$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \text{ (degrees)}$$

The above patterns may be modified as **appropriate, to** achieve a **better representation of the actual antenna pattern.**

In cases where $\frac{D}{\lambda}$ is not given, it may be estimated from the expression **$20\log\left(\frac{D}{\lambda}\right) \approx G_{max} - 7.7$**, where G_{max} is the main lobe antenna gain in dB.

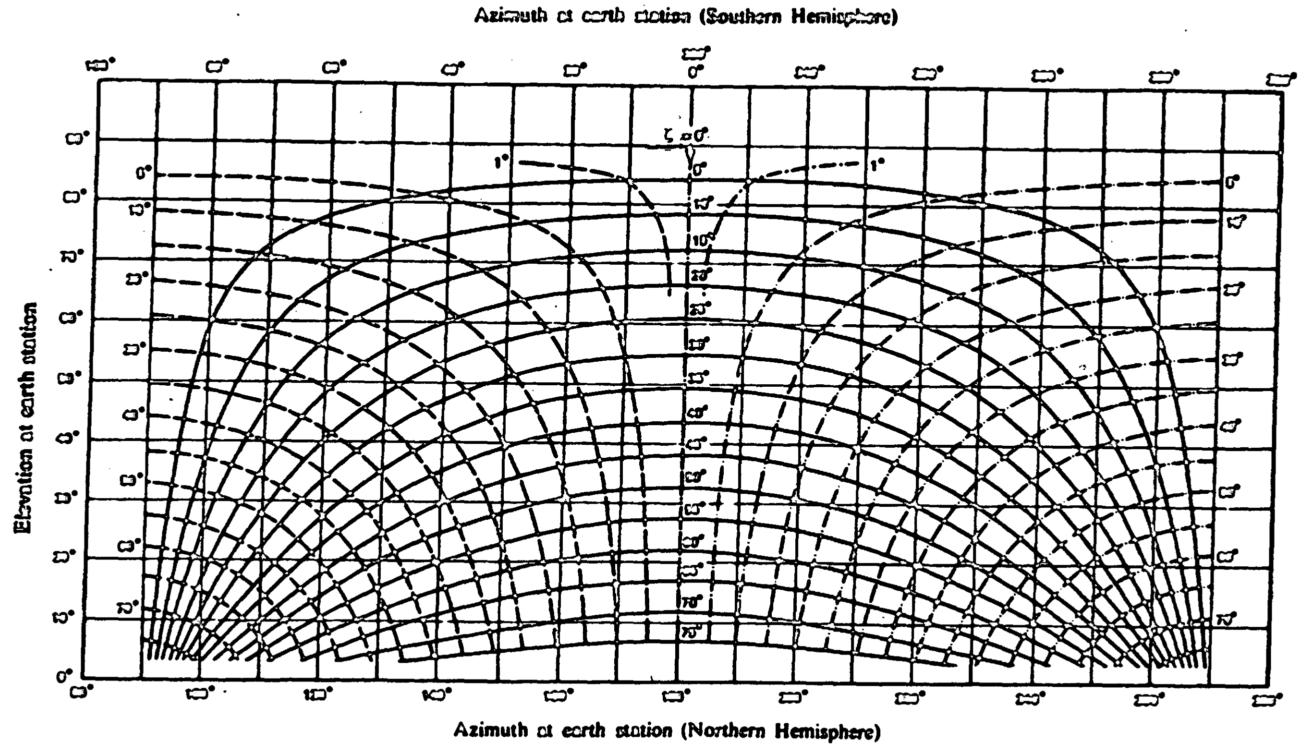

FIGURE 1-1 - *Position arcs of geostationary satellites*

Arc of geostationary satellite orbit visible from earth station at terrestrial latitude ζ
Difference in longitude between earth station and the sub-satellite point:
Satellite longitude E of earth station longitude
Satellite longitude W of earth station longitude
Satellite longitude equal to the earth station longitude

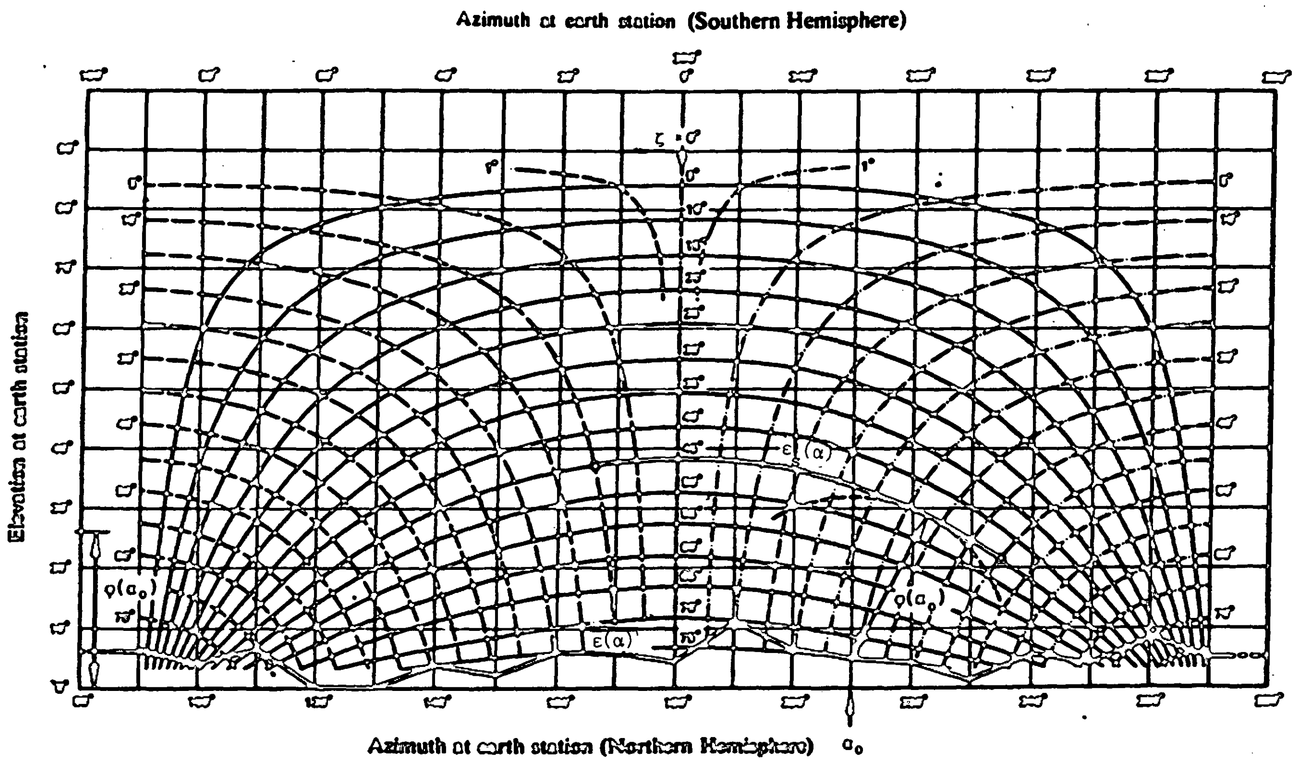

FIGURE 1-2 - *Example of derivation of ρ*

Arc of geostationary satellite orbit visible from earth station at terrestrial latitude ζ
Horizon profile ε(α)
Difference in longitude between earth station and the sub-satellite point:
Satellite longitude E of earth station longitude
Satellite longitude W of earth station longitude
Satellite longitude equal to the earth station longitude

Annex II

Graphical method for the determination of coordination distance for mixed paths

1. Two zones

The procedure to be followed in the case of a mixed path involving two zones is illustrated by the example shown in Figure II-1(a). The earth station is situated in Zone A at a distance of 75 km from Zone B. The graphical presentation described below is particularly useful where more than one boundary between zones may be involved, as in this example.

In the example given below, the coordination loss is assumed to be 180 dB, the frequency 20 GHz, and the percentage of time 0.01 %. The procedure is as follows :

1.1 determine the distance entirely in Zone A that would give the coordination loss. Mark this distance (in this case it is 160 km) from the origin along the abscissa axis of linear graph paper as indicated by the point A (Figure II-1(b));

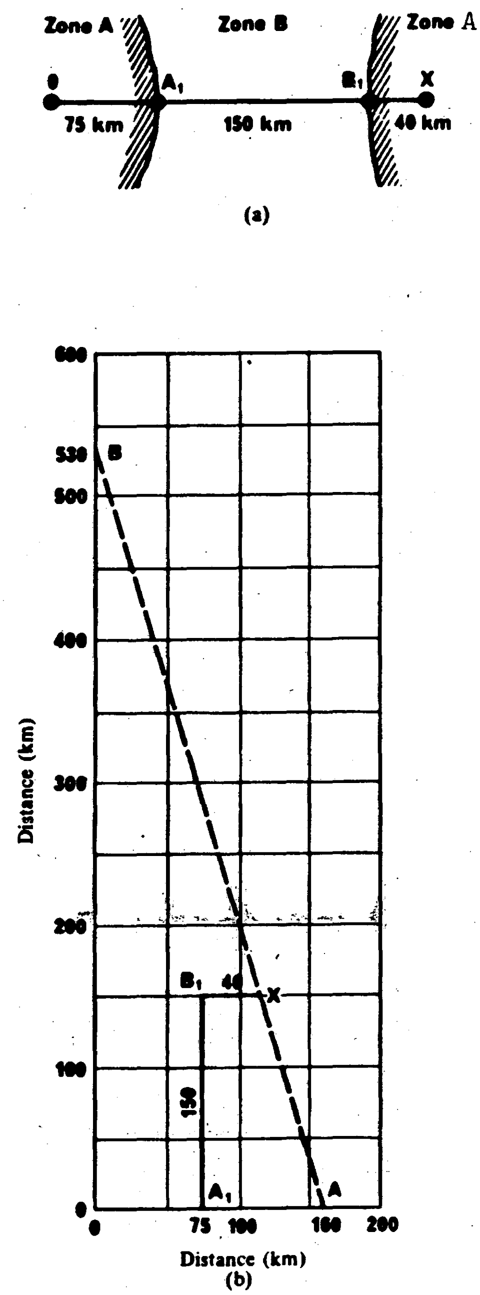

FIGURE II-1 - *Example of determination of coordination distance for mixed paths involving Zones A and B*

1.2 determine the distance entirely in Zone B that would give the same coordination loss. Mark this distance (in this case it is 530 km) from the origin along the ordinate axis of the chart as indicated by the point B;

1.3 draw a straight line between points A and B representing these distances from the origin;

1.4 starting from the origin, the distance of 75 km from the earth station to Zone B is set off along the abscissa axis of the chart as indicated by the point A_1;

1.5 starting from point A_1 the Zone B path length of 150 km is then set off parallel to the ordinate axis of the chart as indicated by the point B_1;

1.6 the further distance in the next Zone A region is then measured parallel to the abscissa axis from the point B_1 to the point of intersection of the mixed path curve as indicated by X. In Figure 18b, this distance is 40 km;

1.7 the coordination distance is the sum of the distances OA_1, A_1B_1 and B_1X and is equal to :

$$75 + 150 + 40 = 265 \text{ km.}$$

2. Three zones

In some special cases, the mixed path involves all three radio-climatic Zones A, B and C. A solution to this problem can be found in adding a third dimension to the procedure to be followed for mixed paths involving only two zones. Theoretically, it means that the third coordinate has to be determined for a point having coordinates corresponding to the known distances in the first two zones and lying in a plane defined by three points on the axes X, Y and Z, corresponding to distances in Zones A, B and C, respectively, that would give the required basic transmission loss.

In practice, the procedure can be reduced to a simple graphical method shown in Figure II-2(a) assuming for example a coordination loss (L_1) of 180 dB at a frequency of 20 GHz. It is required to find the coordination distance from the earth station in the direction given in Figure II-2(a). Here an earth station is situated in Zone A at a distance of 75 km in a given azimuthal direction from Zone B. In the same azimuthal direction Zone B is 150 km long and followed by an unknown portion in Zone C (Figure II-2(a)).

In this case, the procedure to be applied should be as follows (Figure II-2(b)) :

2.1 repeat the same procedure as for mixed paths involving only two zones, given in steps 1.1 to 1.5 above, and continue as follows :

2.2 from the point B_1 draw a line parallel to the line AB to intersect the abscissa axis as indicated by the point D;

2.3 determine the distance entirely in Zone C that would give the coordination loss. Mark this distance (in this case it is 350 km) from the origin along the ordinate axis of the chart as indicated by the point C. Draw a straight line between the points C and A;

2.4 at the point D draw a line parallel to the ordinate axis to intersect the line CA as indicated by X;

2.5 the distance between the points D and X, which is the unknown distance in Zone C, is found to be 85 km;

2.6 the coordination distance is then the sum of the distances OA_1, A_1B_1, and DX and in this example is equal to :

$$75 + 150 + 85 = 310 \text{ km}.$$

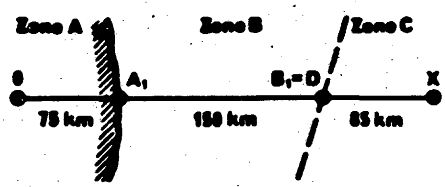

FIGURE II-2(a)

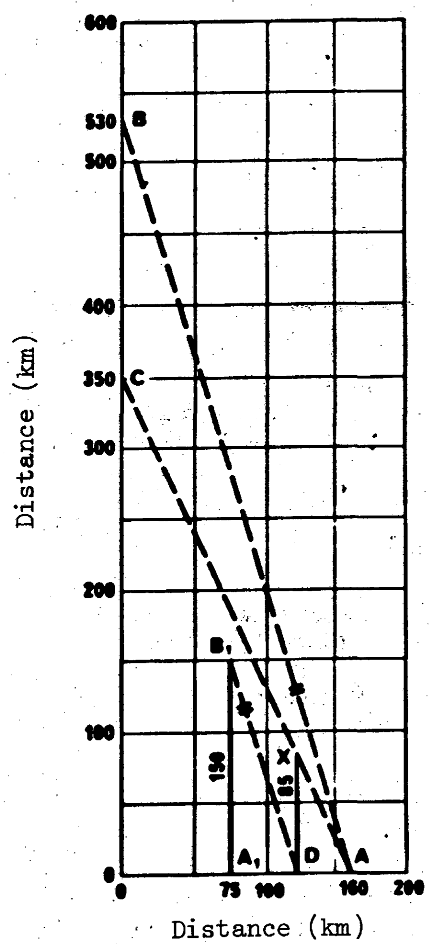

FIGURE II-2(b) - Example of determination of coordination distance for mixed paths including Zones A, B and C

Annex III

Determination and use of auxiliary contours

1. Introduction

For great circle propagation mechanisms, mode 1, auxiliary contours are of great value in eliminating certain existing or planned terrestrial stations falling within the coordination area without recourse to precise and arduous calculations. The work of both the Earth station administration and the effected administrations is therefore eased during subsequent negotiations if these auxiliary contours are supplied.

2. Determination of the auxiliary contours

Two types of contours can be determined, depending on whether the Earth station is used for transmission or reception.

2.1 Transmitting Earth station

From equation (2) one can isolate the terms $G_r - P_r(p)$ and define a sensitivity factor S (in dBW) of the interfered-with terrestrial stations:

$$S = G_r - P_r(p) \qquad (39)$$

Table I shows values of this factor for various types of terrestrial stations.

The co-ordination contour is associated with a (maximum) sensitivity factor S and labelled with its value.

The auxiliary contours are determined in the same way as the corresponding coordination contour for propagation mode 1, but using terrestrial station interference sensitivity factor S values (in dBW) which are 5, 10, 15, 20 dBW, etc. lower than the value (given in Table I of Appendix 28) corresponding to the coordination contour.

2.2 Receiving Earth station

From equation (2) one may, likewise, isolate the terms $P_{t'} + G_{t'}$ and define the equivalent isotropically radiated power E (in dBW) of the interfering terrestrial stations:

$$E = P_{t'} + G_{t'} \qquad (40)$$

values for which are listed in Table II.

The coordination contour is associated with a maximum value for E and labelled with this value.

The contours are determined in the same way as the corresponding coordination contour, for propagation mode 1, but using terrestrial station e.i.r.p. values E (in dBW) which are 5, 10, 15, 20 dB, etc. lower than the value (given in Table II of Appendix 28) corresponding to the coordination contour.

3. Use of auxiliary contours

The auxiliary contours, the coordination contour for great circle propagation (mode 1) and the coordination contour for rain scatter (mode 2) are all plotted on the same diagram for a given shared band. An illustrated example is given in Figure 15.

For each terrestrial station situated within the coordination area, a two stage procedure may be applied, one for the great circle propagation mechanism and the other for rain scatter.

3.1 Great circle propagation mechanism (mode 1)

If a transmitting terrestrial station is outside the coordination area corresponding to mode 1, it need not be considered further with respect to mode 1.

For each transmitting terrestrial station situated within the coordination area corresponding to mode 1, the e.i.r.p. value in the direction of the Earth station is determined. If this value is less than the value associated with the nearest contour defining an area outside of which the station is situated, the station may be considered not to cause more than a permissible level of interference and therefore may be eliminated from further consideration with respect to mode 1.

For each receiving terrestrial station, the analogous procedure may be applied using the interference sensitivity factor instead of the e.i.r.p. value.

3.2 Elimination of a terrestrial station and rain scatter mechanism (mode 2)

Terrestrial stations eliminated by the above procedure from further consideration with regard to propagation mode 1 need, nevertheless, be further considered with regard to propagation mode (2) when they lie within the rain scatter coordination area.

APPENDIX 29

Method of Calculation for determining if Coordination is required between Geostationary Satellite Networks sharing the same Frequency Bands

1. Introduction

The method of calculation for determining if coordination is required under provision / 639AJ / is based on the concept that the noise temperature of a system receiving interference increases as the level of the interfering emission increases. It can, therefore, be applied irrespective of the modulation characteristics of these satellite networks, and of the precise frequencies used.

In this method, the apparent increase in the equivalent satellite link noise temperature resulting from an interfering emission of a given system is calculated (see Section 2 below) and the ratio of this increase to the equivalent satellite link noise temperature, expressed as a percentage, is compared to a threshold value (see Section 3 below).

2. Calculation of the apparent increase in equivalent noise temperature of the satellite link receiving an interfering emission

Two possible cases are considered :

Case I : wanted and interfering networks share one or more frequency bands each in the same direction of transmission;

Case II : wanted and interfering networks share one or more frequency bands each in opposite directions of transmission (bidirectional use).

These two cases cover all relative satellite positions from closely-spaced to near-antipodal positions :

2.1 Parameters

Let A be a satellite link of network R associated with satellite S and A' be a satellite link of network R' associated with satellite S'. The symbols relating to satellite link A' bear primes, those relating to satellite link A do not bear primes.

The parameters are defined as follows (for satellite link A) :

T : the equivalent satellite link noise temperature referred to the output of the receiving antenna of the Earth station (K);

T_s : the receiving system noise temperature of the space station referred to the output of the receiving antenna of the space station (K);

T_e : the receiving system noise temperature of the Earth station referred to the output of the receiving antenna of the Earth station (K);

ΔT_s : apparent increase in the receiver noise temperature of the satellite S caused by an interfering emission referred to the output of the receiving antenna of this satellite (K);

ΔT_e : apparent increase in the receiver noise temperature of the Earth station e_R, caused by an interfering emission referred to the output of the receiving antenna of this station (K);

p_s : maximum power density per Hz delivered to the antenna of satellite S (averaged over the worst 4 kHz band for a carrier frequency below 15 GHz or over the worst 1 MHz band above 15 GHz) (W/Hz);

$g_3(\eta)$: transmitting antenna gain of satellite S in the direction η (numerical power ratio);

- η_A : direction, from satellite S, of the receiving Earth station e_R of satellite link A;
- $\eta_{e'}$: direction, from satellite S, of the receiving Earth station e'_R of satellite link A';

Note : The product $p_s\ g_3(\eta_{e'})$ is the maximum e.i.r.p. per Hz of satellite S in the direction of the receiving Earth station e'_R of satellite link A';

- $\eta_{s'}$: direction, from satellite S, of satellite S';

p_e : maximum power density per Hz delivered to the antenna of the transmitting Earth station e_T (averaged over the worst 4 kHz band for a carrier frequency below 15 GHz or over the worst 1 MHz band above 15 GHz) (W/Hz);

$g_2(\delta)$: receiving antenna gain of satellite S in the direction δ (numerical power ratio);

- δ_A : direction, from satellite S, of the transmitting Earth station e_T of satellite link A;
- $\delta_{e'}$: direction, from satellite S, of the transmitting Earth station e'_T of satellite link A';
- $\delta_{s'}$: direction, from satellite S, of satellite S';

θ_t : topocentric angular separation between the two satellites[1], taking the longitudinal station keeping tolerances into account.

Note : Only the topocentric angle θ_t should be used in dealing with Case I.

θ_g : geocentric angular separation between the two satellites, taking the longitudinal station keeping tolerances into account.

Note : Only the geocentric angle θ_g should be used in dealing with Case II.

$g_1(\theta_t)$: transmitting antenna gain of the Earth station e_T in the direction of satellite S' (numerical power ratio);

$g_4(\theta_t)$: receiving antenna gain of the Earth station e_R in the direction of satellite S' (numerical power ratio);

k : Boltzmann's constant ($1.38\ 10^{-23}$ J/K);

l_d : free-space transmission loss[2] on the down-link (numerical power ratio); evaluated from satellite S to the receiving Earth station e_R for satellite link A;

Note : the free-space transmission loss on any down-link evaluated from the satellites S or S' to the receiving Earth stations e_R or e'_R are considered to be equal to l_d;

l_u : free-space transmission loss[2] on the up-link (numerical power ratio); evaluated from the Earth station e_T, to satellite S for satellite link A;

Note : the free-space loss on any up-link evaluated from the Earth stations e_T or e'_T to the satellites S or S' are considered to be equal to l_u;

l_s : free-space transmission loss[2] on the inter-satellite link (numerical power ratio); evaluated from satellite S' to satellite S;

Notes : 1. A method for calculation of the topocentric angular separation is given in Annex 1.

2. A method for calculation of the free-space transmission loss is given in Annex 2.

γ : transmission gain of a specific satellite link, being the object of interference evaluated from the output of the receiving antenna of satellite S to the output of the receiving antenna of the Earth station e_R (numerical power ratio, usually less than 1).

2.2 General method

In the following equations, the frequency to be used for the calculations of l_d, l_u, and l_s is the average frequency of the band common to both networks in the direction considered. If, in a given direction, there is no overlap of the assigned frequency bands of the two networks the corresponding value (ΔT_s or ΔT_e) is taken to be equal to zero. For cases where there has been no publication of the Appendix 1A data, the assigned frequency band for that network shall be considered as being the /‾ frequency range_/ as provided for in Appendix 1B.

2.2.1 Case I - Wanted and interfering networks sharing the same frequency band in the same direction of transmission

The gains $g_1(\theta_t)$ and $g_4(\theta_t)$ are those of the Earth stations concerned. When neither measured data nor a relevant Recommendation of the CCIR are available the radiation patterns set out in Annex 3 should be used.

2.2.1.1 Simple frequency-changing transponder on-board the satellite

The parameters ΔT_s and ΔT_e are given by the following equations :

$$\Delta T_s = \frac{p_e' g_1'(\theta_t) g_2(\delta_e)}{k l_u} \quad (1)$$

$$\Delta T_e = \frac{p_s' g_3'(\eta_e) g_4(\theta_t)}{k l_d} \quad (2)$$

The symbol ΔT will be used to denote the apparent increase in the equivalent noise temperature for the entire satellite link referred to the output of the receiving antenna of the receiving station e_R due to the interfering emission from link A'.

This increase is the result of the interfering emissions entering at both the satellite and the Earth station receiver link A and can accordingly be expressed as :

$$\Delta T = \gamma \Delta T_s + \Delta T_e \quad (3)$$

Hence,

$$\Delta T = \gamma \frac{p_e' g_1'(\theta_t) g_2(\delta_e)}{k l_u} + \frac{p_s' g_3'(\eta_e) g_4(\theta_t)}{k l_d} \quad (4)$$

An example calculation for the application of the method of this Appendix applied to Case I is given in Annex 4.

In the same way, the increase $\Delta T'$ in the equivalent noise temperature for the entire satellite link referred to the output of the receiving antenna of the receiving Earth station e'_R under the effect of the interference caused by satellite link A is given by the following equations:

$$\Delta T'_s = \frac{p_e\, g_1(\theta_t)\, g'_2(\delta_e)}{k l_u} \tag{5}$$

$$\Delta T'_e = \frac{p_s\, g_3(\eta_e)\, g'_4(\theta_t)}{k l_d} \tag{6}$$

$$\Delta T' = \gamma' \frac{p_e\, g_1(\theta_t)\, g'_2(\delta_e)}{k l_u} + \frac{p_s\, g_3(\eta_e)\, g'_4(\theta_t)}{k l_d} \tag{7}$$

2.2.1.2 Cases requiring independent treatment of the up-link and the down-link

If there is a change of modulation in the satellite or if the transmission is originated on-board the satellite, then the apparent increase in the noise temperature must be related to the total receiving system noise temperature of the specific link being examined (the space station or the Earth station, whichever is applicable). In this case, the equivalent noise temperature of the entire satellite link and the transmission gain are not used and equations (1) and (2) above are used separately as required (see section 2.3).

2.2.2 Case II - Wanted and interfering networks sharing the same frequency band in opposite directions of transmission (bidirectional use)

The calculation method below only applies to interfering emissions between satellites.

Interference between Earth stations using the same frequency band in opposite directions of transmission (bidirectional use) is to be dealt with by coordination procedures analogous to those used for coordination between Earth and terrestrial stations.

All the equations relating to Case II shall use the geocentric angle θg.

2.2.2.1 Simple frequency-changing transponder on-board the satellite

The noise temperature increase ΔT_S referred to the output of the receiving antenna of the satellite of link A is given by :

$$\Delta T_S = \frac{p'_s\, g'_3(\eta_s)\, g_2(\delta_{s'})}{k l_s} \tag{8}$$

The apparent increase in equivalent link noise temperature is then given by :

$$\Delta T = \gamma \Delta T_s \qquad (9)$$

The increase ΔT' in the equivalent noise temperature of the link A' caused by interfering emissions from the satellite associated with the link A is given by :

$$\Delta T' = \gamma' \Delta T'_s = \frac{\gamma' p_s \; g_3(\eta_s) \; g'_2(\delta_s)}{k l_s} \qquad (10)$$

2.2.2.2 <u>Cases requiring independent treatment of the up-link and down-link</u>

In this case equation (8) is used directly with T_s to obtain the percentage increase. The increase $\Delta T'_s$ in the noise temperature of link A' caused by interfering emissions from the satellite associated with link A is obtained in a similar manner.

2.2.3 <u>Consideration of polarization isolation</u>

The polarization isolation factor described in this paragraph shall be considered only if the Administration responsible for each network has consented to such a course and has notified its polarization or published it for coordination under 4114/639AJ. In this case, the apparent increase in the apparent satellite link noise temperature shall be determined by the following expressions :

Case I $\quad \Delta T = \dfrac{\gamma \Delta Ts}{Y_u} + \dfrac{\Delta Te}{Y_d}$

Case II $\quad \Delta T = \dfrac{\gamma \Delta Ts}{Y_{ss}}$

Where the values of ΔTs and ΔTe are those given in paragraphs 2.2.1 and 2.2.2 and the values of the factors of polarization isolation Y_u, Y_d and Y_{ss} are given in the table below.

Polarization		Factor of polarization isolation (numerical ratio) Y
network R	network R'	
LHC	RHC	4
LHC	L	1.4
RHC	L	1.4
LHC	LHC	1
RHC	RHC	1
L	L	1

where LHC = left hand circular
RHC = right hand circular
L = linear

2.3 Determination of the satellite links to be considered in calculating the increase in equivalent satellite link noise temperature (Case I only)

The greatest increase in equivalent satellite link noise temperature caused to any link of another satellite network, existing or planned by interfering emissions of the proposed satellite network must be determined.

The most unfavourably sited transmitting Earth station of the interfering satellite network should be determined for each satellite receiving antenna of the network suffering interference by superimposing the "Earth-to-space" service areas of the interfering network on the space station receiving antenna gain contours plotted on a map of the Earth's surface. The most unfavourably sited transmitting Earth station is the one in the direction of which the satellite receiving antenna gain of the network interfered with is the greatest.

The most unfavourably sited receiving Earth station of the network suffering interference should be determined in an analogous manner for each "space-to-Earth" service area of that network. The most unfavourably sited receiving Earth station is the one in the direction of which the satellite transmitting antenna gain of the interfering network is the greatest.

3. Comparison between calculated percentage increase in noise temperature and the threshold value

3.1 Simple frequency-changing transponder on-board the satellite

The calculated values of the $\frac{\Delta T}{T}$ and $\frac{\Delta T'}{T'}$, expressed as percentages, shall be compared with the threshold value of 4 %.

- If the calculated value of $\frac{\Delta T}{T}$, expressed as a percentage, due to any interfering emission from satellite link A' to satellite link A, is no greater than the threshold value, coordination shall not be required.

- If the calculated value of $\frac{\Delta T}{T}$, expressed as a percentage, is greater than the threshold value coordination is required.

The comparison of $\frac{\Delta T'}{T'}$, expressed as a percentage, with the threshold value shall be carried out in a similar manner.

3.2 Cases requiring independent treatment of the up-link and the down-link

a) In the case of interference into only one link, the up-link or the down-link, the value $\Delta T_e/T_e$ or $\Delta T_s/T_s$, expressed as a percentage, shall be compared with the threshold value of 4 %.

b) In the case of interference into both the up-link and the down-link, between which there is a change of modulation on board the satellite, the values of $\Delta T_e/T_e$ and $\Delta T_s/T_s$, expressed as a percentage, shall each be compared with the threshold value of 4 %.

When none of the calculated values, due to any interfering emission from satellite link A' to satellite link A is greater than the threshold value, coordination shall not be required.

When at least one of the calculated values exceeds the threshold value, coordination is required.

The comparison of $\frac{\Delta Te'}{Te'}$ or $\frac{\Delta Ts'}{Ts'}$, expressed as a percentage, with the threshold value shall be carried out in a similar manner.

4. Consideration of narrow-band carriers

The method of calculation described in this Appendix may underestimate the interference from slow swept TV carriers into certain narrowband (SCPC) carriers.

In order to facilitate coordination between the satellite systems and to reduce the number of Administrations involved in this procedure, the Administrations whose systems are either recorded in the Master Register or are under coordination may inform an Administration notifying its new system about radio frequency channels used in their systems for SCPC transmission, so that the notifying Administration may be able to avoid using these channels for FM-TV transmissions.

Conversely, Administrations introducing new systems using SCPC transmissions may seek appropriate information from other Administrations on their FM-TV transmissions.

Annexes : I, II, III, IV

Annex I

Calculation of the topocentric angular separation between two geostationary satellites

The topocentric angular separation θ_t between two geostationary satellites from a given Earth station can be determined by using the equation :

$$\theta_t = \text{arc cos} \left(\frac{d_1^2 + d_2^2 - (84332 \sin \frac{\theta_g}{2})^2}{2\ d_1 .\ d_2} \right)$$

where d_1 and d_2 are the distances, in km, from the Earth station to the two satellites, respectively, and evaluated as d by the method described in Annex 2, and θg is as defined in paragraph 2.1.

Annex II

Calculation of the free space transmission loss

The free space transmission loss L can be determined by using the following equation :

$$L = 20\ (\log_{10} f + \log_{10} d) + 32.45\ \text{(dB)}$$

where f = frequency in MHz;

d = distance in km

a) The distance d between an Earth station and a geostationary satellite is given by the equation :

$$d = 42\ 644\ \sqrt{1 - 0.2954 \cos \psi} \quad \text{(km)}$$

where

$$\cos \psi = \cos \zeta \ \cos \beta$$

where

ζ = latitude of the Earth station;

β = difference in longitude between the satellite and the Earth station

Note : If $\cos \psi < 0.151$ the satellite is below the horizontal plane.

b) The distance d_s between two geostationary satellites is determined as follows :

$$d_s = 84332 \sin \frac{\theta_g}{2} \quad \text{(km)}$$

Θ_g = geocentric angular separation as defined in paragraph 2.1

Annex III

Radiation pattern for Earth station antennae to be used when they are not published

When neither measured data nor relevant Recommendations of the CCIR are available then Administrations should use the reference diagrams given below (in dB) :

a) for values of $D/\lambda \geqslant 100$*) (maximum gain $\geqslant 48$ dB approx.)

$G(\phi) = G_{max} - 2.5.10^{-3}(\frac{D}{\lambda}\phi)^2$ for $0 < \phi < \phi_m$

$G(\phi) = G_1$ for $\phi_m \leqslant \phi < \phi r$

$G(\phi) = 32 - 25 \log \phi$ for $\phi_r \leqslant \phi < 48^\circ$

$G(\phi) = -10$ for $48^\circ \leqslant \phi < 180^\circ$

where : D = antenna diameter } same units
λ = wavelength }

ϕ = off-axis angle of the antenna, equal to Θ_t or Θ_g as applicable.

G_1 = gain of the first sidelobe = $2 + 15 \log \frac{D}{\lambda}$

$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1}$ (degrees)

$\phi_r = 15.85 \, (D/\lambda)^{-0.6}$

b) for values of $D/\lambda < 100$*) (maximum gain < 48 dB approx.)

$G(\phi) = G_{max} - 2.5.10^{-3}(\frac{D}{\lambda}\phi)^2$ for $0 < \phi < \phi_m$

$G(\phi) = G_1$ for $\phi_m \leqslant \phi < 100\,\frac{\lambda}{D}$

$G(\phi) = 52 - 10 \log \frac{D}{\lambda} - 25 \log \phi$ for $100\,\frac{\lambda}{D} \leqslant \phi < 48^\circ$

$G(\phi) = 10 - 10 \log \frac{D}{\lambda}$ for $48^\circ \leqslant \phi \leqslant 180^\circ$

The above patterns may be modified as appropriate, to achieve a better representation of the actual antenna pattern.

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*) **In cases where $\frac{D}{\lambda}$ is not given, it may be estimated from the expression $20 \log (\frac{D}{\lambda}) \approx G_{max} - 7.7$, where G_{max} is the main lobe antenna gain in dB.**

Annex IV

Example of an application of Appendix 29

1. General

In this example of Case I, two identical satellite networks each with a simple frequency changing transponder and a global coverage antenna are assumed.

All topocentric angles θ_t are assumed to be equal to 5°.

For this angular separation and for an Earth station antenna with D/λ greater than 100, the reference radiation pattern $(32 - 25 \log_{10} \theta_t)$ gives a gain of 14.5 dB in the direction of the satellite of the other network.

The input data are furnished in paragraph 2 in dB values except for the parameters T and θ_t. In paragraph 3 the calculations are performed in dB.

It may be noted that since both satellites use global beams, essentially no antenna discrimination between wanted and unwanted signals is obtained at the satellite and that this constitutes a worst case.

2. Input data

Values of the network parameters used in this paragraph are derived from those published in /‾ Appendix 1A, 1B_/

	Symbol *)	Value	Unit
Up-link at 6 175 MHz	P'_e $G'_1(\theta_t)$ $G_2(\delta_{e'})$ L_u	-37 14.5 15.5 200	dBW/Hz dB dB dB
Down-link at 3 950 MHz	P'_s $G'_3(\eta_e)$ $G_4(\theta_t)$ L_d	-57 15.5 14.5 196	dBW/Hz dB dB dB
	$10 \log_{10}\gamma$ T θ_t	-15 105 5	dB K degree

3. Calculation of $\frac{\Delta T}{T}$

From equation (4)

$$10 \log_{10} \Delta T_s = P'_e + G'_1(\theta_t) + G_2(\delta_{e'}) + 228.6 - L_u$$

$$= -37 + 14.5 + 15.5 + 228.6 - 200 = 21.6 \text{ dBK}$$

Therefore,

$$\Delta T_s = 145\text{K}$$

From equation (5)

$$10 \log_{10} \Delta T_e = P'_s + G'_3(\eta_e) + G_4(\theta_t) + 228.6 - L_d$$

$$= -57 + 15.5 + 14.5 + 228.6 - 196 = 5.6 \text{ dBK}$$

*) All capital symbols, except T, refer to parameters given in logarithmic units.

Therefore,

$\Delta T_e = 3.6K$

From equation (6)

$\Delta T = \gamma \Delta T_s + \Delta T_e =$

$= 0.032 \times 145 + 3.6 = 8.2K$

Thus

$$\frac{\Delta T}{T} \times 100 = \frac{8.2 \times 100}{105} = 7.8 \%$$

4. Conclusion

In the example shown, the percentage increase in equivalent satellite link noise temperature is 7.8 %. Since it exceeds the threshold value of 4 %, coordination between the two networks is required.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 630-E
13 November 1979
Original : French

WORKING GROUP 6A

REPORT BY SUB-WORKING GROUP 6A AD HOC 2 TO

WORKING GROUP 6A

In view of point 12 in Document No. 488 and the draft Resolutions submitted by Greece and Argentina; and taking into account the proposals made orally by the delegates of Upper Volta, Somalia, Ecuador and Kenya aimed at increasing assistance on frequency management problems to developing countries, the Sub-Working Group adopted the draft Resolution annexed hereto.

The delegation of Greece reserved the right to revert to this point in Working Group 6A.

In addition to the delegates present, the representatives of the IFRB, the CCIR and the General Secretariat took part in the work.

Y. KABA
Chairman

Annex : 1

ANNEX

DRAFT

RESOLUTION

On the Organization of ITU Assistance to the
Developing Countries in Connection with Frequency Management

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that national requirements for the use of the radio frequency spectrum continue to increase;

b) that the need to rationalize the use of the frequency spectrum has been identified at the World Administrative Radio Conference, Geneva, 1979, as a prime point to provide better possibilities of spectrum management to developing countries;

c) that international frequency management must be based on permanent monitoring distributed throughout the different regions of the world;

d) that many developing countries do not have the resources (monitoring stations, qualified personnel, and advanced technology such as electronic data-processing) for applying appropriate frequency management methods;

e) that it is necessary to provide the developing countries with the means to deal with this situation;

f) that the efforts made by the developing countries themselves, and the bilateral aid granted for this purpose, are both inadequate;

g) that the Radio Regulations already contain provisions requesting the IFRB to provide assistance to those countries which need it in connection with the search for frequencies, coordination and agreements and the technical calculations required for frequency management; this assistance should be both prompt and comprehensive;

h) that such assistance should not be confined solely to solving short-term problems (such as the search for frequencies or help in applying the provisions of the Radio Regulations) but should also include long-term problems [for example, establishment of data-processing centres];

i) that the Board, as the Organ of the ITU responsible for international frequency [management], has suitable material and experience which could be made available to all Administrations requiring them;

j) that studies are continuing in the CCIR on the use of analysis techniques and computers in frequency management;

k) that developing countries are not all at the same stage of development, and in consequence the assistance to be provided should be suited to the specific conditions of each of them;

l) that there is a need for increasing the participation of the developing countries in the activities of the Union;

resolves

1. that the IFRB shall take the necessary steps to assist countries in solving their immediate and long-term problems in frequency management and optimization of spectrum use;

2. that, to that end, the IFRB shall prepare for the Administrative Council a report setting out the problems of the developing countries and the means and skills available to it for solving such problems; in that report, the IFRB shall bear in mind its experience in developing the data-processing systems which it applies for frequency management;

3. that in the frequency management seminars organized periodically, the IFRB should take into account the conventional methods of management and data-processing systems used by the Administrations and describe the best approaches adopted in these fields;

4. that the appropriate Organs of the ITU shall continue to study the use of computers, and make suitable recommendations to countries taking into account their different stages of development;

5. that the Organs of the ITU shall consider the possibility of seconding their staff for short periods to assist locally in countries where appropriate;

6. that, in their own specialized fields, all Organs of the ITU shall identify ways of helping these countries in the field of frequency management;

requests the Administrative Council

1. to examine the reports thus prepared;

2. to take appropriate decisions for optimizing assistance to developing countries, in particular those designated as the least developed by United Nations;

3. that, once the needs have been established, the Unions' computer experts be made available to Administrations to advise them on the establishment of data-processing centres and on the training of the staff assigned to them;

4. to provide the ITU with appropriate resources for such assistance; and

5. to instruct the appropriate Organs of the Union to implement these decisions;

invites the Secretary-General

to bring this Resolution and the decisions of the Administrative Council to the notice of all Administrations;

urges the Administrations

to support the projects on frequency management through their representatives at the UNDP.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 631-E
16 November 1979
Original : French

PLENARY MEETING

FOURTH REPORT OF COMMITTEE 6

Committee 6 adopted the revised texts on the following subjects (see Document No. 632) which were forwarded to the Editorial Committee for submission to the plenary meeting :

- Appendices 6, 7 and 8
- Resolution No. /̲‾COM 6-5_7

Resolution No. /̲‾COM 6-5_7 replaces Recommendation A on page B.1-7 of Document No. 424.

These texts were adopted unanimously.

Dr. M. JOACHIM
Chairman of Committee 6

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 632-E
16 November 1979
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COMMITTEE 9

FOURTH SERIES OF TEXTS SUBMITTED BY COMMITTEE 6
TO THE EDITORIAL COMMITTEE

The texts mentioned in Document No. 631 and contained in the annexes below are submitted to the Editorial Committee :

Annex 1 : Appendices 6, 7 and 8

Annex 2 : Resolution No. /¯COM 6-5_7

Resolution No. /¯COM 6-5_7 replaces Recommendation A on page B.1-7 of Document No. 424.

Dr. M. JOACHIM
Chairman of Committee 6

Annexes : 2

ANNEX 1

APPENDIX 6

MOD ~~Report~~ Reports of International Monitoring of Emissions
(see Article N18/13)

ADD Section I. Reports concerning stations in the terrestrial radiocommunication services

1. Reports of measurements of frequency should contain as much as necessary of the following information :

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

MOD c) time of measurement ~~(GMT)~~ /_ (UTC) _/;

MOD d) call sign or other means of identification, or both, of the station ~~measured~~ monitored;

MOD e) class of emission;[1]

f) assigned frequency or reference frequency;

g) frequency tolerance;

h) measured frequency;

i) accuracy of measurement;

j) departure from assigned or reference frequency;

k) additional information (e.g. period covered by measurement, drift of measured frequency during that period, quality of received signal and conditions of reception);

l) remarks.

MOD 2. Reports of measurements of field strength or power flux-density; should contain as much as necessary of the following information :

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

MOD c) time of measurement ~~(GMT)~~ [(UTC)];

MOD d) call sign or other means of identification, or both, of the station ~~measured~~ monitored;

MOD e) class of emission;[1]

f) assigned frequency;

MOD g) value of measured field strength or power flux-density;

h) estimated accuracy of measurement;

i) value of the measured component of polarization measured;

j) other elements or characteristics of the measurement;

k) remarks.

3. Reports of observations of spectrum occupancy should as far as practicable be made in the form recommended by the International Frequency Registration Board and contain if possible the following information :

a) identification of the monitoring station (administration or organization, and location);

b) date of the measurement;

MOD c) time of measurement ~~(GMT)~~ [(UTC)];

d) call sign or other means of identification, or both, of the station monitored;

MOD e) class of emission;[1]

MOD f) class of station ~~;~~ and nature of service;

g) measured frequency;

ADD h) period during which the emission was heard or recorded;

MOD i) value of measured field strength or power flux-density or signal strength according to the QSA scale;

MOD j) bandwidth occupied; (indicate if measured, estimated, or the necessary bandwidth notified to the IFRB)

MOD k) information as to the locality or area in which reception is intended:

MOD l) remarks.

4. In providing these data, the symbols contained in the Radio Regulations or in the Preface to the International Frequency List should be used as far as possible.

ADD

Section II. Reports concerning stations in the space radiocommunication services

1. Reports of measurements of frequency should contain as much as necessary of the following information :

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

c) time of measurement ~~(GMT)~~ (UTC);

d) call sign or other means of identification, or both, of the station ~~measured~~ monitored;

e) class of emission;[1]

f) assigned frequency or reference frequency;

g) frequency tolerance;

h) measured frequency;

i) accuracy of measurement;

j) departure from assigned or reference frequency;

k) additional information (e.g. period covered by measurement, drift of measured frequency during that period, quality of received signal and conditions of reception);

l) remarks.

2. Reports of measurements of field strength or power flux-density should contain as much as necessary of the following information :

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

c) time of measurement ~~(GMT)~~ (UTC);

d) call sign or other means of identification, or both, of the station ~~measured~~ monitored;

e) class of emission;[1]

f) assigned frequency;

g) value of measured field strength or power flux-density;

h) estimated accuracy of measurement;

i) value of the measured component of polarization;

j) other elements or characteristics of the measurement;

k) remarks.

3. Reports of observations of spectrum occupancy should as far as practicable be made in the form recommended by the International Frequency Registration Board and contain if possible the following information :

3.1 Reports of observations concerning emissions of space stations

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

c) time of measurement ~~(GMT)~~ (UTC);

d) call sign or other means of identification, or both, of the station monitored;

e) class of emission;[1]

f) class of station and nature of service;

g) measured frequency;

h) value of measured field strength or power flux-density or signal strength according to the QSA scale;

i) bandwidth occupied (indicate if measured, estimated, or the necessary bandwidth notified to the IFRB);

j) observed polarization;

k) information on orbit;

l) information as to the locality or area in which reception is intended, if known;

m) remarks.

3.2 Reports of observations concerning emissions of earth stations

a) identification of the monitoring station (administration or organization, and location);

b) date of the measurement;

c) time of measurement ~~(GMT)~~ (UTC);

d) call sign or other means of identification, or both, of the station monitored;

e) class of emission;[1]

f) class of station and nature of service;

g) measured frequency;

h) period during which the emission was observed or recorded;

i) value of measured field strength or power flux-density or signal strength according to the QSA scale;

j) bandwidth occupied (indicate if measured, estimated, or the necessary bandwidth notified to the IFRB);

k) information as to the locality or area in which reception is intended;

l) remarks.

4. In providing these data, the symbols contained in the Radio Regulations or in the Preface to the International Frequency List should be used as far as possible.

ADD [1]The class of emission shall contain the basic characteristics listed in Article /_N3_/ and, if possible, the additional characteristics listed in Appendix /_5 MOD_/. If any characteristic cannot be determined, indicate the unknown symbol with a dash. However, if a station is not able to identify unambiguously whether the modulation is frequency or phase modulation, indicate frequency modulation (F).

APPENDIX 7

MOD

Report of an Irregularity or of an Infringement of the Convention or the Radio Regulations[1]
(see Articles N20/15 and N19/16)

Particulars concerning the station infringing the Regulations :

	1.	Name[1] if known (in BLOCK letters)	....
	2.	Call sign or other identification (in BLOCK letters)	....
	3.	Nationality, if known	....
MOD	4.	Frequency used (kHz, ~~or~~ MHz, GHz or THz)	....
	5.	Class of emission[2]	....
ADD	6.	Class of station and nature of service, if known	....
ADD	7.	Location[3, 4, 5]	....

Particulars concerning the station, the centralizing office or inspection service reporting the irregularity or infringement :

MOD ~~6~~	8.	Name (in BLOCK letters)	....
MOD ~~7~~	9.	Call sign or other identification (in BLOCK letters)	....
MOD ~~8~~	10.	Nationality	....
MOD ~~9~~	11.	~~Approximate position~~[~~3,8~~] Location[3.4]	....

Particulars of the irregularity or infringement :

MOD ~~10~~	12.	Name[4 8] of the station (in BLOCK letters) in communication with the station committing the irregularity or infringement	....
MOD ~~11~~	13.	Call sign or other identification (in BLOCK letters) of the station in communication with the station committing the irregularity or infringement[6]	....
MOD ~~12~~	14.	~~Time~~[~~5~~] ~~and date~~[~~7~~] Date and time[7 8]	....
MOD ~~13~~	15.	Nature of the irregularity or infringement[6]	....
MOD ~~14~~	16.	Extracts from ship log ~~and~~ or other ~~documents~~ information supporting the report ~~(to be continued on the back of the form if necessary)~~	....

MOD Particulars concerning the transmitting station interfered with ~~7~~ 9 :

MOD ~~15~~ 17. Name of the station (in BLOCK letters) ....

MOD ~~16~~ 18. Call sign or other identification (in BLOCK letters) ....

MOD ~~17~~ 19. Frequency assigned (kHz, ~~or~~ MHz or THz) ....

MOD ~~18~~ 20. Frequency measured at the time of the interference ....

MOD ~~19~~ 21. Class of emission[2] and bandwidth (indicate if measured, estimated, or the necessary bandwidth notified to the IFRB) ....

MOD ~~20~~ 22. Receiving location[3,4] (in BLOCK letters) where the interference was ~~troublesome~~ experienced ....

MOD ~~21~~ 23. Certificate :

I certify that the foregoing report represents, to the best of my knowledge, a complete and accurate account of what took place.

Signature~~s~~ [10] : .... Date~~s~~ : ....

....

Instructions for filling in this form

MOD [1]Each report shall refer to only ~~to~~ one station (see note ~~4~~ 8). If it is forwarded as a letter, it ~~It~~ shall be ~~forwarded~~ in duplicate, and whenever practicable, should be typewritten. It may also be forwarded as a telegram.

MOD [2]The class of emission shall contain the basic characteristics listed in Article / N3 / and, if possible, the additional characteristics listed in Appendix / 5 MOD /. If any characteristic cannot be determined, indicate the unknown symbol with a dash. However, if a station is not able to identify unambiguously whether the modulation is frequency or phase modulation, indicate frequency modulation (F).

MOD [3]In the case of land, ~~or~~ fixed, or earth stations, the position shall be expressed in latitude and longitude (Greenwich). If the position cannot be furnished, the area of operation should be indicated.

MOD [4]~~Applicable only to ships and aircraft~~; In the case of ship or aircraft stations, the position shall be expressed either in latitude and longitude (Greenwich) or by a true bearing in degrees and distance in nautical miles, or in kilometres, from some well-known place. If the position cannot be furnished, the area of operation should be indicated.

ADD [5]Where space stations are concerned, information shall be furnished on the orbit.

MOD [6]A separate report is required for each irregularity or infringement, unless they are repeated ~~have obviously all been made by the same person and~~ within a short time. ~~All reports shall be forwarded in duplicate, and whenever practicable should be typewritten (indelible pencil and carbon paper may be used)~~.

MOD [7]The time must be expressed as Universal Coordinated Time ~~Time Coordinated~~ (UTC) ~~Greenwich Mean Time (GMT)~~ by a group of four figures (0001 to 2400). If the infringement is prolonged or repeated, the dates and times shall be shown.

MOD [8]If both communicating stations infringe the Regulations, a separate report shall be made for each of these stations.

MOD [9]This information is to be given only in case of a complaint about interference.

MOD [10]This report shall be signed by the operator/person responsible for the who has reported the infringement and countersigned by the Master of the ship or aircraft, or the officer in charge of the station in the case of an infringement reported by a station of the mobile service. When the report originates from a centralizing office or from an inspection service, it shall be signed by the head of that office or service and countersigned by an official of the administration transmitting it.

For use of the Administration~~s~~ only

1. Company controlling the installation of the station against which complaint is made ....

2. Name of operator of the station held responsible for the irregularity or infringement of the Regulations ....

3. Action taken ....

APPENDIX 8

Report of harmful interference
(See Article N20/15)

Particulars concerning the station causing the interference :

MOD A. Name or call sign ~~and category of station~~ or other means of identification : ....

MOD B. Frequency measured .... Date : ....
Time [(UTC)] ....

MOD C. Class of emission[1] ....

MOD D. Bandwidth (indicate if measured or estimated)..

MOD E. Field strength or power flux-density[2] ....
Date : ....
Time [(UTC)] ....

SUP ~~F. Nature of interference~~

ADD F. Observed polarization ....

ADD G. Class of station and nature of service ....

ADD H. Location/position/area/bearing (QTE) ....

ADD I. Location of the facility which made the above measurements ....

Particulars concerning the transmitting station interfered with :

MOD ~~G~~ J. Name or call sign ~~and category of station~~ or other means of identification ....

MOD ~~H~~ K. Frequency assigned ....

MOD ~~I~~ L. Frequency measured .... Date : ....
Time [(UTC)] ....

MOD ~~J~~ M. Class of emission[1] ....

MOD ~~K~~ N. Bandwidth (indicate if measured, estimated or the necessary bandwidth notified to the IFRB) ....

SUP ~~L~~ ~~O~~. ~~Field strength~~

ADD O. Location/position/area ....

ADD P. Location of the facility which made the above measurements ....

Particulars furnished by the receiving station experiencing the interference :

MOD ~~M~~ Q. Name of station ....

MOD ~~N~~ R. ~~Geographic location of station~~ Location/position/area ....

MOD ~~O~~ S. Dates and times of occurrence of harmful interference ....

MOD ~~P~~ T. ~~Other particulars~~ Bearings (QTE) or other particulars ....

ADD U. Nature of interference ....

ADD V. Field strength or power flux-density[2] at the receiving station of the emission experiencing the interface.. .... Date : ....

Time (UTC) ....

ADD W. Polarization of the receiving antenna or observed polarization ....

MOD ~~Q~~ X. Action requested ~~Requested action~~ ....

ADD [1]The class of emission shall contain the basic characteristics listed in Article /̄ N3 _7 and, if possible, the additional characteristics listed in Appendix /̄ 5 MOD _7. If any characteristic cannot be determined, indicate the unknown symbol with a dash. However, if a station is not able to identify unambiguously whether the modulation is frequency or phase modulation, indicate frequency modulation (F).

ADD [2]When measurements are not available, signal strengths according to the QSA scale should be provided.

MOD Note : ~~(For convenience and brevity, telegraphic reports shall be in the format above, using the letters in the order listed in lieu of the explanatory titles,~~ ~~and an "X" after any such letter if no information on this particular item is reported.)~~ but only those letters for which information is provided should be used. However, sufficient information shall be provided to the Administration receiving the report, so that an appropriate investigation can be conducted.

ANNEX 2

RESOLUTION No. /‾COM 6-5_7

Relating to the Preparation of Explanatory Information by the International Frequency Registration Board on the Application of the New Method for Designating Emissions in Notification Procedures and the Consequential Revision of the Master International Frequency Register

The World Administrative Radio Conference, Geneva, 1979,

having adopted

Article /‾N3_7 and Appendix /‾5 MOD_7 containing a new system for the designation of emissions;

considering

a) that such designations are fundamental to the notification procedures detailed in the Radio Regulations;

b) that it is essential for this new system of designating emissions to be applied not only to new frequency assignments but also to existing entries;

c) that certain new designations are more detailed than the former designations;

d) that the IFRB does not have the means to replace automatically all former designations by the new designations;

noting

a) that some Administrations may have difficulties in implementing the new method of designating emissions when it first comes into use; and

b) that these Administrations need explanatory information well in advance of the entry into force of the Final Acts of this Conference;

resolves

1. that the IFRB shall prepare explanatory information on the application of the new method of designation, including examples, as it applies to the notification procedures specified in the Radio Regulations and shall make this information available to Administrations as early as possible and at the latest before 1 October 1980;

2. that the IFRB shall proceed with the conversion of the data appearing in the Master Register in consultation with Administrations;

3. that if the Board does not receive from an Administration, within a reasonable time, the information required in application of paragraph 2, it shall convert the data appearing in the Master Register as accurately as possible and insert in the Remarks Column a remark referring to the fact that the conversion was made under the terms of the present sub-paragraph;

4. that, with effect from the date of entry into force of the present revision of the Radio Regulations, the Administrations shall use in the coordination and notification procedures only designations of emissions contained in the /‾revised Article N3_7. If however the Board receives, after this date, information or notification containing the old type of designation, the Board shall not consider it as incomplete only for this reason. The Board shall, when practicable, modify the designation and if clarification is required, it shall consult the Administrations concerned.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 633-E
12 November 1979
Original : English

COMMITTEE 7

Tanzania (United Republic of)

REQUEST FOR ADDITIONAL CALL SIGN ALLOCATIONS

The call sign series now allocated to the United Republic of Tanzania will not be sufficient to cater for the expected growth in radiocommunication over the next twenty years.

The Tanzania delegation is therefore requesting for additional two call sign series to be allocated to the United Republic of Tanzania.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 634-E
13 November 1979
Original : English

COMMITTEE 7

Federal Republic of Nigeria

REQUEST FOR ADDITIONAL ALLOCATION OF CALL SIGN SERIES

In view of the fact

that the present call sign series allocated to the Federal Republic of Nigeria has been used up as a result of the increase in her national and international services, and

in view of the fact

that more call sign series are required to meet the added needs of her ever increasing radiocommunication services;

the Federal Republic of Nigeria therefore requests that at least four (4) additional call sign series be allocated to her.

BLUE PAGES

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 635
13 November 1979

E

B.15

PLENARY MEETING

15th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	609 + 610	Recommendation L — Studies of the Maximum Permitted Levels of Spurious Emissions
		Recommendation M — Provision of Formulae and Examples for the Calculation of Necessary Bandwidths

P. BASSOLE
Chairman of the
Editorial Committee

Annex: 3 pages

RECOMMENDATION L

To the CCIR Relating to Studies of the Maximum Permitted Levels of Spurious Emissions

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that Appendix 4 to the Radio Regulations specifies the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line, for the frequency bands below [17.7] GHz; [ ]

b) that the principal objective of Appendix 4 is to specify the maximum permitted levels of spurious emissions that, while being achievable, provide protection against harmful interference;

c) that excessive levels of spurious emissions may give rise to harmful interference;

d) that while Appendix 4 applies only to the mean power of the transmitter and the spurious emissions, there are a variety of emissions where the interpretation of the term "mean power" and its consequential measurement is difficult;

e) that whilst the CCIR is studying this problem, it has not yet furnished adequate Recommendations pertaining to Appendix 4 for frequency bands above [960] MHz; [ ]

f) that spurious emissions from transmitters operating in space stations may cause harmful interference, particularly in regard to intermodulation components from wideband amplifiers which cannot be adjusted after launch;

g) that spurious emissions from Earth stations also require particular study;

h) that no information is available from the CCIR regarding spurious emissions from stations employing digital modulation techniques in the frequency bands above [960] MHz; [ ]

noting

that in large metropolitan areas radio spectrum usage above [960] MHz is [ ] extensive and rapidly growing and that much of this growth in urban areas is now taking place above 10 GHz;

recommends that the CCIR

1. study as a matter of urgency the question of spurious emissions resulting from space services transmissions, and, on the basis of those studies, develop Recommendations for maximum permitted levels of spurious emissions in terms of mean power of spurious components supplied by the transmitter to the antenna transmission line;

2. continue the study of spurious emission levels in all frequency bands, emphasizing the study of those frequency bands, services and modulation techniques not presently covered by Appendix 4;

3. establish appropriate measurement techniques for spurious emissions, including the determination of reference levels for wideband transmissions as well as the applicability of reference measurement bandwidths;

4. study the categorizing of emissions and spurious emissions in terms of "mean power" and develop appropriate Recommendations to facilitate the interpretation and measurement of "mean power" as it applies to the various classes of emissions.

