INTERNATIONAL TELECOMMUNICATION UNION

General Secretariat

Radio Regulations

Edition of 1990

2

Appendices to the Radio Regulations

Geneva 1990

COVERING NOTE

GENERAL SECRETARIAT INTERNATIONAL TELECOMMUNICATION UNION

CORRIGENDUM NO. 1 — Geneva, 22 March 1991

RADIO REGULATIONS
EDITION OF 1990

Please insert the following corrections to the texts of Appendices 30A(Orb-88), 42 and 44 of the edition of 1990 of the Radio Regulations.

1. *Appendix 30A(Orb-88)*

Add at the bottom of page AP30A (Orb-88)-8

[1] The expression "frequency assignment for reception to a space station", wherever it appears in this Article, shall be understood to refer to a frequency assignment associated with a given orbital position.

2. *Appendix 42*

In the table page AP42-8, replace

~~V6A-V6Z~~	~~Marshall Islands (Republic of the)~~
~~V7A-V7Z~~	~~Micronesia (Federated States of)~~

by

V6A-V6Z	Micronesia (Federated States of)
V7A-V7Z	Marshall Islands (Republic of the)

3. *Appendix 44*

a) *In the table page AP44-3, replace*

~~59700 – 59899~~	~~New Zealand~~

by

59700 – 59899 **	New Zealand

Add at the bottom of the page

** *Note by the General Secretariat:* New Zealand has relinquished to the ITU, for possible redistribution, the following block of selective call numbers for ship stations: 59800-59899.

b) *In the table page AP44-5, replace*

~~02400-02499~~	~~Cook Islands~~
~~02500-02599~~	~~Niue Island~~

by

02400-02449	Cook Islands
02500-02549	Niue Island

c) *In the table page AP44-7, replace*

~~27273-27999~~	~~Japan~~

by

27273-27499	Japan

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APPENDICES
TO THE RADIO REGULATIONS

APPENDIX 1

(See Article **12**)

Introduction

This Appendix contains six sections and one annex:

Section A – Basic Characteristics to Be Furnished for Notification under Nos. **1214** to **1217** of the Radio Regulations

Section B – Basic Characteristics to Be Furnished for Notification under No. **1219** of the Radio Regulations

Section C – Basic Characteristics to Be Furnished for Notification under Nos. **1223** to **1227** of the Radio Regulations

Section D – Information to Be Furnished for Notification under No. **1218** of the Radio Regulations

Section E – Form of Notice

Section F – General Instructions

I. General Notes

II. Notes Concerning Information to Be Entered in the Notice Pertaining to Specific Columns of the Master Register

Annex: Map of Geographical Zones for Broadcasting

Section A. Basic Characteristics to Be Furnished for Notification under Nos. 1214 to 1217 of the Radio Regulations

Column 1	Assigned frequency.
Column 2c	Date of bringing into use.
Column 3	Call sign (identification). *This is not a basic characteristic for stations referred to in No.* **2055.1**.
Column 4a	Name of the transmitting station.
Column 4b	Country or geographical area in which the transmitting station is located.
Column 4c	Longitude and latitude of the transmitter site.
Column 5a	Name of the receiving station. *This is not a basic characteristic for broadcasting, land, radionavigation land, radiolocation land or standard frequency and time signal stations, or for ground-based stations in the meteorological aids service.*
Column 5b	Country or geographical area in which the receiving station is located. *This is not a basic characteristic for broadcasting, land, radionavigation land, radiolocation land or standard frequency and time signal stations, or for ground-based stations in the meteorological aids service.*

Column 5c Longitude and latitude of the site of the receiving station.

This is not a basic characteristic for broadcasting, land, radionavigation land, radiolocation land or standard frequency and time signal stations, or for ground-based stations in the meteorological aids service.

Column 5d Locality or area(s) of the receiving stations.

This is a basic characteristic only for broadcasting, land, radionavigation land, radiolocation land and standard frequency and time signal stations.

Columns 5e and 5f are to be used only if the area is not adequately defined in Column 5d.

Column 5e Longitude and latitude of the centre of the circular receiving area.

This is a basic characteristic only for land, radionavigation land, radiolocation land and standard frequency and time signal stations.

To be used only if the area is not adequately defined in Column 5d.

Column 5f Nominal radius (km) of the circular receiving area.

This is a basic characteristic only for land, radionavigation land, radiolocation land and standard frequency and time signal stations.

To be used only if the area is not adequately defined in Column 5d.

Column 6 Class of station and nature of service.

Column 7a Class of emisssion, necessary bandwidth and description of transmission.

Column 7b Class of operation of the assignment.

This is a basic characteristic only for the assignments to stations of the fixed service in the frequency bands allocated to this service between 3 000 kHz and 27 500 kHz.

Column 8 Power (dBW).

Column 9a Azimuth of maximum radiation.

Column 9b Elevation angle of maximum directivity.

This is a basic characteristic only for stations in the bands above 1 GHz allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services and shall be provided to an accuracy of one tenth of a degree [1].

Column 9c Angular width of radiation main lobe.

This is not a basic characteristic if the Column 9j data are supplied.

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[1] These data shall be provided to an accuracy of one tenth of a degree only if the station is within the coordination area of an earth station or if the direction of the maximum radiation is within three degrees of the geostationary-satellite orbit.

Column 9d Polarization.

This is a basic characteristic only for stations in the bands above 1 GHz allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services and for broadcasting stations in the VHF/UHF bands in the African and European Broadcasting Areas.

Column 9e Height of antenna (metres) for a simple vertical antenna.

This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.

Column 9f Maximum effective height of the antenna.

This is a basic characteristic for broadcasting stations in the VHF/UHF bands in the African and European Broadcasting Areas and is defined in the Final Acts of the relevant conferences.