RECOMMENDATION M

To the CCIR Relating to the Provision of Formulae and Examples for the Calculation of Necessary Bandwidths

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that Article **N3** of the Radio Regulations requires that the necessary bandwidth be part of the full designation of emissions;

b) that Appendix 5, Part B, gives a partial list of examples and formulae for the calculation of the necessary bandwidth of some typical emissions;

c) that sufficient information is not available for the determination of the K-factors used throughout the table of examples of the necessary bandwidth in Appendix 5;

d) that, especially with regard to the efficient utilization of the radio frequency spectrum, monitoring and the notification of emissions, it is required that necessary bandwidths for the individual classes of emission be known;

e) that for reasons of simplification and international uniformity it is desirable that measurements for determining the necessary bandwidth be made as seldom as possible;

recommends that the CCIR

1. provides, from time to time, additional formulae for the determination of necessary bandwidth for common classes of emission, as well as examples to supplement those given in Appendix 5, Part B, from time to time;

2. study and provide values of supplementary K-factors required for the calculation of the necessary bandwidth for common classes of emission.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 636-E
13 November 1979
Original : English

COMMITTEE 5

REPORT OF WORKING GROUP 5/AD HOC 5 TO COMMITTEE 5

The ad hoc Group, consisting of delegates of Canada, France, Ivory Coast, Japan, United Kingdom, United States of America, and USSR, discussed proposals relating to the terms "active sensor" and "passive sensor".

The definitions of these two terms, adopted unanimously after an extensive discussion, are annexed herewith for the approval of Committee 5.

V. QUINTAS
Chairman of Working Group 5/ad hoc 5

Annex : 1

ANNEX

Passive Sensors : A measuring instrument in the Earth exploration-satellite service or in the space research service by means of which information is obtained by reception of radiowaves of natural origin.

Active Sensors : A measuring instrument in the Earth exploration-satellite service or in the space research service by means of which information is obtained by transmission and reception of radiowaves.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 637-E
13 November 1979
Original : English

COMMITTEE 5

ELEVENTH AND LAST REPORT OF
WORKING GROUP 5A TO COMMITTEE 5

Working Group 5A presents its eleventh and last Report to Committee 5.

1. The texts adopted by the Working Group for the approval of Committee 5 are shown in the Annex to this Document.

2. With reference to Document No. 498, the Working Group discussed the necessity of the terms "active" and "passive" and decided that no definition corresponding to these terms were necessary. The Working Group considers that the significance of these terms, used in the Radio Regulations, can be understood from the existing texts referring to these terms.

3. The Working Group, with this Report, has completed the task entrusted to it.

V. QUINTAS
Chairman of Working Group 5A

Annex : 1

ANNEX

ARTICLE N5

General Rules for the Assignment and Use of Frequencies

NOC 3281/116A For the purpose of resolving cases of harmful interference, the radio astronomy service shall be treated as a radiocommunication service. However, protection from services in other bands shall be afforded the radio astronomy service only to the extent that such services are afforded protection from each other.

ADD 3281A For the purposes of resolving cases of harmful interference the space research (passive) service and the Earth exploration-satellite (passive) service shall be afforded protection from different services in other bands only to the extent that these different services are protected from each other.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 638-E
13 November 1979
Original : English

COMMITTEE 5

NINTH REPORT OF WORKING GROUP 5C TO COMMITTEE 5

Subject : Frequency bands between 174 and 235 MHz

1. Working Group 5C considered all proposals in the bands 174 - 235 MHz. With the exception mentioned in point 5 below, it was agreed by a majority to recommend the revised Table in Annex 1 of this Report to Committee 5 for adoption.

2. The Federal Republic of Germany and the Netherlands reserved their position on the exclusive allocation of the band 174 - 223 MHz to the broadcasting service in Region 1 without any reference to a long-term evolution.

3. In Region 1, for the band 223 - 230 MHz, a slight majority was in favour of the revised Table. A reasonable number of Administrations were opposing the introduction of the broadcasting service in the band 223 - 230 MHz.

4. Argentina and Canada reserved their position on the introduction of the mobile service in the band 220 - 225 MHz.

5. The introduction of the fixed service into the band 220 - 225 MHz in Region 2 met with a considerable number of objections and no clear majority was obtained. Argentina and Canada reserved their position on this matter.

6. As regards the footnote 3601A, the delegations of Morocco, Sudan and Tunisia reserved their position, whereas Jordan expressed a wish to hear a clarification from the IFRB on the regulatory implications of such a footnote.

7. The delegate of Sweden made the statement reproduced in Annex 2 to this Report.

K. OLMS
Chairman of Working Group 5C

Annexes : 2

A N N E X 1

MHz
174 - 235

<table>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">174 - 223

BROADCASTING

3601/293 3601A
3608/300 3608A</td><td>174 - 216

BROADCASTING

Fixed

Mobile

3601B</td><td rowspan="3">174 - 223

FIXED

MOBILE

BROADCASTING

3603/295 3602A 3608AC
3601C 3602B 3608AB</td></tr>
<tr><td>216 - 220

FIXED

MARITIME MOBILE

Radiolocation

3608AA</td></tr>
<tr><td rowspan="2">220 - 225

AMATEUR

FIXED

MOBILE

Radiolocation

3608AA</td></tr>
<tr><td rowspan="2">223 - 230

BROADCASTING

Fixed

Mobile

3601/293 3601A
3608/300 3608A
3608B 3608C 3612/304</td><td rowspan="2">223 - 230

FIXED

MOBILE

BROADCASTING

AERONAUTICAL
RADIONAVIGATION

Radiolocation

3612A 3612B</td></tr>
<tr><td rowspan="2">225 - 235

FIXED

MOBILE

/‾3618/308A_7</td></tr>
<tr><td>230 - 235

FIXED

MOBILE

3608/300 3608B 3608C
3612C 3612/304
/‾3618/308A_7</td><td>230 - 235

FIXED

MOBILE

AERONAUTICAL
RADIONAVIGATION

3612B /‾3618/308A_7</td></tr>
</table>

SUP 3599/291

SUP 3600/292

MOD 3601/293 Additional allocation: in the People's Republic of Congo, Ethiopia, Gambia, Guinea, Kenya, Malawi, Oman, Uganda, Senegal, Sierra Leone, Tanzania, Zambia and Zimbabwe, the band 174 - 230 MHz is also allocated to the fixed and mobile services on a permitted basis. Stations of the fixed and mobile services shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations.

ADD 3601A Additional allocation: in Austria, the Federal Republic of Germany, Belgium, Denmark, Finland, France, Ireland, Israel, Italy, Liechtenstein, Luxembourg, Monaco, Norway, the Netherlands, the United Kingdom, Sweden and Switzerland, the band 174 - 230 MHz is also allocated to the land mobile service on a permitted basis. Stations of the land mobile service shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in this footnote.

ADD 3601B Different category of service: in the United States of America and Mexico, the allocation of the band 174 - 216 MHz to the fixed and mobile services is on a primary basis (see No. 3432/141).

ADD 3601C Additional allocation: in China, the band 174 - 184 MHz is also allocated to the space research (space-to-Earth) and the space operation (space-to-Earth) services on a primary basis subject to agreement obtained under the procedure set forth in Article N13A. These services should not cause harmful interference to, or claim protection from, existing or planned broadcasting stations.

SUP 3602/294

ADD 3602A Additional allocation: in Bangladesh, Pakistan and the Philippines, the band 200 - 216 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to agreement between the Administrations concerned.

ADD 3602B Additional allocation: in Australia and Papua New Guinea, the bands 204 - 208 MHz and 222 - 223 MHz are also allocated to the aeronautical radionavigation service on a primary basis.

MOD 3603/295 Additional allocation: in India, the band 208 - 216 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to agreement between the Administrations concerned.

SUP 3604/296

SUP 3605/297

SUP 3606/298

SUP 3607/299

MOD 3608/300 Additional allocation: in Oman, the United Kingdom and Turkey, the band 216 - 235 MHz is also allocated to the radiolocation service on a secondary basis.

ADD 3608A Additional allocation: in Somalia, the band 216 - 225 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

ADD 3608AA In Region 2, the band 216 - 225 MHz is also allocated to the radiolocation service on a primary basis until 1 January 1990. As of 1 January 1990, no new stations in that service may be authorized. Stations authorized prior to 1 January 1990 may continue to operate on a secondary basis.

ADD 3608AB Additional allocation: in China, India, Iran and Thailand, the band 216 - 223 MHz is also allocated to the aeronautical radionavigation service on a primary basis and to the radiolocation service on a secondary basis.

ADD 3608AC Additional allocation: in Japan, the band 222 - 223 MHz is also allocated to the aeronautical radionavigation service on a primary basis and to the radiolocation service on a secondary basis.

ADD 3608B Additional allocation: in Bahrein, the United Arab Emirates, Israel, Jordan, Oman, Qatar and Syria, the band 223 - 235 MHz is also allocated to the aeronautical radionavigation service on a permitted basis.

ADD 3608C Additional allocation: in Spain and Sweden, the band 223 - 235 MHz is also allocated to the aeronautical radionavigation service on a primary basis until 1 January 1990 and subject to not causing interference to existing or planned broadcasting stations.

SUP 3609/301

SUP 3610/302

SUP 3611/303

MOD 3612/304 Alternative allocation: in Botswana, Lesotho, Namibia, South Africa and Swaziland, the bands 223 - 238 MHz and 246 - 254 MHz are allocated to the broadcasting service on a primary basis.

ADD 3612A Alternative allocation: in New Zealand, Western Samoa, Niue and Cook Islands, the band 225 - 230 MHz is allocated to the fixed, mobile and aeronautical radionavigation services on a primary basis.

ADD 3612B Additional allocation: in China, the band 225 - 235 MHz is also allocated to the radio astronomy service on a secondary basis.

ADD 3612C Additional allocation: in Nigeria and Yugoslavia the band 230 - 235 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to agreement obtained under the procedure set forth in Article N13A.

SUP 3613/305

SUP 3615/306

SUP 3616/307

SUP 3617/308

ANNEX 2

STATEMENT BY THE DELEGATE OF SWEDEN

"We have, during the discussions on this band, heard expressed a great deal of sympathy with and support for a world-wide allocation to the mobile service: in this case to the maritime mobile service.

It is also our Administration's view that such an allocation on a world-wide basis should be catered for on an exclusive or primary basis to fulfil the future traffic increase foreseen for the mobile services.

We find it appropriate that we should reflect this in the Report of this meeting in order to try to satsify the requirements of the mobile services in another part of the spectrum later in our discussions."

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 639-E
13 November 1979
Original : English

COMMITTEE 5

TENTH REPORT OF WORKING GROUP 5C TO COMMITTEE 5

Subject : Frequency bands 235 - 335.4 MHz and 335.4 - 401 MHz

1. Working Group 5C considered all proposals in the bands 235 - 335.4 MHz and 335.4 - 401 MHz. It was agreed by a majority to recommend the revised Tables appearing in Annexes 1 and 2 to this Report to Committee 5 for adoption.

2. Several delegations reserved their position on the lower limit in footnote 3618/308A. It was proposed that this should be 230 MHz, but in order not to conflict with the allocations to the aeronautical radionavigation service between 230 - 235 MHz it ought to be set at 235 MHz.

3. Although there was unanimous acknowledgement of the importance of the radio astronomy needs in the band 322 - 328.6 MHz, these needs could not be satisfied by a table allocation or by an appropriate footnote because there was no clear concensus on how this might be done. The two possibilities are therefore presented in parallel for a decision in Committee 5.

4. The suppression of footnote 3625/311A :

> "Additional allocation : in Algeria, Argentina, Bangladesh, Bulgaria, Colombia, the Congo, Costa Rica, Egypt, El Salvador, Ecuador, Gabon, Greece, Guatemala, Guinea, Honduras, Iran, Iraq, Jordan, Kenya, Kuwait, Morocco, Pakistan, the Netherlands, Poland, Qatar, the Democratic People's Republic of Korea, Roumania, Syria, Czechoslovakia, Thailand, Tunisia, Turkey and Yugoslavia, the band 399.9 - 400.05 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis (see Recommendation No. Spa 8). Administrations are urged to protect radionavigation-satellite signals being received in coastal areas from harmful interference by other services operating in those areas."

was made in consequence of an earlier decision of Committee 5. The action taken raised considerable objection by the countries mentioned in the footnote and reserved their right to revert back to this.

K. OLMS
Chairman of Working Group 5C

Annexes : 2

ANNEX 1

MHz
235 - 335.4

Region 1	Region 2	Region 3
235 - 267	FIXED MOBILE 3495/201A 3572A 3614/305A 3618/308A 3612/304 3619/309	
267 - 272	FIXED MOBILE Space operation (space-to-Earth) 3618/308A 3621/309B	
272 - 273	SPACE OPERATION (space-to-Earth) FIXED MOBILE 3618/308A	
273 - 322	FIXED MOBILE 3618/308A	
322 - 328.6	FIXED MOBILE [RADIO ASTRONOMY] [3622/310]	
328.6 - 335.4	AERONAUTICAL RADIONAVIGATION 3624/311	

NOC 3495/201A

MOD 3612/304 (See Document No. 638.)

SUP 3613/305

MOD 3614/305A Additional allocation : in New Zealand, the band 235 - 239.5 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

MOD 3618/308A Subject to agreement obtained under the procedure set forth in Article N13A, the bands /̄230/235_7 - 322 MHz and 335.4 - 399.9 MHz may be used by the mobile-satellite service.

NOC 3619/309

SUP 3620/309A

MOD 3621/309B Subject to agreement obtained under the procedure set forth in Article N13A, the band 267 - 272 MHz may be used by Administrations for space telemetry in their countries on a primary basis.

[MOD 3622/310 In China, India, Indonesia, Kenya and the Philippines, the band 322 - 328.6 MHz is also allocated to the radio astronomy service on a primary basis. In making assignments to stations of other services to which this band is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A, and Article N33A).]

/̄SUP 3623/310A_7

NOC 3624/311

ADD 3572A (See Document No. 409.)

A N N E X 2

MHz
335.4 - 401

Region 1	Region 2	Region 3
335.4 - 399.9	FIXED MOBILE 3618/308A	
399.9 - 400.05	RADIONAVIGATION-SATELLITE 3593/285C	
400.05 - 400.15	STANDARD FREQUENCY-SATELLITE 3626/312B 3627/313	
400.15 - 401	METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Space operation (space-to-Earth) 3627/313	

NOC 3593/285C

SUP 3625/311A

NOC 3626/312B

MOD 3627/313 Additional allocation : in Saudi Arabia, Austria, Bahrain, Bulgaria, Colombia, Costa Rica, Cuba, Egypt, the United Arab Emirates, Ecuador, Hungary, Indonesia, Iran, Iraq, Israel, Kuwait, Liberia, Malaysia, Nigeria, Oman, Pakistan, Philippines, Poland, Qatar, Syria, the German Democratic Republic, Roumania, Singapore, Czechoslovakia, Thailand, Turkey, the USSR and Yugoslavia, the band 400.05 - 401 MHz is also allocated to the fixed and mobile services on a primary basis.

SUP 3628/314

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 640-E
13 November 1979
Original : English

COMMITTEE 5

Federative Republic of Brazil

ALLOCATION OF THE BAND 401 - 406 MHz TO

METEOROLOGICAL-AIDS AND METEOROLOGICAL SATELLITE SERVICES

Of all human activities, meteorology is possibly the field in which there has always been the most international cooperation. Weather knows no boundaries.

Man's knowledge of the atmosphere and his ability to forecast its future state has increased significantly over the past years. The Global Atmospheric Research Programme (GARP), jointly sponsored by the International Council of Scientific Unions and the World Meteorological Organization, has organized international cooperative efforts on an unprecedented scale, such as the GARP Atlantic Tropical Experiment in 1974 and recently the Global Weather Experiment, with regional programmes of great significance such as the Monsoon Experiment (MONEX) and the West-African Monsoon Experiment (WAMEX), in 1978-1979.

In these experiments, our ability to forecast weather over longer periods of time is being tested, and the results are promising. A further objective of the Programme is to increase our understanding of climate and climatic change, with all the implications on the future ability of the world to feed its increasing population.

Fundamental to all these potential advances, as well as to our present ability to make weather forecasts, is the World Weather Watch Programme of the World Meteorological Organization. This Programme coordinates the observational, telecommunication and data processing aspects of daily meteorological data gathering throughout the world.

Within the observational component, called the Global Observing System, upper-air (radiosonde) stations, and more recently fixed and mobile platforms from which data are being collected by geostationary and polar orbiting satellites, are particularly needed to rapidly provide observational data for issuing warnings of tropical cyclones and flash flooding.

The figure in the Annex depicts the distribution of radiosonde stations in the world. They form a truly global network over the land areas. Since better forecasts need a uniform coverage of all the world, including ocean areas, the Global Weather Experiment is testing the concept, which should become operational some time in the future, of using satellite Data Collection Platforms to provide data coverage over oceans and remote land areas. During the Global Weather Experiment, several nations have cooperated in an effort to deploy hundreds of drifting buoys in the Southern Hemisphere Oceans to increase reference values which, together with vertical atmosphere soundings by satellite, fill the data gap over the oceans. All countries of the world are cooperating in one way or another in the Global Atmospheric Research Programme. Expenditures for the Global Weather Experiment are estimated to have been in the order of US $ 1 billion if one includes the satellite systems.

The majority of the radiosondes in the world operate in the band around 400 MHz. The same is true of the Data Collection Platforms. Neither system can operate effectively in a shared primary allocation with the fixed or mobile services.

It is suggested, therefore, that the Conference reconsider its preliminary position in allocating the bands 401 - 406 MHz to the fixed service on a primary basis.

Annex : 1

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 641-E
13 November 1979
Original : French

COMMITTEE 7

United Republic of Cameroon

DRAFT

RESOLUTION

Relating to CCIR Study of Lightning Protection of Radio Equipment

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that there are areas in Africa where, although the required protective devices against lightning have been installed, equipments constantly deteriorate, often very seriously, following discharges produced during violent hurricanes;

b) that tentative studies have not led to conclusive results;

c) the lack of material means and of experience among technicians confronted with this phenomenon;

considering further

No. 72 of the International Telecommunication Convention (Malaga-Torremolinos, 1973);

invites the CCIR

to study this phenomenon and to formulate a recommendation in this matter.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 642-E
13 November 1979
Original : French

COMMITTEE 5

Republic of Upper Volta

FREQUENCY BANDS BETWEEN 8 025 MHz AND 8 400 MHz

Different service category

In Upper Volta, the band 8 025 to 8 400 MHz is allocated on a primary basis to the Earth exploration-satellite service.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 643-E
13 November, 1979
Original: English

COMMITTEE 5

NOTE FROM THE CHAIRMAN OF WORKING GROUP 5C

TO COMMITTEE 5

1. Reconsidering the frequency band 136 - 137 MHz, taking into account Document No. 415, Working Group 5C decided not to change the Table and the related footnote as presented in Document No. 409.

2. Working Group 5C took note of Document No. 542 and had no objections to the principles outlined therein and recommends adoption in its revised version.

K. OLMS
Chairman of Working Group 5C

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Corrigendum No. 1(Rev.1) to
Document No. 644-E
16 November 1979
Original : English

COMMITTEE 5

THIRD REPORT OF WORKING GROUP 5BB TO COMMITTEE 5

Page 1

Add the following paragraph :

5. The delegations of the United Kingdom and Yugoslavia objected against the status given to the land mobile service in footnotes 3507A (band 5 750 - 5 950 kHz) and 3508B (band 6 765 - 7 000 kHz).

Page 4

In footnote ADD 3507A :

Delete "Federal Republic of Germany" and insert after Poland :
"German Democratic Republic".

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Corrigendum No. 1 to
Document No. 644-E
15 November 1979
Original : English

COMMITTEE 5

THIRD REPORT OF WORKING GROUP 5BB TO COMMITTEE 5

Page 1

Add the following paragraph :

5. The delegation of Yugoslavia objected against the status given to the land mobile service in footnotes 3507A (band 5 730 - 5 950 kHz) and 3508B (band 6 765 - 7 000 kHz).

Page 4

In footnote ADD 3507A :

Delete "Federal Republic of Germany" and insert after Poland : "German Democratic Republic".

INTERNATIONAL TELECOMMUNICATION UNION
WORLD ADMINISTRATIVE RADIO CONFERENCE
(Geneva, 1979)

Document No. 644-E
13 November 1979
Original : English

COMMITTEE 5

THIRD REPORT OF WORKING GROUP 5BB TO COMMITTEE 5

1. Bands between 4 000 and 4 650 kHz

1.1 After having considered all the proposals concerning these frequency bands the Working Group decided to recommend to Committee 5 the adoption of the revised Table and of Footnotes ADD 3502B, ADD 3502C, MOD 3503/208, MOD 3504/209 and MOD 3505/209A which appear in Annex 1.

1.2 The delegation of Iran reserved the right to revert in Committee 5 to Footnotes 3503/208 and 3504/209.

1.3 Footnote 3502B was adopted on the understanding that it has also been adopted by Working Group 5BA for the band 3 998 - 4 000 kHz (see Document No. 484).

2. Bands between 5 005 - 5 480 kHz

2.1 After having considered all the proposals concerning these frequency bands, the Working Group decided to recommend to Committee 5 the adoption of the revised Table which appears in Annex 2.

2.2 It was also decided that Footnote 3496/202 would be applicable to the broadcasting service in the band 5 005 - 5060 kHz.

2.3 The delegation of Papua New Guinea reserved the right to revert in Committee 5 to the question of the allocations made in the bands between 5 060 - 5 450 kHz.

2.4 The delegation of Japan reserved the right to revert in Committee 5 to the adjustment from 5 430 to 5 450 kHz of the band 5 450 - 5 480 kHz in Region 3.

3. Bands between 5 730 - 6 200 kHz

3.1 After having considered all the proposals concerning these frequency bands, the Working Group decided by majority to recommend to Committee 5 the adoption of the revised Table which appears in Annex 3.

3.2 The delegations of Botswana, China, Greece, Iran, Pakistan, the Federal Republic of Germany, the United Kingdom and the United States of America reserved the right to revert in Committee 5 to the allocations made in the bands 5 730 - 5 950 kHz.

4. Bands between 6 765 - 7 300 kHz

4.1 All the proposals concerning these bands have been considered and the Working Group decided by majority to recommend the revised Table which appears in Annex 4.

4.2 It was also decided to recommend the adoption of Footnotes ADD 3499A, ADD 3508A, ADD 3508B, ADD 3508C and the deletion of Footnote 3509/212 (see Annex 4).

4.3 The delegations of Switzerland and of the United Kingdom reserved the right to revert in Committee 5 to the question of the extension of the band allocated to broadcasting between 7 100 and 7 500 kHz.

4.4 The delegation of Nigeria reserved the right to revert in Committee 5 to the question of the inclusion of Footnote 3508A in the band 6 765 - 7 000 kHz.

P. BARNES
Chairman of Working Group 5BB

Annexes : 4

ANNEX 1

kHz
4 000 - 4 650

Allocation to Services		
Region 1	Region 2	Region 3
4 000 - 4 063	FIXED MARITIME MOBILE 3502B 3502C	
4 063 - 4 438	MARITIME MOBILE 3503/208 3504/209 3505/209A	
4 438 - 4 650	FIXED MOBILE except aeronautical mobile (R)	4 438 - 4 650 FIXED MOBILE except aeronautical mobile

ADD 3502B In Region 3, the stations of services to which the band 3 998 - 4 002 kHz is allocated may transmit standard frequencies and time signals. Such stations shall be afforded protection from harmful interference.

ADD 3502C The use of the band 4 000 - 4 063 kHz by the maritime mobile service is limited to radiotelephone ship stations (see No. 8220/1351D).

MOD 3503/208 In Afghanistan, Argentina, Australia, Botswana, India and in the USSR, in the bands 4 063 - 4 123 kHz, 4 130 - 4 133 kHz and 4 408 - 4 438 kHz, fixed stations of limited power may operate provided that, in order to minimize the possibility of causing harmful interference to the maritime mobile service, they are situated at least 600 km from the coast. A limited power station is one whose power and antenna characteristics are so adjusted that the field strength established at any point in any direction does not exceed that obtainable with a non-directive antenna and a peak envelope power of 1 kW.

MOD 3504/209 On condition that harmful interference is not caused to the maritime mobile service, the frequencies in the bands 4 063 - 4 123 kHz and 4 130 - 4 438 kHz may be used exceptionally by fixed stations communicating only within the boundary of the country in which they are located, with a mean power not exceeding 50 watts; however, in Regions 2 and 3, between 4 219.4 and 4 349.4 kHz, a mean power not exceeding 500 watts may be used by such fixed stations.

MOD 3505/209A For the use of carrier frequency 4 125 kHz in the zone of Regions 1 and 2 south of latitude 15° N, including Mexico, and in the zone of Region 3 south of latitude 25° N, see No. 6643/1351E.

A N N E X 2

kHz
5 005 - 5 480

<table>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td colspan="3">5 005 - 5 060
FIXED
BROADCASTING 3496/202</td></tr>
<tr><td colspan="3">5 060 - 5 250
FIXED
Mobile except aeronautical mobile
3496A</td></tr>
<tr><td colspan="3">5 250 - 5 450
FIXED
MOBILE except aeronautical mobile</td></tr>
<tr><td>5 450 - 5 480
FIXED
AERONAUTICAL MOBILE (OR)
LAND MOBILE</td><td>5 450 - 5 480
AERONAUTICAL MOBILE (R)</td><td>5 450 - 5 480
FIXED
AERONAUTICAL MOBILE (OR)
LAND MOBILE</td></tr>
</table>

(MOD) 3496/202 For the conditions of use of the bands [.....], 4 750 - 4 850 kHz, 5 005 - 5 060 kHz, [.....] by the broadcasting service see Nos. 3425/135, 3426/136 and 6215/423 to 6221/428.

ADD 3496A Different category of service : in the USSR, the allocation of the band 5 150 - 5 250 kHz to the mobile except aeronautical mobile service is on a primary basis.

A N N E X 3

kHz
5 730 - 6 200

Region 1	Region 2	Region 3
5 730 - 5 950 FIXED 3507A	5 730 - 5 950 FIXED MOBILE except aeronautical mobile (R)	5 730 - 5 950 FIXED Mobile except aeronautical mobile (R)
5 950 - 6 200	BROADCASTING	

ADD 3507A Additional allocation : in the Federal Republic of Germany, Bulgaria, Hungary, Poland, Czechoslovakia and USSR, the band 5 750 - 5 950 kHz is also allocated to the land mobile service on a primary basis.

ANNEX 4

kHz
6 765 - 7 300

Region 1	Region 2	Region 3
6 765 - 7 000	FIXED Land mobile 3508A 3508B	
7 000 - 7 100	AMATEUR AMATEUR-SATELLITE 3499A 3508C	
7 100 - 7 300 BROADCASTING	7 100 - 7 300 AMATEUR 3499A	7 100 - 7 300 BROADCASTING

ADD 3499A For the use of the bands allocated to the amateur service at /‾3.5 MHz_7, 7.0 MHz, /‾10.1 MHz_7, /‾14.0 MHz_7, /‾18.068 MHz_7, /‾21.0 MHz_7 and 144 MHz in the event of natural disasters, see Resolution /‾..._7.

ADD 3508A The band 6 765 - 6 795 kHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 6 780 kHz). The use of this frequency band for ISM applications shall be subject to special authorization by the Administration concerned in agreement with other Administrations whose radiocommunication services might be affected. In applying this provision Administrations shall have due regard to the latest CCIR Recommendations.

ADD 3508B Different service category : in Bulgaria and the USSR, the allocation of the band 6 765 - 7 000 kHz to the land mobile service is on a primary basis.

ADD 3508C Alternative allocation : in the United Republic of Tanzania, the band 7 000 - 7 050 kHz is allocated to the fixed service on a primary basis.

SUP 3509/212

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 645-E
13 November 1979
Original : Spanish

COMMITTEE 5

THIRD REPORT BY WORKING GROUP 5BA TO COMMITTEE 5

1. Frequency band 415 - 495 kHz, Regions 2 and 3

1.1 After considering all the proposals relating to this band, the Working Group decided to recommend the adoption of the revised Table and new footnote 3479A shown in Annex 1.

1.2 It was also decided that footnote 3479/186 should apply to this band.

1.3 The use of the band 490 - 495 kHz by the service to which this band is allocated is subject to the provisions of Recommendation No. /_ _/ in Annex 2 to Document No. 402. Provision 3479B (Annex 1) was adopted for this purpose.

1.4 The Chairman of the Working Group sent a note to the Chairman of Committee 5 concerning allocations in this band for Region 1 (see Document No. 537). Nevertheless, it was decided that footnotes MOD 3471/178, (MOD) 3479/186 and ADD 3479B would apply to this band in Region 1.

2. Frequency band 495 - 505 kHz

2.1 After considering all the proposals relating to this band, the Working Group unanimously decided to recommend the adoption of the revised Table shown in Annex 1.

2.2 It was also decided to keep footnote 3480/187 in the Table.

2.3 The entry into force of the new guard band shown in the Table is subject to the provisions of Recommendation No. /_ _/ in Annex 2 to Document No. 402.

3. Band 505 - 1 606.5 kHz (1 605 kHz in Region 2)

3.1 After considering all the proposals relating to this band, the Working Group decided to recommend to Committee 5 the adoption of the revised Table and footnotes 3478/185, 3478A, 3479/186, 3481/188, 3483/190, 3484/191 and 3484A shown in Annex 1. It was further decided to recommend the deletion of footnote 3482/189.

3.2 The use of the band 505 - 510 kHz by the services to which it is allocated is subject to the provisions of the Recommendation No. /_ _/ in Annex 2 to Document No. 402. Provision 3479B was adopted for this purpose (see Annex 1).

3.3 The delegations of Spain, Finland, Qatar, Yugoslavia, United Kingdom and Zaire reserved the right to raise in Committee 5 the question of the allocations in the band 505 - 526.5 kHz in Region 1.

3.4 The delegation of the USSR reserved the right to raise in Committee 5 the question of the inclusion of footnote 3483/190 in the band 526.5 - 1 606.5 kHz.

3.5 The delegations of the USSR and Yugoslavia reserved the right to raise in Committee 5 the question of the adoption of footnote 3480A.

4. Frequency band 2 170 - 2 194 kHz

4.1 After considering all the proposals relating to this band, the Working Group decided to recommend to Committee 5 the adoption of the revised Table and footnote MOD 3494/201 shown in Annex 2. It was also decided to retain footnote 3495/201A unchanged.

4.2 The Working Group also adopted a draft Recommendation on the future use of the band 2 170 - 2 194 kHz (see Annex 3).

5. Frequency band 2 850 - 3 230 kHz and 3 400 - 3 500 kHz

5.1 After considering all the proposals relating to this band, the Working Group decided to recommend to Committee 5 the adoption of the revised Table and footnotes 3496A and 3499A shown in Annex 4. It further decided that footnotes 3495/201A (see Annex 2) and 3500/205A (see Annex 4) should apply to the band 2 850 - 3 025 kHz and that footnote 3496/202 should apply in band 3 200 - 3 230 kHz to the broadcasting service (see Annex 4).

5.2 The delegation of Greece reserved the right to raise in Committee 5 the question of a world-wide allocation to the maritime mobile service in the band 3 155 - 3 197 kHz.

L. COOK
Chairman of Working Group 5BA

Annexes : 4

ANNEX 1

kHz
415 - 1 606.5 (1 605 in Region 2)

<table>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>415 - 495

*)
3471/178 3479/186
3479B</td><td colspan="2">415 - 495

MARITIME MOBILE

3479/186 3479B 3479A</td></tr>
<tr><td colspan="3">495 - 505 MOBILE (Distress and calling)

3480/187</td></tr>
<tr><td rowspan="3">505 - 526.5

MARITIME MOBILE 3479/186

/AERONAUTICAL RADIONAVIGATION/

3471/178 3478/185
3478A 3479B
3480A 3481/188</td><td>505 - 510

MARITIME MOBILE

3479B 3479/186</td><td rowspan="3">505 - 526.5

MARITIME MOBILE 3479/186

/AERONAUTICAL RADIONAVIGATION/

Aeronautical mobile

Land mobile

3479B</td></tr>
<tr><td>510 - 525

MOBILE

AERONAUTICAL RADIONAVIGATION</td></tr>
<tr><td rowspan="2">525 - 535

BROADCASTING 3484/191

AERONAUTICAL RADIONAVIGATION</td></tr>
<tr><td rowspan="2">526.5 - 1 606.5

BROADCASTING

3483/190</td><td>526.5 - 535

BROADCASTING

Mobile

3484A</td></tr>
<tr><td>535 - 1 605

BROADCASTING</td><td>535 - 1 606.5

BROADCASTING</td></tr>
</table>

*) For the allocations in this band, see Document No. 537.

MOD 3471/178 Norwegian stations of the fixed service situated in northern areas (north of 60° N) subject to auroral disturbances are allowed to continue operation on four frequencies in the bands /_ 283.5 _/ - 490 kHz and 510 - 526.5 kHz.

MOD 3478/185 In the band 515.5 - 526.5 kHz, Austria may continue to operate only those broadcasting stations listed in the Additional Protocol III to the Final Acts of the Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975. This operation is allowed until the entry into force of a revision of the Geneva Plan, 1975 and subject to not causing harmful interference to the maritime mobile and aeronautical radionavigation services.

ADD 3478A Additional allocation : in the United Kingdom, the band 519.5 - 526.5 kHz is also allocated to the broadcasting service on a secondary basis for the transmission of public utility information.

MOD 3479/186 The use of the bands /_ 415 _/ - 495 kHz and 505 - 526.5 kHz (505 - 510 kHz in Region 2) by the maritime mobile service is limited to radiotelegraphy.

ADD 3479A Additional allocation : in Australia, the overseas French departments and territories in Region 3, in China, India, Japan and Papua New Guinea, the band 415 - 495 kHz is also allocated to the aeronautical radionavigation service on a permitted basis.

ADD 3479B The bands 490 - 495 kHz and 505 - 510 kHz shall be subject to the provisions of No. 6676/1112 until the provisions of Recommendation No. /_ _/ /_ Document No. 402, Annex 2 _/ have been implemented.

NOC 3480/187 The frequency 500 kHz is the international distress and calling frequency for radiotelegraphy. The conditions for its use are prescribed in Article N35/32.

ADD 3480A In the Federal Republic of Germany, Belgium, France, Iceland, Italy, Norway, the Netherlands, the United Kingdom, Sweden and Yugoslavia, the frequency 518 kHz is used for the transmission by coast stations of distress, urgency and safety messages using narrowband direct-printing.

MOD 3481/188 In Region 2, in the band 505 - 526.5 kHz, the Administration which operate stations of the aeronautical radionavigation service shall take all the technical steps necessary to avoid harmful interference to the maritime mobile service.

SUP 3482/189

MOD 3483/190 Additional allocation : in Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Republic of South Africa, Swaziland, Zambia and Zimbabwe, the band 526.5 - 535 kHz is also allocated to the mobile service on a secondary basis.

MOD 3484/191 In Region 2, the carrier power of broadcasting stations in the band 525 - 535 kHz, shall not exceed 1 kW during the day and 250 W at night.

ADD 3484A Additional allocation : in China, the band 526.5 - 535 kHz is also allocated to the aeronautical radionavigation service on a secondary basis.

ANNEX 2

kHz
2 170 - 2 194

Region 1	Region 2	Region 3
2 170 - 2 173.5	MARITIME MOBILE	
2 173.5 - 2 190.5	MOBILE (Distress and calling) 3494/201 3495/201A	
2 190.5 - 2 194	MARITIME MOBILE	

MOD 3494/201 The frequency 2 182 kHz is the international distress and calling frequency for radiotelephony. The conditions for the use of the band 2 173.5 - 2 190.5 kHz are prescribed in Articles N35/35 and N57.

NOC 3495/201A The frequencies 2 182 kHz, 3 023 kHz, 5 680 kHz, 8 364 kHz, /̲ 121.5 MHz, 156.8 MHz and 243 MHz_7 may also be used, in accordance with the procedures in force for terrestrial radiocommunication services, for search and rescue operations concerning manned space vehicles.

The same applies to the frequencies 10 003 kHz, 14 993 kHz and 19 993 kHz, but in each of these cases, emissions must be confined in a band of ± 3 kHz about the frequency.

ANNEX 3

DRAFT RECOMMENDATION

Relating to the Future Use of the Band 2 170 - 2 194 kHz

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the frequency 2 182 kHz is the international distress frequency for radiotelephony;

b) that, except for transmissions authorized on the carrier frequency 2 182 kHz all transmissions on the frequencies between 2 173.5 kHz and 2 190.5 kHz are forbidden;

c) that, in Region 1, the adjacent bands 2 170 - 2 173.5 kHz and 2 190.5 - 2 194 kHz are used, respectively, by coast stations calling ship stations (including selective calling), and by ship stations calling coast stations;

noting

a) that this Conference has amended the Table of Frequency Allocations in order to reduce the guardband around the frequency 2 182 kHz to ± 8.5 kHz and has allocated the bands 2 170 - 2 173.5 and 2 190.5 - 2 194 kHz exclusively to the maritime mobile service on a world-wide basis;

b) that a need now exists to replan the entire band 2 170 - 2 194 kHz and to review regulatory provisions, with particular reference to Articles N35 and N57;

recommends

that the next competent World Administrative Radio Conference be invited :

a) to examine the allocations within the band 2 170 - 2 194 kHz;

b) to review the relevant technical and operational parameters with a view to further reducing the guardband around the frequency 2 182 kHz;

c) to develop any necessary regulatory provisions;

d) to develop from these considerations plans for the implementation of any new arrangement, and

e) to determine the date of coming into force of such plans and provisions;

requests

the Secretary-General to send a copy of this Recommendation to the Secretary-General of the Intergovernmental Maritime Consultative Organization for study by the competent body and for making recommendations;

invites

Administrations to study this matter and to submit proposals for consideration by the next competent World Administrative Radio Conference.

ANNEX 4

kHz
2 850 - 3 230

Region 1	Region 2	Region 3
2 850 - 3 025	AERONAUTICAL MOBILE (R) 3495/201A 3500/205A	
3 025 - 3 155	AERONAUTICAL MOBILE (OR)	
3 155 - 3 200	FIXED MOBILE except aeronautical mobile (R) 3496A 3499A	
3 200 - 3 230	FIXED MOBILE except aeronautical mobile (R) BROADCASTING 3496/202 3496A	

kHz
3 400 - 3 500

3 400 - 3 500	AERONAUTICAL MOBILE (R)

NOC 3495/201A (See Annex 2.)

ADD 3496A Administrations are urged to authorize the use of the band 3 155 - 3 195 kHz to provide a common world-wide channel for low power wireless hearing aids. Additional channels for these devices may be assigned by Administrations in the bands between 3 155 kHz and 3 400 kHz to suit local needs.

It should be noted that frequencies in the region of 3 000 kHz to 4 000 kHz are suitable for hearing aid devices which are designed to operate over short distances within the induction field.

ADD 3499A Alternative allocation : in Belgium, Cyprus, Denmark, Spain, Greece, Iceland, Italy, Liberia, Malta, Norway, the Netherlands, the United Kingdom, Singapore, Sweden and Yugoslavia, the band 3 155 - 3 200 kHz is allocated to the maritime mobile service on a primary basis and to the fixed and land mobile services on a permitted basis.

(MOD) 3496/202 For the conditions of use of the bands 3 200 - 3 230 kHz, [...] by the broadcasting service see Nos. 3425/135, 3426/136 and 6215/423 to 6221/428.

NOC 3500/205A The carrier (reference) frequencies 3 023 kHz and 5 680 kHz may also be used, in accordance with Nos. 6640/1326C and 6646/1353B respectively, by stations of the maritime mobile service engaged in coordinated search and rescue operations.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 646(Rev.1)-E
16 November 1979
Original : Spanish

COMMITTEE 5

Spain

DIFFERENT CATEGORY OF SERVICE

E/646/113 (Rev.1) ADD 3612D In Spain and Portugal, the band 223 - 230 MHz is allocated on a permitted basis to the fixed and land mobile services.

Stations in these services shall not cause harmful interference to other countries' stations in the broadcasting service, whether existing or planned, that operate in accordance with the Table and shall not seek protection from them.

/_ Stations of the fixed and land mobile services shall enjoy equal rights with stations of the land mobile service operating in France. _/

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 646-E
13 November 1979
Original : Spanish

COMMITTEE 5

Spain

DIFFERENT CATEGORY OF SERVICE

E/646/113 ADD In Spain the band 223 - 230 MHz is allocated on a primary basis to the fixed and mobile services. Stations in these services shall not cause harmful interference to other countries' stations, whether existing or planned, in the broadcasting service that operate in accordance with the Table and shall not seek protection from them.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 647-E
14 November 1979
Original : French

Note by the Secretary General

STATE OF BAHRAIN

CONFERMENT OF VOTING AND SIGNING POWERS

Under No. 370 of the Convention, the Government of the State of Bahrain, which is not sending its own delegation to the Conference, has conveyed to the delegation of the United Arab Emirates powers to vote and sign on its behalf.

M. MILI
Secretary General

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 648-E
14 November 1979
Original : English

WORKING GROUP 6A

NOTE FROM THE CHAIRMAN OF AD HOC GROUP 2 OF COMMITTEE 6
TO THE CHAIRMAN OF WORKING GROUP 6A

At its seventh meeting held on Tuesday, 13 November, Ad Hoc Group 2 reached decisions on the following documents which had been referred to:

57A Corr. 3
60A Add.3(Rev.1) In the light of the impending Resolution for the convening of a Space Conference, and in the circumstances where the latter Conference would not be held before 1984, there will be value in implementing any desirable improvements to N11 and/or N13 which will assist the operations of space services during the interim period. Group 6AH2 requests that the French and Canadian proposals set down in these papers be studied from this viewpoint.

63A The USSR Resolution contained in this document covers the convening of a Conference for the drawing up of agreements and of plans for uplinks for the 12 GHz Satellite Broadcasting Service. It has been agreed in 6AH2 that an amended version of this Resolution be forwarded for endorsement by the present Conference(in addition to the Resolution for the major Space Conference drafted in DL/218.)

82, 557 The French proposal F/82/816 relates to Article N27/A and, notwithstanding the endorsement of the Resolutions for the two Space Conferences, 6AH2 believes that the issues raised in F/82/816 and also in F/82/822 should be considered by 6A in the hope that they may yield improvements in the present regulatory procedures for the establishing of uplinks in the B/C Satellite Service in the period before the planning Conference(s). Similarly Document No. 557 sets out the views of Committee 4 on the technical feasibility of the constant frequency translation proposal which has been suggested for inclusion in the new N27A. Group 6AH2 has noted Committee 4's comments and believes the paper is now more relevant to the work of 6A.

Rec. Spa2 - 1,
356 In the course of studying the proposals related to a future Space Conference, Group 6AH2 has studied Spa2 - 1 and Document No. 356. The clauses of the draft Resolution for the proposed Space Conference embody the philosophies of both of these documents and the first session of the Conference will be required to reach its decisions in the light of consideration of their contents amongst other factors. Group 6AH2 also commends the documents for consideration by Working Group 6A as a background to its work on Articles N11 and N13

E.J. WILKINSON
Chairman of Ad Hoc Group 2 of Committee 6

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 649-E
14 November 1979
Original : English

COMMITTEE 5

Thailand

DIFFERENT CATEGORY OF SERVICE

THA/649/15 ADD In Thailand the band 401 - 406 MHz is allocated to the land mobile service on a primary basis.

INTERNATIONAL TELECOMMUNICATION UNION

BLUE PAGES

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 650
14 November 1979

E

B.16

PLENARY MEETING

16th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	621 + 622	Art. 26; Art. 27
C.4	473 + 474	Appendix 17A

P. BASSOLE
Chairman of the
Editorial Committee

Annex: 20 pages

ARTICLE N26

NOC **Space Radiocommunication Services sharing Frequency Bands with Terrestrial Radiocommunication Services above 1 GHz**

NOC **Section I. Choice of Sites and Frequencies**

NOC **6037** 470E Spa2 § 1. Sites and frequencies for Earth stations, operating in frequency bands shared with equal rights between terrestrial radiocommunication and space radiocommunication services, shall be selected having regard to the relevant Recommendations of the CCIR with respect to geographical separation from terrestrial stations.

NOC **Section II. Power Limits**

NOC **6038** 470F Spa2 § 2. (1) Earth stations.

(MOD) **6039** 470G Spa2 (2) The equivalent isotropically radiated power (e.i.r.p) transmitted in any direction towards the horizon by an earth station operating in frequency bands between 1 and [15] GHz shall not exceed the following limits except as provided in Nos. **6044**/470H or **6042**/470GC: [ ]

+40 dBW in any 4 kHz band for $\theta \leqslant 0°$

+40 + 3 θ dBW in any 4 kHz band for $0° < \theta \leqslant 5°$

where θ is the angle of elevation of the horizon viewed from the centre of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

(MOD) **6040** 470GA Spa2 (3) The equivalent isotropically radiated power (e.i.r.p.) transmitted in any direction towards the horizon by an earth station operating in frequency bands above [15] GHz shall not exceed the following limits except as provided in Nos. **6044**/470H or **6043**/470GD: [ ]

+64 dBW in any 1 MHz band for $\theta \leqslant 0°$

+64 + 3 θ dBW in any 1 MHz band for $0° < \theta \leqslant 5°$

where θ is as defined in No. **6039**/470G.

(MOD) **6041** 470GB Spa2

(4) For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power (e.i.r.p.) transmitted by an earth station towards the horizon.

(MOD) **6042** 470GC Spa2

(5) As an exception to the limits given in No. **6039**/470G, the equivalent isotropically radiated power (e.i.r.p.) towards the horizon for an earth station in the space research service (deep-space) shall not exceed +55 dBW in any 4 kHz band.

(MOD) **6043** 470GD Spa2

(6) As an exception to the limits given in No. **6040**/470GA, the equivalent isotropically radiated power (e.i.r.p.) towards the horizon for an Earth station in the space research service (deep-space) shall not exceed +79 dBW in any 1 MHz band.

NOC **6044** 470H Spa2

(7) The limits given in Nos. **6039**/470G, **6040**/470GA, **6042**/470GC and **6043**/470GD, as applicable, may be exceeded by not more than 10 dB. However, when the resulting co-ordination area extends into the territory of another country, such increase shall be subject to agreement by the administration of that country.

MOD **6045** 470J Spa2

(8) The limits given in No. **6039**/470G apply in the following frequency bands allocated to transmission by Earth stations in the [fixed-satellite service and Earth exploration-satellite service, and in particular the meteorological-satellite service,] where these bands are shared with equal rights with the fixed or mobile service: [1]

2 655 - 2 690 MHz	(Regions 2 and 3)
4 400 - 4 700 MHz	
5 800 - 5 850 MHz	(for the countries mentioned in No. **3759**/390)
5 850 - 5 925 MHz	(Regions 1 and 3)
5 925 - 6 425 MHz	
7 900 - 7 975 MHz	
7 975 - 8 025 MHz	(for the countries mentioned in No. **3766**/392H)
8 025 - 8 400 MHz	
10.95 - 11.20 GHz	(Region 1)
12.50 - 12.75 GHz	(Regions 2 and 3 and for the countries mentioned in No. **3788**/405BD)
14.175 - 14.300 GHz	(for the countries mentioned in No. **3792**/407)
14.4 - 14.5 GHz	

ADD **6045.1** [1] The equality of right to operate when a band of frequencies is allocated in different Regions to different services of the same category is established in **3282**/117. Therefore, limits concerned with inter-Regional interference which may appear in CCIR Recommendations should, as far as practicable, be observed by administrations.

NOC **6046** 470JA Spa2 (9) The limits given in No. **6040**/470GA apply in the following frequency band allocated to transmission by Earth stations in the [fixed-satellite service,] where this is shared with equal rights with the fixed or mobile service:

[27.5 - 29.5 GHz]

NOC **Section III. Minimum Angle of Elevation**

NOC **6047** 470K Spa2 § 3. (1) Earth stations.

MOD **6048** 470L Spa2 (2) Earth station antennae shall not be employed for transmission at elevation angles of less than 3° measured from the horizontal plane to the direction of maximum radiation, except when agreed to by administrations concerned and those whose services may be affected. In case of reception by an Earth station, the above value shall be used for co-ordination purposes if the operating angle of elevation is less than that value.

NOC **6049** 470LA Spa2 (3) As an exception to No. **6048**/470L, Earth station antennae in the space research service (near-Earth) shall not be employed for transmission at elevation angles of less than 5°, and Earth station antennae in the space research service (deep-space) shall not be employed for transmission at elevation angles of less than 10°, both angles being those measured from the horizontal plane to the direction of maximum radiation. In case of reception by an Earth station, the above values shall be used for co-ordination purposes if the operating angle of elevation is less than those values.

NOC **Section IV. Limits of Power Flux Density from Space Stations**

NOC **6050** 470N Spa2 § 4. (1) Power flux density limits between [1 690 MHz and 1 700 MHz].

MOD **6051** 470NA Spa2

a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed −133 dBW/m^2 in any 1.5 MHz band. This limit relates to the power flux density which would be obtained under assumed free-space propagation conditions.

NOC **6052** 470NB Spa2

b) The limit given in No. **6051**/470NA applies in the frequency band listed in No. **6053**/470NC which is allocated to transmission by space stations in the [Earth exploration-satellite service and in particular the meteorological-satellite service] where this band is shared with equal rights with the meteorological aids service. [ ]

NOC **6053** 470NC Spa2

[1 690 - 1 700 MHz] [ ]

MOD **6054** 470ND Spa2

(2) Power flux density limits between [1 670 MHz and 2 500 MHz]. [ ]

MOD **6055** 470NE Spa2

a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

−154 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−154 + 0.5(δ −5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−144 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

NOC **6056** 470NF Spa2

b) The limits given in No. **6055**/470NE apply in the frequency bands listed in No. **6057**/470NG which are allocated to transmission by space stations in the following space radiocommunication services:

- earth exploration-satellite service and in particular meteorological-satellite service (space-to-Earth)
- space research service (space-to-Earth)
- fixed-satellite service (space-to-Earth)

where these bands are shared with equal rights with the fixed or mobile service:

MOD **6057** 470NG Spa2

1 670 - 1 690 MHz	
1 690 - 1 700 MHz	(for the countries mentioned in No. **3698**/354A)
1 700 - 1 710 MHz	
1 770 - 1 790 MHz	(for the countries mentioned in No. **3704**/356AA)
2 200 - 2 290 MHz	
2 290 - 2 300 MHz	

[1]

ADD **6057.1**

[1] See No. **6045.1**.

NOC **6058** 470NGA Spa2

c) The power flux density values given in No. **6055**/470NE are derived on the basis of protecting the fixed service using line-of-sight techniques. Where a fixed service using tropospheric scatter operates in the bands listed in No. **6057**/470NG and where there is insufficient frequency separation, there must be sufficient angular separation between the direction to the space station and the direction of maximum radiation of the antenna of the receiving station of the fixed service using tropospheric scatter to ensure that the interference power at the receiver input of the station of the fixed service does not exceed –168 dBW in any 4 kHz band.

NOC **6059** 470NH Spa2 (3) Power flux density limits between [2 500 MHz and 2 690 MHz]. []

MOD **6060** 470NI Spa2 a) The power flux density at the Earth's surface produced by emissions from a space station in the {broadcasting-satellite service or the fixed-satellite service} for all conditions and for all methods of modulation shall not exceed the following values: { }

−152 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−152 + 0.75(δ −5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−137 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD **6061** 470NJ Spa2 b) The limits given in No. **6060**/470NI apply in the frequency band:

[2 500 - 2 690 MHz] []

which is shared by the [broadcasting-satellite service or the fixed-satellite service with the fixed or mobile service]. [ ]

NOC **6062** 470NK Spa2 c) The power flux density values given in No. **6060**/470NI are derived on the basis of protecting the fixed service using line-of-sight techniques. Where a fixed service using tropospheric scatter operates in the band mentioned in No. **6061**/470NJ and where there is insufficient frequency separation, there must be sufficient angular separation between the direction to the space station and the direction of maximum radiation of the antenna of the receiving station of the fixed service using tropospheric scatter to ensure that the interference power at the receiver input of the station of the fixed service does not exceed –168 dBW in any 4 kHz band.

NOC **6063** 470NL Spa2 (4) Power flux density limits between [3 400 MHz and 7 750 MHz]. []

MOD **6064** 470NM Spa2 a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

–152 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

–152 + 0.5(δ–5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

–142 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD **6065** 470NN Spa2 b) The limits given in No. **6064**/470NM apply in the frequency bands listed in No. **6066**/470NO which are allocated to transmission by space stations in the following space radiocommunication services:

[– fixed-satellite service (space-to-Earth)

– meteorological-satellite service (space-to-Earth)] []

where these bands are shared with equal rights with the fixed or mobile service:

NOC **6066** 470NO Spa2

[3 400 - 4 200 MHz	
7 250 - 7 300 MHz	(for the countries mentioned in No. **3765**/392G)
7 300 - 7 750 MHz]	

[] 2

ADD **6066.1** [2] See No. **6045.1.**

NOC **6067** 470NP Spa2 (5) Power flux density limits between [8 025 MHz and 11.7 GHz]. []

MOD **6068** 470NQ Spa2 a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

−150 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−150 + 0.5(δ−5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

−140 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD **6069** 470NR Spa2 b) The limits given in No. **6068**/470NQ apply in the frequency bands listed in No. **6070**/470NS which are allocated to transmission by space stations in the following space radiocommunication services:

[– earth exploration-satellite service (space-to-Earth)

– space research service (space-to-Earth)

– fixed-satellite service (space-to-Earth)] []

where these bands are shared with equal rights with the fixed or mobile service:

NOC **6070** 470NS Spa2

[8 025	-	8 400	MHz
8 400	-	8 500	MHz
10.95	-	11.20	GHz
11.45	-	11.70	GHz]

[]

NOC **6071** 470NT Spa2 (6) Power flux density limits between [12.50 GHz and 12.75 GHz]. []

MOD **6072** 470NU Spa2 a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

–148 dBW/m^2 in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

–148 + 0.5(δ –5) dBW/m^2 in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

–138 dBW/m^2 in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

(MOD) **6073** 470NV Spa2 b) The limits given in No. **6072**/470NU apply in the frequency band indicated in No. **6074**/470NW which is allocated to the [fixed-satellite service] for transmission by space stations where this band is shared with equal rights with the fixed or mobile service: []

NOC **6074** 470NW Spa2 [12.50 - 12.75 GHz (Region 3 and for the countries mentioned in No. **3788**/405BD).][3] []

ADD **6074.1** [3] See No. **6045.1**.

NOC **6075** 470NX Spa2 (7) Power flux density limits between [17.7 GHz and 22.0 GHz.] []

MOD **6076** 470NY Spa2 a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

–115 dBW/m^2 in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

$-115 + 0.5(\delta - 5)$ dBW/m^2 in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

-105 dBW/m^2 in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

MOD **6077** 470NZ Spa2

b) The limits given in No. **6076**/470NY apply in the frequency bands listed in No. **6078**/470NZA which are allocated to transmission by space stations in the following space radiocommunication services:

[– fixed-satellite service (space-to-Earth)

– earth exploration-satellite service (space-to-Earth)] []

where these bands are shared with equal rights with the fixed or mobile service:

NOC **6078** 470NZA Spa2

[17.7 - 19.7 GHz
21.2 - 22.0 GHz] 4 []

ADD **6078.1**

4 See No. **6045.1**.

NOC **6079** 470NZB Spa2

[(8) The limits given in Nos. **6051**/470NA, **6055**/470NE, **6060**/470NI, **6064**/470NM, **6068**/470NQ, **6072**/470NU and **6076**/470NY may be exceeded on the territory of any country the administration of which has so agreed.] []

ADD **6079A**

(8A) Power flux density limits between [38.5 GHz and 40.5] GHz. []

ADD **6079B** a) The power flux density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the values given in **6076**/470NY [5]

ADD **6079B.1** [5] The provisions of **6079B** shall apply until such time as the CCIR has made a Recommendation as to the values of power flux density limits which should apply in the frequency band specified in **6079D**, at which time all systems shall meet those power flux density limits recommended by the CCIR.

ADD **6079C** b) The limits given in **6079B** apply in the frequency band given in **6079D** which is allocated to transmission by space stations in the [fixed-satellite service] where this band is shared with equal rights with the fixed or mobile services: [ ]

ADD **6079D** (8D) [38.5-40.5 GHz] [ ]

6080 to **6104** NOT allocated.

ARTICLE N27

NOC **Special Rules Relating to Space Radiocommunication Services**

NOC **Section I. Cessation of Emissions**

NOC **6105** 470V Spa2 § 1. Space stations shall be fitted with devices to ensure immediate cessation of their radio emissions by telecommand, whenever such cessation is required under the provisions of these Regulations.

MOD **Section II. Control of Interference to Geostationary-Satellite Systems**

MOD **6106** 470VA § 2. Non-geostationary space stations shall ceaseor reduce to a negligible level their emissions, and their associated Earth stations shall not transmit to them, whenever there is insufficient angular separation between non-geostationary satellites and geostationary satellites, and whenever there is unacceptable interference [1] to geostationary satellite space systems in the fixed-satellite service operating in accordance with these Regulations.

ADD **6106.1** [1] The level of accepted interference shall be fixed by agreement between the administrations concerned, using the relevant CCIR Recommendations as a guide.

ADD **6106A** § 2A. In the frequency band [27.5-30] GHz space stations [ ] in the Earth exploration-satellite service on board geostationary satellites and operating with space stations in the same service on board non-geostationary satellites shall have the following restriction:

Whenever the emissions from the geostationary satellites are directed towards the geostationary satellite orbit and cause unacceptable interference [2] to any geostationary satellite space system in the fixed-satellite service, these emissions shall be reduced to a level at or less than accepted interference [2].

ADD **6106A.1** [2] See No. **6106.1**.

NOC **Section III. Station Keeping of Space Stations** [1]

(MOD) **A.N27 S.III**

[1] In the case of space stations on board geosynchronous satellites with orbits having an angle of inclination greater than 5 degrees the positional tolerance shall relate to the nodal point.

MOD **6107** 470VB Spa2

§ 3. (1) Space stations on board geostationary satellites which use any frequency band allocated to the fixed-satellite service or the broadcasting-satellite service [2]:

ADD **6107.1**

[2] Space stations in the broadcasting-satellite service on geostationary satellites operating in the band [11.7-12.5] GHz are exempted from these provisions but shall maintain their positions in accordance with [the Final Acts of WARC-77]. [ ]

MOD **6108** 470VC Spa2

– shall have the capability of maintaining their positions within ± 0.1 degree of the longitude of their nominal positions;

MOD **6109** 470VD Spa2

– shall maintain their positions within ± 0.1 degree of longitude of their nominal positions; but

ADD **6109A**

– experimental stations on board geostationary satellites need not comply with No. **6108**/470VC nor No. **6109**/470VD, but shall maintain their positions within ± 0.5 degree of longitude of their nominal positions;

MOD **6110** 470VE Spa2

– however, space stations need not comply with No. **6109**/470VD nor No. **6109A** as appropriate as long as the satellite network to which the space station belongs does not cause unacceptable interference [3] to any other satellite network whose space station complies with the limits given in No. **6109**/470VD and No. **6109A**.

MOD **6110.1** 470VE.1 spa2

[3] See No. **6106.1**.

ADD **6110A**

(2) Space stations on board geostationary satellites which do not use any frequency band allocated to the fixed-satellite service or the broadcasting-satellite service:

ADD **6110B**

– shall have the capability of maintaining their positions within ± 0.5 degree of the longitude of their nominal positions;

ADD **6110C** – shall maintain their positions within ± 0.5 degree of longitude of their nominal positions; but

ADD **6110D** – need not comply with No. **6110C** as long as the satellite network to which the space station belongs does not cause unacceptable interference [4] to any other satellite network whose space station complies with the limits given in No. **6110C**.

ADD **6110D.1** [4] See No. **6106.1**.

ADD **6110E** (3) Space stations [5] on board geostationary satellites which are put into service prior to [5 years from date of entry into force of the Final Acts of WARC-79] with the advance publication information for the network having been published before [the date of entry into force of the Final Acts of WARC-79] are exempted from provisions of No. **6107**/470VB to No. **6110D** inclusive; however they

ADD **6110E.1** [5] See No. **6107.1**.

ADD **6110F** – shall have the capability of maintaining their positions within ± 1 degree of the longitude of their nominal positions, but efforts should be made to achieve a capability of maintaining their positions at least within ± 0.5 degree of the longitude of their nominal positions;

ADD **6110G** – shall maintain their positions within ± 1 degree of longitude of their nominal positions; but

ADD **6110H** – need not comply with No. **6110G** as long as the satellite network to which the space station belongs does not cause unacceptable interference [6] to any other satellite network whose space station complies with the limits given in No. **6110G**.

ADD **6110H.1** [6] See No. **6106.1**.

NOC

Section IV. Pointing Accuracy of Antennae on Geostationary Satellites

MOD **6111** 470VF Spa2

§ 4. The pointing direction of maximum radiation of any earthward beam of antennae on geostationary satellites [1] shall be capable of being maintained within:

10 % of the half power beamwidth relative to the nominal pointing direction, <u>or</u>

0.3 degree relative to the nominal pointing direction,

whichever is greater. This provision applies only when such a beam is intended for less than global coverage.

In the event that the beam is not rotationally symmetrical about the axis of maximum radiation, the tolerance in any plane containing this axis shall be related to the half power beamwidth in that plane.

This accuracy shall be maintained only if it is required to avoid unacceptable interference [2] to other systems.

ADD **6111.1**

[1] Transmitting antennae of space stations in the broadcasting-satellite service operating in the band [11.7-12.5] GHz are not subject to these provisions but shall maintain their pointing accuracy in accordance with [paragraph 3.14.1 of Annex 8 of the Final Acts of WARC-77].

MOD **6111.2** 470VF.1 Spa2

[2] See No. **6106.1**.

NOC

Section V. Power Flux Density at the Geostationary Satellite Orbit

NOC **6112** 470VG Spa2

§ 5. In the frequency band [8 025 to 8 400] MHz, which the [Earth exploration-satellite service using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space)], the maximum power flux density produced at the geostationary satellite orbit by any earth exploration-satellite service space station shall not exceed -174 dBW/m^2 in any 4 kHz band.

ADD **Section VA. Radio Astronomy in the Shielded Zone of the Moon**

ADD **6113** § 5A. (1) In the shielded zone of the Moon [1] emissions causing harmful interference to radio astronomy observations [2] and other [passive users as defined in these Regulations] shall be prohibited in the entire frequency spectrum except in the following bands:

a) the frequency bands allocated to the space research [(active)] service;

b) the frequency bands allocated to the [space operations service (active)], the [Earth exploration satellite service (active)], and radiolocation stations on spaceborne platforms, which are required for the support of space research, as well as for radiocommunications and space research transmissions within the lunar shielded zone.

ADD **6113.1** 1 The shielded zone of the Moon comprises the area of the Moon's surface and an adjacent volume of space which are shielded from emissions originating within a distance of 100 000 km from the centre of the Earth.

ADD **6113.2** 2 The level of harmful interference is determined by agreement between the administrations concerned, with the guidance of the relevant CCIR Recommendations.

ADD **6114** (2) In frequency bands in which emissions are not prohibited by [No. **6113**], radio astronomy observations and [passive space research] in the shielded zone of the Moon may be protected from harmful interference by agreement between administrations concerned.

ADD **Section VB. Earth Station Off-axis Power Limitations**

ADD **6115** § 5B. The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an Earth station at angles in the direction of the geostationary satellite orbit off the main-beam axis has a significant impact on interference caused to other geostationary satellite networks. Enhanced utilization of the geostationary satellite orbit and easier coordination would be attained by minimizing such off-axis radiation and administrations are encouraged to achieve the lowest values practicable bearing in mind the latest CCIR Recommendations. Minimizing such levels is particularly important in intensively used up-link bands.

6116 to **6212** Not allocated.

MOD APPENDIX 17A

Mar Mar2

NOC

Technical Characteristics of Single Sideband Transmitters used in the Maritime Mobile Service for Radiotelephony in the Bands between [1 605] and 4 000 kHz and between 4 000 and [23 000] kHz [ ] [ ]

NOC 1. Power of the carrier:

a) for class {A3A} emissions the power of the carrier shall be: { }

Bands between {1 605} and 4 000 kHz { }

- for coast station transmitters until 1 January 1982 and for ship station transmitters in use or to be installed before {1} January 1982: 16 ± 2 dB below the peak envelope power; { }

- for coast station transmitters after 1 January 1982 and for ship station transmitters installed after 1 January 1982: 18 ± 2 dB below the peak envelope power;

Bands between 4 000 and {23 000} kHz { }

- for coast station transmitters until 1 January 1978 and for ship station transmitters in use or to be installed before {1} January 1978: 16 ± 2 dB below the peak envelope power; { }

- for coast station transmitters after 1 January 1978 and for ship station transmitters installed after 1 January 1978: 18 ± 2 dB below the peak envelope power;

b) for class {A3J} emissions the power of the carrier shall be at least 40 dB below the peak envelope power. { }

NOC 2. Coast and ship stations shall use only the upper sideband.

NOC 3. The transmitter audio-frequency band shall be 350 to 2 700 Hz with a permitted amplitude variation of 6 dB.

MOD 4. The carrier frequencies shall be maintained within the following tolerances:

a) coast stations: ± 20 Hz

b) ship stations:

Bands between [1 605] and 4 000 kHz [ ]

- tolerance applicable to transmitters in use or to be installed before 2 January 1982: ± 100 Hz; the short-term limits (of the order of 15 minutes) shall be ± 40 Hz;

- tolerance applicable to transmitters installed after 1 January 1982 but before 2 January 1985: ± 50 Hz;

- tolerance applicable to transmitters installed after 1 January 1985 and to all transmitters after 1 January 1990: ± 40 Hz;

Bands between 4 000 and [23 000] kHz [ ]

- tolerance applicable to transmitters in use or installed before 2 January 1978: ± 100 Hz; the short-term limits (of the order of 15 minutes) shall be ± 40 Hz;

- tolerance applicable to transmitters installed after 1 January 1978 and to all transmitters after 1 January 1990: ± 50 Hz.

NOC 5. The unwanted frequency modulation of the carrier shall be sufficiently low to prevent harmful distortion.

MOD 6. When class {A3H, A3A or A3J} emissions are used, the power of any unwanted emission supplied to the antenna transmission line on any discrete frequency shall, when the transmitter is driven to full peak envelope power, be in accordance with the following table: { }

a) Transmitters in use or installed before {1} January 1982: [1] { }

Separation Δ in kHz between the frequency of the unwanted emission [2] and the assigned frequency [3]	Minimum attenuation below peak envelope power
$1.6 < \Delta \leqslant 4.8$	28 dB
$4.8 < \Delta \leqslant 8$	38 dB
$8 < \Delta$	43 dB without exceeding the power of 50 mW

Transmitters using reduced carrier or suppressed carrier emission may, as far as concerns out-of-band emissions [4] and those spurious emissions [6] which are a result of the modulation process but do not fall in the [spectrum of out-of-band emissions [4]], be tested for compliance with this regulation by means of a two-tone-audio input signal with a frequency separation between the tones such that all intermodulation products occur at frequencies at least 1.6 kHz removed from the assigned frequency. [ ]

b) Transmitters installed after 1 January 1982: [1]

Separation Δ in kHz between the frequency of the unwanted emission [2] and the assigned frequency [3]	Minimum attenuation below peak envelope power
1.5 < Δ ⩽ 4.5	31 dB
4.5 < Δ ⩽ 7.5	38 dB
7.5 < Δ	43 dB without exceeding the power of 50 mW

Transmitters using reduced carrier or suppressed carrier emission may, as far as concerns out-of-band emissions [4] and those spurious emissions [6] which are a result of the modulation process but do not fall in the [spectrum of out-of-band emissions [4]], be tested for compliance with this regulation by means of a two-tone-audio input signal with a frequency separation between the tones such that all intermodulation products occur at frequencies at least 1.5 kHz removed from the assigned frequency.

---

[1] All administrations recognize the need to reduce the level of unwanted emissions and will therefore endeavour to ensure that the new requirements will be met by all newly designed transmitters under their jurisdiction as soon as practicable before {1} January 1982.

[2] Unwanted emission: See Article N.1, No. **3133F**.

[3] The assigned frequency is 1 400 Hz higher than the carrier frequency (see No. **8045**/445A).

[4] Out-of-band emission: See Article No.1, No. **3133D**.

[SUP] [[5] Out-of-band spectrum (of an emission): The part of the power density spectrum (or the power spectrum when the spectrum consists of discrete components) of an emission which is outside the necessary bandwidth, with the exception of spurious radiations.[6]]

[6] Spurious emission: See Article **No.1**, No. **3141**/92.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 651-E
14 November 1979
Original : English

COMMITTEE 5

The Netherlands and Sweden

PROPOSAL TO THE WORK OF THE CONFERENCE

1. Introduction

1.1 In this document it is proposed that the next mobile WARC will study a possible rearrangement of the MF/HF bands allocated on an exclusive base to the aeronautical mobile (R) and (OR) service.

1.2 It is considered that in the future a certain reduction of these bands might be possible. This reduction and a reallocation is in particular proposed to reduce the congestion in the maritime mobile service and the broadcasting service.

1.3 It is proposed to the Conference to adopt Recommendation [SH]; Administrations should study this matter before the next mobile WARC.

RECOMMENDATION [SH]

Relating to a Possible Reduction and Reallocation of Some Bands,
Currently Allocated to the Aeronautical Mobile (R) and (OR) Service
to be Taken Up by the Mobile Conference

The World Administrative Radio Conference, Geneva, 1979,

noting

a) that the frequency allotment plan for the aeronautical mobile (OR) service as in Appendix 26 to the Radio Regulations is still based upon DSB transmissions;

b) that the WARC on the aeronautical mobile (R) service 1978 revised the Appendix 27 of the Radio Regulations based on DSB transmissions;

c) that Resolution No. Aer2 - 6 urges Administrations to use frequency bands higher than the MF/HF bands for the aeronautical mobile (R) service;

recognizing

a) that a next competent WARC may revise Appendix 26 to the Radio Regulations taking into account the introduction of SSB transmissions, possibly reducing the total amount of frequency spectrum necessary for this service;

b) that the introduction of satellite techniques for the aeronautical mobile (R) service will reduce the need for frequencies from this service in the MF/HF bands considerably;

c) that there exists a considerable congestion in the bands allocated to the maritime mobile service and the broadcasting service;

d) that during the WARC-79 expansion of the maritime mobile service and the broadcasting service could not be met sufficiently;

recommends

1. that the Administrative Council includes in the agenda of the World Administrative Mobile Radio Conference /_198_/ the mandate to rearrange the existing bands, allocated exclusively to the aeronautical mobile (R) service, the aeronautical mobile (OR) service and the maritime mobile service, if deemed necessary;

2. that if reallocations are necessary, these will enter into force at the dates specified by this mobile conference;

invites

Administrations to study this matter and make proposals to the mobile WARC /_198_/ on this subject.

Annex : 1

ANNEX 1

EXAMPLES OF A POSSIBLE RE-ARRANGEMENT TO RELIEVE IN PARTICULAR THE CONGESTION IN BANDS ALLOCATED TO THE MARITIME MOBILE SERVICE

Bands	Actual Allocation	Suggested Allocation
1. 6 525 - 6 570 kHz	Aeronautical mobile (R)	Maritime mobile
6 570 - 6 685 kHz	Aeronautical mobile (R)	Aeronautical mobile (R)
6 685 - 6 696 kHz	Aeronautical mobile (OR)	Aeronautical mobile (R)
6 696 - 6 765 kHz	Aeronautical mobile (OR)	Aeronautical mobile (OR)
2. 8 815 - 8 860 kHz	Aeronautical mobile (R)	Maritime mobile
8 860 - 8 965 kHz	Aeronautical mobile (R)	Aeronautical mobile (R)
8 965 - 8 977 kHz	Aeronautical mobile (OR)	Aeronautical mobile (R)
8 977 - 9 040 kHz	Aeronautical mobile (OR)	Aeronautical mobile (OR)

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 652-E
14 November 1979
Original : English

COMMITTEE 7

Republic of Iraq

REQUEST FOR ALLOCATION OF ADDITIONAL CALL SIGN SERIES

In view of the development of telecommunications in the Republic of Iraq, the call sign series allocated to our Administration have been used up.

Therefore, the Administration of the Republic of Iraq requests that two new call sign series should be allocated to it.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 653-E
14 November 1979
Original : English

PLENARY MEETING

FIFTEENTH REPORT OF COMMITTEE 4

Committee 4 has unanimously decided to abrogate one Resolution (No. 7) and nine Recommendations (Nos. 4, 7, 8, 9, 13, Spa 5, Mar 3, Spa2 - 8, Mar2 - 13) from previous Conferences.

The texts have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 654).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 654-E
14 November 1979
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COMMITTEE 9

FIFTEENTH SERIES OF TEXTS OF COMMITTEE 4 TO THE EDITORIAL COMMITTEE

The following list contains all Resolutions and Recommendations from previous Conferences, allocated to Committee 4, for which Committee 4 decided abrogation for the reasons stated below.

a) All necessary action has been taken

SUP

RESOLUTION No. 7

Relating to Radio Emissions from Artificial Satellites and other Space Vehicles

SUP

RECOMMENDATION No. 7

Relating to Specifications of Broadcasting Receivers at Low Cost

SUP

RECOMMENDATION No. Spa2 – 8

Relating to the Protection of Radio Astronomy Observations on the Shielded Area of the Moon

SUP

RECOMMENDATION No. Mar2 – 13

Relating to the Development of Fixed Frequency Radar Beacons (Racons)

b) They have been replaced as indicated

Recommendation No. 4 by Recommendation No. E (Document No. 562 = B.10)

SUP

RECOMMENDATION No. 4

to the C.C.I.R.
Relating to Studies of Radio Propagation and Radio Noise

Recommendation No. 8 by Recommendation No. K (Document No. 613 = B.12)

SUP

RECOMMENDATION No. 8

Relating to the Classification of Emissions

Recommendation No. 9 by Recommendation No. [S/15/380]

(text to be found in a later Document of Committee 4)

SUP

RECOMMENDATION No. 9

Relating to the Use of the Rationalized M.K.S. System of Units

c) They are now obsolete

SUP

RECOMMENDATION No. 13

Relating to the Technical Standards to be applied when preparing Plans for the Broadcasting Stations in the Bands 68-73 MHz and 76-87·5 MHz

SUP

RECOMMENDATION No. Spa 5

to the C.C.I.R. Relating to the Broadcasting-Satellite Service

SUP

RECOMMENDATION No. Mar 3

Relating to the Utilization of Space Communication Techniques in the Maritime Mobile Service

N. MORISHIMA
Chairman of Committee 4

UNION INTERNATIONALE DES TELECOMMUNICATIONS

CONFERENCE ADMINISTRATIVE MONDIALE DES RADIOCOMMUNICATIONS

(Genève, 1979)

Corrigendum N° 1 au
Document N° 655(Rév.1)-F/E/S
16 novembre 1979

GROUPE DE TRAVAIL 6A
WORKING GROUP 6A
GRUPO DE TRABAJO 6A

RAPPORT DU GROUPE AD HOC 1 DU GROUPE DE TRAVAIL 6A
AU GROUPE DE TRAVAIL 6A

Remplacer le Tableau de la page 4 par le Tableau figurant au verso.

REPORT FROM AD HOC GROUP 1 OF WORKING GROUP 6A
TO WORKING GROUP 6A

Replace Table on page 4 by Table appearing overleaf.

INFORME DEL GRUPO AD HOC 1 DEL GRUPO DE TRABAJO 6A
AL GRUPO DE TRABAJO 6A

Sustitúyase el Cuadro de la página por el Cuadro que figura al reverso.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 655(Rev.1)-E
15 November 1979
Original : English

WORKING GROUP 6A

REPORT FROM AD HOC GROUP 1 OF WORKING GROUP 6A
TO WORKING GROUP 6A

1. The Working Group 6A Ad Hoc 1, composed of delegates of Algeria, Argentina, Australia, Canada, Cuba, the United States, France, the United Kingdom and of the IFRB has met in various meetings to examine the principles listed in Document No. 488 and to study their application with respect to the proposals submitted to the WARC 1979.

2. The Working Group has approved draft new provisions to be included in Article N12, together with modifications to certain other provisions of that Article. Four additional provisions for inclusion in Article N20/15 were also approved.

3. The Working Group has also approved a draft resolution relating to the procedure for reviewing (clean up) entries in the Master Register in the bands allocated to the Fixed Service between 3000 kHz and 27,500 kHz (Resolution /XA/), and a draft resolution relating to improvements in assistance to developing countries in securing access to the HF bands for their fixed services and in ensuring their assignments protection from harmful interference (Resolution /DC/).

4. The Working Group has also approved:

4.1 the definitions of class of operation of the assignments; and

4.2 the draft report of Committee 6 to Committee 5 on the dates to be established for a transitional procedure for the HF Fixed Service.

5. Finally, the Working Group has examined the Corrigendum No. 5 to Document No. 48 on the request of the delegate of the United States and considered that the matter was not within the terms of reference of the Working Group. The text of this corrigendum is therefore submitted to Working Group 6A for consideration.

6. The draft texts mentioned under items 2, 3 and 4.1 above have been transmitted to Drafting Group 6A1 following the decisions of Working Group 6A. The definitions of class of operation of the assignments (item 4.1 above) have also been transmitted to Working Group 6A3 for consideration and consequential changes in Appendix 1.

N. BOUHIRED
Chairman of Ad Hoc Group 1 of Working Group 6A

Annex : 1

A N N E X

DRAFT

REPORT FROM COMMITTEE 6 TO COMMITTEE 5 ON THE DATES TO BE ESTABLISHED FOR A TRANSITIONAL PROCEDURE FOR THE HIGH FREQUENCY FIXED SERVICE

1. Any transitional procedure must be based upon an accurate Master Register. The Master Register is at present inaccurate and must be revised; Committee 6 has therefore developed drafts of an appropriate procedure that should commence shortly after the close of the WARC. The transitional procedure relating to the transfer of fixed services out of the HF bands re-allocated by the WARC to other services must start immediately after the procedure for revision of the relevant parts of the Master Register. The length of time required to complete this transfer involves many factors. These have been examined (omitting those appropriate to Committee 5). Committee 6 submits the following conclusions:

a) a procedure for revising the Master Register as contained in a draft Resolution should be started on 1 January 1980. It will need about 18 months and should therefore, with a margin, run until 1 October 1981;

b) there should then follow a short period for consolidation of the results and publication of the revised parts of the Master Register to provide the basis for a transitional procedure;

c) the transitional procedure should start on the date of entry into force of the Final Acts on [1 January 1982] and the preparatory phase should run for 18 months. In this period, based on the revised Master Register, all fixed service assignments in the bands that are re-allocated by Committee 5 to other services will be found replacements;

d) a further period of six months should then be allowed for acceptance of the new assignments and preparation for the changeover during an operational phase;

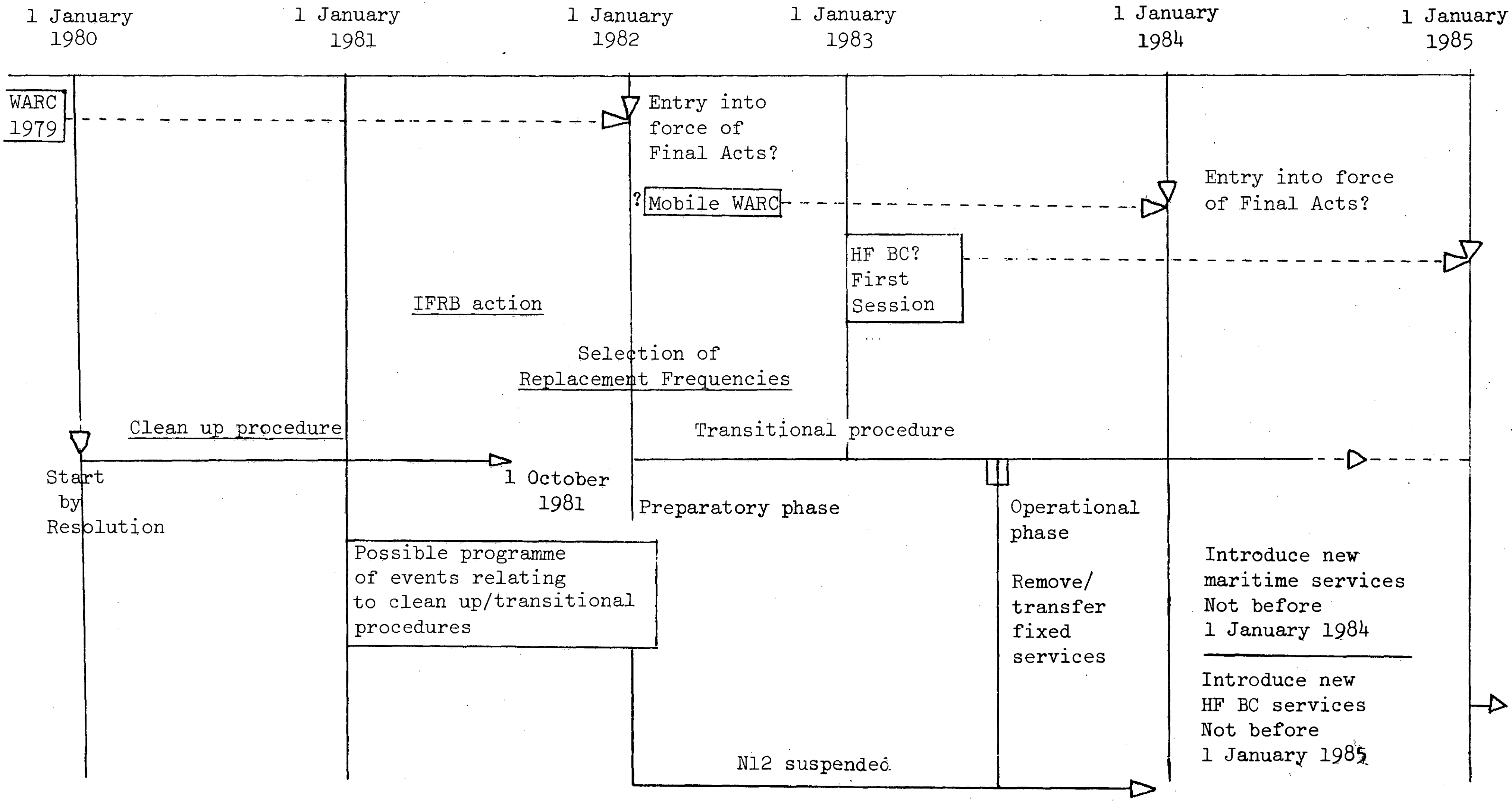
e) the earliest date for the start of the operational phase, i.e. the start of the transfer of High Frequency Fixed Services out of one band and into another would therefore be 1 January 1984.

2. The problems of the services to be introduced into the bands vacated by the Fixed Service must then be considered. The Maritime Mobile Service could not move into its new bands until they have been considered by a Mobile WARC envisaged for 1982, the Final Acts of which will not come into force until perhaps 1 January 1984. The Broadcasting Service could be introduced into its new bands progressively under the Article N15/10 procedure, alternatively it may have to wait until after an HFBC Conference has been held as stated in the footnote ADD 3511A of Document No. 553, with the Final Acts coming into force on perhaps 1 January 1985. In either case the earliest date for the introduction of any new services would be 1 January 1984 and this would fit well with the time-table required to complete the preparations for re-accommodation of the Fixed Service.

3. Committee 5 will of course determine the time scales for these change-overs in the various bands, however from an administrative point of view, Committee 6 believes that the timetable in the diagram annexed could and should be adopted.

4. The maximum period required to find replacement frequencies will be determined by the number of assignments for which new frequencies must be found and the ressources of the IFRB.

Note : This document should not be considered as prejudging decisions of this Conference concerning the date of entry into force and dates of future Conferences.


1 January 1980
1 January 1981
1 January 1982
1 January 1983
1 January 1984
1 January 1985
WARC 1979
Entry into force of Final Acts?
?Mobile WARC
Entry into force of Final Acts?
HF BC? First Session
IFRB action
Selection of Replacement Frequencies
Clean up procedure
Transitional procedure
Start by Resolution
1 October 1981
Preparatory phase
Operational phase
Possible programme of events relating to clean up/transitional procedures
Remove/ transfer fixed services
Introduce new maritime services Not before 1 January 1984
Introduce new HF BC services Not before 1 January 1985
N12 suspended

INTERNATIONAL TELECOMMUNICATION UNION

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WORKING GROUP 6A

REPORT FROM AD HOC GROUP 1 OF WORKING GROUP 6A
TO WORKING GROUP 6A

1. The Working Group 6A Ad Hoc 1, composed of delegates of Algeria, Argentina, Australia, Canada, Cuba, the United States, France, the United Kingdom and of the IFRB has met in various meetings to examine the principles listed in Document No. 488 and to study their application with respect to the proposals submitted to the WARC 1979.

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4.1 the definitions of class of operation of the assignments; and

4.2 the draft report of Committee 6 to Committee 5 on the dates to be established for a transitional procedure for the HF Fixed Service.

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N. BOUHIRED
Chairman of Ad Hoc Group 1 of Working Group 6A

Annex : 1

ANNEX

DRAFT

REPORT FROM COMMITTEE 6 TO COMMITTEE 5 ON THE DATES TO BE ESTABLISHED FOR A TRANSITIONAL PROCEDURE FOR THE HIGH FREQUENCY FIXED SERVICE

1. Any transitional procedure must be based upon an accurate Master Register. The Master Register is at present inaccurate and must be revised; Committee 6 has therefore developed drafts of an appropriate procedure that should commence shortly after the close of the WARC. The transitional procedure relating to the transfer of fixed services out of the HF bands re-allocated by the WARC to other services must start immediately after the procedure for revision of the relevant parts of the Master Register. The length of time required to complete this transfer involves many factors. These have been examined (omitting those appropriate to Committee 5). Committee 6 submits the following conclusions:

a) a procedure for revising the Master Register as contained in a draft Resolution should be started on 1 January 1980. It will need about 18 months and should therefore, with a margin, run until 1 October 1981;

b) there should then follow a short period for consolidation of the results and publication of the revised parts of the Master Register to provide the basis for a transitional procedure;

c) the transitional procedure should start on the date of entry into force of the Final Acts on [1 January 1982] and the preparatory phase should run for 18 months. In this period, based on the revised Master Register, all fixed service assignments in the bands that are re-allocated by Committee 5 to other services will be found replacements;

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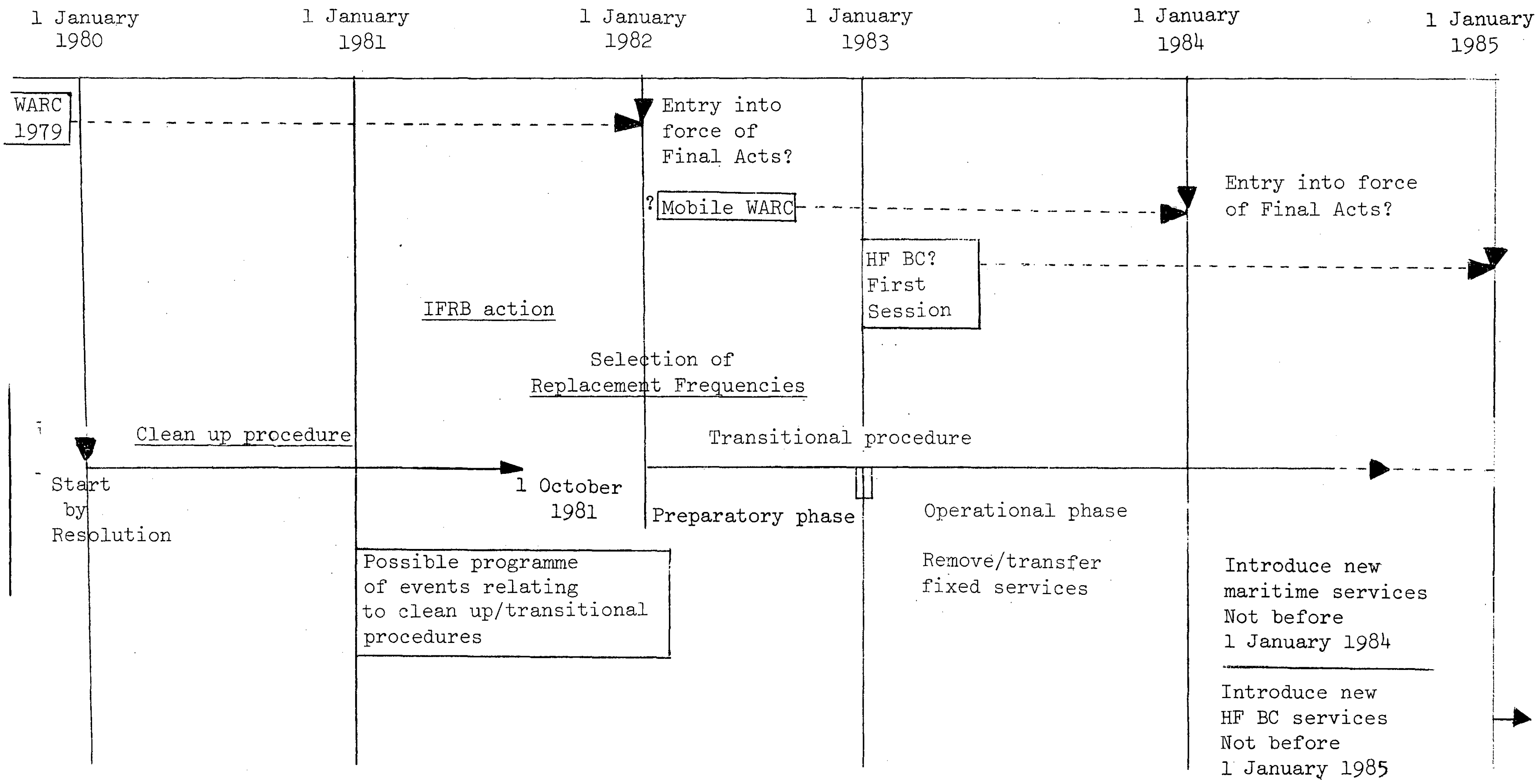
e) the earliest date for the start of the operational phase, i.e. the start of the transfer of High Frequency Fixed Services out of one band and into another would therefore be 1 January 1984.

2. The problems of the services to be introduced into the bands vacated by the Fixed Service must then be considered. The Maritime Mobile Service could not move into its new bands until they have been considered by a Mobile WARC envisaged for 1982, the Final Acts of which will not come into force until perhaps 1 January 1984. The Broadcasting Service could be introduced into its new bands progressively under the Article N15/10 procedure, alternatively it may have to wait until after an HFBC Conference has been held as stated in the footnote ADD 3511A of Document No. 553, with the Final Acts coming into force on perhaps 1 January 1985. In either case the earliest date for the introduction of any new services would be 1 January 1984 and this would fit well with the time-table required to complete the preparations for re-accommodation of the Fixed Service.

3. Committee 5 will of course determine the time scales for these change-overs in the various bands, however from an administrative point of view, Committee 6 believes that the timetable in the diagram annexed could and should be adopted.

4. The maximum period required to find replacement frequencies will be determined by the number of assignments for which new frequencies must be found and the ressources of the IFRB.

Note : This document should not be considered as prejudging decisions of this Conference concerning the date of entry into force and dates of future Conferences.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1 January 1981
1 January 1982
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WARC 1979
Entry into force of Final Acts?
? Mobile WARC
Entry into force of Final Acts?
HF BC? First Session
IFRB action
Selection of Replacement Frequencies
Clean up procedure
Transitional procedure
Start by Resolution
1 October 1981
Preparatory phase
Operational phase
Possible programme of events relating to clean up/transitional procedures
Remove/transfer fixed services
Introduce new maritime services Not before 1 January 1984
Introduce new HF BC services Not before 1 January 1985

INTERNATIONAL TELECOMMUNICATION UNION

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COMMITTEE 5

FOURTEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands 3 500 - 4 200 MHz and 4 990 - 5 470 MHz

1. Frequency bands between 3 500 and 4 200 MHz

All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. For the secondary allocation in the Table to the radiolocation service in the band 3 400 - 3 600 MHz, the discussions and the results thereof on including a suitable footnote provision (ADD 3736A) for Regions 2 and 3 are contained in the twenty-eighth report of Working Group 5D (DT/206).

3. Frequency bands between 4 990 and 5 470 MHz

All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

4. The delegations of France and the USSR reserved the right to come back to footnote 3686/352A.

5. The delegation of the USSR reserved the right to come back to footnotes 3687/352B and 3750/383B.

6. The Working Group decided to suppress footnotes 3740/377, 3742/379, 3749/383A, 3752/384A and 3737/374 (in the band 3 600 - 3 770 MHz).

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 2

ANNEX 1

MHz
3 500 - 4 200

<table>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td></td><td colspan="2" rowspan="2">3 500 - 3 700

FIXED

FIXED-SATELLITE
(Space-to-Earth)

MOBILE except aeronautical mobile

Radiolocation 3741/378 [3736A]</td></tr>
<tr><td rowspan="2">3 600 - 4 200

FIXED

FIXED-SATELLITE
(Space-to-Earth)
[3750A]

Mobile</td></tr>
<tr><td colspan="2">3 700 - 4 200

FIXED

FIXED-SATELLITE (Space-to-Earth) [3750A]

MOBILE except aeronautical mobile

3742A</td></tr>
</table>

SUP 3740/377

SUP 3737/374 Only in the band 3 600 - 3 770 MHz

NOC 3741/378 In Japan, in the band 3 620 - 3 700 MHz, the radiolocation service is excluded.

SUP 3742/379

ADD 3742A Additional allocation : in New Zealand, the band 3 700 - 3 770 MHz is also allocated to the radiolocation service on a secondary basis.

ADD 3750A [In the band [x, x+25] MHz allocated to the fixed-satellite service, Administrations are urged to give preference to feeder links for the satellites of the maritime mobile service over other links of the fixed-satellite service.]

ADD 3736A [In Regions 2 and 3, in the band 3 400 - 3 600 MHz, the radiolocation service is allocated on a primary basis. However, all Administrations operating radiolocation systems in this band are urged to cease operations by 1985. After this date, Administrations shall take all practicable steps to protect the fixed-satellite service and coordination requirements shall not be imposed on the fixed-satellite service.]

ANNEX 2

MHz
4 990 - 5 470

Region 1	Region 2	Region 3
4 990 - 5 000	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space Research (passive) 3531L	
5 000 - 5 250	AERONAUTICAL RADIONAVIGATION 3686/352A 3687/352B 3750/383B 3750AA	
5 250 - 5 255	RADIOLOCATION Space Research 3751/384 3675A	
5 255 - 5 350	RADIOLOCATION 3751/384 3675A	
5 350 - 5 460	AERONAUTICAL RADIONAVIGATION 3753/385 Radiolocation	
5 460 - 5 470	RADIONAVIGATION 3753/385 Radiolocation	

SUP 3531/233B Only in the band 4 990 - 5 000 MHz

ADD 3531L In making assignments to stations of other services to which the band 4 990 - 5 000 MHz is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A).

SUP 3749/383A

MOD 3686/352A The bands 1 610 - 1 626.5 MHz and 5 000 - 5 250 MHz are reserved on a world-wide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based or satellite-borne facilities. Such use and development is subject to agreement obtained under the procedure set forth in Article N13A.

MOD 3687/352B The bands 1 610 - 1 626.5 MHz, 5 000 - 5 250 MHz and 15.4 - 15.7 GHz are also allocated to the aeronautical mobile-satellite (R) service on a primary basis. Such use and development is subject to agreement obtained under the procedure set forth in Article N13A.

MOD 3750/383B The bands 5 000 - 5 250 MHz, and 15.4 - 15.7 GHz are also allocated to the fixed-satellite service and the inter-satellite service for connection between one or more Earth stations at specified fixed points on the Earth and satellites when these services are used in conjunction with the aeronautical radionavigation and/or aeronautical mobile (R) service. Such use shall be subject to agreement obtained under the procedure set forth in Article N13A.

ADD 3750AA The band 5 000 - 5 250 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band.

MOD 3751/384 Additional allocation : in Austria, Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the USSR, the band 5 250 - 5 350 MHz is also allocated to the radionavigation service on a primary basis.

ADD 3675A In the bands 1 215 - 1 300 MHz, 3 100 - 3 300 MHz, 5 250 - 5 350 MHz, 8 550 - 8 650 MHz, 9 500 - 9 800 MHz and 13.4 - 14.0 GHz, radiolocation stations installed on spacecraft may also be employed for the Earth exploration-satellite and space research services on a secondary basis.

SUP 3752/384A

NOC 3753/385 The use of the band 5 350 - 5 470 MHz by the aeronautical radionavigation service is limited to airborne radars and associated airborne beacons.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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14 November 1979
Original : English

COMMITTEE 5

FIFTEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

Subject : Allocations to the fixed-satellite service

1. Several delegations expressed their wish to allocate the band 4.5 - 4.8 GHz to the fixed-satellite service (space-to-Earth) and to draw the attention of Committee 4 to the need of studying the sharing criteria of this band.

2. The delegations of the United Kingdom and Iran had reservation on the allocation of the band 4.5 - 4.8 GHz.

3. The delegation of the United States of America reserved its position on 4.5 - 4.8 GHz, pending a satisfactory resolution of the allocations at 3.4 - 3.7 GHz.

4. The reservations will be re-examined when Drafting Group 5D8 finishes its work and the proposed texts will be available.

5. The Working Group decided to allocate the band 2.5 - 2.69 GHz to the broadcasting-satellite and the fixed-satellite services as follows :

Region 1 :	2 500 - 2 690 MHz :	broadcasting-satellite (NOC)
Region 2 :	2 500 - 2 690 MHz :	broadcasting-satellite (NOC)
	2 500 - 2 655 MHz :	fixed-satellite (space-to-Earth)
	2 655 - 2 690 MHz :	fixed-satellite (Earth-to-space) (NOC)
Region 3 :	2 500 - 2 690 MHz :	broadcasting-satellite (NOC)
	2 500 - 2 535 MHz :	fixed-satellite (space-to-Earth) (NOC)
	2 655 - 2 690 MHz :	fixed-satellite (Earth-to-space) (NOC)

6. The Working Group decided unanimously to allocate the band 10.7 - 11.7 GHz to the fixed-satellite service (space-to-Earth) and the band 12.75 - 13.25 GHz to the fixed-satellite service (Earth-to-space).

Dr. B.S. RAO
Chairman of Working Group 5D

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 658-E
14 November 1979
Original : English

COMMITTEE 7

State of Qatar

REQUEST FOR THE ALLOCATION OF ADDITIONAL CALL SIGN SERIES

As a result of the development of telecommunications in the State of Qatar, the call sign series allocated to our Administration (A7A - A7Z) has been used up.

Therefore, we request accordingly the allocation of an additional new series of call signs.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 659-E
14 November 1979
Original : Spanish

COMMITTEE 5

Republic of Guatemala

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Republic of Guatemala submits the following footnote for the consideration of the Conference :

GTM/659/1 ADD 3633B Alternative allocation : in Guatemala, the band 401 - 406 MHz is allocated on a secondary basis to the fixed service.

INTERNATIONAL TELECOMMUNICATION UNION

BLUE PAGES

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Corrigendum No. 1 to
Document No. 660
16 November 1979

E

B.17

PLENARY MEETING

17th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

(concerns the French text only)

INTERNATIONAL TELECOMMUNICATION UNION

BLUE PAGES

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 660
15 November 1979

E

B.17

PLENARY MEETING

17th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	628 + 629	Appendix 28

P. BASSOLE
Chairman of the
Editorial Committee

Annex: pages

MOD

APPENDIX 28

Spa2

Method for the Determination of the Coordination Area around an Earth Station in Frequency Bands between 1 and 40 GHz shared between Space and Terrestrial Radiocommunication Services

1. Objectives

The coordination area /̅ see No. 3157/103D_7 is determined by calculating, in all directions of azimuth from the earth station, the coordination distances / see No. 3155/103B_7 and drawing to scale on an appropriate map the coordination contour / see No. 3156/103C_7. /̅ _7 /̅ _7 /̅ _7

It must be emphasized that the presence or installation of a terrestrial station within the coordination area of an earth station would not necessarily preclude the successful operation of either the earth station or that terrestrial station, since the method is based on the most unfavourable case assumptions as regards interference.

For the determination of the coordination area two cases may have to be considered :

1) for the earth station when it is transmitting (and hence capable of interfering with terrestrial stations);

2) for the earth station when it is receiving (and hence capable of being interfered with by terrestrial stations).

Where an earth station is intended to transmit a variety of classes of emissions, the earth station parameters to be used in the determination of the coordination contour shall be those which lead to the greatest coordination distances, for each earth station antenna beam and in each allocated frequency band which the earth station proposes to share with the terrestrial services.

Where an earth station is intended to receive a variety of classes of emissions, the earth station parameters to be used in the determination of the coordination contour shall be those which lead to the greatest coordination distances, for each earth station antenna beam and in each allocated frequency band which the earth station proposes to share with the terrestrial services, /̅ except in cases where the administration responsible for the earth station determines that a smaller coordination contour would adequately protect all the transmissions intended to be received by the earth station. When the determination of such a smaller coordination contour is based on a departure from the procedure of this Appendix, the notifying administration shall indicate, in detail, the nature of such departure. /̅

If subsequently an administration decides to protect its receiving earth station through notification of a coordination contour which is greater than the one it had notified under a departure from the method of this Appendix, it must recoordinate the earth station. Any resulting greater protection shall be effective from the date of publication of the notice in Part II of the IFRB weekly circular._/ _/

This Appendix provides methods which are suitable for either graphical or computer determination of the coordination area.

It is suggested to draw, together with the coordination contour, auxiliary contours based on less unfavourable assumptions than those chosen for the determination of the coordination contour. These auxiliary contours may be used during subsequent negotiations between the administrations concerned with a view to eliminating from the discussions (without the need for more precise calculations) the case of certain existing or planned stations located within the coordination area. The determination and use of these auxiliary contours is explained in Annex III to this Appendix.

2. General considerations

2.1 Concept of minimum permissible transmission loss

The determination of coordination distance, as the distance from an earth station beyond which interference from or to a terrestrial station may be considered to be negligible, is based on the premise that the attenuation of an unwanted signal is a monotonically increasing function of distance.

The amount of attenuation required between an interfering transmitter and an interfered-with receiver is given by the minimum permissible transmission loss (dB) for p % of the time, a value which must be exceeded by the predicted transmission loss for all but p % of the time.

$$L(p) = P_{t'} - P_r(p) \qquad (1)$$

where :

$P_{t'}$ *) : maximum available transmitting power level (dBW) in the reference bandwidth at the input to the antenna of an interfering station;

$P_r(p)$: permissible level of an interfering emission (dBW) in the reference bandwidth, to be exceeded for no more than p % of the time at the output of the receiving antenna of an interfered-with station, where the interfering emission originates from a single source.

$P_{t'}$ and $P_r(p)$ are defined for the same radio frequency bandwidth (reference bandwidth) and $L(p)$ and $P_r(p)$ for the same percentage of the time, dictated by the performance criteria of the interfered-with system.

*) Primes refer to the parameters associated with the interfering station.

For the small percentages of the time which are of interest here, it is necessary to distinguish between two significantly different attenuation mechanisms :

- attenuation of signals subject to tropospheric propagation via near-great circle paths; mode (1) see § 3.

- attenuation of signals subject to scatter due to hydrometeors; mode (2) see § 4.

2.2 Concept of minimum permissible basic transmission loss

In the case of propagation mode (1) the transmission loss is defined in terms of separable parameters, viz. : a basic transmission loss, (i.e. attenuation between isotropic antennae) and the effective antenna gains at either end of an interference path. The minimum permissible basic transmission loss may then be expressed as :

$$L_b(p) = P_{t'} + G_{t'} + G_r - P_r(p) \qquad (2)$$

where :

$L_b(p)$: minimum permissible basic transmission loss (dB) for p % of the time; this value must be exceeded by the predicted basic transmission loss for all but p % of the time.

$G_{t'}$: gain (dB relative to isotropic) of the transmitting antenna of the interfering station. If the interfering station is an earth station, this is the antenna gain towards the physical horizon on the azimuth considered; in the case of a terrestrial station, the maximum antenna gain is to be used;

G_r : gain (dB relative to isotropic) of the receiving antenna of the interfered-with station. If the interfered-with station is an earth station, this is the gain towards the physical horizon on the azimuth considered; in the case of a terrestrial station, the maximum antenna gain is to be used.

Annex 1 provides numerical and graphical methods to determine the angle between the earth station antenna main beam and the physical horizon, and of the horizon antenna gain, as functions of azimuth angle.

When considering non-geostationary satellites, $G_{t'}$ or G_r (whichever pertains to the earth station antenna) is variable with time. In such cases, an equivalent time-invariant earth station antenna gain is to be used.*) This equivalent gain is either 10 dB less than the maximum horizon antenna gain or is that value of horizon antenna gain exceeded for no more than 10 % of the time (if available), whichever is the greater.

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*) This equivalent antenna gain is not to be used when the earth station antenna points in the same direction for appreciable periods of time (e.g. when working to space probes or to satellites which are almost geostationary).

2.3 Derivation and tabulation of interference parameters

2.3.1 Permissible level of the interfering emission

The permissible level of the interfering emission (dBW) in the reference bandwidth, to be exceeded for no more than p % of the time at the output of the receiving antenna of a station subject to interference, from each source of interference, is given by the general formula below :

$$P_r(p) = 10 \log (kT_eB) + J + M(p) - W \tag{3}$$

where :

$$M(p) \equiv M(p_0/n) = M_0(p_0) \tag{4}$$

with :

k : Boltzmann's constant, 1.38×10^{-23} J/K;

T_e : thermal noise temperature of the receiving system (K), at the output of the receiving antenna (see Note 1);

B : reference bandwidth (Hz) (bandwidth, of the interfered-with system, over which the power of the interfering emission can be averaged);

J : ratio (dB) of the permissible long term (20 % of the time) interfering emission power to the thermal noise power of the receiving system, referred to the output terminals of the receiving antenna (see Note 2);

p_0 : percentage of the time during which the interference from all sources may exceed the permissible value;

n : number of expected entries of interference, assumed to be uncorrelated;

p : percentage of the time during which the interference from one source may exceed the permissible value; since the entries of interference are not likely to occur simultaneously : $p = p_0/n$;

$M_0(p_0)$: ratio (dB) between the permissible power of the interfering emission, during p_0 % and 20 % of the time, respectively, for all entries of interference (see Note 3);

$M(p)$: ratio (dB) between the permissible power of the interfering emission during p % of the time for one entry of interference, and during 20 % of the time for all entries of interference;

W : equivalence factor (dB) relating interference from interfering emissions to that caused by the introduction of additional thermal noise of equal power in the reference bandwidth. It is positive when the interfering emissions would cause more degradation than thermal noise (see Note 4).

Tables I and II list values for the above parameters.

In certain cases, an administration may have reason to believe that, for its specific earth station, a departure from the values associated with the earth station, as listed in Table II, may be justified. Attention is drawn to the fact that for specific systems the bandwidths B or, as for instance in the case of demand assignment systems, the percentages of the time p and p_0 may have to be changed from the values given in Table II. For further information see § 2.3.2.

Note 1 : The noise temperature, in degrees Kelvin, of the receiving system, referred to the output terminals of the receiving antenna, may be determined from :

$$T_e = T_a + (e - 1)\,290 + eT_r \tag{5a}$$

where T_a = noise temperature (K) contributed by the receiving antenna;

e = numerical loss in the transmission line (e.g. a waveguide) between antenna and receiver front end;

T_r = noise temperature (K) of the receiver front end, including all successive stages, referred to the front end input.

For radio-relay receivers and where the waveguide loss of a receiving earth station is not known, a value of e = 1.0 is to be used.

Note 2 : The factor J (dB) is defined as the ratio of total permissible long term (20 % of the time) power of interfering emissions in the system, to the long term thermal radio frequency noise power in a single receiver. In the computation of this factor, the interfering emission is considered to have a flat power spectral density, its actual spectrum shape being taken into account by the factor W (see below). For example, in a 50-hop terrestrial hypothetical reference circuit, the total allowable additive interference power is 1 000 pWOp (CCIR Recommendation 357-3) and the mean thermal noise power in a single hop may be assumed to be 25 pWOp. Therefore, since in a frequency-division multiplex/frequency modulation (FDM/FM) system the ratio of a flat interfering noise power to the thermal noise power in the same reference band is the same before and after demodulation, J is given by the ratio 1 000/25 expressed in dB, i.e. J = 16 dB. In a fixed-satellite service system, the total allowable interference power is also 1 000 pWOp (CCIR Recommendation 356-4), but the thermal noise contribution of the down path is not likely to exceed 7 000 pWOp, hence J $\geqslant$ -8.5 dB.

In digital systems interference is measured and prescribed in terms of the bit error rate or its permissible increase. While the bit error rate increase is additive in a reference circuit comprising tandem links, the radio frequency power of interfering emissions giving rise to such bit error rate increase is not additive, because bit error rate is not a linear function of the level of the radio frequency power of interfering emissions. Thus, it may be necessary to protect each receiver individually. For digital radio-relay systems operating above 10 GHz, and for all digital satellite systems, the long term interference power may be of the same order of magnitude as the long term thermal noise, hence J = 0 dB. For digital radio-relay systems operating below 10 GHz, long term interference power should not decrease the receiver fade margin by more than 1 dB. Thus the long term interference power should be about 6 dB below the thermal noise power and hence J = -6 dB.

Note 3 : $M_0(p_0)$ (dB) is the "interference margin" between the short term (p_0 %) and the long term (20 %) allowable powers of an interfering emission.

For analogue radio-relay and fixed-satellite systems in bands between 1 and 15 GHz, this is equal to the ratio (dB) between 50 000 and 1 000 pW0p (17 dB).

In the case of digital systems, system performance at frequencies above 10 GHz can, in most areas of the world, usefully be defined as the percentage of the time p_0 for which the wanted signal is allowed to drop below its operating threshold, defined by a given bit error rate. During non-faded operation of the system, the desired signal will exceed its threshold level by some margin M_s which depends on the rain climate in which the station operates. The greater this margin, the greater the enhancement of the interfering emission which would degrade the system to threshold performance. As a first order estimate it may be assumed that, for small percentages of the time (of the order of 0.001 % to 0.003 %), the level of interfering emissions may be allowed to equal the thermal noise which exists at the demodulator input during faded conditions. Thus, M_0 in Tables I and II may, for digital systems operating above 10 GHz, be assumed to be equal to the fade margin M_s of the system. For digital radio-relay systems operating below 10 GHz it is assumed that the short term power of an interfering emission can be allowed to exceed the long term power of the interfering emission by an amount equal to the fade margin of the system minus J, i.e. 41 dB, where J = -6 dB.

Note 4 : The factor W (dB) is the ratio of radio frequency thermal noise power to the power of an interfering emission in the reference bandwidth when both produce the same interference after demodulation (e.g. in a FDM/FM system it would be expressed for equal voice channel performance; in a digital system it would be expressed for equal bit error probabilities). For FM signals, it is defined as follows :

$$W = 10 \log \left\{ \frac{\text{Interference power in the receiving system after demodulation}}{\text{Thermal noise power in the receiving system after demodulation}} \times \frac{\text{Thermal noise power at the output of the receiving antenna in the reference bandwidth}}{\text{Power of the interfering emission at the radio frequency in the reference bandwidth, at the output of the receiving antenna}} \right\} \quad (5b)$$

The factor W depends on the characteristics of the wanted and the interfering signals. To avoid the need for considering a wide range of characteristics, upper limit values were determined for the factor W. When the wanted signal uses frequency modulation with r.m.s. modulation indices which are greater than unity, W is not higher than 4 dB. In such cases, a conservative figure of 4 dB will be used for the factor W in (3), regardless of the chracteristics of the interfering signal. For low-index FDM/FM systems a very small reference bandwidth (4 kHz) implies values of W not greater than 0 dB. In such cases, a conservative figure of 0 dB will be used for W in (3) regardless of the characteristics of the interfering signal.

When the wanted signal is digital, W is usually equal to or less than 0 dB, regardless of the characteristics of the interfering signal.

2.3.2 Coordination parameters for very narrow band transmissions (receiving earth station)

2.3.2.1 General

In the case of an earth station which receives both broadband and very narrow band transmissions (e.g. single channel per carrier (SCPC) transmissions) it may be desirable to draw two separate coordination contours : one for the narrow band transmissions and one for broadband transmissions, giving the specific sections of frequency bands used for very narrow band transmissions.

2.3.2.2 Pre-assigned narrow band transmissions

For such transmissions, it is appropriate to change the value of the reference bandwidth to the value of the bandwidth occupied by one such narrow band transmission.

2.3.2.3 Demand-assigned narrow band transmissions

For such transmissions, in addition, it may be appropriate to take into account the reduced probability that a particular frequency channel will be suffering interference at the time when it is actually selected for use at an earth station.

Administrations shall furnish all relevant technical data used in the determination of the coordination contour(s) for such transmissions.

3. Determination of coordination distance for propagation mode (1) - Great circle propagation mechanisms

3.1 *Radio-climatic zones*

In the calculation of coordination distance for propagation mode (1), the world is divided into three basic radio-climatic zones termed Zones A, B and C. These Zones are defined as follows:

Zone A: Entirely land.

Zone B: Seas, oceans and substantial bodies of inland water (as a criterion of a substantial body of water, one which can encompass a circle of diameter 100 km) at latitudes greater than 23.5° N or S, but excepting the Black Sea and the Mediterranean.

Zone C: Seas, oceans and substantial bodies of inland water (as a criterion of a substantial body of water, one which can encompass a circle of diameter 100 km) at latitudes less than 23.5° N or S, and the Black Sea and the Mediterranean.

3.2 *Calculation of coordination distance for paths within a single radio-climatic zone*

3.2.1 *General*

Equation (2) provides the value of minimum permissible basic transmission loss $L_b(p)$ for p % of the time. From this minimum permissible basic transmission loss, the coordination distance in each radio-climatic zone is derived using either of two alternative methods. The first method described in § 3.2.2, is a numerical method comprising several mathematical equations, and is intended principally for use with the aid of a computer. The second method is a graphical method and is described in § 3.2.3.

Where the distance derived in §§ 3.2.2 or 3.2.3 lies entirely within the boundary of the radio-climatic zone appropriate to the earth station, that distance is taken as the actual coordination distance for propagation mode (1). If the distance extends beyond the boundary of one radio-climatic zone, the overall coordination distance is obtained using the method given in § 3.3.

3.2.2 *Numerical method*

The minimum permissible basic transmission loss is related to coordination distance by the following expression:

$$L_b(p) = A_0 + \beta d_1 + A_h \tag{6}$$

in which:

$A_0 = 120 + 20 \log f$ (dB)

β : rate of attenuation (dB/km)

d_1 : coordination distance for propagation mode (1), (km)

A_h : horizon angle correction (dB)

f: frequency (GHz)

A_h is given by :

$$A_h = 20 \log (1 + 4.5 f^{\frac{1}{2}}\varepsilon) + f^{1/3}\varepsilon \text{ for } \varepsilon > 0^{\circ}\,* \tag{7a}$$

* Equation (7a) and thus Figure 1 should be used with caution at frequencies higher than about 20 GHz or for horizon angles above 5° until further studies have been completed by the CCIR in accordance with [Resolution ...].