This is a basic characteristic for terrestrial stations operating in the bands above 1 GHz that are shared between space and terrestrial services and shall be indicated in metres above mean sea level.

Column 9g Maximum antenna gain (isotropic, relative to a short vertical antenna or relative to a half-wave dipole, as appropriate).

This is not a basic characteristic if the effective radiated power or the e.i.r.p. is notified in Column 8 or if the Column 9j data are supplied.

Column 9h Azimuths defining the sectors of limited radiation in degrees (clockwise) from True North.

This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.

Column 9i Maximum agreed radiation in the sectors.

This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.

Column 9j Type of antenna (see CCIR Book "Antenna Diagrams").

This is not a basic characteristic if the Columns 9c and 9g data are supplied.

Column 10b Regular hours (UTC) of operation of the frequency assignment.

Column 11 Coordination with other administrations.

This is a basic characteristic for the bands and services concerned.

Supplementary information:

a) in any case where there are one or more *reference frequencies* in a particular transmission (e.g. in the case of the frequency of the reduced carrier in an independent or single-sideband emission, or the frequencies of the sound and vision carriers in a television emission), such reference frequencies shall be supplied;

b) any coordination required by Nos. **1148** to **1154**;

c) the name of any administration with which an agreement has been effected to exceed the limits prescribed in these Regulations and the contents of such agreement.

Section B. Basic Characteristics to Be Furnished for Notification under No. 1219 of the Radio Regulations

Column 1 Assigned frequency.

Column 2c Date of bringing into use.

Column 4a Name of the transmitting station: indicate the letter "M" (for Mobile).

Column 4b Country or geographical area in which the transmitting mobile stations are located.

Column 4c The geographical coordinates (longitude and latitude in degrees and minutes) of the centre of the circular transmitting area.

Column 4d The nominal radius (km) of the circular transmitting area.

Column 4e Indicate a standard defined area using the symbols contained in standard references, e.g. MWARA, RDARA, geographical zones, etc. (see also the Preface to the International Frequency List).

Column 5a Name of the receiving land station.

Column 5b Country or geographical area in which the receiving station is located.

Column 5c The geographical coordinates (longitude and latitude in degrees and minutes) of the site of the receiving station.

Column 6 Class of mobile stations and nature of service.

Column 7a Class of emission of mobile stations and necessary bandwidth and description of transmission.

Column 8 Power (dBW).

Column 10b Regular hours (UTC) of operation of the frequency assignment.

Supplementary information:

a) any coordination required by Nos. **1148** to **1154**;

b) the name of any administration with which an agreement has been effected to exceed the limits prescribed in these Regulations and the contents of such agreement.

Section C. Basic Characteristics to Be Furnished for Notification under Nos. 1223 to 1227 of the Radio Regulations

Column 1 Assigned frequency.

Column 2c Date of bringing into use.

Column 4b — Country or geographical area in which the transmitting station is located.

For the remainder of Column 4 complete either 4e alone or 4c and 4d.

Column 4c — The geographical coordinates (longitude and latitude in degrees and minutes) of the centre of the circular transmitting area.

Column 4d — The nominal radius (km) of the circular transmitting area.

Column 4e — Indicate a standard defined area using the symbols appearing in the Preface to the International Frequency List.

Column 6 — Class of station and nature of service.

Column 7a — Class of emission, necessary bandwidth and description of transmission.

Column 8 — Power (dBW).

Column 10b — Regular hours (UTC) of operation of the frequency assignment.

Supplementary information:

the name of any administration with which an agreement has been effected to exceed the limits prescribed in these Regulations and the contents of such agreement.

Section D. Information to Be Furnished for Notification under No. 1218 of the Radio Regulations

1. *General instructions*

a) The assistance of the IFRB concerns the selection of a frequency or frequencies for assignment to a station in the fixed service in frequency bands between 3 000 kHz and 27 500 kHz allocated to that service.

b) The administration shall give:

- a general description of the problems experienced;
- the necessary technical information and any other information that could guide the subsequent search by the IFRB.

c) The instructions appearing in Section F may also be relevant.

2. *Information to be furnished by the administration*

Column 1 Frequency.

1. If the request concerns the selection of a frequency or a set of frequencies for a radio circuit, leave this column blank or indicate the preferred band.
2. If the request concerns a predetermined frequency, indicate that frequency.

Column 2c Date of bringing into use.

Indicate the proposed date of bringing the frequency assignments into use.

Column 3 Call sign (identification).

Column 4	Particulars of the transmitting station.
Column 4a	Indicate the name of the locality by which the transmitting station is known or in which it is situated.
Column 4b	Indicate the country or geographical area in which the station is located. Symbols from the Preface to the International Frequency List should be used.
Column 4c	Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the transmitter site.
Column 5	Particulars of the receiving station.
Column 5a	Name of the receiving station. Indicate the name of the locality by which the receiving station is known or in which it is situated. Provided that, for a given area, the reception area is well defined and sufficiently small to make it easy to forecast the conditions of use of the frequency from the propagation point of view, it is necessary to notify only sufficient stations to define the reception area.
Column 5b	Country or geographical area in which the receiving station is located.
Column 5c	Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the site of the receiving station.
Column 6	Class of station and nature of service. Indicate the class of station and nature of service performed using the symbols shown in Appendix **10**.

Column 7a Class of emission, necessary bandwidth and description of transmission.

Indicate, for each locality or area of reception shown in Column 5a, the class of emission, necessary bandwidth and description of transmission, in accordance with Article **4** and Appendix **6**.

Column 8 Power (dBW).