[ ]

$A_h = 8\,\varepsilon$ for $-0.5° < \varepsilon < 0°$ (7b)

$A_h = -4$ for $\varepsilon < -0.5°$ (7c)

in which ε = horizon angle* (degrees)

From equation (6) the coordination distance d_1 may be found as follows:

$$d_1 = (L_b(p) - A_0 - A_h)/\beta \qquad (8)$$

The value of β depends on the radio-climatic zone and the percentage of time p, and is the sum of three components:

$$\beta = \beta_z + \beta_v + \beta_o \qquad (9)$$

in which

β_z: rate of attenuation (dB/km) due to all effects except atmospheric gases

β_v: rate of attenuation (dB/km) due to atmospheric water vapour

β_o: rate of attenuation (dB/km) due to oxygen

β_z depends on the radio-climatic zone, frequency and the percentage of time as follows:

for Zone A,

$$\beta_{zA} = 0.154\,(1 + 3.05 \log f)^{0.4}\,(0.9028 + 0.0486 \log p)^2 \qquad (10)$$

for Zones B and C,

$$\beta_{zB} = \beta_{zC} = (0.272 + 0.047 \log p)^2 \qquad (11)$$

β_v depends on the frequency and the density of water vapour in the air as follows (β_v may be neglected when $f < 15$ GHz):

$$\beta_v = 3.5 \times 10^{-4}\rho\left[\frac{1}{\left(1 - \frac{22.3}{f}\right)^2 + \frac{9}{f^2}} + \frac{1}{\left(1 + \frac{22.3}{f}\right)^2}\right] + 3 \times 10^{-6}\rho f^2 \qquad (12)$$

where ρ is the water vapour density (g/m^3), and depends on the radio-climatic zone. The following values are to be used:

Zone A, $\rho = 1$ g/m^3
Zone B, $\rho = 2$ g/m^3
Zone C, $\rho = 5$ g/m^3

β_0 depends on the frequency as follows:

$$\beta_o = 68 \times 10^{-4} \times f^2 \left\{\frac{1}{(60 - f)^2} + \frac{1}{(60 + f)^2} + \frac{1}{(f^2 + 0.36)}\right\} \qquad (13)$$

Thus the coordination distance in Zone A is derived for the appropriate frequency, percentage of time and horizon angle using equations (7), (8), (9), (10), (12) and (13). Similarly, the coordination distance in Zone B or C is derived using equations (7), (8), (9), (11), (12) and (13).

3.2.3 *Graphical method*

The equations given in § 3.2.2 have been converted into graphical form, to provide a second method of obtaining coordination distance for propagation mode (1). It is emphasized that the procedure described in this section is an alternative to that described in § 3.2.2 and each administration should use the method which is considered most convenient.

* Horizon angle is defined here as, viewed from the centre of the earth station antenna, the angle between the horizontal plane and a ray that grazes the visible physical horizon in the direction concerned.

The minimum permissible basic transmission loss $L_b(p)$ is obtained from equation (2). The "coordination loss", L_1, is obtained from the minimum permissible basic transmission loss by subtraction of the horizon angle correction A_h:

$$L_1 = L_b(p) - A_h \tag{14}$$

Values for the horizon angle correction are obtained from Fig. 1 for the appropriate frequency and horizon angle.*

The coordination distance in each radio-climatic zone is to be obtained as follows. Taking Zone A first, the coordination distance for 0.01% of the time, d_A (0.01) is obtained with the appropriate value of coordination loss L_1 and frequency from Fig. 2. The Zone A coordination distance for p % of the time is then obtained by multiplying the distance for 0.01% of the time by the factor Δp_A given in Fig. 3.

$$d_A = d_A(0.01) \times \Delta p_A \tag{15}$$

In a similar manner, the coordination distance in Zone B is obtained using values for d_B (0.01) and Δp_{BC} obtained from Figs. 4 and 3 respectively. The coordination distance in Zone C is obtained using values for d_C (0.01) and Δp_{BC} obtained from Figs. 5 and 3 respectively.

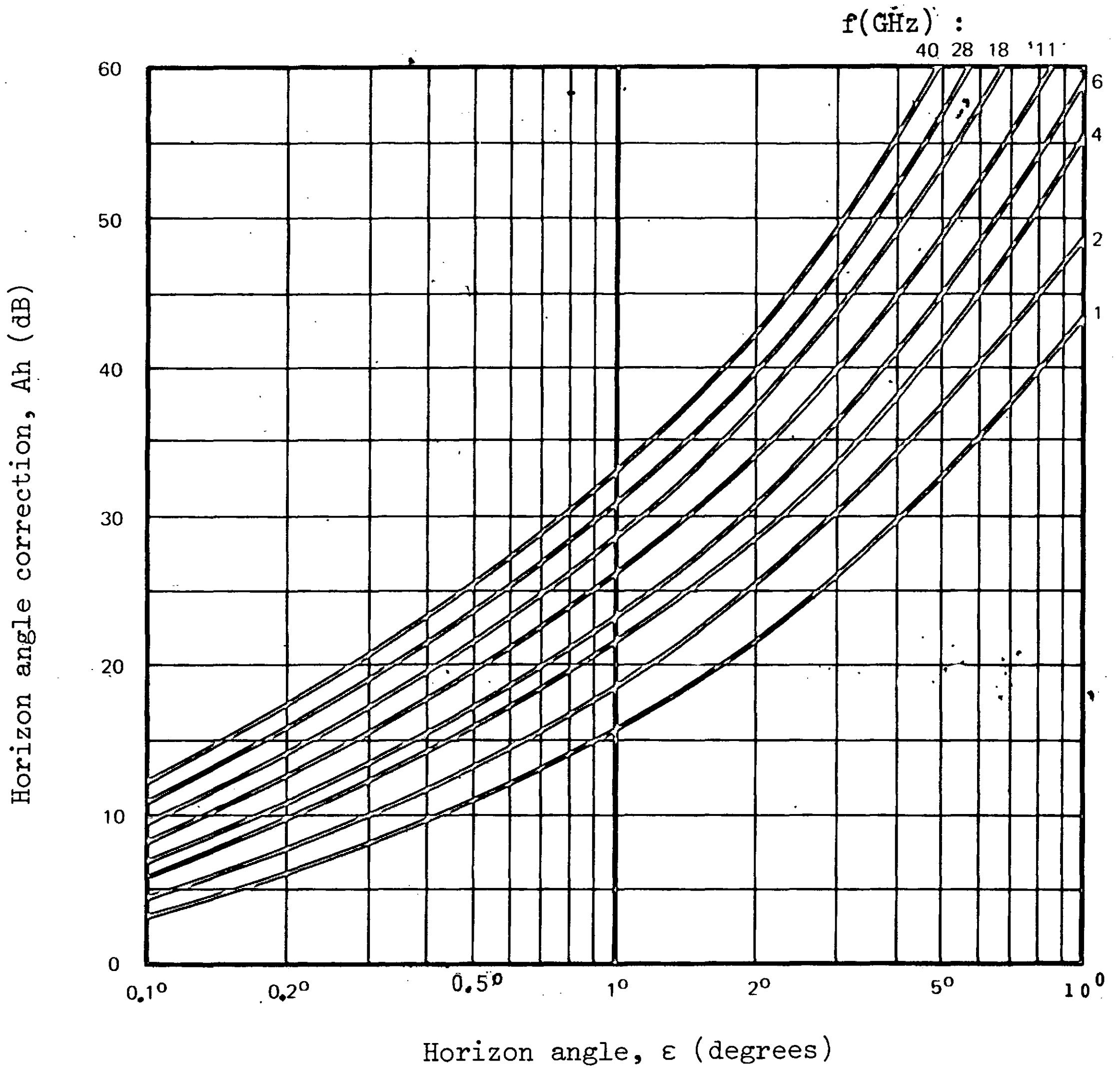

Figure 1 - Horizon angle correction Ah as a function of horizon angle and frequency

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* See footnote on page 9.

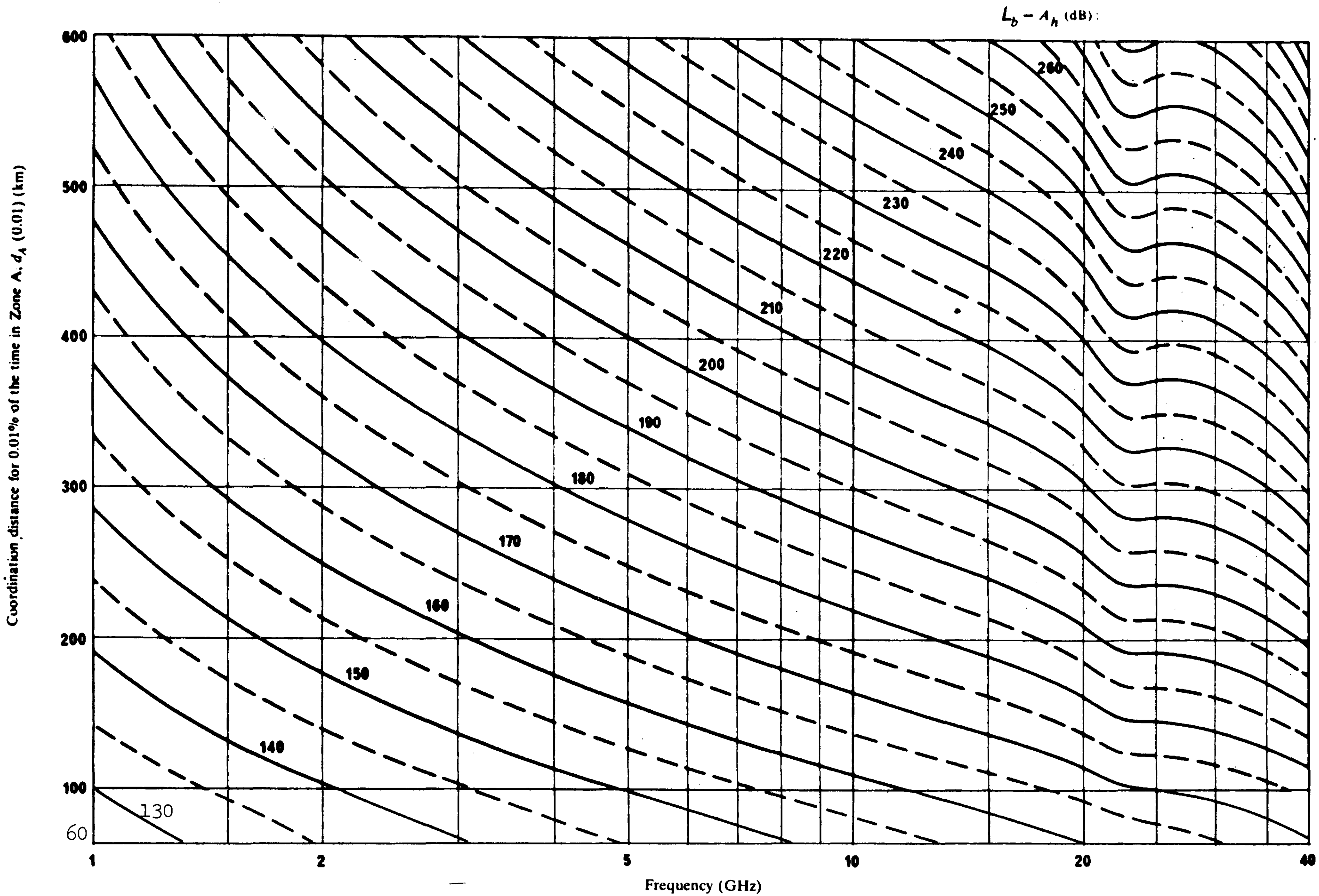


Figure 2 – *Coordination distance d_A (0.01) for 0.01% of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone A*

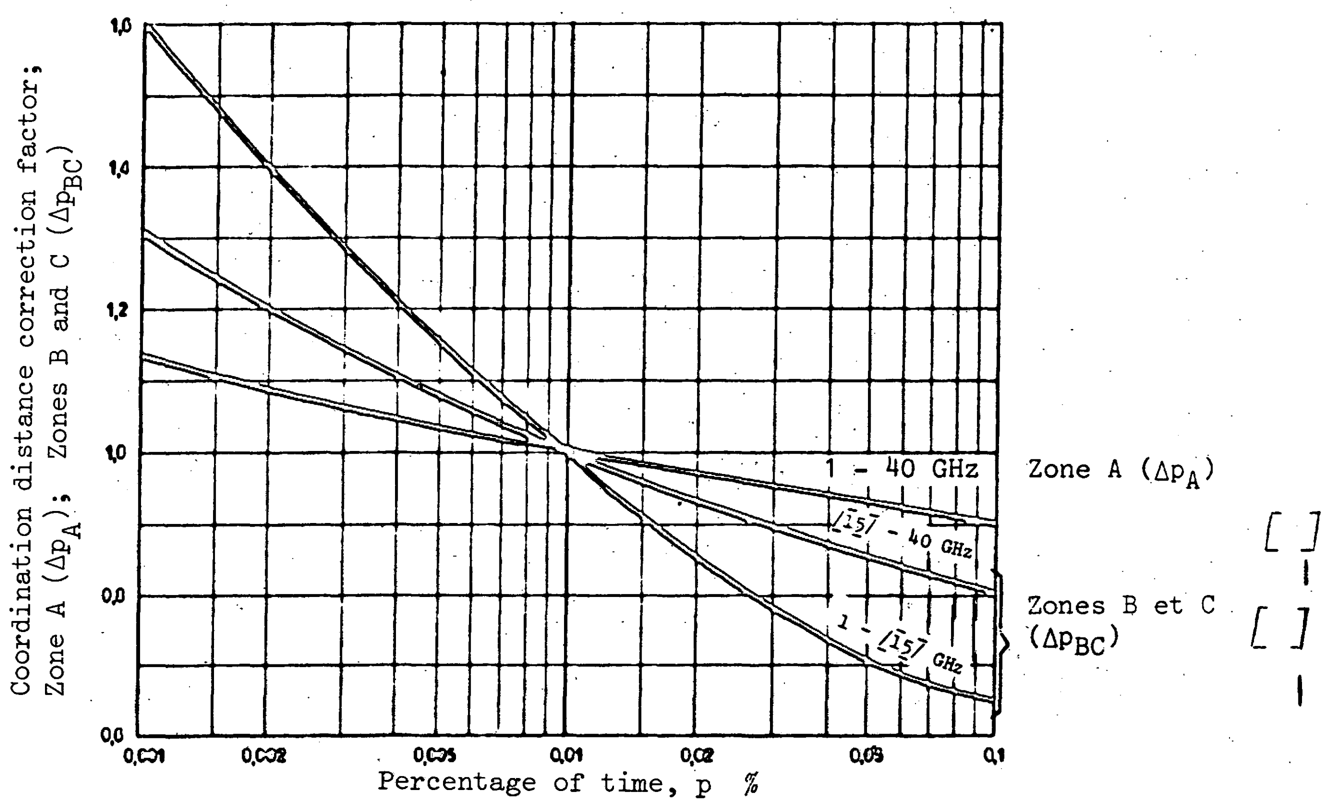


Figure 3 - Coordination distance correction factor for propagation mode (1) for percentages of time other than 0.01

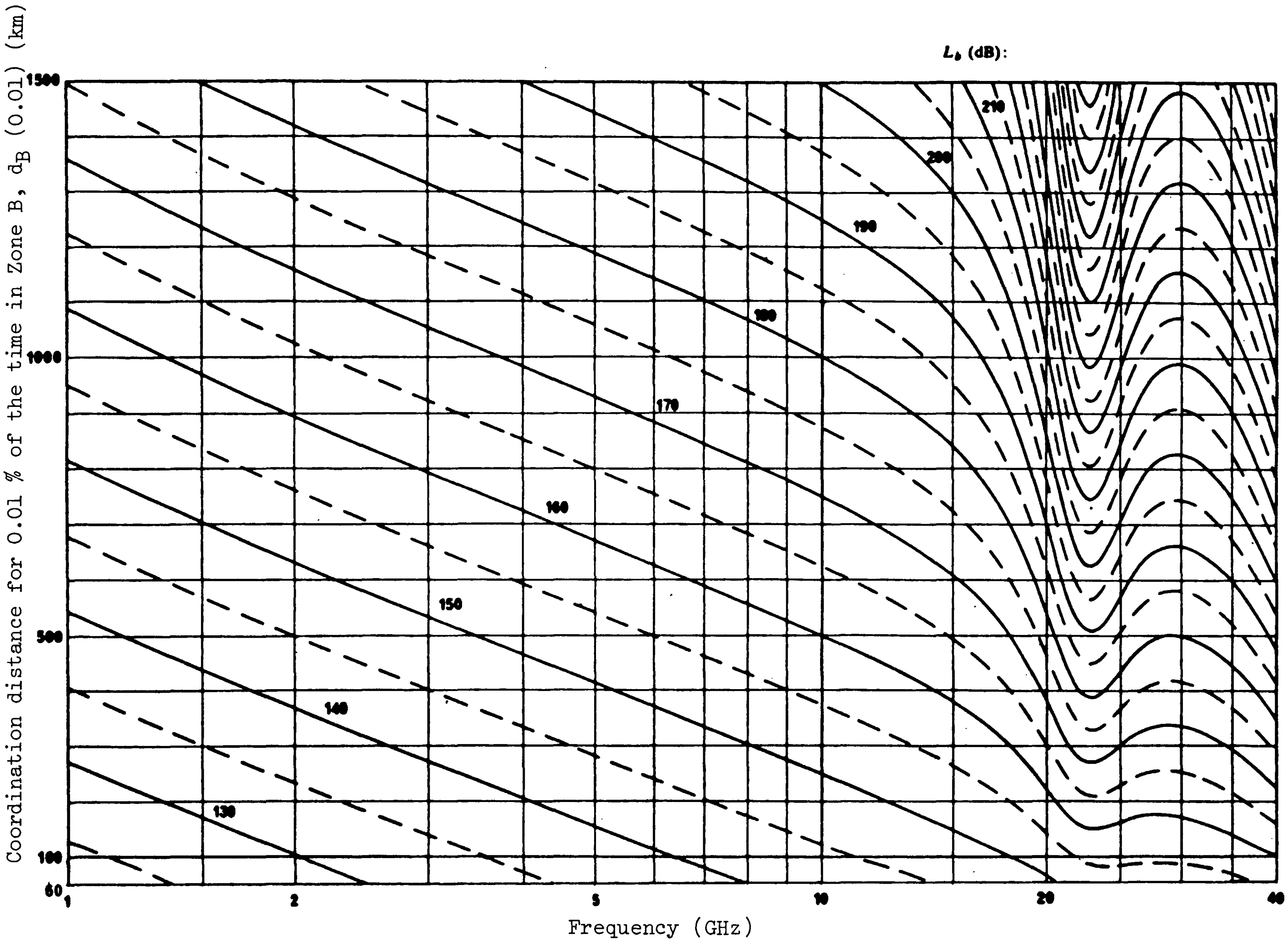


Figure 4 – Coordination distance d_B (0.01) for 0.01 % of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone B

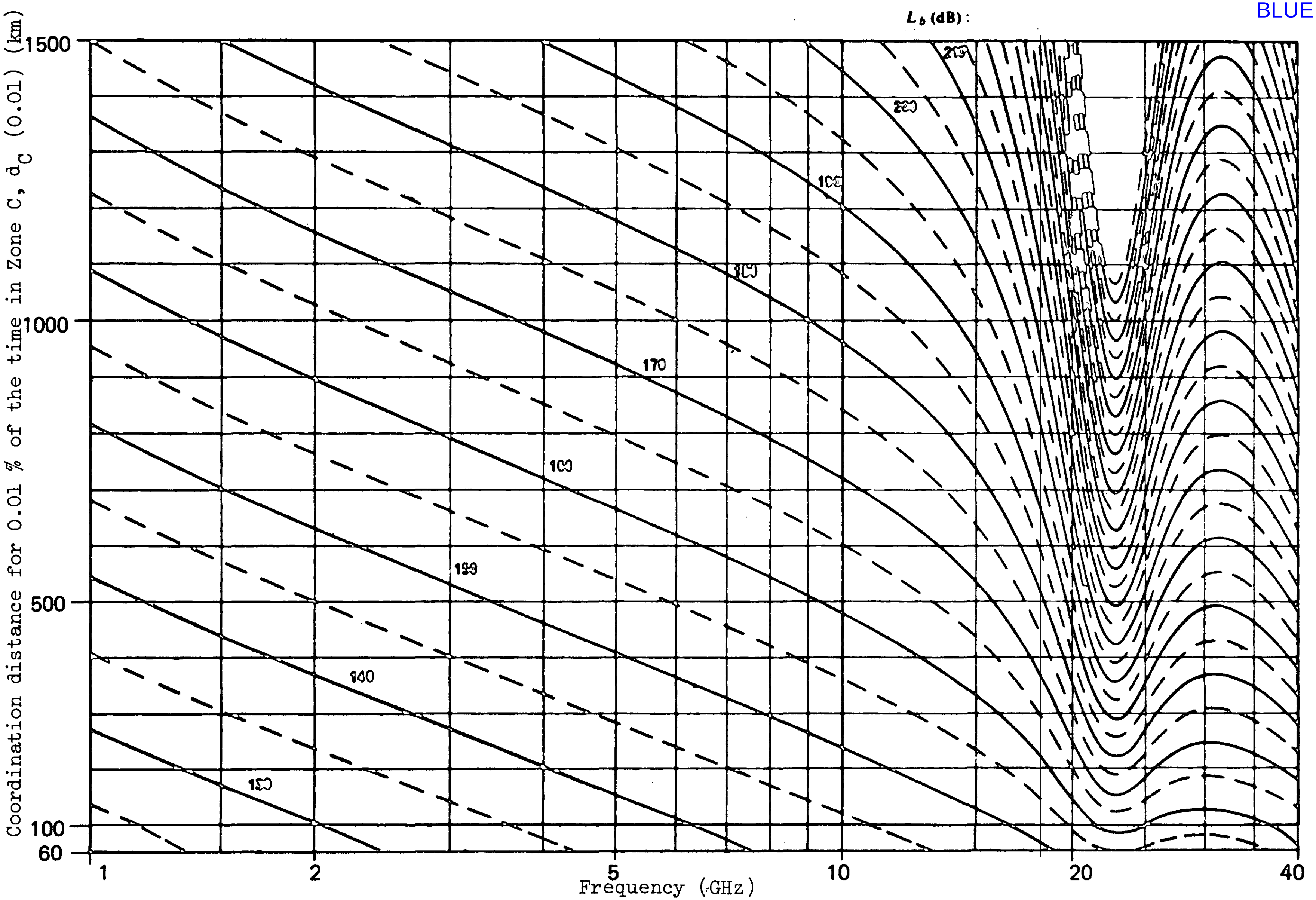


Figure 5 – Coordination distance d_C (0.01) for 0.01 % of the time due to propagation mode (1) as a function of frequency and coordination loss in Zone C

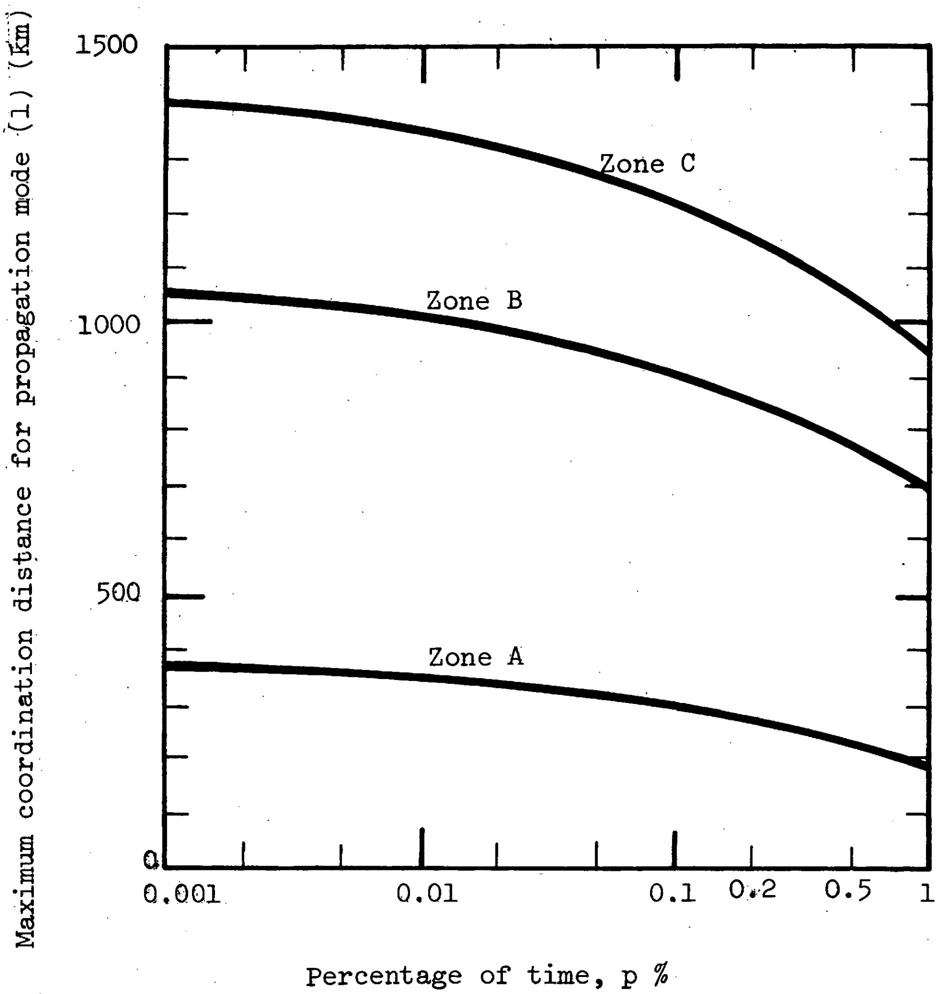


Figure 6 - Maximum coordination distance for propagation mode (1) as a function of percentage of time

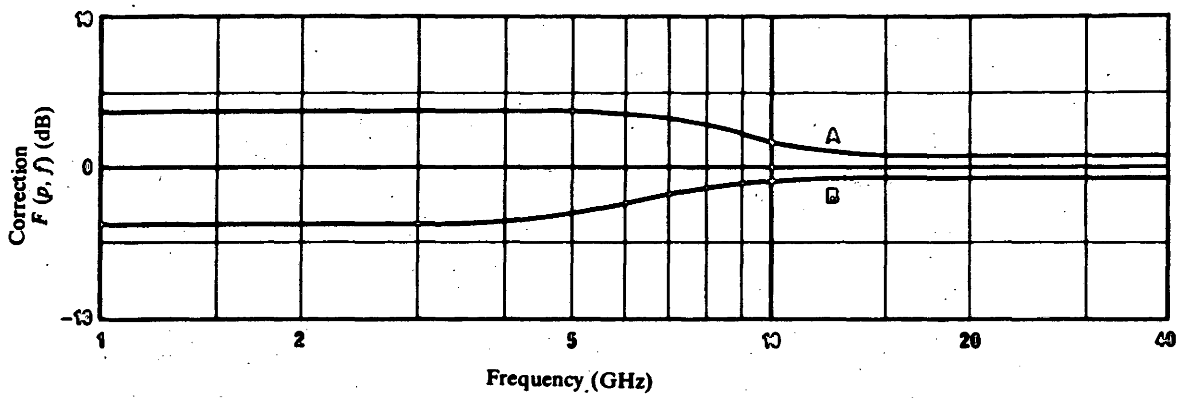


Figure 7 - Correction for conversion from 0.01% of the time for all rain climates

Conversion to 0.1% (Curve A)
Conversion to 0.001% (Curve B)

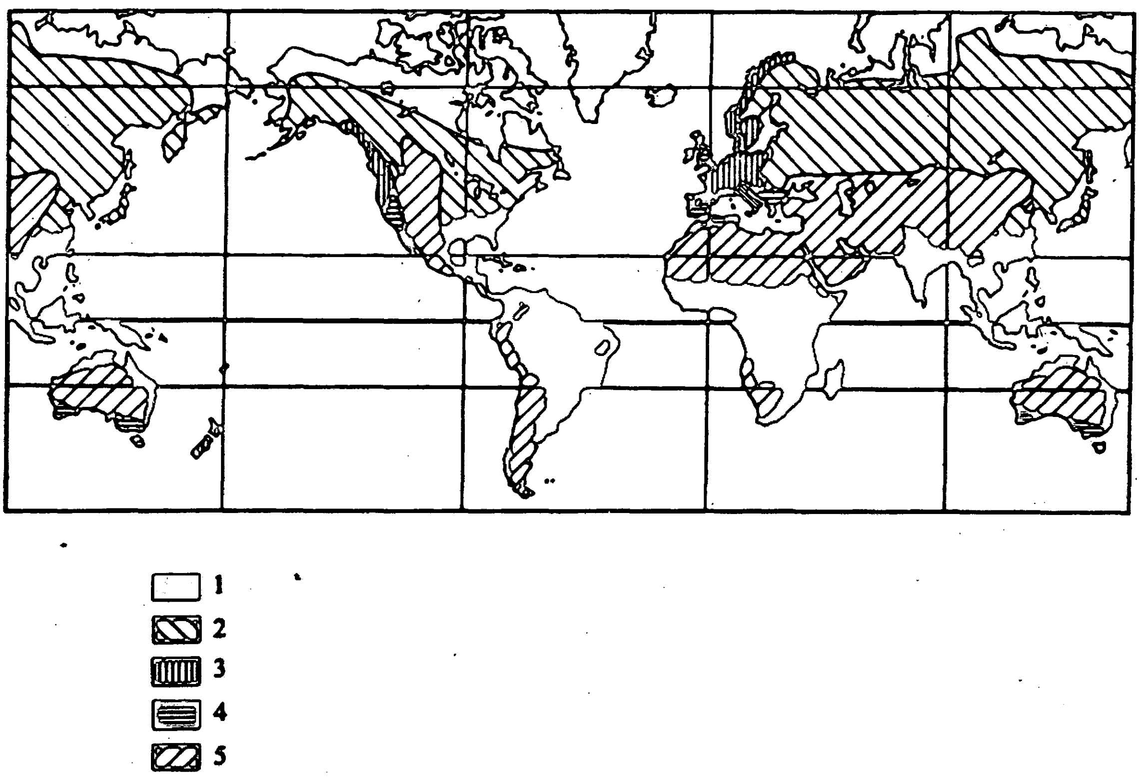


Figure 8 - Regions corresponding to the five rain-climatic zones
(see § 4.2)

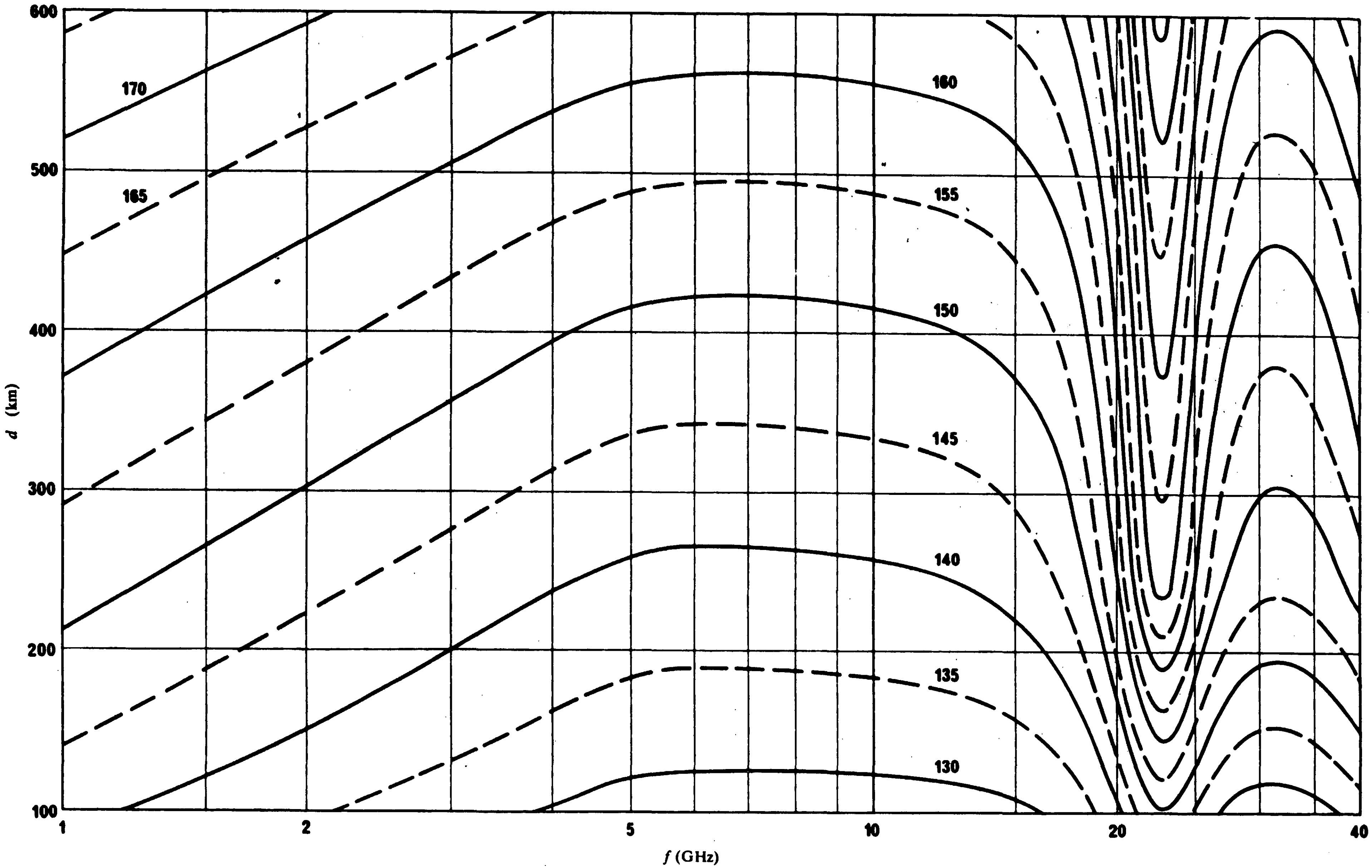


Figure 9 - Rain scatter distance as a function of frequency for 0.01% of the time - Rain-Climatic Zone 1

Contours have transmission loss values shown in dB

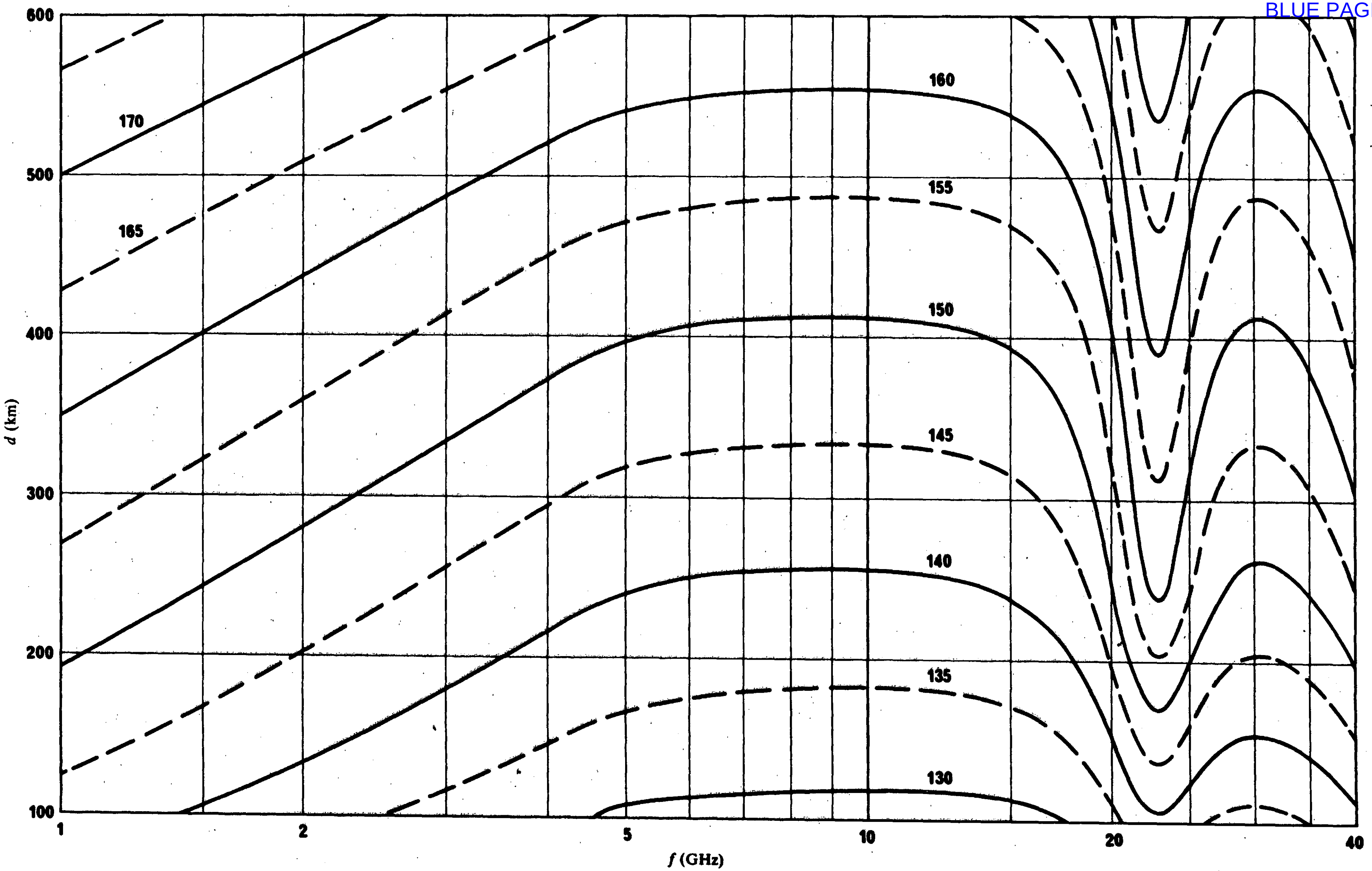


Figure 10 - Rain scatter distance as a function of frequency for 0.01% of the time - Rain-Climatic Zone 2

Contours have transmission loss values shown in dB

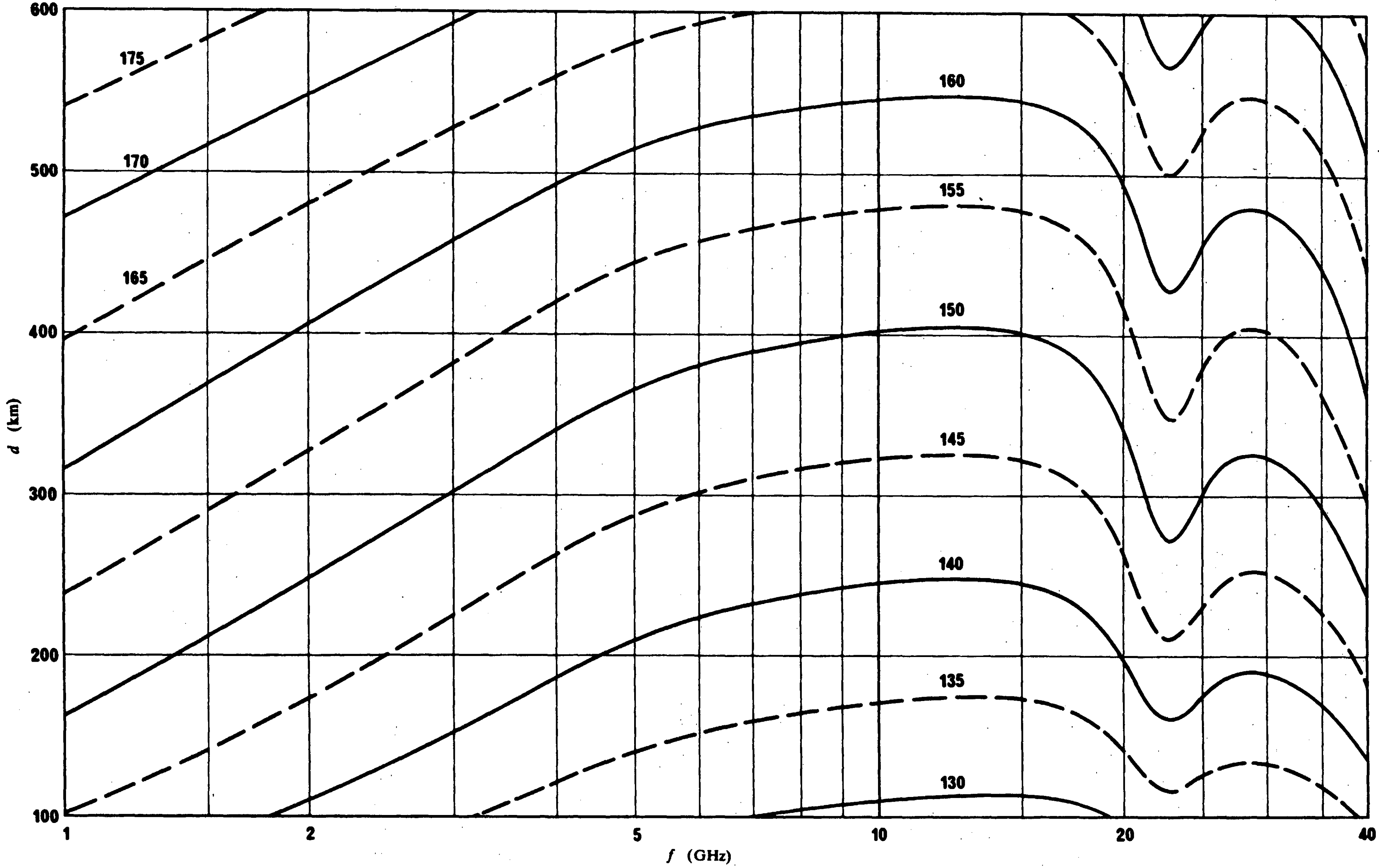


Figure 11 - Rain scatter distance as a function of frequency for 0.01% of the time - Rain Climatic Zone 3

Contours have transmission loss values shown in dB

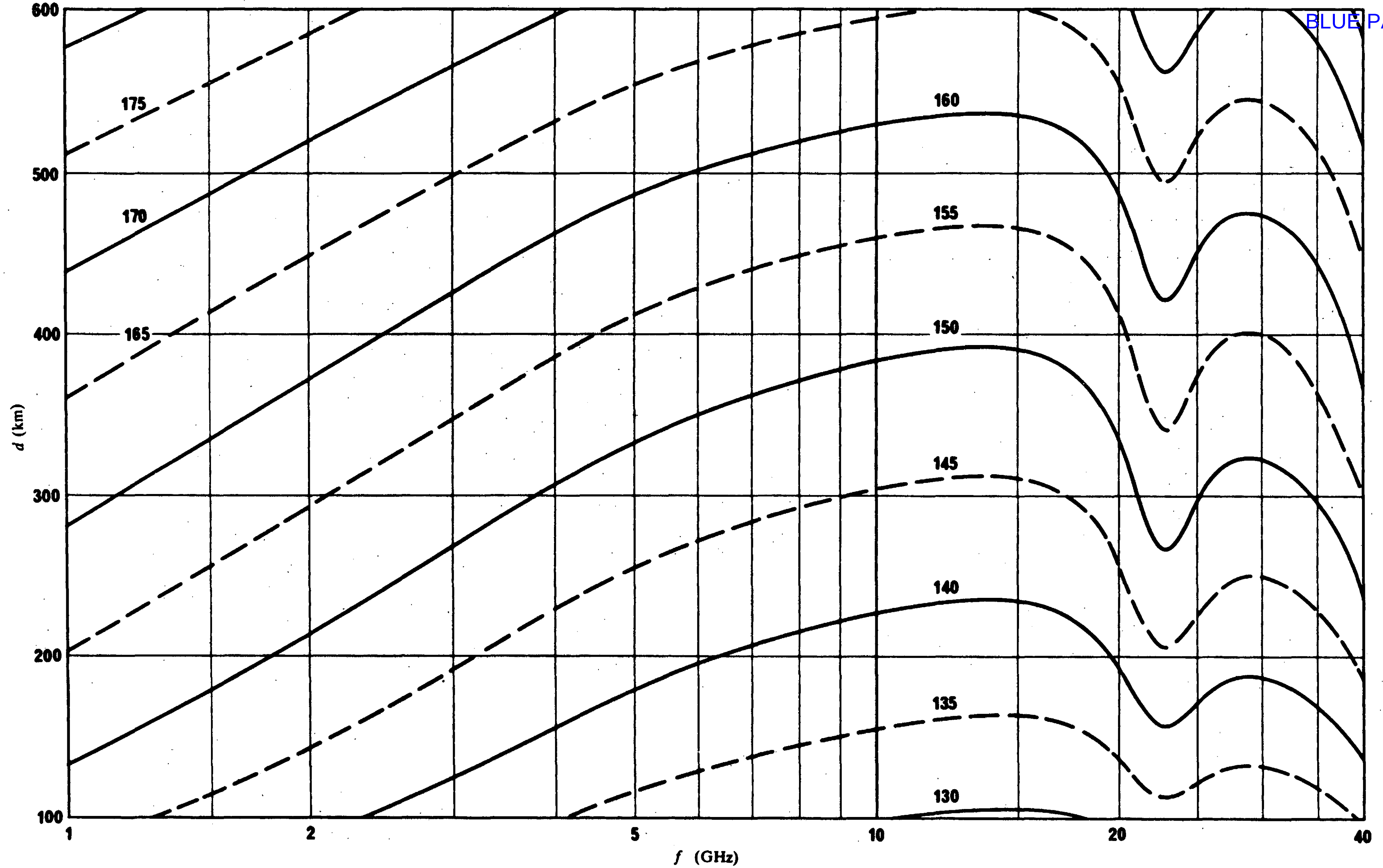


Figure 12 - Rain scatter distance as a function of frequency for 0.01% of the time - Rain-Climatic Zone 4

Contours have transmission loss values shown in dB

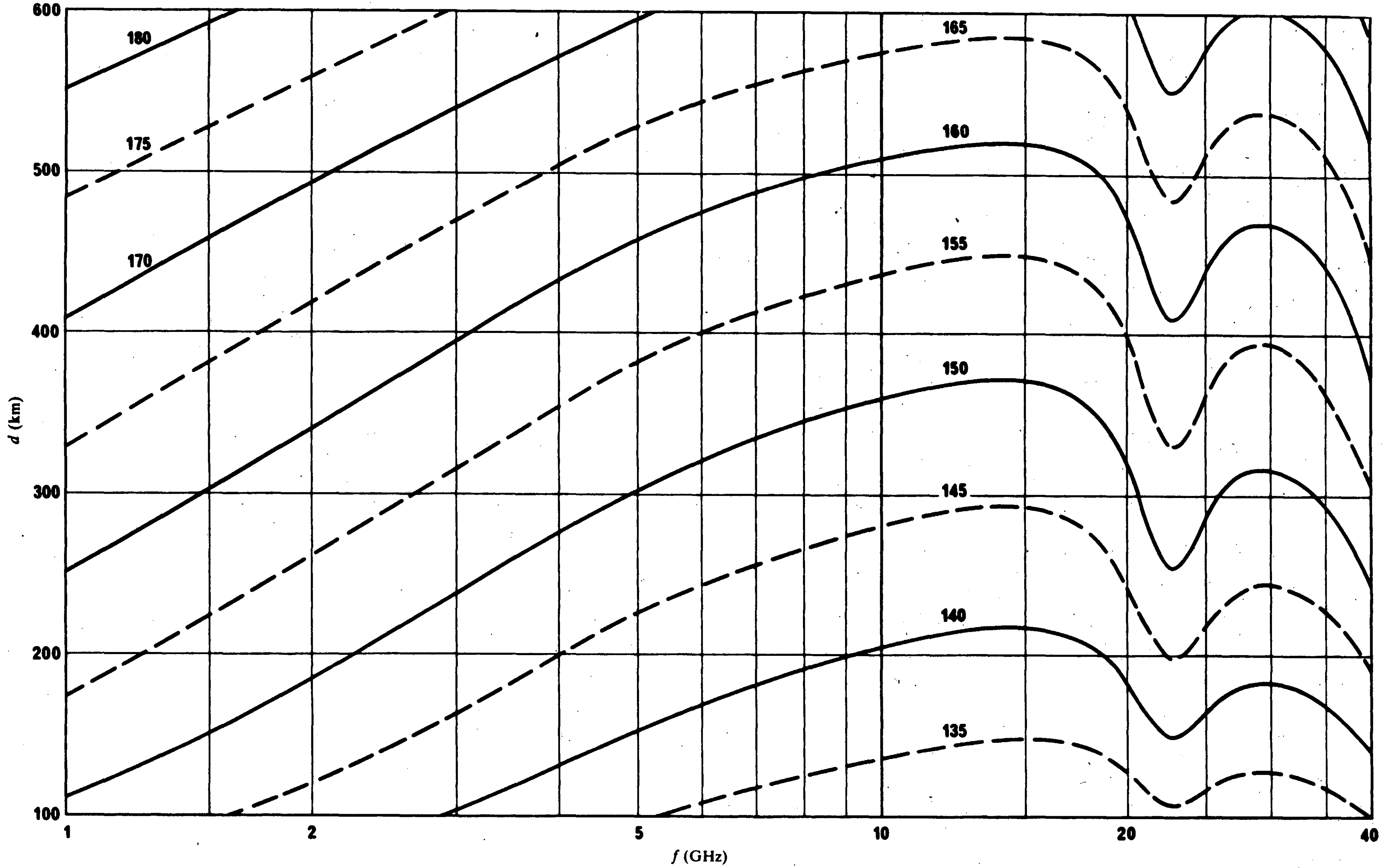


Figure 13 - Rain scatter distance as a function of frequency for
0.01% of the time - Rain-Climatic Zone 5
Contours have transmission loss values shown in dB

3.3 Mixed paths

If the distance being calculated extends through more than one radio-climatic zone (mixed path), the prediction is made as follows :

Designating the successive path sections in different zones by use of the suffixes i, j, k..., it follows that :

$$L_b(p) - A_0 - A_h = \beta_i \, d_i \tag{16}$$

where β_i is the rate of attenuation in the first zone (i).

Now, in the direction considered, if the value d_i is greater than the distance D_i in the first zone (i), it follows that :

$$L_b(p) - A_0 - A_h - \beta_i \, D_i = \beta_j \, d_j \tag{17}$$

and so d_j is found. If the value d_j is greater than the distance D_j of the path in the second zone (j), it can then be stated that :

$$L_b(p) - A_0 - A_h - \beta_i \, D_i - \beta_j \, D_j = \beta_k \, d_k \tag{18}$$

from which *d* may be found. This method may be extended as necessary, and in the case given the total distance d_1 may now be expressed as:

$$d_1 = D_i + D_j + d_k \quad \text{km} \tag{19}$$

Annex II provides examples for the graphical application of this procedure.

3.4 Maximum coordination distance for propagation mode (1)

In the process of determining the coordination distance for propagation mode (1), if values result which exceed the appropriate value given in Figure 6 or in Table III, the coordination distance for propagation mode (1) shall be the value given in Figure 6 or in Table III. In the case of mixed paths, the values to be considered are those given for Zones B or C, as appropriate. In the case of mixed paths with more than one segment in Zone A, the total distance in Zone A shall not exceed the value given in Figure 6 or in Table III for Zone A.

4. Determination of the coordination contour for propagation mode (2) - Scattering from hydrometeors

The determination of the coordination contour for scattering from hydrometeors (rain scatter) is predicated on a path geometry which is substantially different from that of the great circle propagation mechanisms. As a first approximation, energy is scattered isotropically by rain, so that interference may result for large scattering angles, and for beam intersections away from the great circle path.

4.1 *Normalized transmission loss L_2 (0.01)*

To determine the coordination contour associated with rain scatter it is necessary to calculate a "normalized transmission loss", given by:

$$L_2(0.01) = P_{t'} + \Delta G - P_r(p) - F(p, f) \quad (20)$$

where:

ΔG: difference (dB) between the maximum gain of terrestrial station antennae in the frequency band under investigation and the value of 42 dB. When the earth station is a transmitting station, the values shown in Table I should be used; when it is a receiving station, the values shown in Table II should be used.

$F(p, f)$: correction (dB) to relate the effective percentage of the time p to 0.01 % in the frequency band under consideration (see Fig. 7).

All other parameters have been defined in § 2. For terrestrial stations, values of $P_{t'}$ are listed in Table. II.

4.2 *Rain-climatic zones*

The world has been divided into five basic rain-climatic zones numbered 1 to 5 as shown in Fig. 8. The climatic characteristics of these zones for 0.01 % of the time are given in Table IV.

4.3 Calculation of the rain-scatter distance d_r.

4.3.1 *Numerical method*

The normalized transmission loss is composed of six terms :

$$L_2(0.01) = A_1 - A_2 + A_3 - A_4 - A_5 + A_6 \quad (21)$$

in which:

$$A_1 = 157 + 20 \log d_r - 20 \log f \quad \text{(dB)} \quad (22)$$

where d_r is the rain-scatter distance (km)

$$A_2 = 26 + 14 \log R - 5.88 \times 10^{-5}(d_r - 40)^2 \quad \text{(dB)} \quad (23)$$

where R is the surface rainfall rate in mm/h (Table IV). The horizon distance of the terrestrial station is taken to be 40 km.

$$A_3 = 0.005\,(f-10)^{1.7} R^{0.4} \text{ (dB)}, \quad \text{for } 10 < f < 40 \text{ GHz} \quad (24a)$$

$$= 0 \text{ (dB)}, \quad \text{for } f \leq 10 \text{ GHz} \quad (24b)$$

$$A_4 = 10 \log\left[\frac{2.17}{\gamma \cdot D}\left(1 - 10^{-(\gamma \cdot D)/5}\right)\right] \quad \text{(dB) for } f > 5 \text{ GHz} \quad (25a)$$

$$= 0 \quad \text{(dB) for } f \leq 5 \text{ GHz} \quad (25b)$$

where D is the diameter of the rain cell in km (Table IV)

and

$$\gamma = 0.008\, R(f-5) \quad \text{for } f > 5 \text{ GHz} \quad (26a)$$

$$= 0 \quad \text{for } f \leq 5 \text{ GHz} \quad (26b)$$

$$A_5 = 10 \log D \quad \text{(dB)} \quad (27)$$

$$A_6 = d_o\beta_o + d_v\beta_v \quad (28)$$

where

$$d_o = 0.7\, d_r + 32 \text{ km} \quad \text{for } d_r < 340 \text{ km} \quad (29a)$$

$$= 270 \text{ km} \quad \text{for } d_r \geq 340 \text{ km} \quad (29b)$$

$$d_v = 0.7\, d_r + 32 \text{ km} \quad \text{for } d_r < 240 \text{ km} \quad (30a)$$

$$= 200 \text{ km} \quad \text{for } d_r \geq 240 \text{ km} \quad (30b)$$

β_V is given in (12), where ρ is to be replaced by ρ_m (Table IV).

β_o is given in (13).

Thus, for a given rain-climatic zone the parameters in Table IV are used to calculate the rain-scatter distance d_r by an iterative process.

4.3.2 *Graphical method*

The equations of § 4.3.1 have been converted into graphical form to give an alternate method of determining rain-scatter distance d_r.

To obtain the rain-scatter distance for rain-climatic Zone 1, the normalized transmission loss, obtained by solving equation (20), is used together with the appropriate frequency in Fig. 9 to yield the rain scatter distance d_r.

Figs. 10 to 13 show corresponding curves for rain-climatic Zones 2 to 5. In all cases, the rain climate to be chosen is that which corresponds to the location of the earth station.

4.4 *Maximum rain scatter distances*

In the process of determining the rain-scatter distance for propagation mode (2), if values result which exceed the appropriate value given in Table V, the rain-scatter distance d_r for propagation mode (2) shall be the value given in that Table.

4.5 Construction of the rain-scatter coordination contour

Due to the peculiar geometry associated with rain-scatter propagation, the location of the centre of the rain-scatter coordination contour does not coincide with the location of the earth station. The distance by which these locations are separated is designated Δd.

The rain-scatter distance d_r, together with the elevation angle ε_s of the main beam of the earth station antenna are used to determine Δd using the equation:

$$\Delta d = 5.88 \times 10^{-5} (d_r - 40)^2 \cot \varepsilon_s \quad \text{km.} \tag{31}$$

Alternatively, Δd may be determined from Figure 14.

The distance Δd is measured on a map of appropriate scale from the earth station location along the azimuth of the main beam of the earth station antenna; a circle of radius d_r is drawn around the point so reached. The circle is the rain-scatter coordination contour.

The rain-scatter coordination distance, to be labelled d_2, is the distance from the earth station site to the rain-scatter coordination contour on the azimuth under consideration.

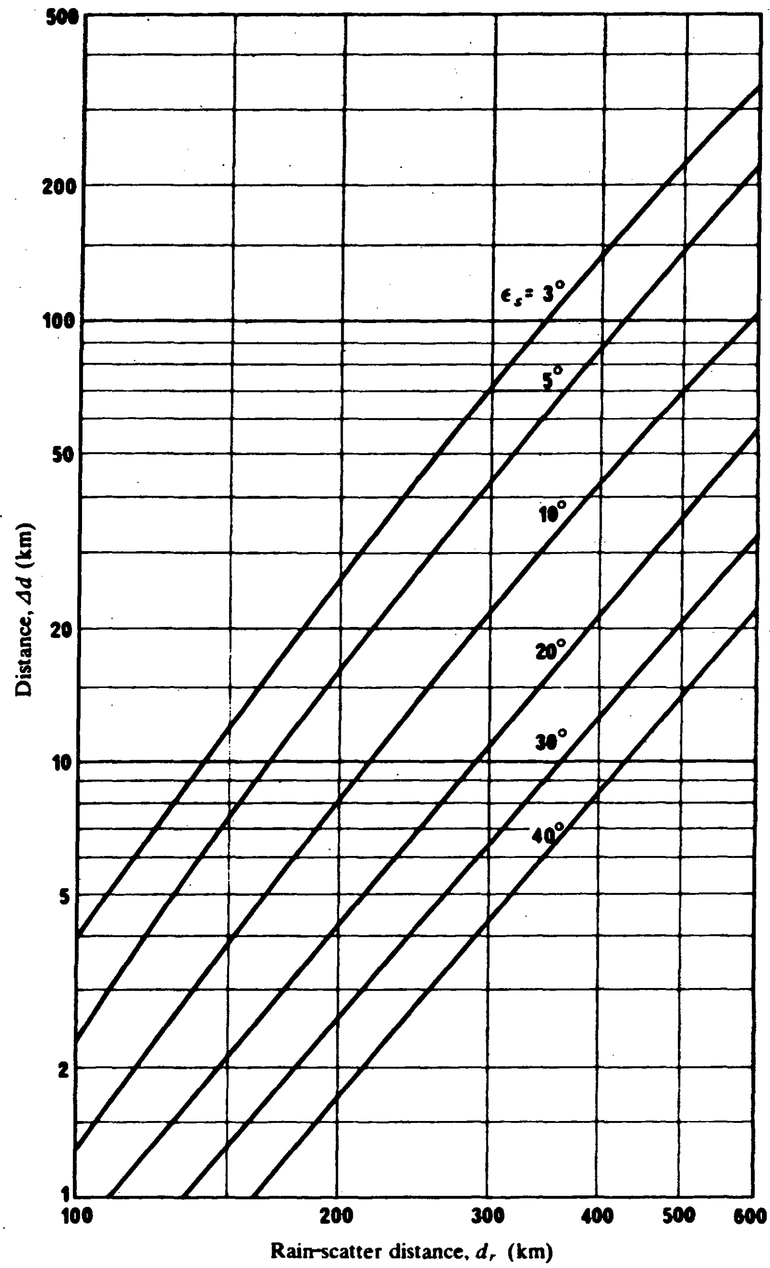


Figure 14 – *Distance Δd as a function of rain-scatter distance d_r and earth station antenna main beam elevation angle ϵ_s.*

4.6 *Absence of mixed path effects*

As the only significant rain scatter is that occurring in the general area of the earth station, the question of a mixed path does not arise. The rain-climatic zone relevant to the earth station is applied, together with the appropriate maximum rain-scatter distance from Table V.

5. Minimum value of coordination distance

If the method for determining d_1, the coordination distance for propagation mode (1), leads to a result less than 100 km, d_1 shall be taken equal to 100 km. Similarly, if the method for determining the rain-scatter distance d_r leads to a result less than 100 km, d_r shall be taken equal to 100 km.

6. The coordination distance

On any azimuth, the greater of the coordination distances d_1 or d_2 is the coordination distance to be used for the coordination procedure.

An example of a coordination contour is shown in Figure 15.

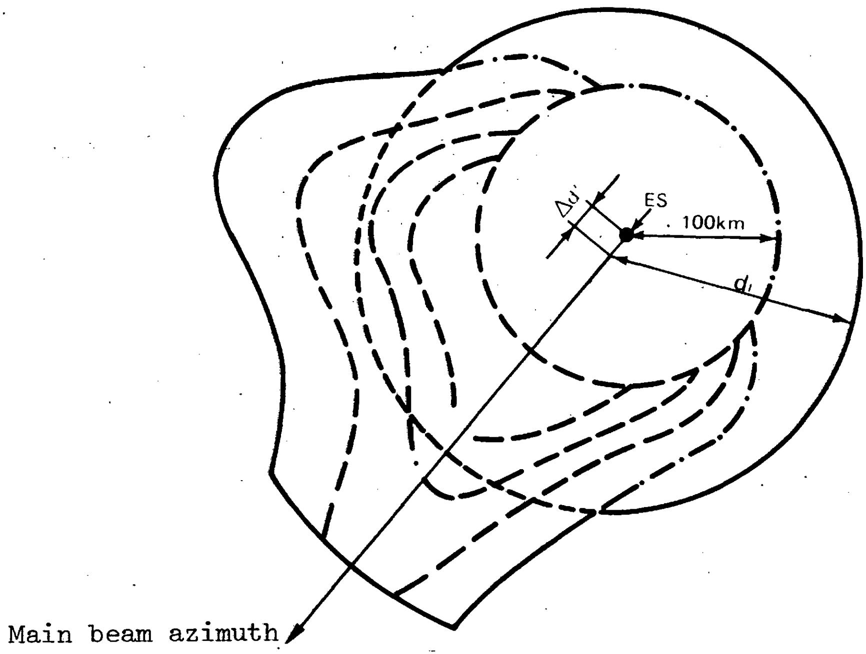


Figure 15 - Example of a coordination contour

ES : Earth station

———— Coordination contour

—·—·—·— Contour for propagation mode (1)

- - - - - - - Contour for propagation mode (2)

— — — — — Auxiliary contours for propagation mode (1)

Note : If by using the auxiliary contours it is seen that a terrestrial station can be eliminated with respect to propagation mode (1) then :

- if that terrestrial station is outside the contour for propagation mode (2) it may be eliminated from any further consideration;

- if that terrestrial station is within the contour for propagation mode (2) it must still be considered, but for this mode only.

7. /Transportable and/ mobile (except aeronautical mobile) earth stations

For the purpose of establishing whether prior agreement with another administration under the provisions of / 4139/639AR / is required, it is necessary to determine the coordination area which would encompass all coordination areas determined for each location within the service area within which operation of the mobile earth stations is proposed.

The preceding method may be used for this purpose by determining the appropriate individual coordination contours for a sufficiently large number of locations within and on the periphery of the proposed service area and by determining from those a composite coordination area which contains all possible individual coordination areas.

8. Revision of propagation data

The material contained in Sections 3, 4, 6 and in Annex II of this Appendix is based, directly or indirectly, on propagation data compiled, interpreted and documented in CCIR Reports and Recommendations. Knowledge regarding propagation is subject to change as new data becomes available, and such change may require or strongly suggest corresponding amendments to the propagation-related material in this Appendix.

Resolution No. AJ provides for the mechanism by which an updating of the propagation-related elements of this Appendix is to be implemented.

TABLE I

Parameters required for the Determination of Coordination Distance for a Transmitting Earth Station

Space radiocommunication service designation		Space Operation (Telecommand)	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite	Fixed-Satellite
Frequency bands (GHz)		1·427–1·429	2·655–2·690	4·400–4·700	5·850–6·425	7·900–7·975 8·025–8·400	10·95–11·20	12·50–12·75	14·4 – 14·5	27·5 – 29·5
Modulation at terrestrial station (1)		A	A	A	A	A	A	A	A	N
Interference parameters and criteria	p_0 (%)	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·003
	n	2	1	1	2	2	2	2	2	1
	p (%)	0·005	0·01	0·01	0·005	0·005	0·005	0·005	0·005	0·003
	J (dB)	16	9	9	16	16	16	16	16	0
	$M_0(p_0)$ (dB)	17	17	17	17	17	17	17	17	30
	W (dB)	0	0	0	0	0	0	0	0	0
Terrestrial station parameters	B (Hz)	$4x10^3$	$4x10^3$	$4x10^3$	$4x10^3$	$4x10^3$	$4x10^3$	$4x10^3$	$4x10^3$	$1x10^6$
	G_r (dB) (2)	35	52 (3)	52 (3)	45	47	50	50	50	50
	ΔG (dB)	−7	10 (3)	10 (3)	3	5	8	8	8	8
	T_r (K)	750	500 (3)	500 (3)	750	750	1500	1500	1500	3200
Auxiliary parameters	S (dBW) (4)	166	192	192	176	178	178	178	178	154
	$P_r(p)$ (dBW) in B	−131	−140	−140	−131	−131	−128	−128	−128	−104

(1) A = analogue modulation; N = digital modulation.
(2) Feeder losses are not included in the values for G_r.
(3) In these bands the parameters for the terrestrial station associated with transhorizon systems have been used.
(4) For a definition of the parameter S see Annex III.

TABLE II

Parameters required for the Determination of Coordination Distance for a Receiving Earth Station

Space Radiocommunication Service designation		Space Operation (Telemetering) [1]	Meteorological-Satellite [1]	Space Research		Fixed-Satellite		Fixed-Satellite		Fixed-Satellite		Earth Exploration-Satellite [1]	Space Research		Fixed-Satellite		Fixed-Satellite		Fixed-Satellite	Earth Exploration-Satellite [1]
				Near Earth	Deep Space; Manned								Near Earth	Deep Space						
Frequency band (GHz)		1·525–1·535	1·670–1·690	1·700–1·710, 2·290–2·300		2·500–2·535		3·400–4·200		7·300–7·750		8·025–8·400	8·400–8·500		10·95–11·20, 11·45–11·70		11·70–12·20, 12·50–12·75		17·7–19·7	21·2–22·0
Modulation at earth station [2]				—	—	A	N	A	N	A	N		—	—	A	N	A	N	N	
Interference parameters and criteria	p_o (%)			0·1	0·001	0·03		0·03	0·003	0·03	0·003		0·1	0·001	0·03	0·003	0·03	0·003	0·003	
	n			2	1	3		3	3	3	3		2	1	2	1	2	1	1	
	p (%)			0·05	0·001	0·01		0·01	0·001	0·01	0·001		0·05	0·001	0·015	0·003	0·015	0·003	0·003	
	J (dB)			—	—	−8		−8	0	−8	0		—	—	−8	0	−8	0	0	
	$M_o(p_o)$ (dB)			—	—	17		17	5 [3]	17	5 [3]		—	—	17	5 [3]	19	5 [3]	5 [3]	
	W (dB)			—	—	4		4	0	4	0		—	—	4	0	4	0	0	
Terrestrial station parameters	E (dBW) in B [8]	55	55	62 [4][6]	62 [4][6]	92 [6]		55	55	55	55		25 [4]	25 [4]	55	55	55	55	35 [5]	
	P_t (dBW) in B	13	13	10 [4][6]	10 [4][6]	40 [6]		13	13	13	13		−17 [4]	−17 [4]	10	10	10	10	−10 [5]	
	ΔG (dB)	0	0	10 [6]	10 [6]	10 [6]		0	0	0	0		0	0	3	3	3	3	3	
Reference bandwidth	B (Hz)			1	1	10^6 [7]		10^6 [7]	10^6 [7]	10^6 [7]	10^6 [7]		1	1	10^6 [7]	10^6 [7]	10^6 [7]	10^6 [7]	10^6 [7]	
Permissible interference power	$P_r(p)$ (dBW) in B			−220	−220	—		—	—	—	—		−220	−220	—	—	—	—	—	

(1) Parameters associated with these services may vary over a rather wide range. Further study is required before representative values become available.
(2) A = analogue modulation; N = digital modulation.
(3) See note (3) in Section 2. $M_0(p_0)$ may assume values between 5 and 40 dB, depending on frequency, rain-climatic zone and system design.
(4) These values are estimated for 1 Hz bandwidth and are 30 dB below the total power assumed for emission.
(5) These values assume an r.f. bandwidth of no less than 100 MHz, and are 20 dB below total power assumed per emission.
(6) In these bands, the parameters for the terrestrial stations associated with transhorizon systems have been used.
(7) In certain systems in the fixed-satellite service it may be desirable to choose a greater reference bandwidth B when the system requirements indicate that this may be done. However, a greater bandwidth will result in smaller coordination distances and a later decision to reduce the reference bandwidth may require recoordination of the earth station.
For narrow band transmissions the reference bandwidth B should be assumed to be equal to the bandwidth occupied by the wanted transmissions.
(8) For a definition of the parameter E see Annex III.

TABLE III - Maximum Coordination Distance for Propagation Mode (1)

	Percentage of Time			
	p = 0.001	p = 0.01	p = 0.1	p = 1
Zone A	375	350	300	200
Zone B	1050	1000	900	700
Zone C	1400	1350	1200	950

TABLE IV - Characteristic values of parameters for the five rain-climatic zones (0.01 % of the time)

Parameter	Rain-climatic zone					Unit
	1	2	3	4	5	
Surface rainfall rate (*R*)	75	55	37	26	14	mm/h
Rain cell diameter (*D*)	2.5	2.8	3	3	4.5	km
Water vapour density (ρ_m)	10	5	2	2	2	g/m³

TABLE V – *Maximum rain scatter distances (km)*

Rain climatic zone	Percentage of time		
	$0.001 \leq p < 0.01$	$0.01 \leq p < 0.1$	$p = 0.1$
1	540	470	390
2	470	390	330
3, 4 and 5	390	330	270

Annexes : I, II, III

ANNEX I TO APPENDIX 28

Antenna Gain in the Direction of the Earth Station Horizon for Geostationary Satellites

1. General

The gain component of the earth station antenna in the direction of the physical horizon around an earth station is a function of the angular separation ϕ between the antenna main beam axis and the horizon direction under consideration. Therefore, knowledge of the angle ϕ is required for each azimuth.

The elevation ε_s and azimuth α_s of geostationary satellites as seen from an earth station at a latitude ζ are uniquely related. Figure I-1 shows the possible location arcs of geostationary satellites in a rectangular elevation/azimuth plot, each arc corresponding to an earth station latitude.

Specific relative satellite longitudes may not be known beforehand, but even when they are, the possibility of the addition of a new satellite or the repositioning of an existing one suggests that all or a portion of the applicable arc be considered to hold satellites.

2. Graphical method for the determination of ϕ (α)

With the correct arc or segment of arc chosen and suitably marked in Figure I-1, the horizon profile ε (α) is added to the plot of Figure I-1, as shown in Figure I-2, where an example is given for an earth station located at 45° N latitude for a satellite expected to be located somewhere between relative longitudes of 10° E and 45° W.

For each point on the local horizon ε (α) the smallest distance to the arc is determined and measured on the elevation scale. The example of Figure I-2 shows the determination of the off-beam angle ϕ at an azimuth α (= 210°) with a horizontal elevation ε (= 4°). The measurement of ϕ yields a value of 26°.

When this is done for all azimuths (in suitable increments, e.g. 5°), a relationship ϕ (α) results.

3. Numerical method for the determination of ϕ (α)

For this purpose the following equations may be used:

$$\psi = \arccos(\cos\zeta \cdot \cos\delta) \tag{32}$$

$$\alpha'_s = \arccos(\tan\zeta \cdot \cot\psi) \tag{33}$$

$\alpha_s = \alpha'_s + 180°$ for earth stations located in the northern hemisphere and satellites located west of the earth station (34a)

$\alpha_s = 180° - \alpha'_s$ for earth stations located in the northern hemisphere and satellites located east of the earth station (34b)

$\alpha_s = 360° - \alpha'_s$ for earth stations located in the southern hemisphere and satellites located west of the earth station (34c)

$\alpha_s = \alpha'_s$ for earth stations located in the southern hemisphere and satellites located east of the earth station (34d)

$$\varepsilon_s = \arctan\left(\frac{K - \cos\psi}{\sin\psi}\right) - \psi \qquad (35)$$

$$\phi(\alpha) = \arccos\left[\cos\varepsilon \cdot \cos\varepsilon_s \cdot \cos(\alpha - \alpha_s) + \sin\varepsilon \cdot \sin\varepsilon_s\right] \qquad (36)$$

where:

- ζ : latitude of the earth station
- δ : difference in longitude between the satellite and the earth station
- ψ : great circle arc between the earth station and the sub-satellite point
- α_s : satellite azimuth as seen from the earth station
- ε_s : satellite elevation angle as seen from the earth station
- α : azimuth of the pertinent direction
- ε : elevation angle of the horizon in the pertinent azimuth, α
- $\phi(\alpha)$: angle between the main beam axis and the horizon direction corresponding to the pertinent azimuth, α
- K : orbit radius/earth radius, assumed to be 6.62

All arcs mentioned above are in degrees.

4. Determination of antenna gain

The relationship $\phi(\alpha)$ may be used to derive a function for the horizon antenna gain, G (dB) as a function of the azimuth α, by using the actual earth station antenna pattern, or a formula giving a good approximation. For example, in cases where the ratio between the antenna diameter and the wavelength is not less than 100, the following equation should be used:

$G(\phi) = G_{max} - 2.5 \cdot 10^{-3}\left(\frac{D}{\lambda}\phi\right)^2$ for $0 < \phi < \phi_m$ (37a)

$G(\phi) = G_1$ for $\phi_m \leqslant \phi < \phi_r$ (37b)

$G(\phi) = 32 - 25\log\phi$ for $\phi_r \leqslant \phi < 48°$ (37c)

$G(\phi) = -10$ for $48° \leqslant \phi < 180°$ (37d)

where : D = antenna diameter, λ = wavelength } expressed in the same unit

G_1 = gain of the first sidelobe $= 2 + 15\log\frac{D}{\lambda}$

$$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1}\ \text{(degrees)}$$

$$\phi_r = 15.85\ (D/\lambda)^{-0.6}\ \text{(degrees)}$$

When it is not possible, for antennae with D/λ of less than 100, to use the above reference antenna pattern and when neither measured data nor a relevant CCIR Recommendation can be used instead, administrations may use the reference diagram as described below:

$$G(\phi) = G_{max} - 2.5.10^{-3}\left(\frac{D}{\lambda}\phi\right)^2 \qquad \text{for } 0 < \phi < \phi_m \tag{38a}$$

$$G(\phi) = G_1 \qquad \text{for } \phi_m \leqslant \phi < 100\frac{\lambda}{D} \tag{38b}$$

$$G(\phi) = 52 - 10\log\frac{D}{\lambda} - 25\log\phi \qquad \text{for } 100\frac{\lambda}{D} \leqslant \phi < 48^0 \tag{38c}$$

$$G(\phi) = 10 - 10\log\frac{D}{\lambda} \qquad \text{for } 48^0 \leqslant \phi \leqslant 180^0 \tag{38d}$$

where : D = antenna diameter } expressed in the
λ = wavelength } same unit

G_1 = gain of the first sidelobe $= 2 + 15\log\frac{D}{\lambda}$

$$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1}\ \text{(degrees)}$$

The above patterns may be modified as appropriate to achieve a better representation of the actual antenna pattern.

In cases where $\frac{D}{\lambda}$ is not given, it may be estimated from the expression $20\log\frac{D}{\lambda} \approx G_{max} - 7.7$, where G_{max} is the main lobe antenna gain in dB.

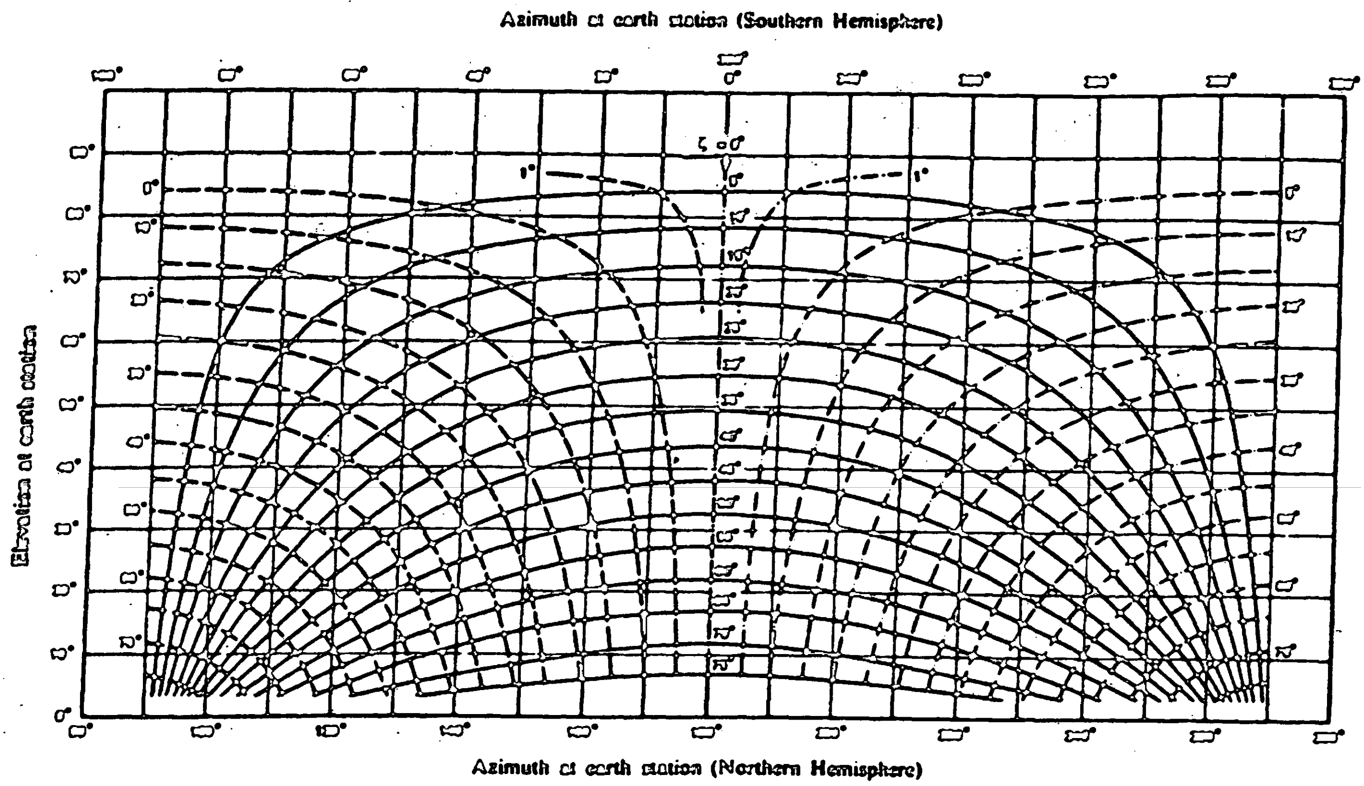


Figure I-1 - *Position arcs of geostationary satellites*

Arc of geostationary satellite orbit visible from earth station at terrestrial latitude ζ

Difference in longitude between earth station and the sub-satellite point:

Satellite longitude E of earth station longitude

Satellite longitude W of earth station longitude

Satellite longitude equal to the earth station longitude

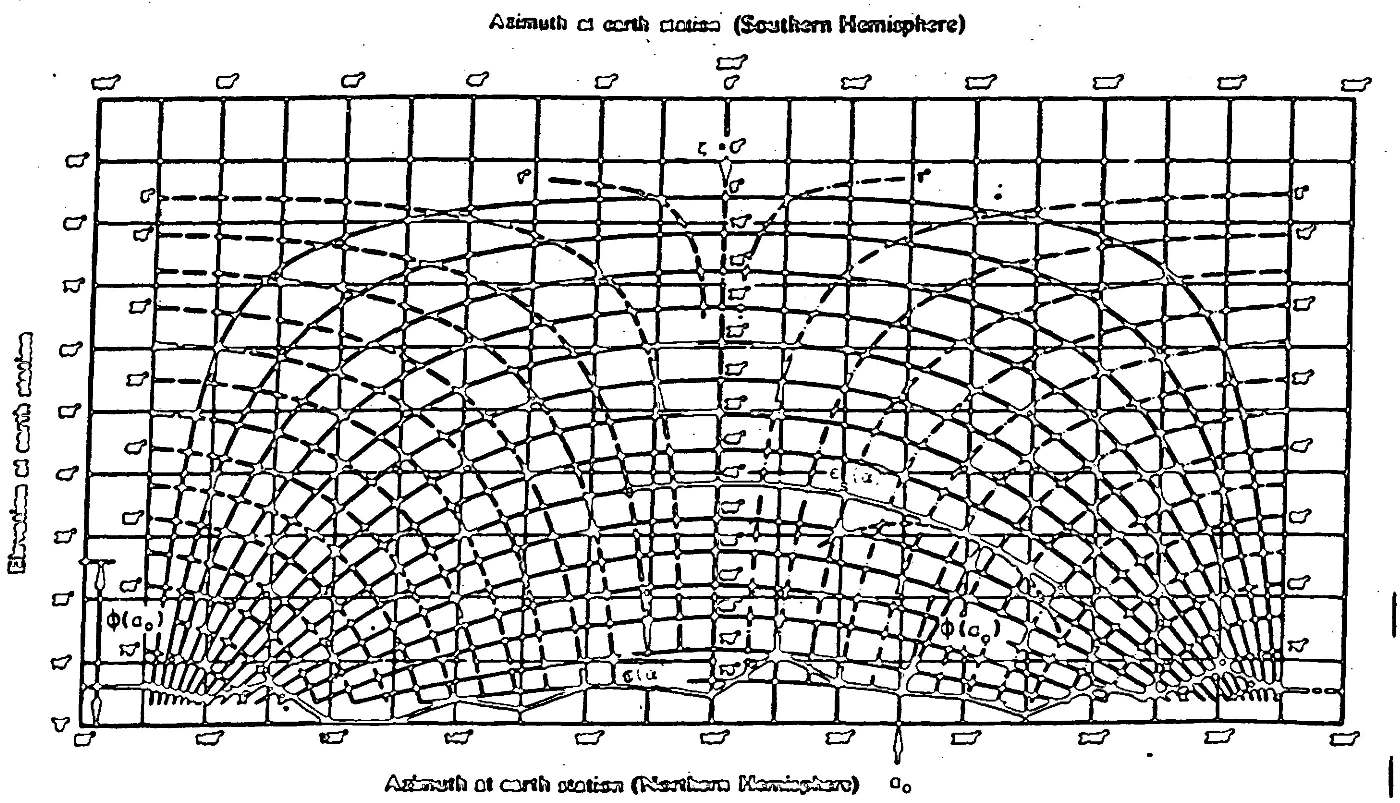


Figure I-2 - *Example of derivation of φ*

Arc of geostationary satellite orbit visible from earth station at terrestrial latitude ζ

Horizon profile ε(α)

Difference in longitude between earth station and the sub-satellite point:

Satellite longitude E of earth station longitude

Satellite longitude W of earth station longitude

Satellite longitude equal to the earth station longitude

ANNEX II TO APPENDIX 28

Graphical Method for the Determination of Coordination Distance for Mixed Paths

1. Two zones

The procedure to be followed in the case of a mixed path involving two zones is illustrated by the example shown in Figure II-1(a). The earth station is situated in Zone A at a distance of 75 km from Zone B. The graphical presentation described below is particularly useful where more than one boundary between zones may be involved, as in this example.

In the example given below, the coordination loss is assumed to be 180 dB, the frequency 20 GHz, and the percentage of time 0.01 %. The procedure is as follows:

1.1 determine the distance entirely in Zone A that would give the coordination loss. Mark this distance (in this case it is 160 km) from the origin along the abscissa axis of linear graph paper as indicated by the point A (Figure II-1(b));

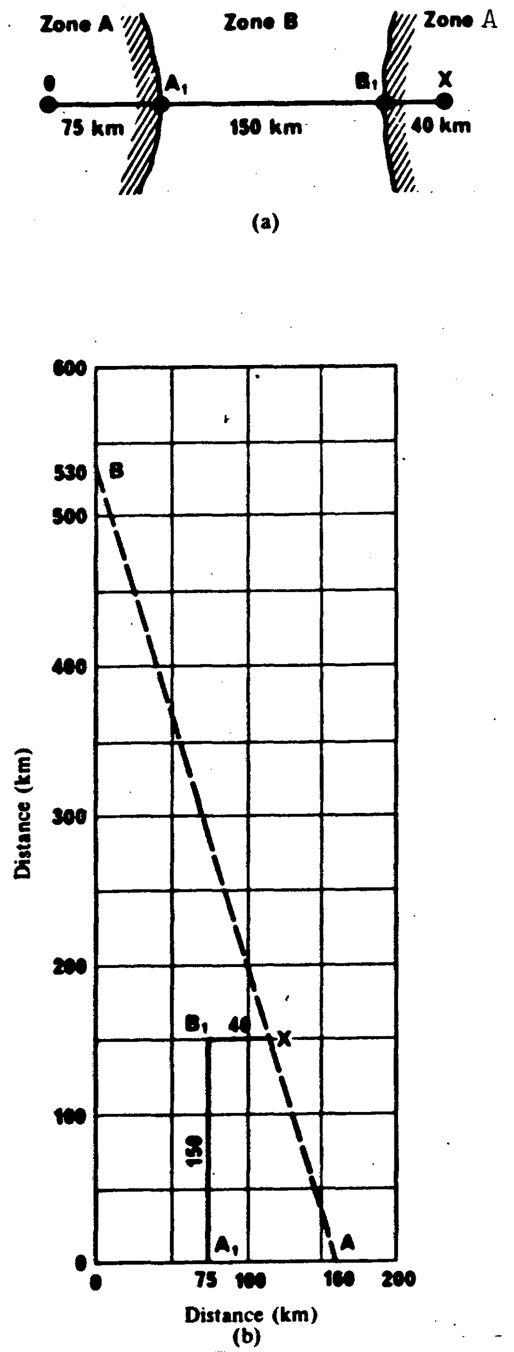


Figure II-1 - Example of determination of coordination distance for mixed paths involving Zones A and B

1.2 determine the distance entirely in Zone B that would give the same coordination loss. Mark this distance (in this case it is 530 km) from the origin along the ordinate axis of the chart as indicated by the point B;

1.3 draw a straight line between points A and B representing these distances from the origin;

1.4 starting from the origin, the distance of 75 km from the earth station to Zone B is set off along the abscissa axis of the chart as indicated by the point A_1;

1.5 starting from point A_1 the Zone B path length of 150 km is then set off parallel to the ordinate axis of the chart as indicated by the point B_1;

1.6 the further distance in the next Zone A region is then measured parallel to the abscissa axis from the point B_1 to the point of intersection of the mixed path curve as indicated by X. In Figure II-1(b), this distance is 40 km;

1.7 the coordination distance is the sum of the distances OA_1, A_1B_1 and B_1X and is equal to :

$$75 + 150 + 40 = 265 \text{ km.}$$

2. <u>Three zones</u>

In some special cases, the mixed path involves all three radio-climatic Zones A, B and C. A solution to this problem can be found in adding a third dimension to the procedure to be followed for mixed paths involving only two zones. Theoretically, it means that the third coordinate has to be determined for a point having coordinates corresponding to the known distances in the first two zones and lying in a plane defined by three points on the axes X, Y and Z, corresponding to distances in Zones A, B and C, respectively, that would give the required basic transmission loss.

In practice, the procedure can be reduced to a simple graphical method shown in Figure II-2(a) assuming for example a coordination loss (L_1) of 180 dB at a frequency of 20 GHz. It is required to find the coordination distance from the earth station in the direction given in Figure II-2(a). Here an earth station is situated in Zone A at a distance of 75 km in a given azimuthal direction from Zone B. In the same azimuthal direction Zone B is 150 km long and followed by an unknown portion in Zone C (Figure II-2(a)).

In this case, the procedure to be applied should be as follows (Figure II-2(b)) :

2.1 repeat the same procedure as for mixed paths involving only two zones, given in steps 1.1 to 1.5 above, and continue as follows:

2.2 from the point B_1 draw a line parallel to the line AB to intersect the abscissa axis as indicated by the point D;

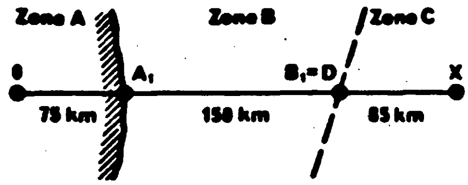
2.3 determine the distance entirely in Zone C that would give the coordination loss. Mark this distance (in this case it is 350 km) from the origin along the ordinate axis of the chart as indicated by the point C. Draw a straight line between the points C and A;

2.4 at the point D draw a line parallel to the ordinate axis to intersect the line CA as indicated by X;

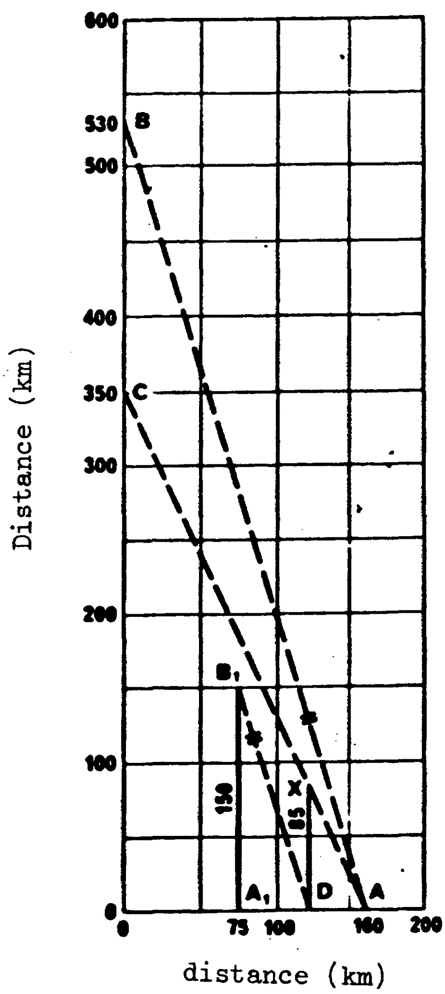
2.5 the distance between the points D and X, which is the unknown distance in Zone C, is found to be 85 km;

2.6 the coordination distance is then the sum of the distances OA_1, A_1B_1, and DX and in this example is equal to:

$$75 + 150 + 85 = 310 \text{ km.}$$



(a)



(b)

Figure II-2 - Example of determination of coordination distance for mixed paths including Zones A, B and C

ANNEX III TO APPENDIX 28

Determination and Use of Auxiliary Contours

1. Introduction

For great circle propagation mechanisms (mode 1) auxiliary contours are of great value in eliminating certain existing or planned terrestrial stations falling within the coordination area without recourse to precise and arduous calculations. The work of both the earth station administration and the affected administrations is therefore eased during subsequent negotiations if these auxiliary contours are supplied.

2. Determination of the auxiliary contours

Two types of contours may be determined, depending on whether the earth station is used for transmission or reception.

2.1 Transmitting earth station

From equation (2) one may **isolate the terms** $G_r - P_r(p)$ **and define** an interference sensitivity factor S (dBW) of the interfered-with terrestrial stations:

$$S = G_r - P_r(p) \qquad (39)$$

Table I shows values of this factor for various types of terrestrial stations.

The coordination contour is associated with a (maximum) sensitivity factor S and labelled with its value.

The auxiliary contours are determined in the same way as the corresponding coordination contour for propagation mode 1, but using terrestrial station interference sensitivity factor S values (dB) which are 5, 10, 15 20 dB, etc. lower than the value (given in Table I) corresponding to the coordination contour.

2.2 Receiving earth station

From equation (2) one may, likewise, isolate the terms $P_{t'} + G_{t'}$ **and define the equivalent isotropically radiated power** E (dBW) of the interfering terrestrial stations:

$$E = P_{t'} + G_{t'} \qquad (40)$$

values for which are listed in Table II.

The coordination contour is associated with a maximum value for E and labelled with this value.

The auxiliary contours are determined in the same way as the corresponding coordination contour, for propagation mode 1, but using terrestrial station e.i.r.p. values E (dBW) which are 5, 10, 15, 20 dB, etc. lower than the value (given in Table II) corresponding to the coordination contour.

3. Use of auxiliary contours

The auxiliary contours, the coordination contour for great circle propagation (mode 1) and the coordination contour for rain scatter (mode 2) are all plotted on the same diagram for a given shared band. An illustrative example is given in Figure 15.

For each terrestrial station situated within the coordination area, a two stage procedure may be applied, one for the great circle propagation mechanism and the other for scattering from hydrometeors.

3.1 Great circle propagation mechanism (mode 1)

If a transmitting terrestrial station is outside the coordination area corresponding to mode 1, it need not be considered further with respect to mode 1.

For each transmitting terrestrial station situated within the coordination area corresponding to mode 1, the e.i.r.p. value in the direction of the earth station is determined. If this value is less than the value associated with the nearest contour defining an area outside of which the station is situated, the station may be considered not to cause more than a permissible level of interference and therefore may be eliminated from further consideration with respect to mode 1.

For each receiving terrestrial station, the analogous procedure may be applied using the interference sensitivity factor instead of the e.i.r.p. value.

3.2 Elimination of a terrestrial station and rain scatter propagation mechanism (mode 2)

Terrestrial stations eliminated by the above procedure from further consideration with regard to propagation (mode 1) - need, nevertheless, be further considered with regard to propagation (mode 2) when they lie within the rain scatter coordination area.

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 661
15 November 1979

E

B.18

PLENARY MEETING

18th SERIES OF TEXTS SUBMITTED BY THE EDITORIAL COMMITTEE TO THE PLENARY MEETING

The following texts are submitted to the Plenary Meeting for first reading:

Source	Document No.	Title
C.4	628 + 629	Appendix 29

P. BASSOLE
Chairman of the
Editorial Committee

Annex: pages

APPENDIX 28

Spa2

MOD

Method of Calculation for Determining if Coordination is Required between Geostationary Satellite Networks Sharing the same Frequency Bands

1. Introduction

The method of calculation for determining if coordination is required under provision 4114/639AJ is based on the concept that the noise temperature of a system suffering interference increases as the level of the interfering emission increases. It can, therefore, be applied irrespective of the modulation characteristics of these satellite networks, and of the precise frequencies used.

In this method, the apparent increase in the equivalent satellite link noise temperature resulting from an interfering emission of a given system is calculated (see § 2 below) and the ratio of this increase to the equivalent satellite link noise temperature, expressed as a percentage, is compared to a threshold value (see § 3 below).

2. Calculation of the apparent increase in equivalent noise temperature of the satellite link receiving an interfering emission subject to interference

Two possible cases are considered:

Case I : wanted and interfering networks share one or more frequency bands, each in the same direction of transmission;

Case II : wanted and interfering networks share one or more frequency bands, each in opposite directions of transmission (bidirectional use).

These two cases cover all relative satellite positions from closely-spaced to near-antipodal positions:

2.1 Parameters

Let A be a satellite link of network R associated with satellite S and A' be a satellite link of network R' associated with satellite S'. The symbols relating to satellite link A' bear primes, those relating to satellite link A do not bear primes.

The parameters are defined as follows (for satellite link A):

$\underline{T}$: the equivalent satellite link noise temperature, referred to the output of the receiving antenna of the earth station (K);

$\underline{T_s}$: the receiving system noise temperature of the space station, referred to the output of the receiving antenna of the space station (K);

$\underline{T_e}$: the receiving system noise temperature of the earth station, referred to the output of the receiving antenna of the earth station (K);

$\Delta \underline{T_s}$: apparent increase in the receiving system noise temperature of the satellite S, caused by an interfering emission, referred to the output of the receiving antenna of this satellite (K);

$\Delta \underline{T_e}$: apparent increase in the receiver noise temperature of the earth station e_R, caused by an interfering emission, referred to the output of the receiving antenna of this station (K);

$\underline{p_s}$: maximum power density per Hz delivered to the antenna of satellite S (averaged over the worst 4 kHz band for a carrier frequency below 15 GHz or over the worst 1 MHz band above 15 GHz) (W/Hz);

$\underline{g_3}(\eta)$: transmitting antenna gain of satellite S in the direction η (numerical power ratio);

η_A : direction, from satellite S, of the receiving earth station e_R of satellite link A;

$\eta_{e'}$: direction, from satellite S, of the receiving earth station e'_R of satellite link A';

Note : The product $p_s\, g_3(\eta_{e'})$ is the maximum e.i.r.p. per Hz of satellite S in the direction of the receiving earth station e'_R of satellite link A';

$\eta_{s'}$: direction, from satellite S, of satellite S';

$\underline{p_e}$: maximum power density per Hz delivered to the antenna of the transmitting earth station e_T (averaged over the worst 4 kHz band for a carrier frequency below 15 GHz or over the worst 1 MHz band above 15 GHz) (W/Hz);

$\underline{g_2}(\delta)$: receiving antenna gain of satellite S in the direction δ (numerical power ratio);

$\delta_{\underline{A}}$: direction, from satellite S, of the transmitting earth station e_T of satellite link A;

$\delta_{\underline{e'}}$: direction, from satellite S, of the transmitting earth station e'_T of satellite link A';

$\delta_{\underline{s'}}$: direction, from satellite S, of satellite S';

θ_t : topocentric angular separation between the two satellites[1], taking the longitudinal station keeping tolerances into account.

Note : Only the topocentric angle θ_t should be used in dealing with Case I.

θ_g : geocentric angular separation between the two satellites, taking the longitudinal station keeping tolerances into account.

Note : Only the geocentric angle θ_g should be used in dealing with Case II.

$g_1(\theta_t)$: transmitting antenna gain of the earth station e_T in the direction of satellite S' (numerical power ratio);

$g_4(\theta_t)$: receiving antenna gain of the earth station e_R in the direction of satellite S' (numerical power ratio);

k : Boltzmann's constant (1.38×10^{-23} J/K);

ℓ_d : free-space transmission loss[2] on the down-link (numerical power ratio), evaluated from satellite S to the receiving earth station e_R for satellite link A;

Note : the free-space transmission loss on any down-link evaluated from the satellites S or S' to the receiving earth stations e_R or e'_R is considered to be equal to ℓ_d;

ℓ_u : free-space transmission loss[2] on the up-link (numerical power ratio), evaluated from the earth station e_T, to satellite S for satellite link A;

Note : the free-space loss on any up-link evaluated from the earth stations e_T or e'_T to the satellites S or S' is considered to be equal to ℓ_u;

ℓ_s : free-space transmission loss[2] on the inter-satellite link (numerical power ratio), evaluated from satellite S' to satellite S;

---

[1] A method for calculation of the topocentric angular separation is given in Annex I.

[2] A method for calculation of the free-space transmission loss is given in Annex II.

γ : transmission gain of a specific satellite link subject to interference evaluated from the output of the receiving antenna of satellite S to the output of the receiving antenna of the earth station e_R (numerical power ratio, usually less than 1).

2.2 General method

In the following equations, the frequency to be used for the calculation of ℓ_d, ℓ_u, and ℓ_s is the average frequency of the band common to both networks in the direction considered. If, in a given direction, there is no overlap of the assigned frequency bands of the two networks, the corresponding value (ΔT_s or ΔT_e is taken to be equal to zero. For cases where the Appendix 1A data have not been published, the assigned frequency band for that network shall be considered as being the/ frequency range/ as provided for in Appendix 1B.

2.2.1 Case I - Wanted and interfering networks sharing the same frequency band in the same direction of transmission

The gains $g_1(\theta_t)$ and $g_4(\theta_t)$ are those of the earth stations concerned. When neither measured data nor a relevant CCIR Recommendation are available the radiation patterns set out in Annex III should be used.

2.2.1.1 Simple frequency-changing transponder on board the satellite

The parameters ΔT_s and ΔT_e are given by the following equations:

$$\Delta T_s = \frac{p'_e\, g'_1(\theta_t)\, g_2(\delta_{e'})}{k l_u} \tag{1}$$

$$\Delta T_e = \frac{p'_s\, g'_3(\eta_e)\, g_4(\theta_t)}{k l_d} \tag{2}$$

The symbol ΔT will be used to denote the apparent increase in the equivalent noise temperature for the entire satellite link referred to the output of the receiving antenna of the receiving earth station e_R due to the interfering emission from link A'.

This increase is the result of the interfering emissions entering at both the satellite and the earth station receiver of link A and can accordingly be expressed as:

$$\Delta T = \gamma \Delta T_s + \Delta T_e \tag{3}$$

Hence,

$$\Delta T = \gamma \frac{p'_e\, g'_1(\theta_t)\, g_2(\delta_{e'})}{k l_u} + \frac{p'_s\, g'_3(\eta_e)\, g_4(\theta_t)}{k l_d} \tag{4}$$

An example calculation for the application of the method of this Appendix in Case I is given in Annex IV.

In the same way, the increase $\Delta T'$ in the equivalent noise temperature for the entire satellite link, referred to the output of the receiving antenna of the receiving earth station e'_R, under the effect of the interference caused by satellite link A is given by the following equations :

$$\Delta T'_s = \frac{p_e\, g_1(\theta_t) g'_2(\delta_e)}{k l'_u} \tag{5}$$

$$\Delta T'_e = \frac{p_s\, g_3(\eta_{e'})\, g'_4(\theta_t)}{k l_d} \tag{6}$$

$$\Delta T' = \gamma' \frac{p_e\, g_1(\theta_t) g'_2(\delta_e)}{k l_u} + \frac{p_s\, g_3(\eta_{e'})\, g'_4(\theta_t)}{k l_d} \tag{7}$$

2.2.1.2 Cases requiring independent treatment of the up-link and the down-link

If there is a change of modulation in the satellite or if the transmission originates on board the satellite, then the apparent increase in the noise temperature must be related to the total receiving system noise temperature of the specific link being examined (the space station or the earth station, whichever is applicable). In this case, the equivalent noise temperature of the entire satellite link and the transmission gain are not used and equations (1) and (2) above are used separately as required (see § 2.3).

2.2.2 Case II - Wanted and interfering networks sharing the same frequency band in opposite directions of transmission (bidirectional use)

The calculation method below only applies to interfering emissions between satellites.

Interference between earth stations using the same frequency band in opposite directions of transmission (bidirectional use) is to be dealt with by coordination procedures analogous to those used for coordination between earth and terrestrial stations.

All the equations relating to Case II shall use the geocentric angle θ_g.

2.2.2.1 Simple frequency-changing transponder on board the satellite

The noise temperature increase ΔT_s referred to the output of the receiving antenna of the satellite of link A is given by :

$$\Delta T_s = \frac{p'_s \quad g'_3(\eta_s) \quad g_2(\delta_{s'})}{k l_s} \tag{8}$$

The apparent increase in equivalent link noise temperature is then given by :

$$\Delta T = \gamma \Delta T_s \tag{9}$$

The increase $\Delta T'$ in the equivalent noise temperature of the link A' caused by interfering emissions from the satellite associated with the link A is given by :

$$\Delta T' = \gamma' \Delta T'_s = \frac{\gamma' p_s \; g_3(\eta/s') \; g'_2(\delta_s)}{k l_s} \qquad (10)$$

2.2.2.2 Cases requiring independent treatment of the up-link and down-link

In this case equation (8) is used directly with T_s to obtain the percentage increase. The increase $\Delta T'_s$ in the noise temperature of link A' caused by interfering emissions from the satellite associated with link A is obtained in a similar manner.

2.2.3 Consideration of polarization isolation

The polarization isolation factor described in this paragraph shall be considered only if the administration responsible for each network has consented to such a course and has notified its polarization or published it for coordination under 4114/639AJ. In this case, the apparent increase in the equivalent satellite link noise temperature shall be determined by the following expressions :

Case I $\quad \Delta T = \gamma \dfrac{\Delta T_s}{Y_u} + \dfrac{\Delta T_e}{Y_d}$

Case II $\quad \Delta T = \gamma \dfrac{\Delta T_s}{Y_{ss}}$

where the values of ΔT_s and ΔT_e are those given in §§ 2.2.1 and 2.2.2 and the values of the factors of polarization isolation Y_u, Y_d and Y_{ss} are those given in the table below.

Polarization		Factor of polarization isolation (numerical ratio) Y
network R	network R'	
LHC	RHC	4
LHC	L	1.4
RHC	L	1.4
LHC	LHC	1
RHC	RHC	1
L	L	1

where LHC = left hand circular
RHC = right hand circular
L = linear

2.3 Determination of the satellite links to be considered in calculating the increase in equivalent satellite link noise temperature (Case I only)

The greatest increase in equivalent satellite link noise temperature caused to any link of another satellite network, existing or planned, by interfering emissions of the proposed satellite network must be determined.

The most unfavourably sited transmitting earth station of the interfering satellite network should be determined for each satellite receiving antenna of the network subject to interference by superimposing the "Earth-to-space" service areas of the interfering network on the space station receiving antenna gain contours plotted on a map of the Earth's surface. The most unfavourably sited transmitting earth station is the one in the direction of which the satellite receiving antenna gain of the network subject to interference is the greatest.

The most unfavourably sited receiving earth station of the network subject to interference should be determined in an analogous manner for each "space-to-Earth" service area of that network. The most unfavourably sited receiving earth station is the one in the direction of which the satellite transmitting antenna gain of the interfering network is the greatest.

2.4 /PENDING/ (see Document No. 615.)

3. Comparison between calculated percentage increase in noise temperature and the threshold value

3.1 Simple frequency-changing transponder on-board the satellite

The calculated values of the $\frac{\Delta T}{T}$ and $\frac{\Delta T'}{T'}$, expressed as percentages, shall be compared with the threshold value of 4%.

- If the calculated value of $\frac{\Delta T}{T}$, expressed as a percentage, due to any interfering emission from satellite link A' to satellite link A, is no greater than the threshold value, coordination is not required with respect to interference from link A' to link A.

- If the calculated value of $\frac{\Delta T}{T}$, expressed as a percentage, is greater than the threshold value coordination is required.

The comparison of $\frac{\Delta T'}{T'}$, expressed as a percentage, with the threshold value shall be carried out in a similar manner.

3.2 Cases requiring independent treatment of the up-link and the down-link

a) In the case of interference into only one link, the up-link or the down-link, the value $\Delta T_e/T_e$ or $\Delta T_s/T_s$, expressed as a percentage, shall be compared with the threshold value of 4%.

b) In the case of interference into both the up-link and the down-link, between which there is a change of modulation on board the satellite, the values of $\Delta T_e/T_e$ and $\Delta T_s/T_s$, expressed as a percentage, shall each be compared with the threshold value of 4%.

When none of the calculated values due to any interfering emission from satellite link A' to satellite link A is greater than the threshold value, coordination is required, with respect to interference from link A' to link A.

When at least one of the calculated values exceeds the threshold value, coordination is required.

The comparison of $\frac{\Delta T_e'}{T_e'}$ or $\frac{\Delta T_s'}{T_s'}$, expressed as a percentage, with the threshold value shall be carried out in a similar manner.

4. Consideration of narrow band carriers

The method of calculation described in this Appendix may underestimate the interference from slow swept TV carriers into certain narrow band (single channel per carrier-SCPC) carriers.

In order to facilitate coordination between the satellite systems and to reduce the number of administrations involved in this procedure, the administrations whose SCPC assignments are either recorded in the Master Register or are under coordination may inform an administration notifying its new assignment of the radio frequency channels used in their systems for SCPC transmission, so that the notifying administration may be able to avoid using these channels for FM-TV transmissions.

Conversely, administrations introducing new systems using SCPC transmissions may seek appropriate information from other administrations on their FM-TV transmissions.

Annexes : I, II, III, IV

ANNEX I TO APPENDIX 29

Calculation of the Topocentric Angular Separation between two Geostationary Satellites

The topocentric angular separation θ_t between two geostationary satellites from a given earth station can be determined by using the equation :

$$\theta_t = \text{arc cos} \left(\frac{d_1^{\,2} + d_2^{\,2} - \left(84332 \sin \frac{\theta_g}{2}\right)^2}{2\, d_1 \cdot d_2} \right)$$

where d_1 and d_2 are the distances, in km, from the earth station to the two satellites respectively, and evaluated as d by the method described in Annex II, and θ_g is as defined in § 2.1.

ANNEX II TO APPENDIX 29

Calculation of the Free Space Transmission Loss

The free space transmission loss $\underline{L}$ can be determined by using the following equation :

$$\underline{L} = 20\ (\log_{10} f + \log_{10} \underline{d}) + 32.45\ (\text{dB})$$

where $\underline{f}$ = frequency (MHz)

$\underline{d}$ = distance (km).

a) The distance d between an earth station and a geostationary satellite is given by the equation :

$$\underline{d} = 42\,644\ \sqrt{1 - 0.2954 \cos \psi} \quad (\text{km})$$

where

$$\cos \psi = \cos \zeta \quad \cos \beta$$

where

ζ = latitude of the earth station

β = difference in longitude between the satellite and the earth station.

Note : If $\cos \psi < 0.151$ the satellite is below the horizontal plane.

b) The distance $\underline{d}_{\underline{s}}$ between two geostationary satellites is determined as follows:

$$\underline{d}_{\underline{s}} = 84\,332 \sin \frac{\theta_{\underline{g}}}{2} \quad (\text{km})$$

$\theta_{\underline{g}}$ = geocentric angular separation as defined in § 2.1.

ANNEX III TO APPENDIX 29

Radiation Pattern for Earth Station Antennae to be used when they are not published

When neither measured data nor relevant Recommendations of the CCIR are available then administrations should use the reference patterns as described below (dB):

a) for values of $D/\lambda \geqslant 100$ *) (maximum gain $\geqslant$ 48 dB approx.)

$$G(\phi) = G_{max} - 2.5 \times 10^{-3}\left(\frac{D}{\lambda}\phi\right)^2 \qquad \text{for } 0 < \phi < \phi_m$$

$$G(\phi) = G_1 \qquad \text{for } \phi_m \leqslant \phi < \phi_r$$

$$G(\phi) = 32 - 25 \log \phi \qquad \text{for } \phi_r \leqslant \phi < 48^0$$

$$G(\phi) = -10 \qquad \text{for } 48^0 \leqslant \phi \leqslant 180^0$$

where : D = antenna diameter, λ = wavelength } expressed in the same unit

ϕ = off-axis angle of the antenna, equal to Θ_t or Θ_g as applicable.

G_1 = gain of the first sidelobe = $2 + 15 \log \frac{D}{\lambda}$

$$\phi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \text{ (degrees)}$$

$$\phi_r = 15.85\,(D/\lambda)^{-0.6} \text{ (degrees)}$$

b) for values of $D/\lambda < 100$ *) (maximum gain < 48 dB approx.)

$$G(\phi) = G_{max} - 2.5 \times 10^{-3}\left(\frac{D}{\lambda}\phi\right)^2 \qquad \text{for } 0 < \phi < \phi_m$$

$$G(\phi) = G_1 \qquad \text{for } \phi_m \leqslant \phi < 100\frac{\lambda}{D}$$

$$G(\phi) = 52 - 10 \log \frac{D}{\lambda} - 25 \log \phi \qquad \text{for } 100\frac{\lambda}{D} \leqslant \phi < 48^0$$

$$G(\phi) = 10 - 10 \log \frac{D}{\lambda} \qquad \text{for } 48^0 \leqslant \phi \leqslant 180^0$$

The above patterns may be modified as appropriate to achieve a better **representation of the actual antenna pattern.**

---

*) **In cases where $\frac{D}{\lambda}$ is not given, it may be estimated from the expression** $20 \log \frac{D}{\lambda} = G_{max} - 7.7$, where G_{max} is the main lobe antenna gain in dB.

ANNEX IV TO APPENDIX 29

Example of an application of Appendix 29

1. General

In this example of Case I (see § 2.2.1), two identical satellite networks each with a simple frequency changing transponder and a global coverage antenna are assumed.

All topocentric angles $\underline{\theta_t}$ are assumed to be equal to 5^o.

For this angular separation and for an earth station antenna with $\underline{D}/\lambda$ greater than 100, the reference radiation pattern ($32 - 25 \log_{10} \underline{\theta_t}$) gives a gain of 14.5 dB in the direction of the satellite of the other network.

The input data are furnished in § 2 below and are expressed in dB values except for the parameters $\underline{T}$ and $\underline{\theta_t}$. In § 3 the calculations are performed in dB.

It may be noted that since both satellites use global beams there is practically no antenna discrimination between wanted and unwanted signals at the satellite, and that this constitutes a worst case.

2. Input data

The values of the network parameters given in the table below are derived from those published in accordance with /̲ Appendix 1A, or 1B /̲.

	Symbol *)	Value	Unit
Up-link at 6 175 MHz	$\underline{P}'_e$ $\underline{G}'_1(\theta_t)$ $\underline{G}_2(\delta_{e'})$ $\underline{L}_u$	-37 14.5 15.5 200	dBW/Hz dB dB dB
Down-link at 3 950 MHz	$\underline{P}'_s$ $\underline{G}'_3(\eta_e)$ $\underline{G}_4(\theta_t)$ $\underline{L}_d$	-57 15.5 14.5 196	dBW/Hz dB dB dB
	$10 \log_{10}\gamma$ $\underline{T}$ θ_t	-15 105 5	dB K degree

3. Calculation of $\frac{\Delta T}{T}$

From equation (1)

$$10 \log_{10} \Delta\underline{T}_s = \underline{P}'_e + \underline{G}'_1(\theta_t) + G_2(\delta_{e'}) + 228.6 - \underline{L}_u$$

$$= -37 + 14.5 + 15.5 + 228.6 - 200 = 21.6 \text{ dBK}$$

Therefore,

$$\Delta\underline{T}_s = 145\text{K}$$

From equation (2)

$$10 \log_{10} \Delta\underline{T}_e = \underline{P}'_s + G'_3(\eta_e) + \underline{G}_4(\theta_t) + 228.6 - \underline{L}_d$$

$$= -57 + 15.5 + 14.5 + 228.6 - 196 = 5.6 \text{ dBK}$$

*) All capital symbols, except T, refer to parameters given in logarithmic units.

Therefore,

$\Delta T_e = 3.6K$

From equation (3)

$\Delta T = \gamma \Delta T_s + \Delta T_e =$

$= 0.032 \times 145 + 3.6 = 8.2K$

Thus

$$\frac{\Delta T}{T} \times 100 = \frac{8.2 \times 100}{105} = 7.8\%$$

4. Conclusion

In the example shown, the percentage increase in equivalent satellite link noise temperature is 7.8%. Since it exceeds the threshold value of 4%, coordination between the two networks is required.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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WORKING GROUP 6A

FIFTH REPORT FROM DRAFTING GROUP 6A1

Having reconsidered the texts relating to the provisions of Article N11 and appearing in Document No. 440, in the light of decisions of other Committees Drafting Group 6A1 has agreed on the new texts appearing in the Annex for consideration by Working Group 6A.

J.K. BJÖRNSJÖ
Chairman of Drafting Group 6A1

Annex : 1

ANNEX

ADD 4114A (2) Frequency assignments to which the provisions of No. 4114/639AJ are applicable are those :

- in the same frequency band ~~/ 1 /~~ as the planned assignment, and
- in conformity with No. 4587/639BM, and
- recorded in the Master Register, or coordinated under the provisions of this section, or
- to be taken into account for coordination with effect from the date of receipt by the Board in accordance with No. 4118/639AL, of the relevant information as annotated in Appendix 1A, or
- notified to the Board without any coordination in those cases where No. 4115/639AK applies.