1. The power supplied to the antenna transmission line shall be notified as follows, according to the class of emission, and shall be provided in dBW:

   a) mean power (*P*Y) for the amplitude modulated emissions using unkeyed full carrier and for all frequency modulated emissions (see No. **152**);

   b) peak envelope power (*P*X) for all classes of emission other than those referred to in *a)* (see No. **151**);

   c) leave blank when the power is to be calculated by the IFRB.

2. The power normally used to each locality or area of reception shown in Column 5a shall be indicated.

Column 9 Transmitting antenna characteristics (give as much information as is available).

Column 9a Azimuth of maximum radiation.

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

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

Columns 9c and 9g	If the radiation characteristics of the antenna concerned differ from those recommended by the CCIR, Columns 9c and 9g should be completed. Where the radiation characteristics are to be found in the CCIR Book "Antenna Diagrams", indicate an appropriate reference in Column 9j.
Column 9c	Angular width of radiation main lobe. The total angle measured horizontally in a plane containing the direction of maximum radiation, in degrees, within which the power radiated in any direction does not fall more than 3 dB below the power radiated in the direction of maximum radiation, should be indicated.
Column 9g	Antenna gain. The relative gain of the antenna in the direction of maximum radiation for the assigned frequency should be indicated (see No. **154**).
Column 9j	Type of antenna (see CCIR Book "Antenna Diagrams"). Indicate the appropriate reference from the CCIR Book "Antenna Diagrams". See Columns 9c and 9g above.
Column 10	Hours of operation.
Column 10a	Maximum hours (UTC) of operation of the circuit to each locality or area. As complementary information, indicate by the letter "I" any part of the period during which the operation of the circuit is intermittent.

Column 10b Regular hours (UTC) of operation of the frequency assignment.

Indicate the time in Coordinated Universal Time (UTC) by a group of four figures (0000 to 2359). Otherwise indicate the hours of operation as day service (HJ), night service (HN), or transition period service (HT).

Column 11 Coordination with other administrations.

If applicable indicate the country or geographical area with which the relevant coordination has been successfully completed.

Column 12a Operating administration or company.

Column 12b Postal and telegraphic addresses of the administration responsible for the station.

Supplementary information:

if available, provide any receiving antenna data.

Section E. Form of Notice

The Board shall develop and keep up to date a form of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences.

Section F. General Instructions

1. A separate notice shall be sent to the International Frequency Registration Board for notifying:

- each new frequency assignment;
- any change in the characteristics of a frequency assignment recorded in the Master International Frequency Register (hereinafter called the *Master Register*);
- any total deletion of a frequency assignment recorded in the Master Register.

2. When a frequency assignment is used by a station to perform different services, a separate notice shall be submitted for each type of service (e.g. FA, FB, FC, FX, etc.).

3. Frequencies prescribed by these Regulations for common use, as specified in the Preface to the International Frequency List, should not be notified (see No. **1220**).

4. Separate entries, in Columns 5a to 10, should be made for the various characteristics when they do not apply to the assignment as a whole, for instance when the class of emission or the power differs according to the localities or areas of reception.

5. For television broadcasting stations in Region 1, separate notices shall be submitted for the sound and vision channels. In such cases, the notice shall relate to the sound and vision carrier frequencies.

I. General Notes

(a) The name of the notifying administration should be indicated.

(b) Indicate in this box by the letter "X" when the notice reflects:

- the first use of a frequency by a station; *or*

- the first use of an additional frequency by a station.

(c) Indicate in this box by the letter "X" when the notice reflects a change in the characteristics of a frequency assignment recorded in the Master Register.

(1) In the case where existing particulars (including the frequency) are changed, the new characteristics in the appropriate place should be underlined; the original characteristics which have been changed should be shown in brackets underneath or at the side.

(2) In the case where the change is an addition to existing particulars, the additional characteristics should be shown in the appropriate place and should be underlined.

(3) In the case where the change is a cancellation of a particular characteristic or characteristics, this should be shown in the appropriate place by a dash and, underneath or at the side, the characteristics which have been cancelled should be shown in brackets.

(d) Indicate in this box by the letter "X" when the notice reflects a deletion of an assignment, in all of its notified characteristics.

(e) The serial number of the notice and the date on which the notice is sent to the Board shall be shown here.

II. Notes Concerning Information to Be Entered in the Notice Pertaining to Specific Columns of the Master Register

Column 1 Assigned frequency.

1. Indicate the assigned frequencies [1, 2] as defined in Article **1**: in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive, and in GHz above 10 500 MHz.

2. *This information is a basic characteristic.*

Column 2c Date of bringing into use.

1. In the case of a new assignment, insert the date (actual or foreseen, as appropriate) of bringing the frequency assignment into use.

2. Whenever the assignment is changed in any of its basic characteristics as defined in this Appendix, except in the case of a change in Column 3, 4a, 10a or 11, the date to be indicated shall be that of the latest change (actual or foreseen, as appropriate).

3. *This information is a basic characteristic.*

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[1] For television broadcasting stations in Region 1, the frequencies to be notified are those of the sound and vision carriers.

[2] For stations in the aeronautical mobile (R) service, see Appendix **27 Aer2** revised paragraph **27/72**.

Column 3 Call sign (identification).

1. Indicate the call sign or other identification used in accordance with Article **25**.

2. *This information is a basic characteristic, except for stations referred to in Nos.* **1223** *and* **2055.1** *or when the frequency assignment is used for reception in the circumstances described in No.* **1219**.

Column 4 Particulars of the transmitting station.

When the frequency assignment is used in the circumstances described in Nos. **1214** *to* **1217**, *the basic characteristics to be provided in Column 4 are as follows:*

Column 4a Indicate the name of the locality by which the transmitting station is known or in which it is situated.

Column 4b Indicate the country or geographical area in which the station is located. Symbols from the Preface to the International Frequency List shall be used.

Column 4c Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the transmitter site. For frequency assignments above 1 GHz in the bands shared between terrestrial radiocommunication and space radiocommunication services, indicate the geographical coordinates (longitude and latitude in degrees, minutes and seconds with an accuracy of one tenth of a minute [1] or, as an alternative, indicate the longitude and latitude in degrees and minutes and, in Column 9a, the azimuth of maximum radiation of the antenna to an accuracy of one tenth of a degree).

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[1] The seconds with an accuracy of one tenth of a minute need only be notified if the station is within the coordination area of an earth station.

When the frequency assignment is used for reception in the circumstances described in No. **1219**, *the basic characteristics to be provided in Column 4 are as follows:*

Column 4a Name of the transmitting station: indicate the letter "M" (for Mobile).

Column 4b Indicate the country or geographical area in which the transmitting mobile stations are located. If the stations are not located within a country, indicate the country responsible. Symbols from the Preface to the Interational Frequency List shall be used.

Column 4c Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the centre of the circular transmitting area.

Column 4d Indicate the nominal radius (km) of the circular transmitting area.

Column 4e Indicate a standard defined area using the symbols contained in standard references, e.g. MWARA, RDARA, geographical zones, etc. (see also the Preface to the International Frequency List).

When the frequency assignment is used in the circumstances described in Nos. **1223** *to* **1227**, *the basic characteristics to be provided in Column 4 are as follows:*

Column 4b Indicate the country or geographical area in which the station is located. Symbols from the Preface to the International Frequency List shall be used.

For the remainder of Column 4 complete either 4e alone or 4c and 4d.

Column 4c Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the centre of the circular transmitting area.

Column 4d Indicate the nominal radius (km) of the circular transmitting area.

Column 4e Indicate a standard defined area using the symbols appearing in the Preface to the International Frequency List.

Column 5 Particulars of the receiving station.

When the frequency assignment is used in the circumstances described in Nos. **1214** *to* **1217**, *the basic characteristics to be provided in Column 5 are as follows:*

Column 5a Name of the receiving station. Indicate the name of the locality by which the receiving station is known or in which it is situated.

1. Provided that, in the fixed service, the reception area is well defined and sufficiently small to make it easy to forecast the conditions of use of the frequency from the propagation point of view, it is necessary to notify only sufficient stations to define the reception area.

2. However, for broadcasting, land, radionavigation land, radiolocation land and standard frequency and time signal stations, and for ground-based stations in the meteorological aids service, it is not necessary to indicate any information in this column.

3. In the case of a network composed of stations intercommunicating on the same frequency, the symbol ZN shall be entered in Column 5a. When the same frequency is used for two or more networks of the same administration, each network should be identified by a separate letter following the network symbol ZN, e.g. ZN-A, ZN-B, etc.

4. In the case of a network, as well as in the case where a frequency is used in a specific area by numerous stations under the jurisdiction of the same administration, it is necessary to notify only sufficient stations to define the area of operation, provided that that area is well defined and sufficiently small to make it easy to forecast the conditions of the use of the frequency from the propagation point of view.

Column 5b Country or geographical area in which the receiving station is located. Symbols from the Preface to the International Frequency List shall be used.

However, for broadcasting, land, radionavigation land and standard frequency and time signal stations, and for ground-based stations in the meteorological aids service, it is not necessary to indicate any information in this column.

Column 5c Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the site of the receiving station.

However, for broadcasting, land, radiolocation land or standard frequency and time signal stations, or for ground-based stations in the meteorological aids service, it is not necessary to indicate any information in this column.

Column 5d Locality or area(s) of the receiving station(s).

1. For broadcasting stations, the area of reception shall be indicated. Each area should be expressed either:

- as interior (INTR);

- or the symbol designating a country or countries or geographical area(s) (Preface to the International Frequency List);
- or one of the geographical zones appearing on the map annexed to this Appendix. If the area of reception cannot be defined in the above manner, Columns 5e and 5f shall be completed.

This is not a basic characteristic for broadcasting stations in the LF/MF or VHF/UHF bands unless specified in a relevant regional agreement.

2. For land, radionavigation land, radiolocation land, standard frequency and time signal stations, and for ground-based stations in the meteorological aids service, indicate an area only if it is standardly described. If the area of reception is not standardly defined, describe the area in Columns 5e and 5f.

Column 5e Longitude and latitude of the centre of the circular receiving area.

1. Indicate the geographical coordinates (in degrees and minutes).
2. This column is not to be used if the area of reception is adequately defined in Column 5d. If Column 5e is used, a corresponding entry must be made in Column 5f.

Column 5f Nominal radius of the circular receiving area.

1. Indicate the radius (km) of the circular receiving area.
2. This column is not to be used if the area of reception is adequately defined in Column 5d. If Column 5f is used, a corresponding entry is required in Column 5e.

When the frequency assignment is used in the circumstances described in No. **1219**, *the basic characteristics to be provided in Column 5 are as follows:*

Column 5a Name of the receiving station. Indicate the name of the locality by which the receiving station is known or in which it is situated.

Column 5b Country or geographical area in which the receiving station is located. Symbols from the Preface to the International Frequency List shall be used.

Column 5c Indicate the geographical coordinates (longitude and latitude in degrees and minutes) of the site of the receiving station.

When the frequency assignment is used in the circumstances described in Nos. **1223** to **1227**, no entry is required in Column 5.

Column 6 Class of station and nature of service.

1. Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10**.
2. When the frequency assignment is used for reception in the circumstances described in No. **1219**, the class of station and nature of service applicable to the mobile stations should be indicated.
3. *This information is a basic characteristic.*

Column 7 Class of emission and class of operation.