~~/ ADD 4114A.1 1 (Note : Examination deferred until definition of the "same band" is adopted by Committee 4.) /~~

MOD 4115 639AK Spa2 (3) ~~(2)~~ No co-ordination under No. 4114/639AJ is required:

~~a)~~ when the use of a new frequency assignment (or a modification to a frequency assignment) will cause, to any service of another administration, an increase in the noise temperature of any space station receiver or earth station receiver, or an increase in the equivalent satellite link noise temperature, as appropriate ~~/ not exceeding the predetermined increase of noise temperature calculated in accordance with the method given in Appendix 29; or /~~ calculated in accordance with the method given in Appendix 29 and not exceeding the value defined therein.

~~(Note : Examination deferred until decision by Committee 4 on definite limits in Appendix 29.)~~

MOD

probability

b) when the ~~/ increase in the noise temperature /~~ ~~/ level~~ of interference resulting from a modification to a frequency assignment, which has previously been coordinated, will not exceed the value agreed during coordination;

probability

ADD

d) when, for a new frequency assignment to a receiving station, the notifying Administration states that it accepts the ~~/ level~~ of interference resulting from the frequency assignments listed in No. 4114A;

MOD **4124 639AO Spa2**

(1)

§11 ~~(2)~~ ~~An administration with which co-ordination is sought under No. 639AJ shall acknowledge receipt of the co-ordination data immediately by telegram. If no acknowledgement is received within thirty days after the date of the weekly circular publishing the information under No. 639AL, the administration seeking co-ordination shall dispatch a telegram requesting acknowledgement, to which the receiving administration shall reply within a further period of thirty days.~~ Upon receipt of the co-ordination data, an administration shall, ~~having regard to the proposed date of bringing into use of the assignment for which co-ordination was requested,~~ promptly examine the matter with regard to interference[1] which would be caused to the service rendered by its stations in respect of which co-ordination is sought under No. **4114**/639AJ ~~and~~ shall within ~~ninety days~~ from the date of the relevant weekly circular, notify the administration requesting co-ordination of its agreement. If the administration with which co-ordination is sought does not agree, it shall, within the same period, send to the administration seeking co-ordination the technical details upon which its disagreement is based, and make such suggestions as it may be able to offer with a view to a satisfactory solution of the problem. A copy of these comments shall also be sent to the Board.

however,

then

four months

or caused by these stations. In so doing, it shall have regard to the proposed date of bringing into use of the assignment for which coordination was requested. It

including those relevant characteristics contained in Appendix 1A which have not previously been notified to the Board, MOD 4124.1 639AO.1 Spa2

[1]The calculation methods and the interference criteria to be employed in evaluating the interference probabilities ~~shall~~ should be based upon relevant CCIR Recommendations agreed between the administrations concerned in application of Resolution No. Spa2 - 6 or otherwise. In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

NOC 4132 639AY Spa2

(4) ~~(5)~~ Where necessary, as part of the procedure under No. 4127/639AS, the Board shall assess the ~~level~~ probability of interference. In any case, the Board shall inform the administrations concerned of the results obtained.

NOC 4133 639AT Spa2

(5) ~~(6)~~ ~~Either the administration seeking co-ordination or an administration with which co-ordination is sought, or~~ The Board may request additional information which it may require to assess the ~~level~~ probability of interference to the services concerned.

MOD 4138 639AN Spa2

16 ~~§ 5~~ (1) Before an administration notifies to the Board or brings into use any frequency assignment to an earth station, whether for transmitting or receiving, in a particular band allocated with equal rights to space and terrestrial radiocommunication services in the frequency spectrum above 1 GHz, it shall, except in the cases described in No. 4139/639AR, effect co-ordination of the assignment with ~~any~~ each other administration whose territory lies wholly or partly within the co-ordination area (1) of the planned earth station. ~~For this purpose it shall send to any other such administration a copy of a diagram drawn to an appropriate scale indicating the location of the earth station and showing the co-ordination areas of the earth station for the cases of transmission and reception by the earth station and the data on which they are based, including all pertinent details of the proposed frequency assignment, as listed in Appendix 1A, and an indication of the approximate date on which it is planned to begin operations.~~

The request for coordination concerning an Earth station may specify all or some of the frequency assignments of the associated space station, but thereafter each assignment shall be dealt with individually.

MOD 4138.1/639AN.1 Appendix 28 shall be used for calculation of the coordination area and contains criteria relating only to coordination between earth stations and stations in the fixed and mobile service. The criteria relating to other terrestrial radiocommunication services should be based upon relevant CCIR Recommendations agreed between the Administrations concerned in application of Resolution No. Spa2 - 6 or otherwise.

In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

SUP 4138.2/639AN.2

MOD **4139** 639AR Spa2 (2) No co-ordination under No. 4138/639AN is required when an administration proposes:

a) to bring into use an earth station, the co-ordination area of which does not include any of the territory of any other country;

b) to change the probability characteristics of an existing assignment in such a way as not to increase the ~~level~~ of interference to or from the terrestrial radiocommunication stations of other administrations;

c) to operate a / ~~transportable Earth station or~~ / mobile earth station. However, on coordination if the co-ordination area associated with the operation of such a mobile earth station, in a frequency band referred to in No. 4138/639AN, includes any of the territory of another country, it shall be subject to ~~prior~~ agreement between the administrations concerned ~~in order to avoid harmful interference to existing terrestrial radiocommunication stations of that country~~. This agreement shall apply ~~to~~ the characteristics of the / ~~transportable Earth station(s) or~~ / mobile earth station(s), or to the characteristics of a typical mobile earth station, and shall apply to a specified service area. Unless otherwise stipulated in the agreement, it shall apply to any / ~~transportable~~ or / mobile earth stations in the specified service area provided that the probability of harmful interference caused by them shall not be greater than that caused by~~the~~ a typical earth station / for which the technical characteristics appear in the notice and have been or are being submitted in accordance with No. 4578/639BD /

~~(Note : Deferred until decision of Committee 5 on definition of transportable Earth station - need for procedure for such stations)~~

~~ADD 4139.1 / The coordination area is calculated in relation to the fixed or mobile service in accordance with the procedure described in Section 6 bis of Appendix 28. /~~

MOD 4141/639AN For the purpose of effecting coordination, the Administration requesting coordination shall send to each Administration concerned under No. 4138/639AN a copy of a diagram drawn to an appropriate scale indicating for transmission and reception cases the location of the earth station and its associated coordination areas, or the coordination area related to a mobile earth station service area, and the data on which they are based, including all pertinent information concerning the proposed frequency assignment as annotated in Appendix 1A, and an indication of the approximate date on which it is planned to begin operations. A copy of this information with the date of dispatch of the request for coordination shall also be sent to the Board.

SUP 4141.1

MOD 4145.1/639AP.1 [1]The calculation methods and the interference criteria to be employed in evaluating the interference probabilities should be based upon relevant CCIR Recommendations agreed between the Administrations concerned in application of Resolution No. Spa2 - 6 or otherwise. In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

MOD 4160.1/492A.1 Appendix 28 shall be used for calculation of the coordination area and contains criteria relating only to coordination between earth stations and stations in the fixed or mobile service. The criteria relating to other terrestrial radiocommunication services should be based upon relevant CCIR Recommendations agreed between the Administrations concerned in application of Resolution No. Spa2 - 6 or otherwise.

In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

MOD 4167.1/492B.1 [1]The calculation methods and the interference criteria to be employed in evaluating the interference probabilities should be based upon relevant CCIR Recommendations agreed between the Administrations concerned in application of Resolution No. Spa2 - 6 or otherwise. In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, those methods and criteria shall be agreed between the Administrations concerned. Whenever the methods and criteria have been agreed between Administrations, it shall be done without prejudice to other Administrations.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 663-E
14 November 1979
Original : English

WORKING GROUP 6A

SIXTH REPORT OF DRAFTING GROUP 6A1

The Drafting Group has again considered the provisions of section VI appearing within square brackets in Document No. 550 and submits, for the consideration of Working Group 6A, the texts appearing in the Annex.

J.K. BJÖRNSJÖ
Chairman of Drafting Group 6A1

Annex : 1

ANNEX

NOC **Section VI. Modification, Cancellation and Review of Entries in the Master Register**

/_ADD 4636A § 23A. The Board shall at intervals not exceeding two years request confirmation from the notifying Administration that its assignment has been and will continue to be in regular use in accordance with its recorded characteristics._/

NOC **4637** 639DK Spa2 § 24. (1) Where the use of a recorded assignment to a space station is suspended for a period of eighteen months, the notifying administration shall, within this eighteen-month period, inform the Board of the date on which such use was suspended and of the date on which the assignment is to be brought back into regular use.

NOC **4638** 639DL Spa2 (2) Whenever it appears to the Board, whether or not as a result of action under No. **4637**/639DK, that a recorded assignment to a space station has not been in regular use for more than eighteen months, the Board shall inquire of the notifying administration as to when the assignment is to be brought back into regular use.

NOC **4639** 639DM Spa2 (3) If no reply is received within six months of action by the Board under No. **4638**/639DL, or if the reply does not confirm that the assignment to a space station is to be brought back into regular use within this six-month limit, a mark shall be applied against the entry in the Master Register. Thereafter, the assignment shall be treated in accordance with No. **4593**/639BS as one which has been established as having been out of regular use for two years.

NOC 4640 639DN Spa2

§ 25. **In case of permanent discontinuance of the use of any recorded frequency assignment, the notifying administration shall inform the Board within ninety days of such discontinuance, whereupon the entry shall be removed from the Master Register.**

MOD 4641 639DO Spa2

§ 26. Whenever it appears to the Board from the information available that a recorded assignment has not been brought into regular operation in accordance with the notified basic characteristics is not being used in accordance with those basic characteristics, the Board shall consult the notifying administration and, subject to its agreement, shall cancel , suitably modify the entry.

or retain the basic characteristics of

MOD 4642 639DP Spa2

§ 27. **If, in connection with an inquiry by the Board under No 4641/639DO, the notifying administration has failed to supply the Board within with the necessary or pertinent information, the Board shall make suitable entries in the Remarks Column of the Master Register to indicate the situation.**

/ three months_7 / from the date of the enquiry_7

on board a geostationary satellite

ADD 4642A

§27A. (1) /_A frequency assignment to a space station[1] shall be deemed definitively discontinued after the expiry of the period of operation shown on the assignment notice, reckoned from the date on which the assignment was brought into service. The Board shall then invite the notifying Administration to take steps to cancel the assignment. If the Board receives no reply within ninety days following the expiry of the period of operation, the entry of the assignment in the Master Register shall be cancelled._7

This period shall be limited to the period for which the satellite network is designed. /In any case, this period shall be no longer than .... years_7

1) The expression "space station" may include more than one satellite provided that only one is operating at any time and that the stations on board the successive satellites have the same basic characteristics.

ADD 4642B (2) /_ If a notifying Administration which wishes to extend the period of operation originally shown on the assignment notice of a frequency assignment of an existing space station[1] informs the Board accordingly more than 3 years before the expiry of the period in question and if all other basic characteristics of that assignment remain unchanged, the Board shall amend as requested the period of operation originally recorded in the Master Register and shall publish that information in a special section of the Weekly Circular._/

/_ Such an extension shall not exceed .... years._/

ADD 4642C (3) /_ If, at least three years before the expiry of the period of operation recorded in the Master Register of a frequency assignment of an existing space station[1], an Administration initiates the coordination procedure under No. 4114/639AJ to bring into service a new space station using the same assigned frequency and the same orbital position but with different technical characteristics, and if , after notification, the Board finds that the new assignment conforms with the provisions of No. 4587/639BM and does not increase, in relation to the preceding assignment, the probability of interference to the detriment of a frequency assignment recorded in the Master Register or in the process of coordination, the new assignment shall be given a favourable finding and shall be entered in the Master Register with the notification date of the preceding assignment._/

4642C (3) If at least three years before the expiry of the period of operation recorded in the Master Register of a frequency assignment of an existing space station[1] an Administration informs the Board of its intention to bring into service a new space station using the same assigned frequency and the same orbital position but with different technical characteristics, and if the Board finds that the new assignment conforms with the provisions of No. 4587/639BM and does not increase, in relation to the preceding assignment, the probability of interference to the detriment of a frequency assignment mentioned in No. 4114A, the new assignment shall be given a favourable finding and shall be entered in the Master Register.

ADD 4642D (4) /_ A notifying Administration which wishes to modify a basic characteristic of a frequency assignment of a space station[1] recorded in the Master Register shall initiate, in any case other than those covered by Nos. 4642B and 4642C, the appropriate modification procedure in accordance with Nos. 4619/639CS to 4622/639CV._/

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1) The expression "space station" may include more than one satellite provided that only one is operating at any time and that the stations on board the successive satellites have the same basic characteristics.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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14 November 1979
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WORKING GROUP 6A

REPORT BY WORKING GROUP 6A3 TO WORKING GROUP 6A

Draft Resolution relating to Action to Facilitate Increased Use of the ITU Computer Installation by the International Frequency Registration Board for Frequency Management

Working Group 6A3 has reconsidered the draft resolution appearing in Document No. 560 in the light of the discussion in Working Group 6A, as requested.

Working Group 6A3 has unanimously agreed to submit the revised text appearing in the attached Annex for the consideration of Working Group 6A.

A.M. CORRADO
Chairman of Working Group 6A3

Annex : 1

ANNEX

DRAFT

Resolution No.

Relating to Action to Facilitate Increased Use of the ITU Computer Installation by the International Frequency Registration Board for Frequency Management

The World Administrative Radio Conference, Geneva, 1979,

considering

a) the initiatives that have been taken to increase the utilization of the ITU computer installation by the IFRB;

b) the necessity for the World Administrative Radio Conference, Geneva, 1979, to further these initiatives without prejudicing the comprehensive systems analysis and design study now being undertaken;

c) that certain improvements are necessary and could be made by the IFRB progressively and without the need for prior adoption by an Administrative Radio Conference;

d) that the improvements obtained from the extended use of the computer for activities of the IFRB will benefit all Administrations;

resolves

that, to gain the maximum benefit from the report of the consultants on measures to increase utilization of the ITU computer installation by the IFRB, the Board shall :

1. within the scope of the Radio Regulations as revised by the World Administrative Radio Conference, Geneva, 1979 :

a) introduce into the Preface to the International Frequency List a standard list of symbols for use in appropriate notices; and

b) prepare and introduce into the Preface to the International Frequency List a set of essential working instructions for the completion of notices;

2. without affecting the basic data required by the Radio Regulations to be given in any notice relating to a frequency assignment, develop if necessary new forms of notice to replace those appearing in Appendices 1 and 1A so as to facilitate the computer processing of data supplied by Administrations;

3. without in any way affecting its statutory contents as prescribed by the Radio Regulations, re-format to the extent necessary the International Frequency List from the point of view of presentation

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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WORKING GROUP 6A

THIRD REPORT OF SUB-WORKING GROUP 6A2

During its second meeting, Sub-Working Group 6A2 treated the following matters:

1. Production of a Handbook explaining regulatory procedures

1.1 The Working Group considered Documents Nos. GRC/86A and AUS/143 and taking into account the diverse views expressed in Working Group 6A came to the conclusion that it would be appropriate for the IFRB to be tasked with preparing a handbook;

a) which is designed to explain the regulatory procedures of the Radio Regulations in simple language, essentially for the benefit of those whose duty it is to apply them; and

b) which contains a series of documents and flow charts designed to illustrate the texts; the flow charts should be modelled on the proposals of GRC and on those included in the Report of the IFRB, and should be drawn up on the basis of application by and explanation for Administrations

1.2 To avoid the possibility of confusion between explanatory texts or flow charts and the Radio Regulations themselves, and to permit the handbook to be fully developed in the most helpful way, it should be separate from the Radio Regulations. Further as it would be of assistance to be able to interleave pages from such a handbook between the relevant pages of the Radio Regulations, the format of such a handbook should be designed to allow this.

1.3 Accordingly, Working Group 6A2 submits, in Annex 1, the draft resolution aimed at having the IFRB and the Secretary-General prepare and publish, respectively, the handbook suggested during the discussions of this subject by Working Group 6A.

2. Production of a Handbook on the use of computers in spectrum management

The Sub-Working Group next considered proposal S/15. Following some discussion and taking into account views expressed in Working Group 6A, the draft recommendation in Annex II has been agreed upon and is submitted for consideration in Working Group 6A.

3. It was not possible to consider the report of Ad Hoc 2 of 6A, together with proposals from Greece (Document No. 516) and Argentina (Document No. 149), as instructed by Working Group 6A, as this report was not available.

4. A further meeting will be required to perform this task.

J.A. LEWIS
Chairman of Sub-Working Group 6A2

Annexes : 2

ANNEX I

DRAFT

RESOLUTION No. /̄ _7

Relating to the Preparation of a Handbook to explain and illustrate the Procedures of the Radio Regulations

The World Administrative Radio Conference, Geneva, 1979,

considering

a) the complexity of the regulatory procedures contained in Articles /̄ N11, N12, N13 ..._7 of the Radio Regulations;

b) the need of many Administrations for a handbook to give their staff a better understanding of these procedures to help in their application;

c) the possible use of diagrams, flow charts and other graphical aids to the understanding of complex procedures;

recognizing

1. that the WARC, 1979, has insufficient time to develop explanatory material and diagrams for inclusion in or attachment to the Final Acts;

2. that a special effort will be required to develop a handbook to adequately meet the need referred to in b) above;

3. that the format of a handbook that is compatible with the format of the Radio Regulations would have advantages;

resolves

that the IFRB should as soon as possible after the WARC, 1979, prepare a handbook, including appropriate graphical material, to help the staff of Administrations to apply the regulatory procedures of Articles /̄ N11, N12, N13, ..._7 of the Radio Regulations;

instructs

the Secretary-General to publish the handbook prepared by the IFRB.

ANNEX II

RECOMMENDATION No. [F]

To the CCIR relating to a Handbook for Computer-aided Techniques in Spectrum Management

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that due to the growing demands on the radio frequency spectrum, there is a need to achieve efficient spectrum utilization;

b) that spectrum utilization problems require data storage, data retrieval, and analysis capabilities, and consequently are amenable to the application of computer methods;

c) that administrations are facing increasingly voluminous and complex tasks in spectrum management;

d) that technological developments have made powerful computers, particularly mini-computers, available at reasonable cost;

e) that specific guidance is required by many administrations with respect to computer-aided techniques in spectrum management;

f) that compatibility between national data bases is desirable to ease coordination between administrations and the exchange of data with the IFRB;

g) that many administrations are interested in, and some are actively developing, computer systems for spectrum management; and

h) that the General Secretariat provides computer resources including advice, as appropriate, to all permanent organs of the ITU and to administrations;

recommends

that a handbook be prepared by the CCIR by 1982 which describes the various aspects involved in applying computer-aided techniques to spectrum management, discusses the approaches which have been made, provides guidelines for various levels of practical application and makes recommendations for those aspects involving international cooperation;

invites

the General Secretariat and the IFRB to participate in the development of this handbook to ensure that their requirements can be considered.

INTERNATIONAL TELECOMMUNICATION UNION
WORLD ADMINISTRATIVE RADIO CONFERENCE
(Geneva, 1979)

Document No. 666-E
14 November 1979
Original : French

COMMITTEE 5

France

DRAFT

RESOLUTION

Relating to the Modification of Carrier Frequencies of LF Broadcasting Stations in Region 1

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that it would be advantageous, both technically and economically, to reduce interference caused in domestic broadcasting receivers by combination frequencies;

b) that such interference is considerably reduced when the nominal values of the carrier frequencies of broadcasting stations are multiples of the channel separation;

c) that the nominal values of the carrier frequencies of stations listed in the LF Broadcasting Plan for Region 1 (Geneva, 1975) are not multiples of the channel separation (9 kHz);

d) that, in order to avoid interference, any modification of the carrier frequencies of LF broadcasting stations in Region 1 must be carried out, on the same date for all stations;

resolves

that, on /̄ 1 February 1986 _/ at /̄ 01.00 _/ hours UTC :

1. the LF band allocated to the broadcasting service in Region 1 shall become 148.5 - 283.5 kHz instead of 150 - 285 kHz;

2. the nominal values of the carrier frequencies of all LF stations in conformity with the LF/MF Broadcasting Agreement (Geneva, 1975), whether or not these stations are in service, shall be reduced by 2 kHz on that date, so that they become multiples of 9 kHz, the other characteristics of the stations remaining unchanged.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Corrigendum No. 1 to
Document No. 667-E
17 November 1979
Original : French

COMMITTEES 4 AND 5

France

FREQUENCY SHARING BETWEEN THE EARTH EXPLORATION-SATELLITE (PASSIVE SENSING) SERVICE AND OTHER RADIOCOMMUNICATION SERVICES IN THE BANDS 10.6 - 10.68 GHz AND 18.6 - 18.8 GHz

1. Band 10.6 - 10.68 GHz

Page 1, first line, for "-3 dB" read "-3 dBW".

2. Page 2, Annex

In the operative part of the draft Recommendation, under "invites the CCIR", add the following paragraphs 3 and 4 :

"3. to study the minimum restrictions that should be imposed on the fixed, mobile (except aeronautical mobile) and fixed-satellite (space-to-Earth) services to ensure satisfactory operation of passive sensors;

4. to study the maximum restrictions that can be tolerated by the fixed, mobile and fixed-satellite services without detriment to the operation of all services likely to use this frequency band."

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEES 4 AND 5

France

FREQUENCY SHARING BETWEEN THE EARTH EXPLORATION-SATELLITE (PASSIVE SENSING) SERVICE AND OTHER RADIOCOMMUNICATION SERVICES IN THE BANDS 10.6 - 10.68 GHz AND 18.6 - 18.8 GHz

1. Band 10.6 - 10.68 GHz

France proposes that the power supplied to the antenna should be limited to -3 dB and the eirp of terrestrial stations for the fixed and mobile services, to 40 dBW.

2. Band 18.6 - 18.8 GHz

Subject to the outcome of further sharing studies, passive sensors could be afforded some protection in the band 18.6 - 18.8 GHz by :

1) the adoption of the provisions contained in Proposals Nos. F/57B/420 - ADD 3800A and F/57B/421 - ADD 3800B;

2) and by the adoption of a Recommendation to the CCIR, the text of which is proposed in Annex hereto.

Annex : 1

ANNEX

DRAFT

RECOMMENDATION TO THE CCIR

on the Criteria for Frequency Sharing between Space and Terrestrial Radiocommunication Services in the Band 18.6 - 18.8 GHz

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that allocations to the Earth exploration-satellite and space research services for the operation of passive sensors aboard spacecraft have been made in various frequency bands;

b) that the allocations made in the bands 10.6 - 10.68 GHz and 18.6 - 18.8 GHz are for sharing with the fixed, mobile and fixed-satellite services;

c) that the criteria for sharing proposed by the CCIR might restrict the development of the fixed, mobile and fixed-satellite services;

invites the CCIR

1. to arrange for further examination of the content of Report No. 694 by all the Study Groups concerned (particularly Study Groups 4 and 9);

2. to continue with those studies which gave rise to Report No. 609-1, bearing in mind the needs of the Earth exploration-satellite (passive sensing) and space research (passive sensing) services; and in particular to grant preference to the so called "interleaved channel" arrangement (Section 4 of Report No. 609-1) or, failing that, to reduce the power authorized in the narrowband channels in the other arrangement (Section 3 of Report No. 609-1).

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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15 November 1979
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PLENARY MEETING

FOURTH REPORT OF COMMITTEE 5

1. Committee 5 has adopted the following decisions :

1.1 Article N29 - Fixed Service;

1.2 Article N33A - Radio Astronomy Service;

1.3 Article N5/3 - General Rules for the Assignment and Use of Frequencies (Nos. 3281/116A and 3281A) (in continuation of Document No. 606);

1.4 Article N7/5 - Table of Frequency Allocations for the Frequency Bands between 40 and 400 GHz;

1.5 Recommendation relating to the Use of Airborne Radars in the Frequency Bands shared between the Inter-Satellite and the Radiolocation Service;

1.6 Recommendation relating to Sharing of Frequency Bands between the Aeronautical Mobile Service and the Inter-Satellite Service;

1.7 Review of Recommendations Nos. Spa2 - 3, Spa2 - 4 and Spa2 - 5.

The texts mentioned above have been submitted to the Editorial Committee for subsequent submission to the Plenary Meeting. (See Document No. 669).

M. HARBI
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 9

FOURTH SERIES OF TEXTS FROM COMMITTEE 5 TO THE EDITORIAL COMMITTEE

The texts mentioned in Document No. 668 are hereby submitted to the Editorial Committee in Annexes 1 to 7 to the present document.

M. HARBI
Chairman of Committee 5

Annexes : 7

ANNEX 1

ARTICLE N29

NOC **Fixed Service**

Section I. General

MOD 6323/465 Administrations are urged to discontinue, in the fixed service, the use of double sideband radiotelephone (class /A3/) transmissions. ~~in the bands below 30 MHz, if possible as from 1 January 1970.~~

(MOD) 6324/466 Class /F3/ emissions are prohibited in the fixed service in the bands below 30 MHz.

Section II. Frequencies for the International Exchange of Police Information

NOC 6325/467 The frequencies necessary for the international exchange of information to assist in the apprehension of criminals shall be selected from the bands allocated to the fixed service, if necessary by special agreement among interested administrations, in accordance with Article 31 of the Convention.

NOC 6326/468 To obtain economy in the use of frequencies, the International Frequency Registration Board should be consulted by the administrations concerned whenever such agreements are under discussion on a regional or world-wide basis.

Section III. Frequencies for the International Exchange of Synoptic Meteorological Information

NOC 6327/469 The frequencies necessary for the international exchange of synoptic meteorological information shall be selected from the bands allocated to the fixed service, if necessary by special agreement among interested administrations, in accordance with Article 31 of the Convention.

NOC 6328/470 To obtain economy in the use of frequencies, the International Frequency Registration Board should be consulted by the administrations concerned whenever such agreements are under discussion on a regional or world-wide basis.

ANNEX 2

ARTICLE N33A

Radio Astronomy Service

Section I. General Provisions

§ 1. Administrations shall cooperate in protecting the radio astronomy service from interference, bearing in mind

a) the exceptionally high sensitivity of radio astronomy stations,

b) the frequent need for long periods of observation without harmful interference, and

c) that the small number of radio astronomy stations in each country and their known locations often make it practicable to give special consideration to the avoidance of interference.

§ 2. The locations of the radio astronomy stations to be protected and their frequencies of observation shall be notified to the IFRB in accordance with No. 4577/639BC and published by the Secretary-General in accordance with No. 5534/815 for communication to Members of the Union.

Section II. Measures to be taken in the Radio Astronomy Service

§ 3. The locations of radio astronomy stations shall be selected with due regard to the possibility of harmful interference to these stations.

§ 4. All practicable technical means shall be adopted at radio astronomy stations to reduce their susceptibility to interference. The development of improved techniques for reducing susceptibility to interference shall be pursued, including participation in cooperative studies through the CCIR.

Section III. Protection of the Radio Astronomy Service

§ 5. The status of the radio astronomy service in the various frequency bands is specified in the Table of Frequency Allocations, Article N7/5. Administrations shall provide protection from interference to stations in the radio astronomy service in accordance with its status in those bands. (See also No. 3281/116A).

§ 6. In providing protection from interference to the radio astronomy service on a permanent or temporary basis, Administrations, shall use appropriate means such as geographical separation, site shielding, antenna directivity and the use of time-sharing and the minimum practicable transmitter power.

§ 7. In bands adjacent to those in which observations are carried out in the radio astronomy service, operating in accordance with the Radio Regulations, Administrations are urged, when assigning frequencies to stations of other services, to take all practicable steps to protect the radio astronomy service from harmful interference in accordance with No. 3280/116. In addition to the measures referred to in § 6, technical means for minimizing the power radiated at frequencies within the band used for radio astronomy shall be given special consideration. (See also No. 3281/116A)

§ 8. When assigning frequencies to stations in other bands, Administrations are urged, as far as practicable, to take into consideration the need to avoid spurious emissions which could cause harmful interference to the radio astronomy service operating in accordance with the Radio Regulations. (See also No. 3281/116A)

§ 9. In applying the measures outlined in this section, Administrations shall bear in mind that the radio astronomy service is extremely susceptible to interference from space and airborne transmitters.

§ 10. Administrations shall take note of the relevant CCIR Recommendations with the aim of limiting interference to the radio astronomy service from other services.

ANNEX 3

ARTICLE N5/3

General Rules for the Assignment and Use of Frequencies

NOC 3281/116A For the purpose of resolving cases of harmful interference, the radio astronomy service shall be treated as a radiocommunication service. However, protection from services in other bands shall be afforded the radio astronomy service only to the extent that such services are afforded protection from each other.

ADD 3281A For the purposes of resolving cases of harmful interference the space research (passive) service and the Earth exploration-satellite (passive) service shall be afforded protection from different services in other bands only to the extent that these different services are protected from each other.

ANNEX 4

TABLE OF FREQUENCY ALLOCATIONS FOR 40 - 400 GHz

GHz
40 - 43.5

Allocation to Services		
Region 1	Region 2	Region 3
40 - 40.5	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE MOBILE-SATELLITE (Space-to-Earth)	
40.5 - 42.5	BROADCASTING-SATELLITE /BROADCASTING/ Fixed Mobile	
42.5 - 43.5	FIXED FIXED-SATELLITE (Earth-to-space) 3814B MOBILE except aeronautical mobile RADIO ASTRONOMY 3814A	

ADD 3814A In making assignments to stations of other services to which the band 42.5 - 43.5 GHz is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference, especially in the bands 42.77 - 42.87 GHz, 43.07 - 43.17 GHz, and 43.37 - 43.47 GHz, which are used for spectral line observations of silicon monoxide. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A.)

ADD 3814B The allocation of the spectrum for the fixed-satellite service in the bands 42.5 - 43.5 GHz and 47.2 - 50.2 GHz, for Earth-to-space transmission is greater than that in the band 37.5 - 39.5 GHz for space-to-Earth transmission in order to accommodate feeder links to broadcasting-satellites. Administrations are urged to take all practicable steps to reserve the band 47.2 - 49.2 GHz for feeder links to broadcasting satellites operating in the band 40.5 - 42.5 GHz.

GHz
43.5 - 50.2

Allocation to Services		
Region 1	Region 2	Region 3
43.5 - 47	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 3814C	
47 - 47.2	AMATEUR AMATEUR-SATELLITE	
47.2 - 50.2	FIXED FIXED-SATELLITE (Earth-to-space) 3814B MOBILE 3814E 3814D	

ADD 3814C In the bands 43.5 - 47 GHz, 66 - 71 GHz, 95 - 100 GHz, 134 - 142 GHz, 190 - 200 GHz and 252 - 265 GHz satellite links connecting land stations at specified fixed points are also authorized when used in conjunction with the mobile-satellite service or the radionavigation-satellite service.

ADD 3814CA In the bands 43.5 - 47 GHz, 66 - 71 GHz, 95 - 100 GHz, 134 - 142 GHz, 190 - 200 GHz and 252 - 265 GHz, the use of stations in the land mobile service is subject to not causing harmful interference to the satellite services to which these bands are allocated (see No. 3442/148).

ADD 3814D The bands 48.94 - 49.04 GHz, and 97.88 - 98.08 GHz are also allocated to the radio astronomy service on a primary basis for spectral line observations. In making assignments to stations of other services to which these bands are allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A.)

ADD 3814E In the band 48.94 - 49.04 GHz, all emissions from airborne stations are prohibited.

GHz
50.2 - 59

Allocation to Services		
Region 1	Region 2	Region 3
50.2 - 50.4	EARTH EXPLORATION-SATELLITE (Passive) FIXED MOBILE SPACE RESEARCH (Passive)	
50.4 - 51.4	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Mobile-satellite (Earth-to-space)	
51.4 - 54.25	EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive) 3815/412J 3815A	
54.25 - 58.2	EARTH EXPLORATION-SATELLITE (Passive) FIXED INTER-SATELLITE MOBILE 3815BA SPACE RESEARCH (Passive) 3815B	
58.2 - 59	EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive) 3815/412J 3815A	

MOD 3815/412J In the bands 51.4 - 54.25 GHz, 58.2 - 59 GHz, 64 - 65 GHz, 86 - 92 GHz, 105 - 116 GHz and 217 - 231 GHz all emissions are prohibited. In these bands the use of passive sensors by other services is also authorized.

ADD 3815A Radio astronomy observations in the bands 51.4 - 54.25 GHz, 58.2 - 59 GHz, 64 - 65 GHz and 72.77 - 72.91 GHz may be carried out under national arrangements. Administrations are urged to take all practicable steps to protect radio astronomy observations in these bands from harmful interference.

ADD 3815B Additional allocation : in the Federal Republic of Germany, Japan and the United Kingdom, the band 54.25 - 58.2 GHz is also allocated to the radiolocation service on a primary basis.

ADD 3815BA In the bands 54.25 - 58.2 GHz, 59 - 64 GHz, 116 - 134 GHz, 170 - 182 GHz and 185 - 190 GHz the use of stations in the aeronautical mobile service is subject to not causing harmful interference to the inter-satellite service (see No. 3442/148).

GHz
59 - 66

Allocation to Services		
Region 1	Region 2	Region 3
59 - 64	FIXED INTER-SATELLITE MOBILE 3815BA RADIOLOCATION 3815C 3815D	
64 - 65	EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive) 3815/412J 3815A	
65 - 66	EARTH EXPLORATION-SATELLITE SPACE RESEARCH Fixed Mobile	

ADD 3815C In the bands 59 - 64 GHz and 126 - 134 GHz, the use of airborne radars in the radiolocation service is subject to not causing harmful interference to the inter-satellite service (see No. 3442/148).

ADD 3815D The band 61 - 61.5 GHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 61.25 GHz). The use of this frequency band for ISM applications shall be subject to special authorization by the Administration concerned in agreement with other Administrations whose radiocommunication services might be affected. In applying this provision Administrations shall have due regard to the latest CCIR Recommendations.

GHz
66 - 76

Allocation to Services		
Region 1	Region 2	Region 3
66 - 71	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 3814C	
71 - 74	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE MOBILE-SATELLITE (Earth-to-space) 3815A	
74 - 75.5	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	
75.5 - 76	AMATEUR AMATEUR-SATELLITE	

GHz
76 - 86

Allocation to Services		
Region 1	Region 2	Region 3
76 - 81	RADIOLOCATION Amateur Amateur-satellite 3815E	
81 - 84	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE MOBILE-SATELLITE (Space-to-Earth)	
84 - 86	FIXED MOBILE BROADCASTING BROADCASTING-SATELLITE 3815F	

ADD 3815E In the band 78 - 79 GHz radars located on space stations may be operated on a primary basis in the earth exploration-satellite service and in the space research service.

ADD 3815F In the band 84 - 86 GHz, the stations in the fixed, mobile and broadcasting services shall not cause harmful interference to the broadcasting-satellite stations operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

GHz
86 - 95

Allocation to Services		
Region 1	Region 2	Region 3
86 - 92	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) 3815/412J	
92 - 95	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIOLOCATION 3815G	

ADD 3815G The band 93.07 - 93.27 GHz is also used by the radio astronomy service for spectral line observations. In making assignments to stations of other services to which this band is allocated, Administrations are urged to take all practicable steps to protect radio astronomy observations in the band from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

GHz
95 - 116

Allocation to Services		
Region 1	Region 2	Region 3
95 - 100	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE Radiolocation 3814C 3814D	
100 - 102	EARTH EXPLORATION-SATELLITE (Passive) FIXED MOBILE SPACE RESEARCH (Passive) 3679A	
102 - 105	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 3679A	
105 - 116	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) 3679A 3815/412J	

SUP 3816/412K

ADD 3679A In the bands /¯1 400 - 1 727 MHz, ¯/ 101 - 120 GHz, and 197 - 220 GHz, passive research is being conducted by some countries in a programme for the search for intentional emissions of extra-terrestrial origin.

GHz
116 - 142

Allocation to Services		
Region 1	Region 2	Region 3
116 - 126	EARTH EXPLORATION-SATELLITE (Passive) FIXED INTER-SATELLITE MOBILE 3815BA SPACE RESEARCH (Passive) 3679A 3816A 3816B	
126 - 134	FIXED INTER-SATELLITE MOBILE 3815BA RADIOLOCATION 3815C	
134 - 142	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE Radiolocation 3814C 3816C 3816D	

ADD 3816A The band 122 - 123 GHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 122.5 GHz). The use of this frequency band for ISM applications shall be subject to special authorization by the Administration concerned in agreement with other Administrations whose radiocommunication services might be affected. In applying this provision Administrations shall have due regard to the latest CCIR Recommendations.

ADD 3816B The band 119.98 - 120.02 GHz is also allocated to the amateur service on a secondary basis.

ADD 3816C The bands 140.69 - 140.98 GHz, 144.68 - 144.98 GHz, 145.45 - 145.75 GHz and 146.82 - 147.12 GHz are also allocated to the radio astronomy service on a primary basis for spectral line observations. In making assignments to stations of other services to which the bands are allocated Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A.)

ADD 3816D In the band 140.69 - 140.98 GHz all emissions from airborne stations, and from space stations in the space-to-Earth direction, are prohibited.

GHz
142 - 151

Allocation to Services		
Region 1	Region 2	Region 3
142 - 144	AMATEUR AMATEUR-SATELLITE	
144 - 149	RADIOLOCATION Amateur Amateur-satellite 3816C	
149 - 150	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	
150 - 151	EARTH EXPLORATION-SATELLITE (Passive) FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE SPACE RESEARCH (Passive) 3816E	

ADD 3816E The bands 150 - 151 GHz, 174.42 - 175.02 GHz, 177 - 177.4 GHz, 178.2 - 178.6 GHz, 181 - 181.46 GHz and 186.2 - 186.6 GHz are also allocated to the radio astronomy service on a secondary basis for spectral line observations. In making assignments to stations of other services to which these bands are allocated, Administrations are urged to take all practicable steps in these bands to protect radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A.)

GHz
151 - 182

Allocation to Services		
Region 1	Region 2	Region 3
151 - 164	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	
164 - 168	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive)	
168 - 170	FIXED MOBILE	
170 - 174.5	FIXED INTER-SATELLITE MOBILE 3815BA 3816E	
174.5 - 176.5	EARTH EXPLORATION-SATELLITE (Passive) FIXED INTER-SATELLITE MOBILE 3815BA SPACE RESEARCH (Passive) 3816E	
176.5 - 182	FIXED INTER-SATELLITE MOBILE 3815BA 3816E	

GHz
182 - 217

Allocation to Services		
Region 1	Region 2	Region 3
182 - 185	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) 3816F 3816G	
185 - 190	FIXED INTER-SATELLITE MOBILE 3815BA/ 3816E	
190 - 200	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 3679A 3814C	
200 - 202	EARTH EXPLORATION-SATELLITE (Passive) FIXED MOBILE SPACE RESEARCH (Passive) 3679A	
202 - 217	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 3679A	

ADD 3816F Additional Allocation : in the United Kingdom the band 182 - 185 GHz is also allocated to the fixed and mobile services on a primary basis.

ADD 3816G In the band 182 - 185 GHz all emissions are prohibited except for those under the provisions of No. 3816F. The use of passive sensors by other services is also authorized.

GHz
217 - 248

Allocation to Services		
Region 1	Region 2	Region 3
217 - 231	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) 3815/412J 3679A	
231 - 235	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation	
235 - 238	EARTH EXPLORATION-SATELLITE (Passive) FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE SPACE RESEARCH (Passive)	
238 - 241	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation	
241 - 248	RADIOLOCATION Amateur Amateur-satellite 3816H	

ADD 3816H The band 244 - 246 GHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 245 GHz). The use of this frequency band for ISM applications shall be subject to special authorization by the Administration concerned in agreement with other Administrations whose radiocommunication services might be affected. In applying this provision Administrations shall have due regard to the latest CCIR Recommendations.

GHz
248 - 265

Allocation to Services		
Region 1	Region 2	Region 3
248 - 250	AMATEUR AMATEUR-SATELLITE	
250 - 252	EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive) 3816I	
252 - 265	MOBILE 3814CA MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 3814C 3816I 3816J 3816K	

ADD 3816I The bands 250 - 251 GHz and 262.24 - 262.76 GHz are also allocated to the radio astronomy service on a primary basis for spectral line observations. In making assignments to stations of other services to which these bands are allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116, 3281/116A and Article N33A).

ADD 3816J The band 257.5 - 258 GHz is also allocated to the radio astronomy service on a secondary basis for spectral line observations. In making assignments to stations of other services to which the band is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116, 3281/116A and Article N33A).

ADD 3816K In the Federal Republic of Germany, Argentina, Spain, France, Finland, India, Italy, the Netherlands and Sweden, the band 261 - 265 GHz is also allocated to the radio astronomy service on a primary basis. In making assignments to stations of other services to which the band is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

GHz
265 - 400

Allocation to Services		
Region 1	Region 2	Region 3
265 - 275	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 3816L	
275 - 400	(Not allocated) 3816M	

ADD 3816L In making assignments to stations of other services to which the band 265 - 275 GHz is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference, especially in the bands 265.64 - 266.16 GHz, 267.34 - 267.86 GHz and 271.74 - 272.26 GHz, which are used for spectral line observations. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116, 3281/116A and Article N33A).

ADD 3816M The frequency band 275 GHz to 400 GHz may be used by Administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services :

Radio astronomy service : 278 - 280 GHz and 343 - 348 GHz.

Space research service (passive) and earth exploration-satellite service (passive) : 275 - 277 GHz, 300 - 302 GHz, 324 - 326 GHz, 345 - 347 GHz, 363 - 365 GHz and 379 - 381 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the next competent World Administrative Radio Conference.

ANNEX 5

RECOMMENDATION No.

Relating to the Use of Airborne Radars in the Frequency Bands shared between the Inter-Satellite Service and the Radiolocation Service

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the bands 59 - 64 GHz and 126 - 134 GHz are allocated to the inter-satellite service and the radiolocation service;

b) that the foregoing bands are located in parts of the radio frequency spectrum close to peaks of atmospheric absorption;

c) that, nevertheless, the atmospheric absorption alone may not prevent harmful interference to stations of the inter-satellite service from radars operating on aircraft flying at high altitudes;

d) that for this reason the use of airborne radars in the radiolocation service is subject to not causing harmful interference to the inter-satellite service (see ADD 3815C, the text of which is reproduced below);

recommends

that, as a matter of urgency, studies should be made of the sharing criteria for these two services in the frequency bands listed above;

requests the CCIR

to carry out these studies;

recommends further

that a future competent World Administrative Radio Conference review the allocations of these bands, taking into account the results of the studies of the CCIR.

ADD 3815C In the bands 59 - 64 GHz and 126 - 134 GHz, the use of airborne radars in the radiolocation service is subject to not causing harmful interference to the inter-satellite service (see No. 3442/148).

ANNEX 6

RECOMMENDATION No.

Relating to Sharing of Frequency Bands between the Aeronautical Mobile Service and the Inter-Satellite Service

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the bands 54.25 - 58.2 GHz, 59 - 64 GHz, 116 - 134 GHz, 170 - 182 GHz, and 185 - 190 GHz are allocated to the inter-satellite service and the mobile service;

b) that the foregoing bands are located in parts of the radio frequency spectrum close to peaks of atmospheric absorption;

c) that, nevertheless, the atmospheric absorption alone may not prevent harmful interference to the stations of the inter-satellite service from stations on aircraft flying at high altitudes;

d) that for this reason the use of aircraft stations in the aeronautical mobile service is subject to not causing harmful interference to the inter-satellite service (see ADD 3815BA, the text of which is reproduced below);

recommends

that, as a matter of urgency, studies should be made of the sharing possibility and criteria for these two services in the frequency bands listed above;

requests the CCIR

to carry out these studies;

recommends further

that a future competent World Administrative Radio Conference review the allocations of these bands, taking into account the results of the studies of the CCIR.

ADD 3815BA In the bands 54.25 - 58.2 GHz, 59 - 64 GHz, 116 - 134 GHz, 170 - 182 GHz and 185 - 190 GHz, the use of stations in the aeronautical mobile service is subject to not causing harmful interference to the inter-satellite service (see No. 3442/148).

ANNEX 7

Review of Recommendations Nos. Spa2 - 3, Spa2 - 4 and Spa2 - 5

SUP Recommendation No. Spa2 - 3

Reason: Superseded by draft Recommendations in Annexes 5 and 6 of the present document.

SUP Recommendation No. Spa2 - 4

Reason: All action has been completed by decisions of Committee 5 (See Documents Nos. 394(Rev.2), 449(Rev.1) and 450(Rev.1).

SUP Recommendation No. Spa2 - 5

Reason: All action has been completed by decisions of Committee 5 (See Document No. 390(Rev. 2).

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 670-E
15 November 1979
Original : English

COMMITTEE 5

ELEVENTH REPORT OF WORKING GROUP 5C TO COMMITTEE 5

Subject : Frequency bands 401 - 406 MHz and 406 - 420 MHz

1. Working Group 5C considered all proposals to the bands 401 - 406 MHz and 406 - 420 MHz. It was agreed by a majority to recommend the revised Table appearing in the Annex to this Report to Committee 5 for adoption.

2. A majority decision was taken to allocate the fixed service on a primary basis in the band 401 - 406 MHz. Objections were raised and several delegations reserved their position on this decision. Others reserved their position only in so far as the bands 401 - 403 MHz were concerned.

Malaysia and Thailand reserved their position on footnote 3628A, which they would wish to see without the limiting last sentence.

3. Papua New Guinea reserved its right to come back to its proposal (which was not supported) concerning the EPIRBs in the band 406 - 406.1 MHz.

K. OLMS
Chairman of Working Group 5C

Annex : 1

ANNEX

MHz
401- 420

Region 1	Region 2	Region 3
401 - 402	METEOROLOGICAL AIDS FIXED SPACE OPERATION (Space-to-Earth) Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) Mobile except aeronautical mobile 3628A 3628C	
402 - 403	METEOROLOGICAL AIDS FIXED Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) Mobile except aeronautical mobile 3628A 3629/315 3628C	
403 - 406	METEOROLOGICAL AIDS FIXED Mobile except aeronautical mobile 3628A 3628B 3629/315 3633A	
406 - 406.1	MOBILE-SATELLITE (Earth-to-space) 3634/317A 3635/317B	
406.1 - 410	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 3633A 3531/233B	
410 - 420	FIXED MOBILE except aeronautical mobile	

MOD 3531/233B In making assignments to stations of other services to which the bands [ ], 406.1 - 410 MHz and [ ] MHz are allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

SUP 3628/314

ADD 3628A Different category of service : in Israel, Malaysia and Thailand, the allocation of the band 401 - 406 MHz to the mobile (except aeronautical mobile) service is on a primary basis. Stations of the mobile service shall not cause harmful interference to, or claim protection from, stations operating in accordance with the Table.

ADD 3628B Different category of service : in Australia, Equador, Libya, Papua New Guinea and Thailand, the allocation of the band 403 - 406 MHz to the mobile (except aeronautical mobile) service is on a primary basis.

ADD 3628C Stations in the fixed and mobile services in the band 401 - 403 MHz shall not cause harmful interference to, or claim protection from, the meteorological aids service.

MOD 3629/315 Alternative allocation : in France and the French Overseas Departments and territories in Regions 2 and 3, the band 402 - 406 MHz is allocated to the meteorological aids service on a primary basis.

SUP 3630/315A

SUP 3631/315B

SUP 3632/315C

ADD 3633A Additional allocation : in Canada, the bands 405.5 - 406 MHz and 406.1 - 410 MHz are also allocated to the mobile (except the aeronautical mobile) satellite service (Earth-to-space), on a primary basis, subject to agreement obtained under the procedure set forth in Article N13A.

SUP 3633/316

NOC 3634/317A

MOD 3635/317B Additional allocation : in Austria, Bahrain, Bulgaria, United Arab Emirates, Cameroon, Chile, Ethiopia, Hungary, India, Iran, Iraq, Jordan, Kenya, Kuwait, Liechtenstein, Malaysia, Mongolia, Nigeria, Uganda, the Philippines, Poland, Qatar, Syria, the German Democratic Republic, Rwanda, Singapore, Switzerland, Tanzania, Czechoslovakia, Thailand, the USSR and Yugoslavia, the band 406 - 406.1 MHz is also allocated to the fixed and mobile (except aeronautical mobile) services on a primary basis. Stations in the fixed and mobile service shall not cause interference to or claim protection from the mobile-satellite service (Emergency Position-Indicating Radiobeacon).

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 5

TWELFTH REPORT OF WORKING GROUP 5C TO COMMITTEE 5

Subject : Frequency bands between 420 and 470 MHz

1. Working Group 5C considered all proposals to the bands 420 - 470 MHz. It was agreed by a majority to recommend the revised Table in the Annex to this Report to Committee 5 for adoption.

2. The United States of America reserved their position on the downgrading of the radiolocation service in the bands 420 - 430 MHz and 440 - 450 MHz. They also reserved their position on the introduction of the fixed and mobile services into these bands.

3. China and the USSR reserved their position on the status of the service in footnote 3636/318 which they wished to see as primary and not secondary.

4. With regard to the proposed modification of footnote 3643/320, there were divergent views on whether the needs of the fixed and mobile (except aeronautical mobile) services should be covered by an allocation in the Table or in the footnote. The suggestion that the band 430 - 440 MHz should be allocated separately to these services in Region 3 was not carried, the majority view being that an undivided Table for Regions 2 and 3 should be maintained.

5. Roumania reserved its position on the proposed new footnotes 3646C and 3646E.

K. OLMS
Chairman of Working Group 5C

Annex : 1

A N N E X

MHz
420 - 470

Region 1	Region 2	Region 3
420 - 430	FIXED MOBILE except aeronautical mobile Radiolocation 3640A 3636/318 3640/319	
430 - 440 AMATEUR RADIOLOCATION 3636/318 3643/320 3644/320A 3646/322 3646A 3646B 3646C 3646D 3646E 3645A 3642/319B 3645/321	430 - 440 RADIOLOCATION Amateur 3640B 3642/319B 3643/320 3644/320A 3646C 3636/318	
440 - 450	FIXED MOBILE except aeronautical mobile Radiolocation 3640A 3636/318 3640/319 3641/319A 3640C 3640D	
450 - 460	FIXED MOBILE 3636/318 3641/319A 3638/318B 3639/318C	
460 - 470	FIXED MOBILE Meteorological-satellite (space-to-Earth) 3650/324B 3637/318A 3638/318B 3639/318C	

ADD 3640A Additional allocation : in Australia, the United States of America, Jamaica and the Philippines, the bands 420 - 430 MHz and 440 - 450 MHz are also allocated to the amateur service on a secondary basis.

ADD 3640B Different category of service : in Argentina, Colombia, Cuba and Venezuela, the allocation of the band 430 - 440 MHz to the amateur service is on a primary basis (see No. 3432/141).

MOD 3636/318 Additional allocation : in China, India, the German Democratic Republic and the USSR, the band 420 - 460 MHz is also allocated to the aeronautical radionavigation service (radio altimeters) on a secondary basis.

MOD 3640/319 Different category of service : in Australia, the United States of America, India, Japan and the United Kingdom, the allocation of the bands 420 - 430 MHz and 440 - 450 MHz to the radiolocation service is on a primary basis (see No. 3432/141).

ADD 3640C Additional allocation : in Canada, New Zealand and Papua New Guinea, the band 440 - 450 MHz is also allocated to the amateur service on a secondary basis.

MOD 3641/319A Subject to agreement obtained under the procedure set forth in Article N13A, the band 449.75 - 450.25 MHz may be used for the space operation service (Earth-to-space) and the space research service (Earth-to-space).

MOD 3642/319B Additional allocation : in Brazil, France and the French Overseas Departments in Region 2, and India, the band 433.75 - 434.25 MHz is also allocated to the space operation service (Earth-to-space) on a primary basis until 1 January 1990 and subject to agreement obtained under the procedure set forth in Article N13A. After 1 January 1990, the band 433.75 - 434.25 MHz will be allocated in the same countries to the same services on a secondary basis.

MOD 3643/320 Additional allocation : in Afghanistan, Algeria, Saudi Arabia, Bahrain, Brunei, Burundi, Cameroon, Egypt, the United Arab Emirates, Ecuador, Spain, Ethiopia, Greece, Guinea, India, Indonesia, Iran, Iraq, Ireland, Italy, Jordan, Kenya, Kuwait, Liechtenstein, Libya, Malaysia, Malta, Nigeria, Oman, Pakistan, the Philippines, Qatar, Syria, Singapore, Switzerland, Tanzania, Thailand and Togo, the band 430 - 440 MHz is also allocated to the fixed and mobile (except aeronautical mobile) service on a primary basis.

NOC 3644/320A In the band 435 - 438 MHz, the amateur-satellite service may be authorized, on condition that no harmful interference shall be caused to other services operating in accordance with the Table. Administrations authorizing such use shall ensure that any harmful interference caused by emissions from an amateur satellite is immediately eliminated in accordance with the provisions of No. 6362/1567A.

MOD 3645/321 In the Federal Republic of Germany, Austria, Liechtenstein, Portugal, Switzerland and Yugoslavia, the band 433.05 - 434.79 MHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 433.92 MHz). Radio services operating within this band must accept harmful interference which may be caused by these applications. ISM equipment operating in this band is subject to the provisions of No. 5002A.

ADD 3645A In Region 1, except countries mentioned in 3645/321, the band 433.05 - 434.79 MHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 433.92 MHz). The use of this frequency band for ISM applications shall be subject to special authorization by the Administration concerned, in agreement with other Administrations whose radio services might be affected. In applying this provision, Administrations shall have due regard to the latest CCIR Recommendations.

SUP 3647/323

SUP 3648/324

NOC 3650/324B Earth exploration-satellite service applications, other than the meteorological-satellite service, may also be used in the bands 460 - 470 MHz and 1 690 - 1 700 MHz for space-to-Earth transmissions on condition that no harmful interference is caused to stations operating in accordance with the Table.

MOD 3646/322 Alternative allocation : in Denmark, Norway and Sweden, the bands 430 - 432 MHz and 438 - 440 MHz are allocated to the fixed and mobile except aeronautical mobile services on a primary basis.

ADD 3646A Different category of service : in Denmark, Libya, Norway and Sweden, the allocation of the bands 430 - 432 MHz and 438 - 440 MHz to the radiolocation service is on a secondary basis (see No. 3431/140).

ADD 3646B Additional allocation : in Finland and Libya, the bands 430 - 432 MHz and 438 - 440 MHz are also allocated to the fixed and mobile (except aeronautical mobile) services on a primary basis.

ADD 3646C Additional allocation : in Bulgaria, Chile, Hungary, Israel, Mongolia, Poland, the German Democratic Republic, Czechoslovakia and the USSR, the band 430 - 440 MHz is also allocated to the fixed service on a primary basis.

ADD 3646D Different category of service : in France, the allocation of the band 430 - 434 MHz to the amateur service is on a secondary basis (see No. 3431/140).

ADD 3646E Additional allocation : in Austria and Yugoslavia, the band 438 - 440 MHz is also allocated to the fixed and mobile (except aeronautical mobile) services on a primary basis.

MOD 3637/318A Different category of service : in Afghanistan, Bulgaria, China, Cuba, Hungary, Japan, Poland, Czechoslovakia and the USSR, the allocation of the band 460 - 470 MHz to the meteorological-satellite service (Space-to-Earth) is on a primary basis (see No. 3422/141) and is subject to agreement obtained under the procedure set forth in Article N13A.

NOC 3638/318B Mar2 In the maritime mobile service, the frequencies 457 - 525 MHz, 457 - 550 MHz, 457 - 575 MHz, 467 - 525 MHz, 467 - 550 MHz and 467 - 575 MHz may be used by on-board communication stations. The use of these frequencies in territorial waters may be subject to the national regulations of the Administration concerned. The characteristics of the equipment used shall conform to those specified in Appendix 19A.

NOC 3639/318C Mar2 In the territorial waters of Canada, the United States of America and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457 - 525 MHz, 457 - 550 MHz, 457 - 575 MHz and 457 - 600 MHz paired, respectively, with 467 - 750 MHz, 467 - 750 MHz, 467 - 800 MHz and 467 - 825 MHz. The characteristics of the equipment used shall conform to those specified in Appendix 19A.

ADD 3640D Different category of service : in Canada, the allocation of the band 440 - 450 MHz to the radiolocation service is on a primary basis (see No. 3422/141).

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 672-E
15 November 1979
Original : English

WORKING GROUP 5BA

REPORT OF SUB-WORKING GROUP 5BA11 TO WORKING GROUP 5BA

The Sub-Working Group agreed unanimously to amend the draft Recommendation contained in Document No. 513 as follows :

1) After the considerings add :

recognizing

the provision of No. 3282/117 of the Radio Regulations.

2) Amend as follows :

invites

1. the Administrative Council to take . . . (unchanged).

2. the CCIR to perform the necessary technical studies relating to the Region 2 Broadcasting Conference bearing in mind the allocations to other services in Regions 1 and 3 and the need for sharing criteria.

All other clauses of Document No. 513 remain unchanged.

R.C. DAVIES
Chairman of Sub-Working Group 5BA11

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 673-E
15 November 1979
Original : English

COMMITTEE 5

International Air Transport Association

OBSERVATIONS ON PROPOSALS FOR A REDUCTION OF THE MF/HF EXCLUSIVE AERONAUTICAL MOBILE (R) BANDS

1. Introduction

1.1 In Document No. 25, the Netherlands have proposed a 20 % reduction in certain MF/HF bands allocated exclusively to the aeronautical mobile (R) service.

1.2 A somewhat similar proposal, affecting the MF/HF bands between 5 and 8 MHz allocated exclusively to the aeronautical mobile (R) and (OR) services, has now been presented in Document No. 651.

2. Discussion

2.1 The World Administrative Radio Conference on the Aeronautical Mobile (R) Service (1978) originally intended to satisfy the needs of that service until the year 2000. However, the requirements, especially for Regional and Domestic Air Route Areas (RDARA), far exceeded the available spectrum. Therefore, the 1978 WARC only was able to satisfy requirements until about the year 1990, and, accordingly many requirements went unfilled.