Column 7a Class of emission, necessary bandwidth and description of transmission.

1. Indicate, for each locality or area of reception shown in Column 5a, the class of emission, necessary bandwidth and description of transmission, in accordance with Article **4** and Appendix **6**.

2. When the frequency assignment is used for reception in the circumstances described in No. **1219**, the particulars to be indicated are those applicable to the mobile stations.

3. *This information is a basic characteristic.*

Column 7b Class of operation of the assignment.

This is a basic characteristic. For assignments to stations of the fixed service in the frequency bands allocated to this service between 3 000 kHz and 27 500 kHz, indicate the class of operation of the assignment by the symbols A, B or C, as follows:

Symbol A – Assignment for regular operational use which is not provided by another satisfactory means of telecommunication.

Symbol B – Assignment for use as a standby to some other means of telecommunication.

Symbol C – Assignment for occasional use on a reserve basis and not requiring internationally recognized protection from harmful interference.

Column 8 Power (dBW).

1. The power supplied to the antenna transmission line shall be notified as follows, according to the class of emission, and shall be provided in dBW:

a) carrier power (*PZ*) for A3E sound broadcasting (see No. **153**);

b) mean power (*P*Y) for other amplitude modulated emissions using unkeyed full carrier, and for all frequency modulated emissions (see No. **152**);

c) peak envelope power (*P*X) for all classes of emission other than those referred to in *a)* or *b),* including C3F television (vision) (see No. **151**).

2. In the bands above 28 000 kHz which are not allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services, except for notices referred to in Nos. **1223** to **1227**, the effective radiated power shall be notified (see No. **156**).

3. In the bands above 1 GHz allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services, the equivalent isotropically radiated power (e.i.r.p.) shall be notified (see No. **155**).

4. The appropriate symbol *P*Z, *P*Y or *P*X shall follow the indication of the value of the power. In cases where the effective radiated power is notified, this symbol shall be followed by the letter "e". In cases where the e.i.r.p. is notified, this symbol shall be followed by the letter "i".

5. The power normally used to each locality or area of reception shall be indicated.

6. When the frequency assignment is used for reception in the circumstances described in No. **1219**, the power of the mobile stations should be indicated. If not all of the stations use the same power, the highest power should be indicated.

7. *This information is a basic characteristic.*

Column 9 Transmitting antenna characteristics.

Column 9a Azimuth of maximum radiation.

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

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

3. For frequency assignments above 1 GHz in the bands shared between terrestrial radiocommunication and space radiocommunication services, the azimuth shall be provided to an accuracy of one tenth of a degree [1] in those cases where the required accuracy in the geographical coordinates (to a tenth of a minute [2]) has not been specified in Column 4c.

4. *This information is a basic characteristic, except for stations referred to in Nos.* **1223** *to* **1227**, *or when the frequency assignment is used for reception in the circumstances described in No.* **1219**.

Column 9b Elevation angle of maximum directivity.

This is a basic characteristic only for stations in the bands above 1 GHz allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services and shall be provided to an accuracy of one tenth of a degree [1].

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[1] These data shall be provided to an accuracy of one tenth of a degree only if the station is within the coordination area of an earth station or if the direction of the maximum radiation is within three degrees of the geostationary-satellite orbit.

[2] The seconds with an accuracy of one tenth of a minute need only be notified if the station is within the coordination area of an earth station.

Columns 9c and 9g	If the radiation characteristics of the antenna concerned differ from those recommended by the CCIR, Columns 9c and 9g should be completed. Where the radiation characteristics are to be found in the CCIR Book "Antenna Diagrams", indicate an appropriate reference in Column 9j.
Column 9c	Angular width of radiation main lobe. The total angle measured horizontally in a plane containing the direction of maximum radiation, in degrees, within which the power radiated in any direction does not fall more than 3 dB below the power radiated in the direction of maximum radiation, should be indicated.
Column 9d	Polarization. *This is a basic characteristic for stations in the bands above 1 GHz allocated on a shared basis to the space radiocommunication and terrestrial radiocommunication services and for broadcasting stations in the VHF/UHF bands in the African and European Broadcasting Areas.*
Column 9e	Height of antenna (metres) for a simple vertical antenna. *This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.*
Column 9f	Maximum effective height of the antenna. *This is a basic characteristic for broadcasting stations in the VHF/UHF bands in the African and European*

Broadcasting Areas and is defined in the Final Acts of the relevant conferences.

This is a basic characteristic for terrestrial stations operating in the bands above 1 GHz that are shared between space radiocommunication and terrestrial radiocommunication services and shall be indicated in metres above mean sea level.

Column 9g Maximum antenna gain (isotropic, relative to a short vertical antenna or relative to a half-wave dipole, as appropriate).

1. The relative gain of the antenna in the direction of maximum radiation for the assigned frequency should be indicated (see No. **154**).
2. *This is not a basic characteristic if the effective radiated power or the e.i.r.p. is notified in Column 8.*

Column 9h Azimuths defining the sectors of limited radiation in degrees (clockwise) from True North.

1. Indicate the azimuths defining the sectors of limited radiation in degrees (clockwise) from True North.
2. *This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.*

Column 9i Maximum agreed radiation in the sectors.

1. Indicate the maximum agreed radiation in the sector, in dB relative to a cymomotive force (c.m.f.) of 300 V or an effective monopole radiated power (e.m.r.p.) of 1 kW,

determined from the nominal power of the transmitter and the theoretical gain of the antenna without allowing for miscellaneous losses.

2. *This is a basic characteristic for broadcasting stations in the LF/MF bands in Region 1 and MF bands in Region 3.*

Column 9j Type of antenna (see CCIR Book "Antenna Diagrams").

Indicate the appropriate reference from the CCIR Book "Antenna Diagrams". See Columns 9c and 9g above.

Column 10 Hours of operation.

Column 10a Maximum hours (UTC) of operation of the circuit to each locality or area.

1. When the frequency assignment is used for reception in the circumstances described in No. **1219**, the maximum hours of operation are those relating to the mobile stations.

2. As complementary information, indicate by the letter "I" any part of the period during which the operation of the circuit is intermittent.

3. *This information is not a basic characteristic.*

Column 10b Regular hours (UTC) of operation of the frequency assignment.

1. If known, indicate the regular hours of operation of the frequency assignment in UTC. Otherwise indicate the hours of operation as day service (HJ), night service (HN), or transition period service (HT).

2. *This is a basic characteristic.*

Column 11 Coordination with other administrations.

1. Identify the country or geographical area with which coordination has been successfully completed and indicate the provision (No. of the Radio Regulations, regional agreement, or other arrangement) requiring such coordination.

2. *This is a basic characteristic for the bands and services concerned.*

Column 12a Operating administration or company *.

This information is not a basic characteristic, but it is recommended it be supplied in cases where the same agency operates in more than one country.

Column 12b Postal and telegraphic addresses of the administration responsible for the station *.

1. The addresses required are those to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the circuit (see Article **22**).

2. *This information is not a basic characteristic.*

Supplementary Information

Any supplementary information supplied by the administration should be indicated within the frame provided on the notice.

1. If the assignment is made in application of a regional or service agreement, the relevant agreement shall be indicated in the appropriate place; otherwise, insert the indication "Nil".

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* Where this information already appears in the Preface to the International Frequency List, the appropriate reference number or letter may be used.

2. Indicate after the symbol COORD/ the name of any administration with which coordination has been effected for the use of the frequency; if no coordination has been effected, the indication "Nil" should be inserted. In the case of a notification under Nos. **1223** to **1227** in a frequency band above 28 000 kHz, the area or areas of the actual use to which the coordination refers should be indicated.

3. In any case where there are one or more reference frequencies in a particular transmission (e.g. in the case of the frequency of the reduced carrier in an independent or single-sideband emission, or the frequencies of the sound and vision carriers in a television emission), such reference frequencies shall be supplied. In the case of television broadcasting stations in Region 1, each notice shall include, as supplementary information, both the frequency of the other carrier and the assigned frequency.

4. Any other information which the administration considers to be relevant should be indicated, such as, for example, an indication that the assignment concerned would be operating in accordance with No. **342** of these Regulations, or information concerning the use of the notified frequency if such use is restricted or if the frequency is not used during all the time which is possible according to propagation conditions.

5. *Only the information specified in paragraph 3 above is a basic characteristic; it is recommended, however, that the information under paragraphs 1 and 2 above be supplied. However, in the case of stations in the terrestrial radiocommunication services referred to in Nos.* ***1148*** *to* ***1154****, the name of any administration with which coordination of the use of the frequency has been sought and the name of any administration with which such coordination has been effected are basic characteristics.*

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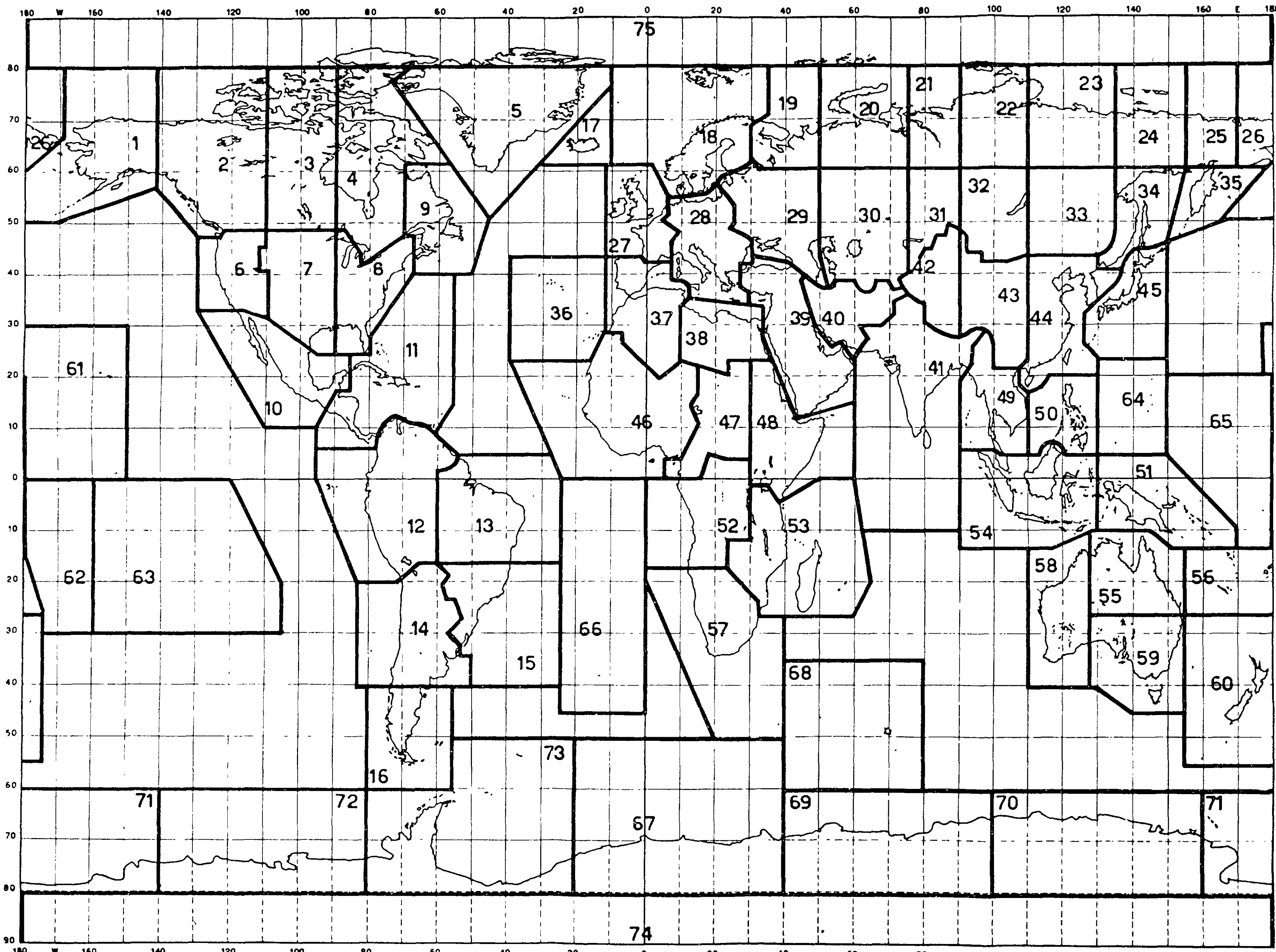