2.2 Any readjustment of the frequency bands concerned in Documents Nos. 25 and 651 will necessitate a complete revision of the newly completed Appendix 27 Aer 2 of the Radio Regulations and will obviate any planning for its implementation already completed by the International Civil Aviation Organization, Administrations and aircraft operating agencies. Further, the proposals for the reduction of the exclusive aeronautical mobile (R) bands addresses those most heavily used and would, in fact, destroy the family of frequencies concept which has been one of the inherent strengths of the MF/HF aeronautical mobile (R) service. The planning for the implementation of Appendix 27 Aer 2 will have well progressed by the time of the convening of a mobile WARC in the early 1980s and any planning thus far accomplished will be negated thereby requiring further planning meetings to effect the implementation of a once again revised Appendix 27 Aer 2. This will only delay the transition from double-sideband to single-sideband in the aeronautical mobile (R) service necessitating the use of the bands concerned even longer than now contemplated.

2.3 The documents referenced above would infer that an aeronautical satellite system will reduce the requirements of that service for use of the MF/HF bands presently allocated. Attention is is drawn to the fact that today the aeronautical mobile (R) service does not have a firm proposal for an aeronautical satellite system and it has been estimated that such a system cannot begin implementation until about mid 1990s. The maritime service has had such a system in being for about three years and has estimated, in Document No. 463, that only about 8,000 out of 110,000 ships will be fitted for satellite operation by the year 2000. Obviously, the aeronautical community, which today has no operational satellite system, will be some years behind the maritime community with respect to full implementation of a world-wide satellite system. Even with the advent of a satellite system for the aeronautical mobile (R) service, MF/HF will be required for a considerable number of years as back-up for the satellite system and for communications coverage in areas not covered by the satellite.

2.4 The Resolutions proposed by the Netherlands and Sweden are premature by at least two decades and should be reserved for some future competent World Administrative Radio Conference after the year 2000 when the requirements of both the aeronautical and maritime communities have been identified with respect to the satellite applications of both services.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 674-E
15 November, 1979
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COMMITTEE 8

NOTE FROM THE CHAIRMAN OF COMMITTEE 5

TO THE CHAIRMAN OF COMMITTEE 8

With reference to Document No. 297, I wish to draw your attention to Annex 7 to Document No. 605, in which Committee 5 has adopted the text 7380/1162, as proposed by Committee 8.

M. HARBI
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 675-E
15 November, 1979
Original: English

COMMITTEE 7

NOTE FROM THE CHAIRMAN OF COMMITTEE 5

TO THE ACTING CHAIRMAN OF COMMITTEE 7

With reference to Document No. 470, I wish to inform you that Committee 5 at its eleventh meeting on 12 November 1979 decided to adopt the terms "Amateur Service" and "Amateur-Satellite Service" without the addition of the word radio before these terms.

M. HARBI
Chairman of Committee 5

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 676-E
15 November 1979
Original : English

COMMITTEE 5

REPORT OF WORKING GROUP 5/AD HOC 6 TO COMMITTEE 5

Subject : a) Earth exploration-satellite service (space-to-Earth) in the band 8 025 - 8 400 MHz

b) Sharing between the inter-satellite service and the radionavigation service in the band 32 - 33 GHz

1. Working Group 5/ad hoc 6 held one meeting on 15 November 1979 from 0900 to 1200 hours in Room XIV. Representatives of the Administrations of Benin, Canada, Federal Republic of Germany, France, Japan, Kenya, the Netherlands, United Kingdom, United States of America, and the USSR were present.

The delegate of Canada did not participate in the discussion of item a).

The delegates of the Netherlands and the USSR did not participate in the discussions of item b).

2. With regard to the allocation of the earth exploration satellite service (space-to-Earth) in Regions I and III, the Working Group agreed unanimously, after some discussion, to submit the new footnote, presented in Annex I, to Committee 5 for consideration. The reference to this footnote, if adopted, should appear in the Table of Allocations for the bands 8 025 - 8 175, 8 175 - 8 215 and 8 215 - 8 400 MHz in Regions I and III.

3. With regard to sharing between the intersatellite service and the radionavigation service in the band 32 - 33 GHz, the Working Group agreed that, at present, there is insufficient information to specify precise sharing criteria and further, that it is not possible to develop such criteria in the time remaining for the business of the 1979 WARC.

The Working Group therefore unanimously agreed to recommend to Committee 5, for their consideration, a footnote and a draft Recommendation.

The footnote, which is presented in Annex 2, is a modification to the new footnote ADD 3807A which presently appears on page 4 of Document No. 595.

The draft Recommendation is presented in Annex 3 of this Report.

H.G. KIMBALL
Chairman of Working Group 5/ad hoc 6

Annexes : 3

ANNEX 1

ADD 3770A Subject to agreement obtained under the procedure set forth in Article N13A, the band 8 025 - 8 400 MHz may be used for the earth exploration satellite service (space-to-Earth) in France, Upper Volta, Italy, Kenya, Japan, Senegal, Sweden and Zaire on a primary basis.

A N N E X 2

ADD 3807A In the planning of systems for the inter-satellite and radionavigation service in the band 32 - 33 GHz Administrations shall take all measures to prevent harmful interference between these two services, bearing in mind the safety aspects of the radionavigation service (see Recommendation No. [AA]).

ANNEX 3

DRAFT RECOMMENDATION No. [ ]

Relating to the Use of the Frequency Band 32 - 33 GHz Shared Between the Inter-Satellite Service and the Radionavigation Service

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the band 32 - 33 GHz is allocated to the inter-satellite service and the radionavigation service;

b) that there are safety aspects associated with the radionavigation service;

c) that footnote 3807A has been incorporated into Article N7/5;

recommends

that, as a matter of urgency, studies should be made of the sharing criteria for these two services in the frequency band listed above;

requests the CCIR

to carry out these studies;

recommends further

that a future competent World Administrative Radio Conference review the Recommendations of the CCIR with a view to the inclusion of such sharing criteria in Article N.26.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 677-E
15 November 1979
Original : English

COMMITTEE 5

Joint report of Working Groups 5BA, 5BB and 5C

USE OF RADIOCOMMUNICATIONS IN THE EVENT OF NATURAL DISASTERS

1. Sub-Working Group 5BA9 considered the proposals concerning the use of radiocommunications at the scene of natural disasters and associated proposals related to the provisions of a safety service allocation as proposed by Papua New Guinea.

2. Working Groups 5BA, 5BB and 5C took note of the report of Sub-Working Group 5BA9 (Document No. 542) and had no objections to the principles outlined therein and recommend the adoption in its revised version contained in the Annex to this document.

Annex : 1

ANNEX

ADD 3499A For the use of the bands allocated to the amateur service at /¯ 3.5 MHz_7 /¯7.0 MHz_7 /¯10.1 MHz_7 /¯14.0 MHz_7 /¯18.068 MHz_7 /¯21.0 MHz_7 and 144 MHz in the event of natural disasters, see Resolution /¯..._7

DRAFT RESOLUTION /¯..._7

Relating to the International Use of Radiocommunications in Frequency Bands Allocated to the Amateur Service in the Event of Natural Disasters

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that in the event of natural disaster normal communication systems are frequently overloaded, damaged, or completely interrupted;

b) that rapid establishment of communication is essential to facilitate world-wide relief actions;

c) that the amateur bands are not bound by international service plans or notification procedures, and are therefore well adapted for short-term use in emergency cases;

d) that international disaster communications would be facilitated by temporary use of certain frequency bands allocated to the amateur service;

e) that under those circumstances the stations of the amateur service, because of their widespread distribution and its demonstrated capacity in such cases, can assist in meeting essential communications needs;

f) that national and regional amateur emergency networks exist that use frequencies throughout the bands allocated to the amateur service;

g) that in the event of a natural disaster direct communication between amateur stations and other stations might also be useful so that vital communications can be carried out until normal communications are restored;

recognizing

that the rights and responsibilities in such cases rest with the Administrations involved;

resolves

1. that it is necessary for Administrations to provide for the needs of international disaster communications in those bands allocated to the amateur service which are specified in No. 3499A;

2. that such use of these bands shall be only for communications in relation to relief operations in connection with natural disasters;

3. that use of specified bands allocated to the amateur service by non-amateur stations for disaster communications shall be limited to the duration of the emergency and for the specific geographical areas as defined by the responsible authority of the affected country;

4. that disaster communications take place within the disaster area and between the disaster area and the permanent location of the organization providing relief;

5. that such communications shall be carried out only with the consent of the Administration of the country in which the disaster has occurred;

6. that relief communications from a source outside the country in which the disaster has occurred shall not replace existing national or international amateur emergency networks;

7. that close cooperation is desirable between amateur stations and the stations of other radio services which may find it necessary to use amateur frequencies in disaster communications;

8. that such international relief communications shall avoid as far as practicable interference to the amateur service networks;

9. that it is necessary for Administrations to provide for the needs of emergency communications within their national regulations.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 678-E
15 November 1979
Original : English

COMMITTEE 6

FINAL REPORT OF AD HOC GROUP 2 OF COMMITTEE 6

1. The terms of reference of the Group, as shown in Document No. DT/150 (Rev.1), involved the examination of all proposals related to the use of the geostationary-satellite orbit and the planning of space services utilizing it.

2. Attendance at meetings of the Group was not restricted and between fifty and sixty delegations were represented at its meetings.

3. Seven meetings of the Group were held allowing twenty hours of discussion on the proposals before the Group.

4. With the agreement of the Group a further twenty hours of consultation was held between the Chairman and representatives from the following delegations, to draft texts for consideration by the Group:

Afghanistan, Algeria, Canada, China, Columbia, the United states of America, Equador, France, India, Iraq, Kenya, Nigeria, the United Kingdom, Somali and the USSR.

5. The following documents were considered by the Group:

57A(Corr.3), 60A(Add.3)(Rev.1), 63A, 82, 93(Add.2), DT/150(Rev.1), 153, 288, 326, 356, 359, 400, 557, Rec. Spa2 - 1.

Of these documents the following have been referred for further study by Working Group 6A as set down in Document No. 648:

57A(Corr.3), 60A(Add.3)(Rev.1), 82, 557, Rec. Spa2 - 1, 356.

6. Referring to Document No. 63A, it was agreed within the Group that an amended version of the proposal URS/63A/114 should be recommended for adoption by Committee 6 and this Resolution is attached as Annex 2. It was acknowledged within the discussion on this Resolution that the plan for the uplinks for broadcasting-satellites operating in the 12 GHz band could conveniently be prepared during the course of the Space Services Conference proposed in the Resolution attached as Annex 1 to this Report. It was also the view of the Group that Annex 2 should, nevertheless, be endorsed by this Conference as a separate Resolution.

7. The main work of the Group, is embodied in the Resolution attached as Annex 1 and comment on the other documents listed in paragraph 5 is unnecessary. The formulation arrived at in Annex 1 represents a compromise between the differing views contained in certain of the documents studied by the Group and also between the often widely diverging views expressed by delegations in attendance at the meetings of the Group.

8. The Working Group commends the Resolutions contained in Annex 1 and Annex 2 for endorsement by Committee 5.

E.J. WILKINSON
Chairman of Ad Hoc Group 2 of Committee 6

Annexes : 2

ANNEX 1

RESOLUTION No.

Relating to the Use of the Geostationary-Satellite Orbit
and to the Planning of Space Services Utilizing it

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the geostationary-satellite orbit and the radio frequency spectrum are limited natural resources and are utilized by space services;

b) that there is a need for equitable access to, and efficient and economical use of, these resources by all countries as provided for in Article 33 of the International Telecommunication Convention, Malaga-Torremolinos, 1973, and Resolution No. Spa2 - 1 of the Radio Regulations;

c) that the utilization of radio frequencies and the geostationary-satellite orbit by individual countries and groups of countries can take place at various points in time, based on their requirements and the availability of the resources at their disposal;

d) that there are growing requirements all over the world for orbital position and frequency assignments for the space services;

e) that attention must be given to relevant technical aspects concerning the special geographical situation of particular countries in relation to the geostationary orbit;

resolves

1. that a World Administrative Radio Conference shall be convened not later than [1984] to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands allocated to space services;

2. that this Conference shall be held in two sessions;

3. that the first session shall

3.1 decide which space services and frequency bands should be planned;

3.2 establish the principles, technical parameters and criteria for the planning, including those for orbit and frequency assignments of the space services and frequency bands identified as per 3.1, taking into account the relevant technical aspects concerning the special geographical situation of particular countries; and provide guidelines for associated regulatory procedures;

3.3 establish guidelines for regulatory procedures in respect of services and frequency bands not covered by 3.2;

./..

3.4 consider other possible approaches that could meet the objective of resolves 1;

4. that the second session shall be held not sooner than twelve months and not later than eighteen months after the first session and implement the decisions taken at the first session;

invites

1. the CCIR to carry out preparatory studies and provide the first session of the Conference with technical information concerning principles, criteria and technical parameters including those required for planning space services;

2. the IFRB to prepare a report on the operation of the procedures of Articles N11 and N13 including information about difficulties which may be reported to the IFRB by Administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to Administrations at least one year before the first session of the Conference;

3. the IFRB to carry out technical preparations for the Conference in accordance with the provisions of the Radio Regulations;

4. the Administrations to examine all aspects of the matter with a view to submitting proposals to the Conference, and to cooperate actively in the above-mentioned work of the CCIR and IFRB;

5. the Administrative Council to take all necessary steps for the convening of the Conference in accordance with this Resolution.

ANNEX 2

RESOLUTION No.

Concerning the drawing up of agreements and of the associated plans for uplinks to broadcasting-satellites operating in the band 12 GHz under the Plan adopted by the World Broadcasting-Satellite Administrative Radio Conference (Geneva, 1977) for Regions 1 and 3 and under the future plan for Region 2

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the geostationary orbit and the frequency bands allocated to the fixed-satellite service should be utilized as efficiently as possible;

b) that the World Broadcasting-Satellite Administrative Radio Conference, 1977, prepared and adopted a Plan for the assignment of frequency channels and orbital positions in the band 11.7 - 12.5 GHz for Region 1 and 11.7 - 12.2 GHz for Region 3;

c) that the World Broadcasting-Satellite Administrative Radio Conference, 1977, adopted a Recommendation on the convening, by 1982, of a Regional Administrative Conference for the preparation of a plan for the assignment of frequency channels and orbital positions for Region 2 in the frequency band 11.7 - 12.2 GHz;

d) that the uplink to broadcasting satellites concerns the fixed-satellite service and the use of the frequency bands on this uplink should be governed by Article N11/9A of the Radio Regulations;

e) that the presence of a large number of broadcasting satellites operating in geostationary orbit positions determined by the above plans will cause considerable difficulties in the coordination of the use of frequency bands on the uplink for the transmission of programmes with systems of the fixed-satellite service,

resolves

1. that the uplinks to broadcasting satellites operating in the bands 11.7 - 12.5 GHz in Region 1 and 11.7 - 12.2 GHz in Regions 2 and 3 shall be organized and operated in the bands [ ] GHz for Region 1 and [ ] GHz for Regions 2 and 3 in accordance with agreements and the associated plans adopted at World or Regional Administrative Conferences in which all Administrations concerned and any Administrations whose services may be affected may participate;

2. that the Administrative Council shall be invited to study the question of convening a World and/or Regional Administrative Conferences as appropriate in order to determine the appropriate date and place of meeting and also the agenda for such conferences;

3. that pending the entry into force of such agreements and relevant plans the Administrations and the IFRB shall apply the procedure prescribed in Article N11/9A for uplinks for the transmission of programmes;

4. that the CCIR should study the most appropriate technical characteristics for uplinks for the transmission of programmes and the method of planning the assignment of frequency channels.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 679(Rev.1)-E
20 November 1979
Original : French

COMMITTEE 7

France and the United Kingdom

DRAFT RECOMMENDATION FOR THE REVISION OF THE REGIONAL ARRANGEMENT FOR MARITIME RADIOBEACONS IN THE EUROPEAN AREA OF REGION 1, PARIS, 1959

Maritime radiobeacons in the European Maritime Area are at present governed by the Regional Arrangement for Maritime Radiobeacons in the European Area of Region 1 (Paris, 1951).

In almost thirty years, the technique and mode of use of radiobeacons obviously have changed a great deal.

Consequently, a revision of the Regional Arrangement concluded in Paris in 1951 is undoubtedly necessary,

For this purpose, a specialized Conference might be convened on the basis of Article 32 of the Malaga-Torremolinos Convention, 1973.

If such a Conference is to make the amendments it deems necessary, it is important that the Radio Regulations should not prove an impediment.

The delegation of France therefore proposes the adoption of the draft Recommendation in the Annex below.

Annex : 1

ANNEX

DRAFT

RECOMMENDATION

Relating to Maritime Radiobeacons

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that maritime radiobeacons in the European Maritime Area are governed by the Regional Arrangement for Maritime Radiobeacons in the European Area of Region 1, Paris, 1951, hereinafter referred to as the "Paris Arrangement, 1951";

b) that the Paris Arrangement, 1951, is based largely on the geographical disposition of radiobeacons as it existed before 1939 and on the state of maritime navigation at that time;

c) that since the conclusion of the Paris Arrangement, 1951, the geographical disposition and certain characteristics of maritime radiobeacons have been changed by bilateral or multilateral agreements, particularly to take into account the changes which have occurred in the habits and rules of maritime navigation in the area in question;

d) that the Paris Arrangement, 1951, is based essentially on the use of aural direction-finding receivers;

e) that for several years there has been a considerable increase in the number of automatic direction-finding receivers which depend solely on the radiobeacon carrier and do not use modulation to separate radiobeacons operating on the same frequency;

f) that it is therefore desirable that, following a review of the technical operating characteristics of maritime radiobeacons to be conducted by a competent World Administrative Conference, a specialized conference should be convened under Article 32 of the Málaga-Torremolinos Convention, 1973, in order to revise the Paris Arrangement, 1951;

g) that this review should concern both the extent of the area covered by the Arrangement and the technical characteristics and field-strength value of the service range, the adjacent channel separation, the modulation depth and any other provision deemed necessary;

noting

– the existence in Chapter NVIII of the Radio Regulations, Article N33, Section IV, point C "Maritime Radiobeacons", of Provisions 6482/458-6488/464;

– the existence in Chapter NIII, Article N7, Section 1, of No. 3424/134 which defines the European Maritime Area;

recommends

1. that the Administrations concerned examine the question of the limits of the area covered by the Arrangement and submit relevant proposals to the next competent World Administrative Radio Conference;

2. that all Administrations and the CCIR study as a matter of urgency the technical characteristics of maritime radiobeacons and submit their conclusion to the next competent World Administrative Radio Conference;

3. that the next competent World Administrative Radio Conference contemplate a modification of the relevant Articles of the Radio Regulations;

invites

the Administrative Council to arrange for questions relating to maritime radiobeacon stations, which are of interest to the mobile services, to be included in the agenda of the next competent World Administrative Radio Conference on the mobile services;

requests the Secretary-General

to communicate this Recommendation to IMCO and IALA.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 679-E
15 November 1979
Original : French

COMMITTEE 7

France

DRAFT RECOMMENDATION FOR THE REVISION OF THE REGIONAL ARRANGEMENT FOR MARITIME RADIOBEACONS IN THE EUROPEAN AREA OF REGION 1, PARIS, 1959

Maritime radiobeacons in the European Maritime Area are at present governed by the Regional Arrangement for Maritime Radiobeacons in the European Area of Region 1 (Paris, 1951).

In almost thirty years, the technique and mode of use of radiobeacons obviously have changed a great deal.

Consequently, a revision of the Regional Arrangement concluded in Paris in 1951 is undoubtedly necessary,

For this purpose, a specialized Conference might be convened on the basis of Article 32, paragraph 129, of the Malaga-Torremolinos Convention, 1973.

If such a Conference is to make the amendments it deems necessary, it is important that the Radio Regulations should not prove an impediment.

The delegation of France therefore proposes the adoption of the draft Recommendation in the Annex below.

Annex : 1

ANNEX

DRAFT

RECOMMENDATION

Relating to Maritime Radiobeacons

The World Administrative Radio Conference, Geneva, 1979,

considering

— that maritime radiobeacons in the European Maritime Area are governed by the Regional Arrangement for Maritime Radiobeacons in the European Area of Region 1, Paris, 1951, hereinafter referred to as the "Paris Arrangement, 1951";

— that the Paris Arrangement, 1951, is based largely on the geographical disposition of radiobeacons as it existed before 1939 and on the state of maritime navigation at that time;

— that since the conclusion of the Paris Arrangement, 1951, the geographical disposition and certain characteristics of maritime radiobeacons have been changed by bilateral or multilateral agreements, particularly to take into account the changes which have occurred in the habits and rules of maritime navigation in the area in question;

— that the Paris Arrangement, 1951, is based essentially on the use of aural direction-finding receivers;

— that for several years there has been a considerable increase in the number of automatic direction-finding receivers which depend solely on the radiobeacon carrier and do not use modulation to separate radiobeacons operating on the same frequency;

— that it is therefore desirable for a specialized Conference to be convened on the basis of Article 32, paragraph 129, of the Malaga-Torremolinos Convention, 1973, in order to revise the Paris Arrangement, 1951,

-- that this revision should concern both the extent of the area covered by the Arrangement and the technical characteristics and field-strength value of the service range, the adjacent channel separation, the modulation depth and any other provision deemed necessary;

noting

— the existence in Chapter NVIII of the Radio Regulations, Article N33, Section IV, point C "Maritime Radiobeacons", of Provisions 6482/458-6488/464;

— the existence in Chapter NIII, Article N7, Section 1, of No. 3424/134 which defines the European Maritime Area;

— the fact that these numbers concern the limits of the area to which the provisions of the Paris Arrangement, 1951, apply, or the characteristics of maritime radiobeacons, and that the Conference convened to revise the Paris Arrangement, 1951, may have to request their amendment;

recommends

that the next competent World Administrative Radio Conference should consider the results of the future Conference called to revise the Paris Arrangement, 1951, with a view to introducing, if necessary, the proposed amendments in the relevant provisions of the Radio Regulations;

invites

the Administrative Council to ensure that questions relating to maritime radiobeacons, which are of interest to the mobile services, are included in the agenda of the next World Administrative Radio Conference dealing with the mobile services.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 680-E
16 November 1979
Original : English

COMMITTEE 5

SIXTEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands 10 - 11.7 GHz and 13.25 - 14.3 GHz

Frequency bands between 10 and 11.7 GHz

1. All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. The delegation of France reserved the right to come back to the provisions of No. 3783B in Committee 5.

3. The discussions and the results thereof on allocations to the fixed-satellite service for the feeder link of the broadcasting-satellite service in the bands 10.7 - 11.7 GHz, 14.5 - 15.35 GHz, and 17.3 - 18.1 GHz are contained in the twenty-sixth report of Working Group 5D to Committee 5.

Frequency bands between 13.25 and 14.3 GHz

4. All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

5. The delegation of Algeria reserved the right to come back in Committee 5 to the allocation of the band 14 - 14.25 GHz to the fixed-satellite service (space-to-Earth) in Region 1.

6. The delegation of France and the United States of America reserved the right to come back to the provisions of No. 3794B in Committee 5.

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 2

A N N E X 1

GHz
10 - 10.68

Allocation to Services		
Region 1	**Region 2**	**Region 3**
10 - 10.45	RADIOLOCATION Amateur 3779/401A 3780/402	
10.45 - 10.5	RADIOLOCATION Amateur Amateur-satellite 3780/402	
10.5 - 10.55 FIXED MOBILE Radiolocation	10.5 - 10.55 FIXED MOBILE RADIOLOCATION	
10.55 - 10.6	FIXED MOBILE except aeronautical mobile Radiolocation	
10.6 - 10.68	EARTH EXPLORATION-SATELLITE [(Passive)] FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH [(Passive)] Radiolocation 3531A [3783B]	

GHz
10.68 - 11.7

Region 1	Region 2	Region 3
10.68 - 10.7	EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) 3784/405B 3784B	
10.7 - 10.95	FIXED FIXED-SATELLITE (space-to-Earth) /¯(Earth-to-space)_7 MOBILE except aeronautical mobile /¯3784A_7	
10.95 - 11.2 FIXED FIXED-SATELLITE (Space-to-Earth) /¯(Earth-to-space)_7 /¯3784A 3784AA_7 MOBILE except aeronautical mobile	10.95 - 11.2 FIXED FIXED-SATELLITE (space-to-Earth) /¯3784A_7 MOBILE except aeronautical mobile	
11.2 - 11.7	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile /¯3784A_7	

MOD 3779/401A The band 9 975 - 10 025 MHz is also allocated to the meteorological-satellite service for use by weather radars on a secondary basis.

MOD 3780/402 Additional allocation : in Afghanistan, Algeria, the Federal Republic of Germany, Saudi Arabia, Austria, Bangladesh, Benin, China, the Republic of Korea, Costa Rica, Ivory Coast, Spain, Finland, Gabon, Guatemala, India, Indonesia, Iran, Iraq, Israel, Jamaica, Japan, Malaysia, Malta, Mauritania, Nepal, Pakistan, Philippines, Portugal, Senegal, Singapore, Somalia, Sudan, Sweden, Thailand and Togo, the band 10 - 10.5 GHz is also allocated to the fixed and mobile services on a primary basis.

SUP 3781/403

SUP 3782/404

SUP 3783/404A

ADD 3531A In making assignments to stations of other services to which the band 10.6 - 10.68 GHz is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space or airborne stations can be particularly serious sources of interference to the radio astronomy service. (See Nos. 3280/116 and 3281/116A and Article N33A).

ADD 3783B In the band 10.6 - 10.68 GHz the fixed and mobile services are limited to a maximum equivalent radiated power of /‾35/40_/ dBW and the power delivered to the antenna shall not exceed /‾-3_/ dBW. These limits may be exceeded subject to agreement obtained under the procedure set forth in Article N13A. However, in /‾Algeria, the Federal Republic of Germany, Saudi Arabia, Australia, Cameroon, Chile, China, Denmark, Spain, Finland, France, Greece, India, Indonesia, Iran, Iraq, Japan, Nigeria, Pakistan, Papua New Guinea, Netherlands, Portugal, Singapore, Syria, the United Kingdom, Thailand and Turkey,_/ the restrictions to the fixed and mobile (except aeronautical mobile) services are not applicable.

MOD 3784/405B Additional allocation : in Saudi Arabia, Bulgaria, Cameroon, China, Colombia, the Republic of Korea, Costa Rica, Cuba, Egypt, Ecuador, Hungary, Iran, Iraq, Israel, Japan, Kuwait, Lebanon, Mongolia, Pakistan, Poland, Qatar, the German Democratic Republic, Roumania, Czechoslovakia, and Yugoslavia, the band 10.68 - 10.7 GHz is also allocated to the fixed service and to the mobile (except aeronautical mobile) service on a primary basis. Such use is limited to equipment operating on or before 1 January 1985.

ADD 3784B All emissions in the band 10.68 - 10.7 GHz are prohibited, except for those under the provisions of No. 3784/405B. The use of passive sensors by other services is also authorized.

/‾ADD 3784A In the bands 10.7 - 11.7 GHz the fixed-satellite service (Earth-to-space) is intended solely for feeder links of the broadcasting-satellite service._/

/‾ADD 3784AA In the band 10.95 - 11.2 GHz the fixed-satellite service (Earth-to-space) is provided in Region 1 solely for the connection with broadcasting-satellites._/

ANNEX 2

GHz
13.25 - 14.3

<table>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>13.25 - 13.4</td><td colspan="2">AERONAUTICAL RADIONAVIGATION

3791/406 3793/407A 3793A</td></tr>
<tr><td>13.4 - 14</td><td colspan="2">RADIOLOCATION

Standard frequency and time signal-satellite [(Earth-to-space)]

Space research

3675A 3793A 3794D 3798/409</td></tr>
<tr><td>14 - 14.25

FIXED-SATELLITE (Earth-to-space) [(Space-to-Earth)]

[RADIONAVIGATION] [3795/408A]

Space research

3795C 3794B
[3795A] [3789A]</td><td colspan="2">14 - 14.25

FIXED-SATELLITE (Earth-to-space)

[RADIONAVIGATION] [3795/408A]

Space research

3795C 3794B
[3795A] [3789A]</td></tr>
<tr><td>14.25 - 14.3</td><td colspan="2">FIXED-SATELLITE (Earth-to-space) [3789A]

[RADIONAVIGATION] [3795/408A]

Space research

3795B 3795C 3795D
[3795A] 3794B</td></tr>
</table>

MOD 3791/406 The aeronautical radionavigation service in the band 13.25 - 13.4 GHz is limited to Doppler navigation aids.

SUP 3792/407 Only in the bands 13.25 - 13.5 GHz and 14.175 - 14.3 GHz.

MOD 3793/407A Subject to agreement obtained under the procedure set forth in Article N13A, the band 13.25 - 13.4 GHz may also be used in the space research service (Earth-to-space) on a secondary basis.

ADD 3793A Additional allocation : in India and Pakistan, the band 13.25 - 14 GHz is also allocated to the fixed service on a primary basis.

SUP 3794/408 Only in the band 13.4 - 14 GHz.

ADD 3794D Additional allocation : in Afghanistan, Algeria, Saudi Arabia, Bangladesh, Cameroon, Republic of Korea, Finland, Gabon, Indonesia, Iran, Iraq, Israel, Jordan, Kuwait, Mali, Malaysia, Malta, Morocco, Mauritania, Pakistan, Qatar, Senegal, Sweden, Singapore, Sudan, Thailand and Tunisia, the band 13.4 - 14 GHz is also allocated to the fixed and mobile services on a primary basis.

MOD 3798/409 Additional allocation : in Austria, Bulgaria, Spain, Hungary, Japan, Mongolia, Poland, the German Democratic Republic, Roumania, the United Kingdom, Czechoslovakia and the USSR, the band 13.4 - 14 GHz is also allocated to the radionavigation service on a primary basis.

ADD 3675A In the bands 1 215 - 1 300 MHz, 3 100 - 3 300 MHz, 5 250 - 5 350 MHz, 8 550 - 8 650 MHz, 9 500 - 9 800 MHz and 13.4 - 14 GHz, radiolocation stations installed on spacecraft may also be employed for the Earth exploration-satellite and space research services on a secondary basis.

SUP 3793/407A

ADD 3794B The band 14 - 14.5 GHz is also allocated to the mobile-satellite service (Earth-to-space) on a secondary basis. Such use is limited to /_ transportable Earth stations _/.

MOD 3795/408A /_ The use of the bands 14 - 14.3 GHz /_ and 14.3 - 14.4 GHz _/ by the radionavigation service /_ and radionavigation-satellite service respectively, _/ shall be such as to provide sufficient protection to space stations of the fixed-satellite service (see Recommendation No. /_ Spa2 - 15, paragraph 2.14 _/). _/

ADD 3795C Additional allocation : in Afghanistan, Algeria, Saudi Arabia, Australia, Cameroon, China, Republic of Korea, Gabon, Guatemala, India, Indonesia, Iraq, Israel, Japan, Jordan, Malaysia, Malta, Morocco, Mauritania, Pakistan, Philippines, Syria, Senegal, Singapore and Thailand, the band 14 - 14.3 GHz is also allocated to the fixed service on a primary basis.

ADD 3795B Additional allocation : in the Federal Republic of Germany, Austria, Denmark, Spain, Finland, France, Greece, Ireland, Iceland, Italy, Norway, the Netherlands, Portugal, the United Kingdom, Sweden, Switzerland and Turkey, the band 14.25 - 14.3 GHz is also allocated to the fixed service on a primary basis.

ADD 3795D Additional allocation : in Japan, Pakistan and the United Kingdom, the band 14.25 - 14.3 GHz is also allocated to the mobile (except aeronautical mobile) service on a primary basis.

/ ADD 3795A Radionavigation devices operating on 1 January 1980 in the band 14 - 14.3 GHz, in accordance with Recommendation No. / Spa2 - 15, paragraph 2.14 /, may continue to do so. /

/ ADD 3789A No feeder links are authorized in the bands 12.5 - 12.75 GHz, 14 - 14.5 GHz in Region 1 and 12.75 - 13.25 GHz in the three Regions. /

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COMMITTEE 5

SEVENTEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands 1 700 - 1 710 MHz and 17.7 - 19.7 GHz

Frequency band between 1 700 and 1 710 MHz

All proposals relating to this band were considered and the Working Group decided unanimously to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. Frequency bands between 17.7 and 19.7 GHz

All proposals relating to these bands were considered and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

3. The delegations of Brazil, Canada and the United States of America reserved the right to come back in Committee 5 to the allocation to passive services in the band 18.6 - 18.8 GHz.

4. The discussions and the results thereof on allocations to the fixed-satellite service for the feeder link of the broadcasting-satellite service in the bands 10.7 - 11.7 GHz, 14.5 - 15.35 GHz, and 17.3 - 18.1 GHz are contained in the twenty-sixth report of Working Group 5D to Committee 5.

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 2

ANNEX 1

MHz
1 700 - 1 710

Region 1	Region 2	Region 3
1 700 - 1 710 FIXED METEOROLOGICAL-SATELLITE (Space-to-Earth) Mobile except aeronautical mobile 3650/324B 3679A	1 700 - 1 710 FIXED METEOROLOGICAL-SATELLITE (Space-to-Earth) MOBILE except aeronautical mobile 3701AAA 3650/324B 3679A	

ADD 3701AAA Additional allocation : in India, Indonesia, Japan and Thailand, the band 1 700 - 1 710 MHz is also allocated to the space research service (space-to-Earth) on a primary basis.

MOD 3650/324B Earth exploration-satellite service applications, other than the meteorological-satellite service, may also be used in the bands /‾460 - 470 MHz and_7 1 690 - 1 710 MHz for space-to-Earth transmissions on condition that no harmful interference is caused to stations operating in accordance with the Table.

ADD 3679A In the bands 1 400 - 1 727 MHz, /‾101 - 120 GHz and 197 - 220 GHz_7, passive research is being conducted by some countries in a programme for the search for intentional emissions of extra-terrestrial origin.

SUP 3701/354D

ANNEX 2

GHz
17.7 - 19.7

Region 1	Region 2	Region 3
17.7 - 18.6	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 3799A	
18.6 - 18.8 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE except aeronautical mobile Earth exploration-satellite (Passive) Space research (Passive)	18.6 - 18.8 EARTH EXPLORATION-SATELLITE (Passive) FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE except aeronautical mobile SPACE RESEARCH (Passive)	18.6 - 18.8 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE except aeronautical mobile Earth exploration-satellite (Passive) Space research (Passive)
18.8 - 19.7	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	

3799A The frequency band 18.1 to 18.3 GHz is also allocated to the meteorological-satellite service (Space-to-Earth) on a primary basis and is limited for use by geostationary satellites only and shall operate in accordance with provisions of No. 6076/470NY.

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COMMITTEE 5

EIGHTEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands between 19.7 and 22 GHz

1. All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in the Annex.

2. The delegation of the United Kingdom reserved the right to come back to the allocations in the bands 19.7 - 21.2 GHz and to footnote ADD 3800M in Committee 5.

Dr. B.S. RAO
Chairman of Working Group 5D

Annex : 1

A N N E X

GHz
19.7 - 22

Region 1	Region 2	Region 3
19.7 - 20.2	FIXED-SATELLITE (Space-to-Earth) Mobile-satellite (Space-to-Earth) 3800M	
20.2 - 21.2	FIXED-SATELLITE (Space-to-Earth) MOBILE-SATELLITE (Space-to-Earth) Standard frequency-satellite (Space-to-Earth) 3800M	
21.2 - 21.4	EARTH EXPLORATION-SATELLITE (Passive) FIXED MOBILE SPACE RESEARCH (Passive)	
21.4 - 22	FIXED MOBILE	

ADD 3800M Additional allocation : in Afghanistan, Algeria, Saudi Arabia, Austria, Bahrain, Brazil, Cameroon, Central African Republic, China, Congo, the Republic of Korea, the United Arab Emirates, Gabon, Guinea, India, Indonesia, Iran, Iraq, Israel, Japan, Kuwait, Malaysia, Mali, Mauritania, Nepal, Pakistan, Qatar, Singapore, Sudan, Chad and Thailand, the band 19.7 - 21.2 GHz is also allocated to the fixed and mobile services on a primary basis. This additional use shall not impose any limitation on the power flux-density of space stations in the fixed-satellite service.

SUP 3800/409E Only in the band 19.7 - 21.2 GHz.

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COMMITTEE 5

NINETEENTH REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands between 1 790 and 2 290 MHz as well as between 2 500 and 2 655 MHz.

1. Frequency band between 1 790 and 2 290 MHz

All proposals relating to this band were considered, and the Working Group decided unanimously to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. Frequency bands between 2 500 and 2 655 MHz

All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

3. The delegations of Iraq, Jordan, Qatar, Syria and Sudan reserved the right to come back to the allocation of the mobile (except aeronautical mobile) service in the band 2 500 - 2 655 MHz.

4. The delegation of France reserved the right to come back to provision ADD 3707C in Committee 5.

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 2

ANNEX 1

MHz
1 790 - 2 290

Region 1	Region 2	Region 3
1 790 - 2 290 FIXED Mobile 3707A 3707B 3707C 3701A 3701AA	1 790 - 2 290 FIXED MOBILE 3703/356A 3707A 3707B 3707D 3707C 3701A 3701AA	

MOD 3703/356A Subject to agreement obtained under the procedure set forth in Article N13A, the band 1 750 - 1 850 MHz may also be used for space operation (Earth-to-space) and space research (Earth-to-space) services in Region 2, Afghanistan, Australia, India, Indonesia, Japan and Thailand.

ADD 3701A In Brazil, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Guyana, India, Iran, Nigeria, Papua New Guinea, Sudan, Tanzania and Venezuela, the band 1 700 - 1 900 MHz is also used for transhorizon radio-relay systems (troposcatter) in the fixed and land mobile services.

ADD 3701AA In Angola, Cape Verde, China, Republic of Korea, Ecuador, Spain, Indonesia, Iraq, Malaysia, Syria and Thailand, the band 1 710 - 2 350 MHz is also used for transhorizon radio-relay systems (troposcatter) in the fixed service.

SUP 3702/356

SUP 3705/356AB

SUP 3706/356ABA

SUP 3707/356AC

ADD 3707A Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 025 - 2 110 MHz may also be used for Earth-to-space and space-to-space transmissions in the space research, space operation and Earth exploration-satellite services. The services using space-to-space transmissions shall operate in accordance with the provisions of Nos. 6055/470NE to 6058/470NGA and shall not cause harmful interference to the other space services.

ADD 3707B Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 110 - 2 120 MHz may also be used for Earth-to-space transmissions in the space research (deep space) service.

ADD 3707D Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 110 - 2 120 MHz may also be used in Japan for space research (Earth-to-space) and space operation (Earth-to-space) services until 31 December 1990.

ADD 3707C Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 200 - 2 290 MHz may also be used for space-to-Earth and space-to-space transmissions in the space research, space operations and Earth exploration-satellite services. These services shall operate in accordance with the provisions of Nos. 6055/470NE to 6058/470NGA; the space-to-space transmissions shall not cause harmful interference to the other space services.

ANNEX 2

MHz
2 500 - 2 655

Region 1	Region 2	Region 3
2 500 - 2 655 FIXED 3721/364C MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B	2 500 - 2 655 FIXED 3721/364C FIXED-SATELLITE (Space-to-Earth) 3723/364E MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B	2 500 - 2 535 FIXED 3721/364C FIXED-SATELLITE (Space-to-Earth) 3723/364E MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B 3724/364F 3723B
		2 535 - 2 655 FIXED 3721/364C MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B
3713/361 3716/362 3724/364F 3717/363 3718/364 3680D	3714/361A 3680D	3724/364F 3680D

MOD 3713/361 Alternative allocation: In France, the band 2 450 - 2 550 MHz is allocated on a primary basis to the radiolocation service and on a secondary basis to the fixed and mobile services. Such use is subject to agreement with the Administrations having services operating or planned to operate in accordance with the Table, which may be affected.

ADD 3723B Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 500 - 2 535 MHz may also be used in Region 3 for the mobile (except aeronautical mobile) satellite (space-to-Earth) service for operation limited to within national boundaries.

MOD 3714/361A Additional allocation: in Canada, the band 2 500 - 2 550 MHz is also allocated to the radiolocation service on a primary basis.

MOD 3715/361B The use of the band 2 500 - 2 690 MHz by the broadcasting-satellite service is limited to domestic and regional systems for community reception and such use shall be subject to agreement obtained under the procedure set forth in Article N13A. The power flux-density at the Earth's surface shall not exceed the values given in Nos. 6059/470NH to 6062/470NK.

MOD 3716/362 Additional allocation : In the United Kingdom, the band 2 500 - 2 600 MHz is also allocated to the radiolocation service on a secondary basis.

MOD 3717/363 Alternative allocation : In the Federal Republic of Germany, Austria and Greece, the band 2 500 - 2 690 MHz is allocated to the fixed service on a primary basis.

NOC 3721/364C When planning new tropospheric scatter radio-relay links in the band 2 500 - 2 690 MHz, all possible measures shall be taken to avoid directing the antennae of these links towards the geostationary satellite orbit.

MOD 3723/364E The use of the band 2 500 - 2 690 MHz in Region 2 and 2 500 - 2 535 MHz and 2 655 - 2 690 MHz in Region 3 by the fixed-satellite service is limited to domestic and regional systems and such use shall be subject to agreement obtained under the procedure set forth in Article N13A. In the direction space-to-Earth, the power flux-density at the Earth's surface shall not exceed the values given in No. /̅ 6055/470NE /̲.

MOD 3724/364F Alternative allocation : In Bulgaria, Iran and the USSR, the band 2 500 - 2 690 MHz is allocated to the fixed service and the mobile (except aeronautical mobile) service on a primary basis.

ADD 3680D The bands 1 370 - 1 400 MHz, 2 640 - 2 655 MHz, 4 950 - 4 990 MHz, 6 725 - 7 250 MHz and 15.2 - 15.35 GHz are also allocated to the space research (passive) and Earth exploration-satellite (passive) services on a secondary basis.

MOD 3718/364 Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 500 - 2 690 MHz may be used for tropospheric scatter systems in Region 1.

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COMMITTEE 5

TWENTIETH AND TWENTY-FIRST REPORT
OF WORKING GROUP 5D TO COMMITTEE 5

Subject : Frequency bands between 1 530 and 1 660.5 MHz.

1. All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. The representative of the USSR expressed his delegation's reservation concerning the retention of footnote 3687/352B.

Dr. B.S. RAO
Chairman of Working Group 5D

Annex : 1

ANNEX 1

MHz
1 530 - 1 660.5

Allocation to Services		
Region 1	Region 2	Region 3
1 530 - 1 535 SPACE OPERATION (Space-to-Earth) FIXED MARITIME MOBILE-SATELLITE (Space-to-Earth) Earth exploration-satellite Mobile except aeronautical mobile 3683/350C 3679A 369	1 530 - 1 535 SPACE OPERATION (Space-to-Earth) MARITIME MOBILE-SATELLITE (Space-to-Earth) Earth exploration-satellite Fixed Mobile 3680C 3679A 3695C	1 530 - 1 535 SPACE OPERATION (Space-to-Earth) FIXED MARITIME MOBILE-SATELLITE (Space-to-Earth) Earth exploration-satellite Mobile 3680C 3683/350C 3679A 3695C
1 535 - 1 544	MARITIME MOBILE-SATELLITE (Space-to-Earth) 3688/352D 3679A	
1 544 - 1 545	AERONAUTICAL MOBILE-SATELLITE (R) (Space-to-Earth) MARITIME MOBILE-SATELLITE (Space-to-Earth) 3688/352D 3695A 3679A	
1 545 - 1 559	AERONAUTICAL MOBILE-SATELLITE (R) (Space-to-Earth) 3685/352 3688/352D 3691/352G 3679A	
1 559 - 1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION SATELLITE (Space-to-Earth) 3685/352 3688/352D 3679A 3695B	
1 610 - 1 626.5	AERONAUTICAL RADIONAVIGATION 3685/352 3686/352A 3687/352B 3688/352D 3695/352K 3679A	
1 626.5 - 1 645.5	MARITIME MOBILE-SATELLITE (Earth-to-space) 3685/352 3688/352D 3679A	

MHz
1 530 - 1 660.5 (cont.)

Region 1	Region 2	Region 3
1 645.5 - 1 646.5	AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space) MARITIME MOBILE-SATELLITE (Earth-to-space) 3685/352 3688/352D 3695A 3679A	
1 646.5 - 1 660	AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space) 3685/352 3688/352D 3694/352J 3679A	
1 660 - 1 660.5	AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space) RADIO ASTRONOMY 3695D 3694/352J 3679A	

SUP 3681/350A

SUP 3682/350B

MOD 3683/350C Different category of service : in Saudi Arabia, Bahrain, Bulgaria, Egypt, the United Arab Emirates, France, Hungary, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Mongolia, Morocco, Oman, Poland, Qatar, the German Democratic Republic, Roumania, Czechoslovakia, Thailand, the USSR, the PDR of Yemen and Yugoslavia, the allocation of the band 1 525 - 1 535 MHz to the mobile, except aeronautical mobile service is on a primary basis (see No. 3432/141).

SUP 3684/350D

ADD 3679A In the bands 1 400 - 1 727 MHz, [101 - 120 GHz and 197 - 220 GHz], passive research is being conducted by some countries in a programme for the search for intentional emissions of extra-terrestrial origin.

ADD 3680C In Region 2 in Australia and in Papua New Guinea the use of the band 1 435 - 1 535 MHz by the aeronautical mobile service for telemetering purposes has priority over other uses by the mobile services.

MOD 3685/352 Additional allocation : in Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the USSR, the band 1 550 - 1 660 MHz is also allocated to the fixed service on a primary basis.

MOD 3686/352A The bands 1 610 - 1 626.5 MHz and 5 000 - 5 250 MHz are reserved on a world-wide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based or satellite-borne facilities. Such use and development is subject to agreement obtained under the procedure set forth in Article N13A.

MOD 3687/352B The bands 1 610 - 1 626.5 MHz, 5 000 - 5 250 MHz and 15.4 - 15.7 GHz are also allocated to the aeronautical mobile-satellite (R) service on a primary basis. Such use is subject to agreement obtained under the procedure set forth in Article N13A.

MOD 3688/352D Additional allocation : in Austria, Indonesia, the Federal Republic of Germany and Thailand, the band 1 540 - 1 660 MHz is also allocated to the fixed service on a primary basis.

SUP 3689/352E

SUP 3690/352F

MOD 3691/352G Transmissions in the band 1 545 - 1 559 MHz from terrestrial aeronautical stations directly to aircraft stations, or between aircraft stations, in the aeronautical mobile (R) service are also authorized when such transmissions are used to extend or supplement the satellite-to-aircraft links.

SUP 3692/352H

SUP 3693/352I

MOD 3694/352J Transmissions in the band 1 646.5 - 1 660.5 MHz from aircraft stations in the aeronautical mobile (R) service directly to terrestrial aeronautical stations, or between aircraft stations, are also authorized when such transmissions are used to extend or supplement the aircraft-to-satellite links.

ADD 3695E The band 1 610.6 - 1 613.8 MHz is also allocated to the radio astronomy service on a secondary basis for spectral line observations. In making assignments to other services to which the band is allocated, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see No. 3280/116 and 3281/116A and Article N33A).

ADD 3695A The use of the bands 1 544 - 1 545 MHz (Space-to-Earth) and 1 645.5 - 1 646.5 (Earth-to-space) by the aeronautical mobile-satellite and maritime mobile-satellite services is limited to distress and safety operations. The bands are also allocated to the land mobile-satellite service on a primary basis for the same use.

ADD 3695B Alternative allocation : in Sweden, the band 1 590 - 1 610 MHz is allocated to the aeronautical radionavigation service on a primary basis.

ADD 3695C The allocation to the maritime mobile-satellite service in the band 1 530 - 1 535 MHz shall be effective from 1 January 1990. From this date the fixed service will be on a secondary basis.

ADD 3695D In making assignments to stations of other services to which the band 1 660 - 1 660.5 MHz is allocated, Administrations are urged to take all practical steps to protect the radio astronomy service from harmful interference. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

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Spanish

COMMITTEE 5

TWENTY-SECOND REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands 22 - 23.6 GHz; 25.25 - 27.5 GHz; 34.2 - 35.2 GHz; 36 - 40 GHz.

1. Frequency bands between 22 and 23.6 GHz

All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. The delegation of France reserved the right to come back in Committee 5 to footnotes relating to the radio astronomy service in the band 22.01 - 22.28 GHz.

3. The delegations of Australia, Canada and the United States of America reserved the right to come back to allocations of the band 22.21 - 22.5 GHz to Earth-exploration-satellite (passive) and space research (passive) services on a secondary basis.

4. Frequency bands between 25.25 and 27.5 GHz

All proposals relating to these bands were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

5. Frequency band between 34.2 and 35.2 GHz

All proposals relating to this band were considered, and the Working Group decided unamimously to recommend the adoption of the revised Table and the revised provisions as given in Annex 3.

6. Frequency bands between 36 and 40 GHz

All proposals relating to these bands, as well as the Note of the Chairman of Working Group 5E to the Chairman of Working Group 5D were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 4.

7. The delegation of the United Kingdom reserved the right to come back in Committee 5 to the allocation of the band 36 - 37 GHz to Earth-exploration-satellite and space research services on a primary basis.

8. The Working Group decided to suppress footnotes 3801/410A, 3792/407, 3805/412 and 3809/412D.

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 4

A N N E X 1

GHz
22 - 23.6

Allocation to Services		
Region 1	Region 2	Region 3
22 - 22.21	FIXED MOBILE except aeronautical mobile 3801A	
22.21 - 22.5	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY [Earth-exploration-satellite (passive)] [Space research (passive)] 3801A 3801B	
22.5 - 22.55 FIXED MOBILE	22.5 - 22.55 BROADCASTING-SATELLITE 3802/410B FIXED MOBILE 3801C	
22.55 - 23 FIXED INTER-SATELLITE MOBILE 3801D	22.55 - 23 BROADCASTING-SATELLITE 3802/410B FIXED INTER-SATELLITE MOBILE 3801D 3801C	
23 - 23.55	FIXED INTER-SATELLITE MOBILE 3801E	
23.55 - 23.6	FIXED MOBILE	

ADD 3801A In making assignments to services, Administrations are urged to take all practicable steps to protect the spectral line observations of the radio astronomy service from harmful interference in the band 22.01 - 22.28 GHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see also No. 3280/116 and 3281/116A and Article N33A).

ADD 3801B In making assignments to services, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference in the band 22.21 - 22.5 GHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see also No. 3280/116 and 3281/116A and Article N33A).

SUP 3801/410A

ADD 3801C Additional allocation : in Japan, the band 22.5 - 23 GHz is also allocated to the broadcasting service on a primary basis.

ADD 3801D In making assignments to services, Administrations are urged to take all practicable steps to protect the spectral line observations of the radio astronomy service from harmful interference in the band 22.81 - 22.86 GHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see also No. 3280/116 and 3281/116A and Article N33A).

MOD 3802/410B In Regions 2 and 3, the broadcasting-satellite service is authorized in the band 22.5 - 23.0 GHz, subject to power flux density limits for the protection of the terrestrial services in this band.

ADD 3801E In making assignments to services, Administrations are urged to take all practicable steps to protect the spectral line observations of the radio astronomy service from harmful interference in the band 23.07 - 23.12 GHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see also No. 3280/116 and 3281/116A and Article N33A).

ANNEX 2

GHz
25.25 - 27.5

Region 1	Region 2	Region 3
25.25 - 27	FIXED MOBILE Earth exploration-satellite (Space-to-space) Standard frequency and time signal satellite (Earth-to-space)	
27 - 27.5 FIXED MOBILE Earth exploration-satellite (Space-to-space)	27 - 27.5 FIXED FIXED SATELLITE (Earth-to-space) MOBILE Earth exploration-satellite (Space-to-space)	

A N N E X 3

GHz
34.2 - 35.2

Region 1	Region 2	Region 3
34.2 - 35.2	RADIOLOCATION Space research 3808/412C 3808A 3794/408	

SUP 3792/407

MOD 3794/408 Additional allocation : in Afghanistan, Algeria, Saudi Arabia, Bangladesh, Cameroon, Finland, Gabon, Guinea, Indonesia, Iran, Iraq, Israel, Jordan, Kuwait, Mali, Malta, Morocco, Mauritania, Pakistan, Qatar, Senegal, Sudan, Sweden, Singapore, Thailand and Tunisia, the bands 13.4 - 14 GHz, 15.7 - 17.7 GHz and 33.4 - 36 GHz are also allocated to the fixed and mobile services on a primary basis.

SUP 3805/412

SUP 3809/412D

MOD 3808/412C Different category of service : in Bulgaria, Cuba, Hungary, Poland, Mongolia, the German Democratic Republic, Czechoslovakia and the USSR, the allocation of the band 34.2 - 35.2 GHz to the space research service is on a primary basis (see No. 3432/141).

ADD 3808A Different category of service : in Australia, Spain and the United States of America, the allocation of the band 34.2 - 34.7 GHz to the space research (deep-space) (Earth-to-space) is on a primary basis (see No. 3432/141).

ANNEX 4

GHz
36 - 40

Region 1	Region 2	Region 3
36 - 37	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) 3761/391A	
37 - 37.5	FIXED MOBILE 3807C	
37.5 - 39.5	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 3807C	
39.5 - 40 /‾- 40.5_7	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE MOBILE-SATELLITE (Space-to-Earth)	

MOD 3761/391A In making assignments to services, Administrations are urged to take all practicable steps to protect the spectral line observations of the radio astronomy service from harmful interference in the band 36.43 - 36.50 GHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

SUP 3810/412E

ADD 3807C Subject to agreement obtained under the procedure set forth in Article N13A, the band 37 - 39 GHz may also be used in Japan for Earth-to-space transmission in the fixed-satellite service, up to 31 December 1990.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 5

TWENTY THIRD REPORT OF WORKING GROUP 5D TO COMMITTEE 5

(ALLOCATIONS)

Subject : Frequency bands 2 655 - 2 690 MHz and 5 470 - 7 250 MHz

1. Frequency band 2 655 - 2 690 MHz

All proposals relating to this band were considered, and the Working Group decided by majority to recommend the adoption of the revised Table and the revised provisions as given in Annex 1.

2. The delegation of Canada reserved the right to come back to the allocations of the fixed-satellite service (Space-to-Earth) in the band 2 655 - 2 690 MHz, in Committee 5.

3. Frequency bands 5 470 - 7 250 MHz

All proposals relating to these bands were considered, and the Working Group decided unanimously to recommend the adoption of the revised Table and the revised provisions as given in Annex 2.

Dr. B.S. RAO
Chairman of Working Group 5D

Annexes : 2

ANNEX 1

MHz
2 655 - 2 690

Allocation to Services		
Region 1	Region 2	Region 3
2 655 - 2 690. FIXED 3721/364C 3722/364D 3718/364 MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B 3726/364H Earth exploration-satellite (Passive) Space research (Passive) 3717/363 3724/364F 3725/364G	2 655 - 2 690 FIXED 3721/364C 3722/364D FIXED-SATELLITE (Earth-to-space) 3723/364E MOBILE except aeronautical mobile BROADCASTING-SATELLITE 3715/361B 3726/364H Earth exploration-satellite (Passive) Space Research (Passive) 3725/364G 3723A	

(MOD) 3715/361B The use of the band 2 500 - 2 690 MHz by the broadcasting-satellite service is limited to domestic and regional systems for community reception and such use is subject to agreement obtained under the procedure set forth in Article N13A. The power flux-density at the Earth's surface shall not exceed the values given in Nos. 6059/470NH to 6062/470NK.

MOD 3717/363 Alternative allocation : in the Federal Republic of Germany, Austria and Greece, the band 2 500 - 2 690 MHz is allocated to the fixed service on a primary basis.

NOC 3721/364C When planning new tropospheric scatter radio-relay links in the band 2 500 - 2 690 MHz, all possible measures shall be taken to avoid directing the antennae of these links towards the geostationary-satellite orbit.

MOD 3723/364E The use of the band 2 500 - 2 690 MHz in Region 2 and 2 500 - 2 535 MHz and 2 655 - 2 690 MHz in Region 3 by the fixed-satellite service is limited to domestic and regional systems and such use is subject to agreement obtained under the procedure set forth in Article N13A. In the direction space-to-Earth, the power flux-density at the Earth's surface shall not exceed the values given in No. [6055/470NE].

MOD 3724/364F Alternative allocation : in Bulgaria and the USSR, the band 2 500 - 2 690 MHz is allocated to the fixed service and the mobile except aeronautical mobile service on a primary basis.

MOD 3718/364 Subject to agreement obtained under the procedure set forth in Article N13A, the band 2 500 - 2 690 MHz may be used for tropospheric scatter systems in Region 1.

NOC 3722/364D Administrations shall make all practicable efforts to avoid developing new tropospheric scatter systems in the band 2 655 - 2 690 MHz.

ADD 3723A Subject to agreement obtained under the procedure set forth in Article N13A the band 2 655 - 2 690 MHz may also be used in Region 3 for the mobile (except aeronautical mobile) satellite service (Earth-to-space) for operation limited to national boundaries.

MOD 3725/364G[1)] In making assignments to services, Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference in the band 2 655 - 2 690 MHz. Emissions from space and airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 3280/116 and 3281/116A and Article N33A).

/‾MOD_7 3726/364H In the design of systems in the broadcasting-satellite service /‾in the bands between 2 500 MHz and 2 690 MHz_7, Administrations are urged to take all necessary steps to protect the radio astronomy service in the band 2 690 - 2 700 MHz.

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1) Note by the Editorial Group : The terminology of "making assignments to services" is not in conformity with other relevant provisions of the Radio Regulations. Editorial Group suggests the use of the standard text No. 7.3 of Document No. 239(Rev.2).