GEOGRAPHICAL ZONES FOR BROADCASTING

APPENDIX 2
HFBC-87

Submission of HF Broadcasting Requirements to the IFRB

(See Article **17**)

Section A. Introduction

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

An administration wishing to notify a broadcasting requirement to the Board will do so on the basis of the information provided in Section B of this Appendix. The necessary information shall be provided on a requirement form developed by the Board.

A separate requirement form shall be sent to the IFRB for notifying:

– each requirement to be put into use for particular seasons;

– any modification in the characteristics of a requirement;

– any deletion of a requirement.

Section B. Information relating to the broadcasting service in the exclusive HFBC bands to be provided in requirement forms *

1. *Notifying administration* [1]

The notifying administration shall be indicated using the symbols given in the Preface to the International Frequency List.

1.1 Requirement reference number allocated by the administration.

2. *Name of transmitting station* [1]

3. *Symbol of the country or geographical area in which the transmitting station is located* [1]

4. *Geographical coordinates of the transmitting station* [1]

When two or more transmitting stations are almost co-located, the administration shall indicate, as far as possible, the same coordinates.

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[1] Basic information that must be provided by administrations.

* *Note:* The Board will develop a form for the submission of HF broadcasting requirements based on the items of information and corresponding explanations contained in this Appendix. Furthermore, the Board may add other items of an administrative nature, although provision of the information in these additional items will not be obligatory.

5. *Required service areas*[1]

In specifying the required service area, reference shall be made to a combination of:

- CIRAF Zones,[2]

- quadrants of CIRAF Zones,

- parts of quadrants specified by the sets of test points contained within those parts.

Where it is necessary to specify a required service area which is smaller than an entire zone or quadrant, this may be done by specifying the boundaries of the area as two azimuths and two ranges from the transmitter location.

The map of the CIRAF Zones to be used in notifying a requirement is given in Section C of this Appendix.

6. *Season*[1]

The season or seasons to which the requirement is intended to apply. When the requirement is not intended to be implemented on a daily basis, the days on which it will be implemented shall be indicated.

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[1] Basic information that must be provided by administrations.

[2] CIRAF = Conferencia Internacional de Radiodifusión por Altas Frecuencias (International High Frequency Broadcasting Conference), Mexico, 1948.

7. *Hours of operation (UTC)*[1]

7.1 Indicate legal clock time changes.[2]

8. *Indicate temporary interruptions of broadcasting services* (due, for example, to natural disasters or other types of catastrophe)

9. *Transmitting antenna characteristics*[1]

9.1 For all types of antenna indicate:

9.1.1 The type of antenna to be used, with reference to the antenna type appearing in the IFRB Technical Standards (see Resolution **516 (HFBC-87)**).

9.1.2 The azimuth of maximum radiation in degrees from true North in clockwise direction.

9.1.3 The maximum gain (isotropic, G_i, dB) if different from that associated with the relevant pattern in the reference antenna set. In the case of slewed horizontal dipole arrays this maximum gain is the gain in the slewed mode.

9.1.4 The lowest and highest frequency bands (in MHz) for multi-band antennas, or the frequency band for single band antennas.

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[1] Basic information that must be provided by administrations.

[2] For information only.

9.2 For horizontal dipole arrays, indicate in addition to the above parameters:

9.2.1 Type of radiator (end-fed or centre-fed dipole elements).

9.2.2 Type of reflector (tuned dipoles or aperiodic screen).

9.3 For multi-band horizontal dipole arrays, indicate in addition to the above parameters:

9.3.1 Design frequency, in MHz. If not indicated, the design frequency will be assumed as the arithmetic mean of the centre frequencies of the lowest and highest frequency bands covered by the antenna.

9.4 For slewed horizontal dipole arrays, indicate in addition to the above parameters:

9.4.1 Azimuth of the normal to the plane of the radiating elements (in degrees from true North in the clockwise direction).

10. *Transmitter power (dBW)*[1]

1) For double-sideband emissions, indicate the carrier power in dBW.

2) For single-sideband emissions, indicate the peak envelope power in dBW.

3) Indicate the range of available powers.

[1] Basic information that must be provided by administrations.

11. *Class of emission*[1]

Indicate whether it is a double-sideband emission, or a single-sideband emission with a carrier reduced by 6 dB or by 12 dB relative to peak power (see Article **4**).