ANNEX 2

MHz
5 470 - 7 250

Region 1	Region 2	Region 3
5 470 - 5 650	MARITIME RADIONAVIGATION Radiolocation 3754/386 3755/387 3730A 3755A	
5 650 - 5 725	RADIOLOCATION Amateur Space research (Deep space) 3757/389 3755A 3644/320A 3758/389A 3758A	
5 725 - 5 850 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur 3756/388 3760/391 3755A 3758A 3757/389 3761C	5 725 - 5 850 RADIOLOCATION Amateur 3757/389 3760/391 3758A 3761C	
5 850 - 5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 3760/391	5 850 - 5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Amateur Radiolocation 3760/391	5 850 - 5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Radiolocation 3760/391
5 925 - 7 075	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 3743/379A 3761B	
7 075 - 7 250	FIXED MOBILE 3763/392B 3761B 3762A	

MOD 3644/320A In the bands /‾435 - 438 MHz,_7 1 260 - 1 270 MHz, 2 400 - 2 450 MHz, 3 400 - 3 410 MHz (in Regions 2 and 3 only), 5 650 - 5 670 MHz, /‾and 240 - 250 GHz_7 the amateur-satellite service may operate subject to not causing harmful interference (see No. 3442/148).

Administrations authorizing such use shall ensure that any harmful interference caused by emissions from a station in the amateur-satellite service is immediately eliminated in accordance with the provisions of No. 6362/1567A.

The service in bands 1 260 - 1 270 MHz and 5 650 - 5 670 MHz shall be only in the Earth-to-space direction.

SUP 3697/354

MOD 3743/379A The standard frequency and time signal-satellite service may be authorized to use the frequency 4 202 MHz for space-to-Earth transmissions and the frequency 6 427 MHz for Earth-to-space transmissions. Such transmissions shall be confined within the limits of ± 2 MHz of these frequencies and shall be subject to agreement obtained under the procedure set forth in Article N13A.

ADD 3730A In the bands 2 900 - 3 100 MHz, 5 470 - 5 650 MHz and 9 500 - 9 800 MHz, the use of maritime transponder systems shall be confined to the sub-bands 2 930 - 2 950 MHz, 5 470 - 5 480 MHz and 9 500 - 9 520 MHz.

ADD 3755A Additional allocation : in the United Kingdom, the band 5 470 - 5 850 MHz is also allocated to the land mobile service on a secondary basis.

MOD 3754/386 Additional allocation : in Austria, Bulgaria, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the USSR, the band 5 470 - 5 650 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

NOC 3755/387 Between 5 600 and 5 650 MHz ground-based radars used for meteorological purposes are authorized to operate on the basis of equality with stations of the maritime radionavigation service.

MOD 3757/389 Additional allocation : in Afghanistan, Saudi Arabia, Cameroon, China, Congo, the Republic of Korea, Gabon, Guinea, India, Indonesia, Iran, Iraq, Israel, Jamaica, Japan, Libya, Nigeria, Pakistan, Singapore and Thailand, the band 5 650 - 5 850 MHz is also allocated to the fixed and mobile services on a primary basis.

ADD 3762A Subject to agreement obtained under the procedure set forth in Article N13A, in Region 2 the band 7 125 - 7 155 MHz may be used for Earth-to-space transmissions in the space operation service.

MOD 3758/389A Different category of service : in Bulgaria, Cuba, Hungary, Mongolia, Poland, the German Democratic Republic, Czechoslovakia and the USSR, the allocation of the band 5 670 - 5 725 MHz to the space research service is on a primary basis (see No. 3432/141).

ADD 3758A Additional allocation : in Bulgaria, Cuba, Hungary, Mongolia, Poland, the German Democratic Republic, Czechoslovakia and the USSR, the band 5 670 - 5 850 MHz is also allocated to the fixed service on a primary basis.

SUP 3761/391A Only in the band 5 750 - 5 770 MHz.

MOD 3756/388 Additional allocation : in the Federal Republic of Germany, the band 5 755 - 5 850 MHz is also allocated to the fixed service on a primary basis.

SUP 3759/390

MOD 3760/391 The band 5 725 MHz - 5 875 MHz is designated for industrial, scientific and medical (ISM) applications (centre frequency 5 800 MHz). Radio services operating within this band must accept harmful interference which may be caused by these applications. ISM equipment operating in this band is subject to the provisions of No. 5002A.

ADD 3761C The band 5 830 - 5 850 MHz is also allocated to the amateur-satellite service (space-to-Earth) on a secondary basis.

ADD 3761B In the band 6 425 - 7 075 MHz, passive microwave sensor measurements are carried out over the Earth's oceans. In the band 7 075 - 7 250 MHz, passive microwave sensor measurements are carried out. Administrations should bear in mind the needs of the Earth exploration-satellite (Passive) and space research (Passive) services in their future planning of this band.

SUP 3767/393

SUP 3762/392AA

MOD 3763/392B Subject to agreement obtained under the procedure set forth in Article N13A, the band 7 145 - 7 235 MHz may be used for Earth-to-space transmissions in the space research service. The band 7 145 - 7 190 MHz is restricted to deep space; no emissions to deep space shall be effected in the band 7 190 - 7 235 MHz.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 9

NOTE FROM THE VICE-CHAIRMAN OF COMMITTEE 7
TO THE CHAIRMAN OF COMMITTEE 9

Committee 7 has approved the draft Resolution relating to the Abrogation of Various Resolutions and Recommendations of past ITU Administrative Radio Conferences (see Annex).

Committee 7 will collect the input to complete the different items of the draft Resolution and will officially approve the completed draft Resolution when all the relevant Resolutions and Recommendations have been incorporated. The final draft Resolution will be passed on to Committee 9 for subsequent submission to the Plenary.

H.L. VENHAUS
Vice-Chairman of Committee 7

Annex : 1

A N N E X

DRAFT RESOLUTION

Relating to the Abrogation of Various Resolutions and Recommendations of past ITU Administrative Radio Conferences

The World Administrative Radio Conference, Geneva, 1979,

considering

1) that all necessary action has been taken on the following Resolutions and Recommendations of the

a) Ordinary Administrative Radio Conference, Geneva, 1959,

....

....

....

b) Extraordinary Administrative Radio Conference, Geneva, 1963,

....

....

....

c) World Administrative Radio Conference, Geneva, 1967,

....

....

....

d) World Administrative Radio Conference for Space Telecommunications, Geneva, 1971,

....

....

....

....

e) World Maritime Administrative Radio Conference, Geneva, 1974,

....

....

....

f) World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977,

....

....

....

g) European VHF-UHF Broadcasting Conference, Stockholm, 1961,

....

....

h) Regions 1 and 3 Administrative LF/MF Broadcasting Conference, Geneva, 1975,

....

....

2) that the following Resolutions and Recommendations of the

a) Ordinary Administrative Radio Conference, Geneva, 1959,

....

....

....

b) Extraordinary Administrative Radio Conference, Geneva, 1963,

....

....

....

c) World Administrative Radio Conference, Geneva, 1967,

....

....

....

d) World Administrative Radio Conference for Space Telecommunications, Geneva, 1971,

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....

....

e) World Maritime Administrative Radio Conference, Geneva, 1974,

....

....

....

f) World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977,

....

....

....

g) European VHF-UHF Broadcasting Conference, Stockholm, 1961,

....

....

h) Regions 1 and 3 Administrative LF/MF Broadcasting Conference, Geneva, 1975,

....

....

have been replaced as indicated;

3) that the following Resolutions and Recommendations of the

a) Ordinary Administrative Radio Conference, Geneva, 1959,

....

....

....

b) Extraordinary Administrative Radio Conference, Geneva, 1963,

....

....

....

c) World Administrative Radio Conference, Geneva, 1967,

....

....

....

d) World Administrative Radio Conference for Space Telecommunications, Geneva, 1971,

....

....

....

....

e) World Maritime Administrative Radio Conference, Geneva, 1974,

....

....

....

f) World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977,

....

....

....

g) European VHF-UHF Broadcasting Conference, Stockholm, 1961,

....

....

h) Regions 1 and 3 Administrative LF/MF Broadcasting Conference, Geneva, 1975,

....

....

are now obsolete;

resolves

that all the said Resolutions and Recommendations are abrogated.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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15 November 1979
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PLENARY MEETING

France

DRAFT

RECOMMENDATION

On Terminology

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the discussions concerning certain technical terms and definitions in Article N1/1 have shown the existence of various problems which it has not been possible to settle in a fully satisfactory manner during this Conference;

b) that technological development and modes of expression may call for the addition, amendment or possibly the deletion of certain definitions;

invites

the CCIR and the CCITT, each in its own field, to examine the definitions of technical terms in Article N1/1 and to propose any amendments they deem necessary;

instructs

the Secretary-General to transmit the proposals prepared by the two organs to the Administrative Conferences concerned for consideration.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 689-E
15 November 1979
Original : English

WORKING GROUP 5BA

REPORT OF SUB-WORKING GROUP 5BA10

TO WORKING GROUP 5BA

1. Terms of Reference

i) To provide for the sharing of the band 2 160 - 2 170 kHz that is to be allocated to the radiolocation service, with other services for countries in Region 1 wishing to do so either within the Table of Frequency Allocation or through a footnote.

ii) To draft a Resolution along the lines proposed by Denmark with regard to a time scale and procedure for the freeing of the bands to be allocated to the radiolocation service viz : 1 625 - 1 635 kHz, 1 800 - 1 810 kHz and 2 160 - 2 170 kHz from existing services.

iii) To report on the Recommendation of Sub-Working Group 5BA8 regarding the deletion of Footnote 3490/195A.

2. Sub-Working Group 5BA10 had two meetings, and was composed of delegates from the Administrations of Denmark, France, Federal Republic of Germany, Malawi, Netherlands, Nigeria, United Kingdom, USSR and IMCO.

3. The Sub-Working Group agreed by a majority to the introduction of footnotes 3490A, 3490B, 3490C and 3490D to meet the requirements of 1 i) and ii) above as follows :

kHz

Region 1
1 625 - 1 635 RADIOLOCATION /3490/195A/ /3485B/ 3490A 3490B
1 800 - 1 810 RADIOLOCATION /3490/195A/ /3485B/ 3490A 3490B

3490A The establishment and operation of stations in the radiolocation service in Region 1 shall be the subject of special arrangements between Administrations operating services which may be affected.

3490B In Region 1, stations in the fixed and mobile except aeronautical (R) services existing as of 1 January 1980 may continue to operate on a primary basis until a satisfactory reassignment shall be made in accordance with the procedure described in Resolution ... (i.e. the Resolution referred to in 3511B). For the maritime mobile services the reassignment shall be made in accordance with Resolution ... (see Annex 1).

kHz

Region 1
2 045 - 2 160 MARITIME MOBILE /FIXED/ /LAND MOBILE/ /3490/195A/
2 160 - 2 170 RADIOLOCATION 3490C 3490D

3490C The establishment and operation of stations in the radiolocation service in Region 1 shall be the subject of special arrangements between Administrations operating services which may be affected. (See also 3490D).

3490D Additional allocation : in Malawi, ... the band 2 160 - 2 170 kHz is also allocated to the fixed and mobile except aeronautical mobile (R) services, with a mean power not exceeding 50 Watts. In the remaining countries of Region 1, stations in the fixed and mobile except aeronautical mobile (R) services existing as of 1 January 1980 may continue to operate on a primary basis until a satisfactory re-assignment shall be made in accordance with the procedure described in Resolution ... (i.e. the Resolution referred to in 3511B). For the maritime mobile services the re-assignment shall be made in accordance with Resolution ...., (see Annex 1).

4. The Sub-Working Group did not reach agreement on the deletion of footnote 3490/195A.

5. The Sub-Working Group unanimously agreed that a Resolution was necessary to provide for the freeing of the bands to be allocated to radiolocation, from existing services. A draft Resolution is submitted for consideration in Annex 1.

F.V.V. WATSON
Coordinator of Sub-Working Group 5BA10

Annex : 1

ANNEX 1

DRAFT RESOLUTION

Relating to the Reassignment of Stations
in the Fixed and Mobile Services in the
Bands Allocated to Radiolocation

/ 1 625 - 1 635; 1 800 - 1 810; 2 160 - 2 170; /

The World Administrative Radio Conference, Geneva, 1979,

considering

that the World Administrative Radio Conference has adopted modifications to the allocation of the frequency bands between 1 605 and 2 850 kHz;

noting

1. that the implementation of the revised Table of Frequency Allocations presents difficulties in particular for stations in the maritime mobile service in Region 1 in the bands 1 625 - 1 635 kHz, 1 800 - 1 810 kHz and 2 160 - 2 170 kHz which are to be made available for radiolocation services;

[2. that the World Administrative Radio Conference has recommended to convene a general mobile conference not later than 1982;]

emphasizing

the need for frequency assignment plans to be drawn up for the band 1 605 - 2 850 kHz in order to implement the provisions in No. 3490B of the Radio Regulations;

invites

the mobile radio conference mentioned above to give priority to the adoption of a new assignment plan for the band 1 605 - 2 850 kHz for the maritime mobile service;

recommends

that Administrations endeavour to reassign existing assignments to stations in the fixed and mobile services in the bands concerned at the earliest possible opportunity in order to make the bands available exclusively for the radiolocation service;

resolves

that the protection afforded to stations of the fixed and mobile services by No. 3490B and No. 3490D shall continue to apply until such a time as a satisfactory reassignment has been made. For the stations of the maritime mobile service the reassignment shall be made in accordance with an agreed international frequency assignment plan.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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COMMITTEE 5

Canada

INFORMATION NOTE ON THE ALLOCATION OF SPECTRUM TO FEEDER LINKS FOR 12 GHz BROADCASTING SATELLITES

1. Introduction

In proposal CAN/60B/488, Canada proposed that spectrum in the 17 GHz band be allocated to the fixed-satellite service in the Earth-to-space direction for use in the provision of feeder links to broadcasting-satellite systems in the 12 GHz band. Other Administrations have proposed, as an alternative, spectrum in the 15 GHz band for such use.

Two factors in Canada's consideration of such an allocation are the propagation characteristics in the 15 and 17 GHz bands, and the resulting satellite system implications.

2. Propagation considerations

The only significant propagation factor to consider is the additional rain attenuation margin required for the 17 GHz band as compared with the 15 GHz band. Information in Fig. 10.2.6.3 of the SPM Report and Fig. 1 of CCIR Report 564-1 was used to make such a comparison for CCIR Rain Climates 1 to 5 (see Fig. 10.2.6.3 of the SPM Report). The results for a percentage availability of 99.9 % which is appropriate for broadcasting-satellite applications, and three typical elevation angles of the earth station antenna are as follows :

Additional rain attenuation margin (dB) required at 18.1 GHz beyond that at 15.35 GHz

Elevation Angle	CCIR Rain Climate 1	2	3	4	5
30°	2.2	1.7	1.5	1.1	0.7
50°	1.7	1.2	1.1	0.8	0.5
70°	1.4	1.0	0.9	0.7	0.4

Since it is known that the use of rain-rate data for CCIR Rain Climate 1 is likely to underestimate the rain attenuation that will occur in sub-tropical and tropical areas (see section 10.2.6 of the SPM Report), estimates were also obtained using actual rain-rate data for tropical locations (references 1-3). Such a procedure is recommended in section 4.1.1 of CCIR Report 563-1. The results for a transmitting earth station elevation angle of 70° and four locations in the wet tropical region of South and Central America are as follows :

Additional rain attenuation margin (dB) required at 18.1 GHz beyond that at 15.35 GHz

Rio de Janeiro Brazil	Gioania Brazil	Manros Brazil	Utibe Panama
1.7	1.9	2.9	3.1

A similar calculation for Yamaguchi in the typhoon rain region of Japan, based on data in section 6.2 and Fig. 2 of CCIR Report 564-1, results in an additional margin of only 2.6 dB at an elevation angle of 50°.

It can be concluded, therefore, that under practical situations, an increase of at most 3 dB would be required in the rain attenuation margin for the 17 GHz band to obtain the same performance as in the 15 GHz band.

3. System considerations

The next step is to turn these propagation data and system margin data into an appreciation of system design changes and the accompanying increase in system cost and availability. Based on these data, an earth station e.i.r.p. must be up to 3 dB greater than 18.1 GHz than at 15.35 GHz, or for the purposes of the example below, up to 4 dB greater than that required at 14.5 GHz.

Based on Canadian experience, earth stations used for television transmission in the 14 GHz band have e.i.r.p.'s in the order of 80 dBW, use antennae in the range of 5 to 10 metres and use final amplifiers of several hundred watts. For example, two earth stations used to transmit television in the 14 GHz ANIK-B system in Canada have the following characteristics :

System 1 : e.i.r.p. : 82 dBW
Antenna diameter : 9 metres
Final amplifier : 200 watts

System 2 : e.i.r.p. : 76 dBW
Antenna diameter : 3.7 metres
Final amplifier : 250 watts

These stations cost in the order of \$ 300,000 to \$ 600,000 depending on several factors, including number purchased, transportability, antenna diameter, etc.

In order to provide the additional margin to overcome rain attenuation at 17 GHz, the final amplifier of the transmitter would require an output power in the 500 to 700 watt range. Based on information obtained in the development of the ANIK-B system, this increase in power from that of the two systems noted above can be expected to result in a cost increase for the final amplifier of the order of \$ 1,000. A cost increase of this magnitude, however, would be insignificant compared to the total cost of the station.

At present, earth station transmitters for broadcasting-satellite applications are not available for either the 15 GHz or 17 GHz bands. Nevertheless, the design of such devices is within the present state-of-the-art. Since each fully-operational broadcasting-satellite system, including the satellite and the earth stations, would cost in the order of \$ 200,000,000 to \$ 500,000,000, and it is likely that there will be many such systems, it is certain that manufacturers will have sufficient incentive to develop systems, when required, for either the 15 GHz or 17 GHz bands.

4. Conclusions

Since there is little difference from a technical and economic standpoint in the use of either of these bands for feeder links to broadcasting-satellites, Canada believes that a band in the 17 GHz range, such as the 17.3 - 18.1 GHz band, offers the best solution.

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2. CCIR Doc. 5/68 /̄1970 - 1973_7, (Brazil), "Millimeter wave propagation in tropical and equatorial regions".

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INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 691-E
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Original : English

COMMITTEE 7

Federal Republic of Germany

IDENTIFICATION OF STATIONS

(Article N23, Section III - Formation of Call Signs)

In order to facilitate the task of Committee 7 when dealing with Section III of Article N23, the Administration of the Federal Republic of Germany has prepared a proposal (see Annex 1) which takes into account and consolidates the proposals submitted by different Administrations on this subject, as well as the relevant part of the Report of the Secretary-General (Document No. 157, paragraph 5.4).

Furthermore, Annexes 2 and 3 give a graphic representation of the manner in which call signs could be formed and the number of possibilities obtainable from a given series formation as reflected in the text in Annex 1.

Annexes : 3

ANNEX 1

Section III. Formation of Call Signs

NOC 5351 756 § 14. (1) The twenty-six letters of the alphabet, as well as digits in the cases specified below, may be used to form call signs. Accented letters are excluded.

NOC 5352 757 (2) However, the following combinations shall not be used as call signs:

NOC 5353 758 *a)* combinations which might be confused with distress signals or with other signals of a similar nature;

NOC 5354 759 Mar* *b)* combinations reserved for the abbreviations to be used in the radiocommunication services (see Appendices **13** and **13A**);

(MOD) 5355 761 $\boxed{d)}$ *c)* for amateur stations, combinations commencing with a digit when the second character is the letter O or the letter I.

MOD 5356 762 § 15. Call signs in the international series are formed as indicated in Nos. **5358**/763 to 5378/773A. The first or the second character in a particular series of call signs can be a letter or a digit. The first two characters or in certain cases the first character of a call sign constitute the nationality identification. 2

NOC 5357 *Land and fixed stations*

SUP 5358 763 ~~§ 16. (1)~~ – ~~two characters and one letter~~ ~~three letters, or~~ ~~two characters and one letter~~
– ~~three letters followed by not more than three digits (other than the digits 0 and 1 in cases where they immediately follow a letter).~~

MOD 5359 764 (2) However, it is recommended that, as far as possible,

(A) ~~a)~~ ~~the call signs of *coast and aeronautical stations* consist of:~~
- two characters and one letter ~~three letters~~; *or*
- two characters and one letter followed by not more than three ~~letters followed by one or two~~ digits (other than the digits 0 and 1 in cases where they immediately follow a letter);

~~b)~~ the call signs of *fixed stations* consist of:
- two characters and one letter ~~three letters~~ followed by two digits (other than the digits 0 and 1 in cases where they immediately follow a letter).

NOC 5350.1 755.1 [1] By "frequency series" is meant a group of frequencies, each of which belongs to one of the different bands between 4 000 and 27 500 kHz that are allocated exclusively to the maritime mobile service.

ADD 5356.1 [2] For call sign series beginning with B, F, G, I, K, M, N, R, U and W, only the first character is required for nationality identification. In the cases of half series, the first three characters are required for nationality identification.

NOC 5360 *Ship stations*

MOD 5361 765 § 17. (1) – two characters and two letters, or ~~four letters.~~
– two characters, two letters and one digit (other than the digits 0 and 1.

MOD 5362 766 (2) However, *ship stations* employing radiotelephony may also use a call sign consisting of:

– two characters (provided that the second is a letter) followed by four digits (other than the digits 0 and 1 in cases where they immediately follow a letter), or

– two characters and one letter followed by four digits (other than the digits 0 and 1 in cases where they immediately follow a letter).

NOC 5363 *Aircraft stations*

MOD 5364 767 § 18. – ~~five letters.~~ two characters and three letters.

NOC 5365 *Ship's survival craft stations*

NOC 5366 768 § 19. – the call sign of the parent ship followed by two digits (other than the digits 0 or 1 in cases where they immediately follow a letter).

NOC 5367 *Emergency position-indicating radiobeacon stations*

NOC 5368 768A Mar § 20. – the Morse letter B and/or the call sign of the parent ship to which the radiobeacon belongs.

NOC 5369 *Aircraft survival craft stations*

NOC 5370 769 § 21. – the complete call sign of the parent aircraft (see No. **5364**/767), followed by a single digit other than 0 or 1.

NOC 5371 *Land mobile stations*

SUP 5372 770 § 22. ~~(1) – four letters followed by a single digit other than 0 or 1.~~

MOD 5373 771 – two characters (provided that the second is a letter) followed by four digits (other than the digits 0 and 1 in cases where they immediately follow a letter), or
– two characters and one or two letters followed by four digits (other than the digits 0 and 1 in cases where they immediately follow a letter).

NOC 5374 *Amateur and experimental stations*

MOD 5375 772 § 23. (1) – one ~~or two letters~~ character (see No. 5356.1) and a single digit (other than 0 or 1), followed by a group of not more than three letters, or
– two characters and a single digit (other than 0 or 1), followed by a group of not more than three letters.

NOC 5376 773 (2) However, the prohibition of the use of the digits 0 and 1 does not apply to *amateur stations*.

NOC 5377 *Stations in the Space Service*

MOD 5378 773A Spa § 24. When call signs for stations in the space service are employed, it is recommended that they consist of:

– two ~~letters~~ characters followed by two or three digits (other than the digits 0 and 1 in cases where they immediately follow a letter). (See also No. **5334**/737A.)

A N N E X 2

Mode and Possibilities of Call Sign Formation

	Composition of call sign → / Class of station ↓	formed by 2 characters + →	1 digit and 1 letter	1 digit and 2 letters	1 digit and 3 letters	2 digits	3 digits	4 digits	1 letter	1 letter and 1 digit	1 letter and 2 digits	1 letter and 3 digits	1 letter and 4 digits	2 letters	2 letters and 1 digit	2 letters and 4 digits	3 letters	Remarks
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
1.		Possibilities for 1 series* →	208	5408	140608	80	800	8000	26	208	2080	20800	208000	676	5408	5408000	17576	Total possibilities for 1 series* ↓
2.	Land and fixed stations.. however, as far as possible :								No.5359	No.5359	No.5359	No.5359						23114
(3)											No.5359							
4.	fixed stations - - - - - -																	2080
5.	Ship stations - - - - - - - however, also :													No.5361	No.5361			6084
6.	ship stations employing radiotelephony - - -							No.5362					No.5362					216000
7.	Aircraft stations - - - - - -																No.5364	17576
8.	Land mobile stations - - - -							No.5373					No.5373			No.5375		5624000
(9)																		
10.	Stations in the space service - - - - - - -					No.5378	No.5378											880
11.	Amateur and experimental stations - - -	formed by 1 character +	No.5375	No.5375	No.5375													146224
12.	- - -	formed by 2 characters +	No.5375	No.5375	No.5357													146224
13.	Ship's survival craft stations (No. 5365) the call sign of the parent ship followed by 2 digits																	486720
14.	Aircraft survival craft stations (No. 5369) the complete call sign of the parent aircraft followed by 1 digit																	140608

* The actual number of possibilities would be less due to the need to observe Radio Regulations Nos. 5353/758 and 5354/759

ANNEX 3

Mode and Possibilities of Call Sign Information (Comparison of present formation and consolidated proposals)

	Composition of call sign → / Class of station ↓	formed by 2 characters + →	1 digit and 1 letter	1 digit and 2 letters	1 digit and 3 letters	2 digits	3 digits	4 digits	1 letter	1 letter and 1 digit	1 letter and 2 digits	1 letter and 3 digits	1 letter and 4 digits	2 letters	2 letters and 1 digit	2 letters and 4 digits	3 letters	Remarks
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
1.		Possibilities for 1 series* →	208	5408	140608	80	800	8000	26	208	2080	20800	208000	676	5408	5408000	17576	Total possibilities for 1 series* ↓
2.	Land and fixed stations -- however, as far as possible :								No.5358	No.5358	No.5358	No.5358						23114
3.	coast and aeronautical stations - - - - - - - - - -								No.5359	No.5359	No.5359 a)	No.5359						~~2314~~ 23114
4.	fixed stations - - - - - -										No.5359 b)							2080
5.	Ship stations - - - - - - - however, also :													No.5361	No.5361			~~676~~ 6084
6.	ship stations employing radiotelephony - - -							No.5362					No.5362					216000
7.	Aircraft stations - - - - - -																No.5364	17576
8.	Land mobile stations - - - - ~~however, also : land mobile stations employing radio--~~														~~No.5372~~			~~5408~~ 0
9.	~~telephony~~							No.5373					No.5373			No.5375		~~216000~~ 5624000
10.	Stations in the space service - - - - - - - -					No.5378	No.5378											880
11.	Amateur and experimental stations - - -	formed by 1 character +	No.5375	No.5375	No.5375													146224
12.	- - -	formed by 2 characters +	No.5375	No.5375	No.5357													146224
13.	Ship's survival craft stations (No. 5365): the call sign of the parent ship followed by 2 digits																	~~54080~~ 486720
14.	Aircraft survival craft stations (No. 5369): the complete call sign of the parent aircraft followed by 1 digit																	140608

* The actual number of possibilities would be less due to the need to observe Radio Regulations Nos. 5353/758 and 5354/759

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE
RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 7

Somali Democratic Republic

REQUEST FOR ADDITIONAL CALL SIGN SERIES

The Administration of the Somali Democratic Republic earnestly requests that new call sign series be allocated to Somalia.

Reasons : The increasing development of telecommunications in our country has exhausted the call sign series hitherto allocated to Somalia.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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15 November 1979
Original : English

COMMITTEE 7

Syrian Arab Republic

REQUEST FOR THE ALLOCATION OF ADDITIONAL CALL SIGNS SERIES

As a result of the development of telecommunications in the Syrian Arab Republic, the call signs series allocated to our Administration are very congested.

So, we request accordingly the allocation of additional series of call signs.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 694-E
15 November 1979
Original : English

WORKING GROUP 5D

REPORT FROM THE CHAIRMAN OF DRAFTING GROUP 5D3

TO THE CHAIRMAN OF WORKING GROUP 5D

The Drafting Group set up by the Chairman of Working Group 5D (Document No. DT/80 refers) and comprising representatives from the delegations of Australia, France, India, United Kingdom and the United States of America, have unanimously agreed on the text of a proposed draft Resolution as indicated in the Annex.

The progression of the thoughts expressed in the draft Resolution culminate in two main points :

1) to request the CCIR to undertake appropriate studies on all aspects of the effects of such radio transmissions of power from space on radiocommunication services, and to make appropriate Recommendations as to the technical parameters which would need to be observed, and

2) to invite the Administrative Council to review the CCIR Reports and Recommendations when they are received. Taking into account the state of the art so far as the transmittion of power from space is concerned, and given that such power transmission schemes are at that time found to be feasible - considering 1 is drafted in the terms that "it may now be technically feasible" - then it would be for the Administrative Council to take account also of other relevant information, particularly on ecological and biological implications in framing an agenda item for the next suitable World Administrative Radio Conference to enable that Conference to decide on all the necessary provisions relating to this topic.

The draft Resolution is submitted for the consideration and approval of Working Group 5D.

A.O. CARTER
Chairman of Drafting Group 5D3

Annex : 1

A N N E X

Resolution on the Transmission of Electric Power from a Spacecraft Using Radio Frequencies

The World Administrative Radio Conference, Geneva, 1979,

considering

1. that it may now be technically feasible to convert some portions of the sun's radiation into electric power on board a spacecraft and to transmit that power to earth by means of radio transmissions and that such power could augment the world's energy resources;

2. that the possibility of such high power radiation may adversely affect the propagation of radio waves for other services through the ionosphere;

recognizing

that it would be necessary to ensure that the radio transmission of electric power from space did not give rise to harmful interference to radiocommunication services;

that an assessment needs to be made of any likely ecological and biological effects of radio transmissions of power from space, including in particular to aircraft passing through such beams;

noting

that the SPM report to the World Administrative Radio Conference, Geneva, 1979, recognized the technical feasibility of a solar power satellite and considered 2 450 MHz as an appropriate band for experimentation leading towards the development of wireless transmission of power from space;

noting also

the provisions of Article 3 of the Radio Regulations referring to the obligations on Administrations not to cause harmful interference to radiocommunication services operating in accordance with the Regulations;

requests

the CCIR to undertake appropriate studies on all aspects of the effects of such radio transmissions of power from space on radiocommunication services and to recommend as appropriate the technical parameters for such transmission of power by radio and to report the results of its studies to the Administrative Council;

invites

the Administrative Council : i) to review the CCIR Reports and Recommendations referred to in requests, and ii) in light of this and other relevant information concerning the state of the technology, including pertinent information on ecological and biological implications to place on the agenda of a suitable World Administrative Radio Conference an item which will enable that Conference to decide upon all the necessary provisions for the radio transmission of power from space.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

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COMMITTEE 5

The Observer of the International Civil Aviation Organization (ICAO)

OBSERVATIONS CONCERNING THE INTRODUCTION OF SSB IN THE AERONAUTICAL MOBILE (R) SERVICE BELOW 30 MHz

1. Introduction

1.1 This document contains information concerning the introduction of SSB in the aeronautical mobile (R) service, (AM(R)S), and makes observations on the factors affecting the progress of a plan to ensure safe and orderly transition from DSB to SSB classes of emissions. It is specifically directed to assisting the Conference in its discussions concerning the proposal for a Recommendation in Document No. 651.

2. Discussion

2.1 ICAO is concerned only with the AM(R)S, and the efficient use of the spectrum used by this service.

2.2 Administrations have been urged, by both the ITU and ICAO, to use frequencies higher than the MF/HF bands for the AM(R)S, and have been doing so with considerable success in Europe and North America. However, the requirements in the MF/HF bands were reviewed by both the IFRB and ICAO prior to the World Administrative Radio Conference on the Aeronautical Mobile (R) Service, Geneva, 1978, and that review revealed that all requirements could not be satisfied. As a result of this inability to satisfy requirements up to the year 2000, it was necessary to adopt a plan satisfying requirements only up to 1990, after which further action would be required.

2.3 ICAO has, in response to Recommendation No. Aer2 - 4 of WARC AM(R)S, 1978, embarked on an intensive programme of transition from DSB to SSB classes of emissions, and is well advanced in the process of finalizing with its Contracting States an agreed transition programme in fulfillment of "recommends 2." of the above Recommendation. Since the time for transition is extremely short for a widely implemented mobile service, ICAO, through its Regional Organization, has been assisting Administrations to prepare for the implementation date in 1983, and planning in this regard is well advanced, with consequent commitment of funds by Administrations and aircraft operating agencies. Because of the complexity of transferring from an existing developed system to a new channelling plan and new types of equipment in a safe and orderly manner, the only practical transition plan is critically dependent on interlocking changes in all parts of the HF spectrum allocated to the AM(R)S, and changes to the basic concept of transition decided upon could cause a failure of the plan, with consequent delay and expense to all concerned.

2.4 According to available information, experience of implementation in the maritime satellite service suggests that it would be unduly optimistic to expect more rapid implementation in the AM(R)S satellite service, where the fitment of new equipment involves much more complex airworthiness aspects. Evidence available to ICAO is that major implementation of satellite techniques is unlikely to occur within at least the next ten years. Increased MF/HF allotments will be a critical necessity, particularly in the developing countries where civil aviation services are being developed and expanded to meet national and international needs, and where, for geographical, economical, and technical reasons, MF/HF frequencies will be required in increasing numbers through the foreseeable future.

2.5 There exists also a considerable congestion in the bands allocated to the AM(R)S, and it is only through a concentrated effort, involving regular updating of the air navigation plan at Regional Air Navigation Meetings of ICAO, that the service has been able with great difficulty to confine itself to present allotments. All of the above was done in strict conformity to the instructions for efficient and effective use of the available spectrum given to the present Conference, and to the Conference held in 1978.

2.6 The aeronautical mobile (R) service is operated in families of frequencies, a concept which has been carefully developed over the years, and which has been most effective in the efficient utilization of frequency allotments. Re-arrangement of the allocations agreed by the WARC AM(R)S 1978, and endorsed by this Conference, would fatally disrupt the family of frequencies concept, and would create a critical shortage of frequencies in the most used bands. The effect on the current transition plan would be very severe, and would delay for several years the introduction of SSB classes of service in the AM(R)S. It would be particularly disruptive to developing countries, where the need for increasing numbers of MF/HF frequencies in the AM(R)S is expected to extend considerably beyond the life of the amendments currently being made by this Conference.

3. <u>Brief summary of observations</u>

3.1 The AM(R)S has been carefully managed by Administrations, and is required to maintain a vital safety service. Any proposals which would disrupt and delay a planning process which is well under way, established by the World Administrative Radio Conference on the Aeronautical Mobile (R) Service, would cause needless expense and disruption to Administrations and aircraft operating agencies. The transition plan being formulated in response to the above Conference is inter-related in such a manner that the re-arrangements would require a complete reassessment of the plan, and would negate the considerable amount of planning and work which has already been carried out. Such a proposal would be prejudicial to a single service, and any acceptable Recommendation should express only the need for reassessment of allotments in general by a future competent Conference where all services are represented. Finally, it would be particularly regrettable if any Recommendation of the Conference would cause difficulties in the developing countries which are actively engaged in the fruitful exploitation of aeronautical services as a vital element of the evolution of their transportation infrastructure.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

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PLENARY MEETING

SIXTEENTH REPORT OF COMMITTEE 4

Committee 4 has unanimously decided to retain without change one Resolution (No. Mar 7) and seven Recommendations (Nos. 1, 2, 3, 6, Spa2 - 10, Sat-7 and Aer2 - 1). It is understood however that the introductory phrase should read "The World Administrative Radio Conference, Geneva, 1979" and that the Editorial Committee may make other editorial improvements. The texts have been transmitted to the Editorial Committee for subsequent submission to the Plenary Meeting (see Document No. 697).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION
WORLD ADMINISTRATIVE RADIO CONFERENCE
(Geneva, 1979)

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COMMITTEE 9

SIXTEENTH SERIES OF TEXTS OF COMMITTEE 4
TO THE EDITORIAL COMMITTEE

Committee 4 has unanimously decided to retain without change one Resolution (No. Mar 7) and seven Recommendations (Nos. 1, 2, 3, 6, Spa2 -10, Sat-7 and Aer2 - 1). It is understood however that introductory phrase should read "The World Administrative Radio Conference, Geneva, 1979" and that the Editorial Committee may make other editorial improvements. The texts shown in the Annex are hereby submitted to the Editorial Committee (see also Document No. 696).

N. MORISHIMA
Chairman of Committee 4

Annex : 1

ANNEX

RES Mar 7-1

RESOLUTION No Mar 7

(NOC) **Relating to the Recommendations and Standards for Emergency Position-Indicating Radiobeacons Operating on the Frequencies 121·5 MHz and 243 MHz**

(MOD) The World Administrative Radio Conference, Geneva, ~~1967~~, 1979,

NOC *considering*

a) that emergency position-indicating radiobeacons operating on the frequencies 121·5 MHz and 243 MHz are intended to facilitate search and rescue operations;

b) that the frequencies 121·5 MHz and 243 MHz are in common use by aircraft engaged in search and rescue operations;

c) that the International Civil Aviation Organization has established recommended signal characteristics and technical specifications for aircraft equipment operating on 121·5 MHz and/or 243 MHz;

NOC *resolves*

that administrations authorizing the use of emergency position-indicating radiobeacons on 121·5 MHz and/or 243 MHz should ensure that such radiobeacons comply with the relevant recommendations and standards of the International Civil Aviation Organization and the International Radio Consultative Committee.

RECOMMENDATION No. 1

NOC **to the C.C.I.R. Relating to the Frequency Tolerances of Transmitters**

(MOD) The World Administrative Radio Conference, Geneva, ~~1959,~~ 1979,

NOC *considering*

a) that Appendix 3 to the Radio Regulations specifies the permissible frequency tolerances for transmitters ;

b) that the principal objective of this Appendix has been the reduction of frequency space required per channel by means of the tightening of frequency tolerances, and that in many cases considerable improvement in spectrum utilization can continue to be obtained by further tightening of frequency tolerances ;

c) that for some services, a reduction in frequency tolerance to the lowest value possible in the state of the technique would be useful in order to increase the signal to noise ratio, improve intelligibility and reduce errors ;

d) that in certain cases, a further reduction of frequency tolerance would not in practice increase the number of available channels ;

e) that in particular frequency bands, the frequency tolerances specified in Appendix 3 to these Radio Regulations may already approach the minimum useful value for certain categories of station when using existing techniques and methods of operation ;

f) that it will be of considerable assistance to administrations, in the future planning of services and provision of equipment, to know those frequency tolerances which can be considered to be the ultimate useful minimum value for stations when using existing techniques and methods of operation ;

g) that in certain cases, reduction of frequency tolerances is subject to economic limitations, which should be known and taken into account ;

NOC *invites the C.C.I.R.*

1. to continue its study of frequency tolerances with a view to the reduction of the frequency space required for a given channel ;

2. to consider whether or not in certain cases it is possible to predict ultimate values of tolerances, which it would not be necessary to make more stringent under currently known conditions of operation, and to state what these tolerance values might be ;

3. to report upon the possibility of achieving such ultimate values of tolerances consistent with economic and design requirements and other practical considerations ;

4. to indicate which, if any, of the tolerances specified in Appendix 3 to the Radio Regulations have already attained these ultimate values.

RECOMMENDATION No. 2

NOC **Relating to the Technical Standards of the I.F.R.B.**

(MOD) The World Administrative Radio Conference, Geneva, ~~1959,~~ 1979,

NOC *recognizing*

that the Technical Standards of the International Frequency Registration Board (I.F.R.B.) are in daily use in the technical examination of frequency assignment notices,

NOC *urges the C.C.I.R.*

to expedite all phases of the programme of studies which will assist the I.F.R.B. in the further refinement of its Technical Standards,

NOC *and invites the administrations*

in their participation in the work of the C.C.I.R. and its study groups, to give special priority to those studies.

RECOMMENDATION No. 3

NOC **to the C.C.I.R. Relating to Signal to Interference Protection Ratios and Minimum Field Strengths Required**

(MOD) The World Administrative Radio Conference, Geneva, ~~1959,~~ 1979,

NOC *recognizing*

that the available information on signal to interference protection ratios and minimum field strengths required for each one of the services needs further refinement in order to permit the most efficient planning of the use of the radio frequency spectrum ;

NOC *invites the C.C.I.R.*

1. to continue to study the signal to interference protection ratios which define the threshold of harmful interference for the several services;

2. to continue to study the signal to noise ratios and the minimum field strengths required for satisfactory reception of the different classes of emission in the several services ;

3. to continue the study of fading allowances for the several services;

4. to give particular attention to those studies which will assist in the further refinement of the technical standards used by the International Frequency Registration Board.

RECOMMENDATION No. 6

NOC **to the C.C.I.R. Relating to Studies of the Technical Characteristics of Equipment**

(MOD) The World Administrative Radio Conference, Geneva, ~~1959,~~ 1979,

NOC *recognizing*

that the available technical information concerning the various types of apparatus used for the reception of the different classes of emission in the several services needs to be more complete and more precise in order to permit the most efficient planning of the use of the radio frequency spectrum ;

NOC *invites the C.C.I.R.*

1. to continue to study, and to make recommendations for the bandwidth, selectivity, sensitivity and stability characteristics of various types of apparatus used for the reception of the different classes of emission in the several services ;

2. to continue to study practical methods of achieving the recommended characteristics ;

3. to study the minimum practicable spacing between adjacent channels for the different classes of emission for the several services in the various bands ;

4. to study other desirable conditions to be fulfilled by the complete systems employed by the different services in order to determine the required technical performance of the equipment, including the station terminal apparatus and the antennae ;

5. to study methods for determining whether the equipment satisfies the recommended requirements ;

6. to give particular attention to those studies which will assist in the further refinement of the technical standards used by the International Frequency Registration Board.

RECOMMENDATION No. Spa2 – 10

NOC

Relating to the Criteria to be applied for Frequency Sharing between the Broadcasting-Satellite Service and the Terrestrial Broadcasting Service in the Band 620 - 790 MHz

(MOD)

The World Administrative Radio Conference, ~~for Space Telecommunications (~~Geneva, ~~1971)~~, 1979,

NOC

considering

a) that, within the band 620 - 790 MHz, assignments may be made to television stations using frequency modulation in the broadcasting-satellite service;

b) that it is necessary to have a power flux density limit which will provide adequate protection to the terrestrial broadcasting service;

NOC

taking into account

a) that the conclusions of the Special Joint Meeting of the C.C.I.R. (Geneva, 1971), indicated that the following power flux density limits are necessary to protect the terrestrial broadcasting service:

-121 dBW/m²	$\delta \leq 20°$
$-121 + 0.4\,(\delta-20)$ dBW/m²	$20° < \delta \leq 60°$
-105 dBW/m²	$60° < \delta \leq 90°$

where δ is the angle of arrival above the horizontal plane (in degrees);

b) that additional tests carried out by one administration after the Special Joint Meeting of the C.C.I.R., indicated that the following more conservative power flux density limits may be necessary:

-130 dBW/m²	$\delta \leq 20°$
$-130 + 0.4\,(\delta-20)$ dBW/m²	$20° < \delta \leq 60°$
-114 dBW/m²	$60° < \delta \leq 90°$

where δ is the angle of arrival above the horizontal plane (in degrees);

c) that additional information is required on the protection ratio for interference from an FM television signal into a VSB television signal for both the 625- and 525-line systems;

d) that with terrestrial television receiving systems using current technology, the minimum field strength to be protected may in some cases be less than the values included in C.C.I.R. Recommendation 417-2;

e) that account may have to be taken of ground reflections;

f) that energy dispersal techniques may reduce the required protection ratio and should be used if shown to be effective;

NOC

recommends

1. that in view of the absence of sufficient information on tests under operational conditions and in order to provide sharing criteria, on a provisional basis, the maximum power flux density produced at the surface of the Earth within the service area of a terrestrial broadcasting station (see C.C.I.R. Recommendation 417-2), by a space station in the broadcasting-satellite service in the band 620 - 790 MHz should not exceed:

-129 dBW/m^2	$\delta \leqslant 20°$
$-129 + 0{\cdot}4\,(\delta - 20)$ dBW/m^2	$20° < \delta \leqslant 60°$
-113 dBW/m^2	$60° < \delta \leqslant 90°$

where δ is the angle of arrival above the horizontal plane (in degrees);

2. that these limits be not exceeded on the territory of a country except with the agreement of its administration;

3. that the transmission of unmodulated carriers should be avoided;

4. that the C.C.I.R. urgently study the sharing criteria to be applied to frequency sharing between the broadcasting-satellite service and the terrestrial broadcasting service in the band 620 - 790 MHz and prepare a Recommendation on power flux densities to be used in lieu of the above provisional limits;

5. that in its studies the C.C.I.R. consider in particular the following aspects:

5.1 the required protection ratio for both 525- and 625-line systems for interference from an FM television signal into a VSB television signal;

5.2 the minimum field strength to be protected for the terrestrial television service taking into account the current state of the art;

5.3 the effect of ground reflections;

5.4 the number of broadcasting satellites that may be visible from a terrestrial broadcasting receiver;

5.5 the effect of polarization discrimination;

5.6 the effect of antenna directivity;

6. that in its studies the C.C.I.R. should consider the advantages of energy dispersal techniques in the broadcasting-satellite service (television).

RECOMMENDATION No. Sat – 7

NOC

To the CCIR relating to the interdependence of receiver design, channel grouping and sharing criteria

(MOD) The World ~~Broadcasting-Satellite~~ Administrative Radio Conference, Geneva, ~~1977~~, 1979,

NOC *considering*

a) that receiver design, channel grouping and sharing criteria are interrelated and have a considerable influence on the development of a plan for the broadcasting-satellite service;

b) that, so far, insufficient attention may have been give to these factors and to their influence on the implementation of such a plan;

NOC *invites the CCIR*

to study the problem of the interdependence of receiver design, channel grouping and sharing criteria, together with the effects of these factors on the operation of the broadcasting-satellite service.

RECOMMENDATION No. Aer2 – 1

NOC

Relating to the Development of Techniques which would help to reduce Congestion in the High Frequency Bands Allocated to the Aeronautical Mobile (R) Service

(MOD) The World Administrative Radio Conference ~~on the Aeronautical Mobile (R) Service~~, Geneva, ~~1978~~, 1979,

NOC *considering*

a) that several administrations are actively engaged in the development of communication techniques the wider use of which, in the aeronautical mobile (R) service, would help to reduce congestion in the high frequency bands allocated to that service; such developments include the use of higher frequencies with remotely controlled stations, directional antennae, space radiocommunication techniques and automatic data transmission;

b) that knowledge of these developments would be useful to other administrations in considering the application of these techniques to their aeronautical mobile (R) communication services;

c) that the International Civil Aviation Organization (ICAO) is actively engaged in coordinating the operational development of such techniques;

NOC *recommends*

administrations engaged in the development of techniques which would help to reduce congestion in the HF bands to inform the IFRB periodically of the progress achieved;

NOC *instructs*

the IFRB to circulate periodically the information so obtained to administrations and to the ICAO.

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 698-E
15 November 1979
Original : English

PLENARY MEETING

SEVENTEENTH REPORT OF COMMITTEE 4

Committee 4 has unanimously decided that no action is needed for one Resolution (No. 8) and two Recommendations (Nos. 3 and 5) adopted by the Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975.

For easy reference, the texts have been transmitted to the Editorial Committee for subsequent submission, if felt necessary, to the Plenary Meeting (see Document No. 699).

N. MORISHIMA
Chairman of Committee 4

INTERNATIONAL TELECOMMUNICATION UNION

WORLD ADMINISTRATIVE RADIO CONFERENCE

(Geneva, 1979)

Document No. 699-E
15 November 1979
Original : English

COMMITTEE 9

SEVENTEENTH SERIES OF TEXTS OF COMMITTEE 4
TO THE EDITORIAL COMMITTEE

Committee 4 has unanimously decided that no action is needed for one Resolution (No. 8) and two Recommendations (Nos. 3 and 5) adopted by the Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975.

For easy reference, the texts shown in the Annex are hereby submitted to the Editorial Committee (see Document No. 698).

N. MORISHIMA
Chairman of Committee 4

Annex : 1

ANNEX

RESOLUTION No. 8

Relating to the Use of Bandwidth Saving Modulation Systems

The Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975,

considering

a) that the application of bandwidth saving modulation systems will lead to more efficient use of the LF and MF bands;

b) that the transition to such systems would pose difficulties with regard to transmitters and receivers, and frequency planning;

invites the C.C.I.R.

to expedite its studies of bandwidth saving modulation methods with particular reference to the technical and operational aspects of single-sideband and independent sideband modulation, taking into account the problems of compatibility with existing receivers;

resolves

1. that broadcasting stations may provisionally use bandwidth saving modulation methods on condition that interference in the same or adjacent channels concerned does not exceed the interference resulting from the application of double sideband modulation with full carrier (A3);

2. that any administration which envisages using these methods of emission shall seek the agreement of all affected administrations by following the procedure specified in Article 4 of the Agreement.

RECOMMENDATION No. 3

Relating to Methods of Predicting Sky-Wave Propagation

The Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975,

considering

that the methods of predicting sky-wave propagation used in drawing up the Plan may be improved in the future;

recommends to administrations

that in their bilateral negotiations on modifications to the Plan, they use the methods most recently adopted by the C.C.I.R. for predicting sky-wave propagation or any other methods on which they may agree.

RECOMMENDATION No. 5

Relating to the Publication of a Handbook of Radiation Diagrams of Directional Antennae that can be used in the Broadcasting Service

The Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva, 1975,

considering

a) that the calculation criteria adopted by the Conference, the essentials of which are contained in Annex 2 to the Agreement, require a knowledge of the antenna gain in the direction of propagation;

b) that it is useful to have up-to-date information on the characteristics of LF and MF broadcasting antennae;

c) that a handbook of radiation diagrams of directional antennae that can be used in the LF/MF broadcasting service is being prepared by the C.C.I.R. specialized secretariat in accordance with C.C.I.R. Recommendation 414 and Resolution 59;

d) that it would be useful for measured values of antenna radiation diagrams to be available for comparison with the calculated radiation diagrams;

recommends

that administrations communicate to the director of the C.C.I.R. all the results they may have of relevant measurements.

INTERNATIONAL TELECOMMUNICATION UNION
WORLD ADMINISTRATIVE RADIO CONFERENCE
(Geneva, 1979)

Document No. 700-E
15 November 1979
Original : English

WORKING GROUP 6A

FOURTH AND LAST REPORT OF SUB-WORKING GROUP 6A2 TO WORKING GROUP 6A

In its last meeting Sub-Working Group 6A2 examined the matters described below :

1. Resolution /‾6A2 Rev.1_7

The revised text of this Resolution, originally given in Document No. 624 has been modified in accordance with the views expressed in Working Group 6A, in Sub-Working Group 6A2 and by the IFRB.

As this Resolution is intended to apply only to Earth stations of the amateur-satellite service the heading of the text has been revised accordingly. It should be noted that this Resolution in no way reduces the obligations required with respect to the application of the provisions of Articles N11 and N13 to space stations in the amateur-satellite service.

The revised text is included in Annex 1.

2. Resolution on the production of an explanatory handbook (originally in Document No. 665)

This text has been revised to take account of the point raised by the delegate of Iran. The new text is included in Annex 2.

3. Resolution /‾ZZ_7 on the use of computers in radio frequency management

This text arises from the consideration of Corrigendum No. 1 to Document No. 149 and Document No. 516 along with Document No. 630, the report of Working Group 6A/ad hoc 2. The revised text has been developed on the basis that a specific text relating to assistance to Administrations in the use of computers in radio frequency management was to be produced. It was stressed in discussion that the broad principles covered in Resolution /‾COM 6-2_7 in Document No. 412 should not be limited or reduced in any way, and that any text should recognize this principle. On this basis, the text proposed seeks to cover the specific point relating to the use of computers as an aid in radio frequency management. The draft Resolution is included in Annex 3.

4. Recommendation /‾F Rev.1_7

This text, previously in Document No. 665, has been revised to take account of points raised in discussion in Working Group 6A and those received from delegates. The revised text is included in Annex 4.

5. As part of its work Sub-Working Group 6A2 studied Resolution /‾COM 6-2_7 of Document No. 412 and the draft Resolution contained in Document No. 630. This study was based on the need to establish as to whether the 12th principle given in Document No. 488 has been satisfactorily covered in texts produced under the auspices of Committee 6. Having removed material relating to computer assistance from the Resolution in Document No. 630, as reflected in 3. above, the remaining text of that Resolution was considered. Sub-Working Group 6A2 decided that principle 12 of Document No. 488 was covered by texts already in existence, or included in the Annexes to this Report and saw no need to further expand on the subject. The particular relevance and importance of Resolution /‾COM 6-2_7 in this regard was stressed.

6. This Report is submitted for the consideration of Working Group 6A.

J.A. LEWIS
Chairman of Sub-Working Group 6A2

Annexes : 4

ANNEX 1

DRAFT RESOLUTION No. /6A2 Rev.1 /

Relating to the Bringing into Use of Earth Stations in the Amateur Satellite Service

The World Administrative Radio Conference, Geneva, 1979,

recognizing

that the procedures of Articles N11 and N13 may be applied to the amateur-satellite service;

recognizing further

a) that the characteristics of Earth stations in the amateur-satellite service vary widely;

b) that space stations in the amateur-satellite service are intended for multiple access by amateur Earth stations in all countries;

c) that coordination among stations in the amateur and amateur-satellite services is accomplished without the need for formal procedures;

d) that the burden of terminating any harmful interference is placed upon the Administration authorizing a space station in the amateur-satellite service pursuant to No. 6362/1567A of the Radio Regulations;

notes

that certain information specified in Appendices 1A and 1B cannot reasonably be provided for Earth stations in the amateur-satellite service; and

resolves

that when an Administration (or one acting on behalf of a group of named Administrations) intends to establish a satellite system in the amateur-satellite service and wishes to publish information with respect to Earth stations of its amateur-satellite system it may :

1. communicate to the IFRB all or part of the information listed in Appendix 1A and the IFRB shall publish such information in a special section of its weekly circular requesting comments to be communicated within a period of four months after the date of publication;

2. notify under No. 4575/639BA all or part of the information listed in Appendix 1A; the IFRB shall record it without any date in a special list;

3. that this information shall include at least the characteristics of a typical amateur Earth-station having the facility to transmit signals to the space station to initiate, modify, or terminate the functions of the space station.

ANNEX 2

DRAFT RESOLUTION No. /‾ Rev.1_7

Relating to the Preparation of a Handbook to Explain and Illustrate the Procedures of the Radio Regulations

The World Administrative Radio Conference, Geneva, 1979,

considering

a) the complexity of the regulatory procedures contained in Articles /‾N11, N12, N13 ...._7 of the Radio Regulations;

b) the need of many Administrations for a handbook to give their staff a better understanding of these procedures to help in their application;

c) the possible use of diagrams, flow charts and other graphical aids to the understanding of complex procedures;

recognizing

1. that the World Administrative Radio Conference, 1979, has insufficient time to develop explanatory material and diagrams for inclusion in or attachment to the Final Acts;

2. that a special effort will be required to develop a handbook to adequately meet the need referred to in b) above;

3. that the format of a handbook that is compatible with the format of the Radio Regulations would have advantages;

resolves

that the IFRB should as soon as possible after the World Administrative Radio Conference, 1979, prepare a handbook, including appropriate graphical material including flow charts, to help the staff of Administrations to apply the regulatory procedures of Articles /‾N11, N12, N13 ...._7 of the Radio Regulations;

instructs the Secretary-General

1. to publish the handbook prepared by the IFRB;

2. to insert in published editions of the Radio Regulations the flow charts, when available, clearly marked to the effect that they are an aid to understanding and that they do not form part of the Radio Regulations.

ANNEX 3

DRAFT RESOLUTION No. /‾ZZ_7

Relating to the Introduction and Development of Computer Assistance in Radio Frequency Management within Administrations

The World Administrative Radio Conference, Geneva, 1979,

considering

a) Resolution /‾COM 6-2_7 /‾see Document No. 412_7 relating to the development of national radio frequency management;

b) Resolution /‾Annex II of this Document_7 relating to the preparation of a handbook to explain and illustrate certain provisions of the Radio Regulations;

c) Recommendation /‾Annex IV of this Document_7 to the CCIR relating to the preparation of a handbook on computer-aided techniques in radio frequency management;

considering also

a) the potential value of computer aids in many aspects of radio frequency management and utilization, and in the identification and resolution of cases of harmful interference;

b) the need for further assistance, particularly to developing countries, in introducing and developing computer aids or in maximizing the use of their existing computer facilities as aids to radio frequency management;

resolves

that the Secretary-General shall promptly initiate a review of these problems to ensure that the following actions shall be taken in the most effective manner :

1. the holding of regional seminars particularly directed to education in this field, bearing in mind the national requirements of Administrations;

2. the use of all educational resources available to the Union to provide further training in this field appropriate to the national requirements of Administrations;

3. the establishment of a specialized unit, within the existing framework of the ITU, responsible for aiding Administrations in the identification of their special problems in this field and helping to provide solutions, by the best possible application of computer technology;

invites the Administrative Council

to consider the recommendations of the Secretary-General and to find the necessary resources;

urges Administrations

to support this project through their representatives at the United Nations.

A N N E X 4

RECOMMENDATION No. /¯F Rev.1_7

To the CCIR relating to a Handbook for Computer-aided Techniques in Spectrum Management

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that due to the growing demands on the radio frequency spectrum, there is a need to improve spectrum utilization;

b) that spectrum management problems require data storage, data retrieval, and analysis capabilities, and consequently are amenable to the application of computer methods;

c) that Administrations are facing increasingly voluminous and complex tasks in spectrum management;

d) that technological developments have made powerful computers, particularly mini-computers, available at reasonable cost;

e) that guidance is required by many Administrations with respect to computer-aided techniques in spectrum management;

f) that a certain degree of compatibility is desirable to ease coordination between Administrations and the exchange of data with the IFRB;

g) that many Administrations are interested in, and some are actively developing, computer systems for spectrum management; and

h) that the General Secretariat provides computer resources including advice to all permanent organs of the ITU and further, provides advice, as appropriate, to Administrations;

recommends

1. that a handbook be prepared by the CCIR by 1982 which describes the various aspects involved in applying computer-aided techniques to spectrum management, discusses the approaches which have been made, provides guidelines for various levels of practical application and makes recommendations for those aspects involving international cooperation;

2. that the CCIR should periodically review and revise the handbook;

invites

the General Secretariat and the IFRB to participate in the development of this handbook to ensure that their requirements can be considered.