11.1 Indicate if the transmitter can operate in either mode (double-sideband and single-sideband).[2]

12. *Assigned frequency* (for application of Article **17** or Section 2 of Annex 1 to Resolution **515 (HFBC-87)**)

Administrations may indicate:

- the assigned frequency (in kHz);[3]
- alternative frequencies (in kHz);[3]
- the frequency band (in MHz).

If no information is provided, the Board will select the appropriate band and frequency in accordance with Annex 1 to Resolution **515 (HFBC-87)**.

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[1] Basic information that must be provided by administrations.

[2] For information only.

[3] *a)* For a double-sideband emission, the assigned frequency shall be expressed in kHz ending with 0 or 5.

b) For a single-sideband emission, the assigned frequency shall be expressed in kHz ending with 2.5 or 7.5.

13. *Preset frequencies (in kHz)*[1]

14. *Preferred frequency (in kHz)*[1]

15. *Preferred frequency band (in MHz)*

16. *Equipment availability*

Indicate the number of transmitters that can be used simultaneously and the associated bands for possible use in case more than one frequency has to be used to achieve the required basic broadcast reliability (BBR) (see the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**).

17. *Requested types of frequency continuity (types 2, 3, 4 and/or 5)* (see IV.3 of the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**)

17.1 Identify requirements which are related by these types of continuity.

18. *Lowest value of BBR to be used for this requirement* (see IV.3.3 of the Appendix to Section 3 of Annex 1 to Resolution **515 (HFBC-87)**)

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[1] *a)* For a double-sideband emission, the assigned frequency shall be expressed in kHz ending with 0 or 5.

b) For a single-sideband emission, the assigned frequency shall be expressed in kHz ending with 2.5 or 7.5.

19. *Indicate the use of synchronized transmitters*

20. *Indicate equipment limitations* (e.g. frequency bands available)

21. *Indicate whether consultations are required when the co-channel RF protection ratio is less than 17 dB*

22. *Nature of requirement* (for instance, national or international) [1]

23. *Postal and telegraphic addresses of the administration responsible for the station*

24. *Remarks and supplementary information*

Indicate, after the symbol COORD/, the name of any administration with which coordination has been effected for use of the frequency.

Indicate any other information that the Board may require for the evaluation of the improved HFBC Planning System (see Resolution **515 (HFBC-87)**).

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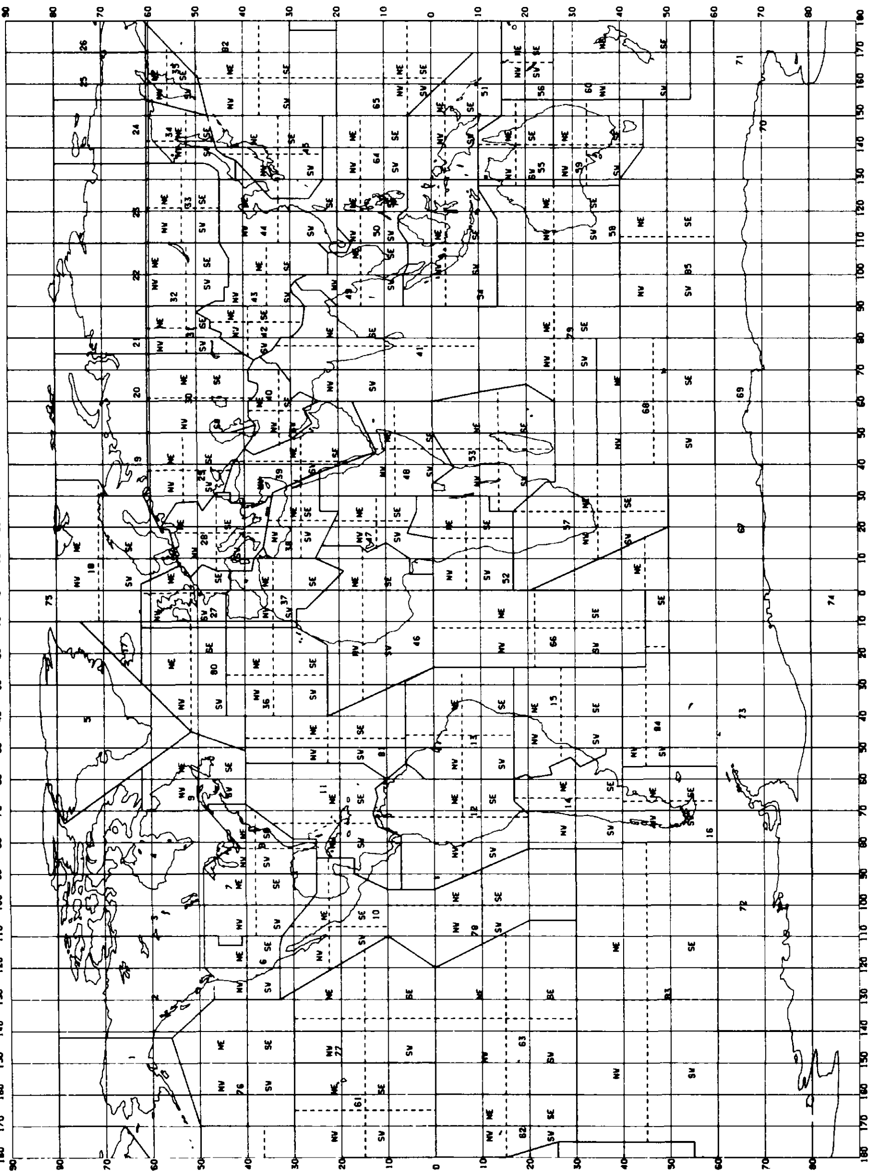
[1] For the purpose of Resolution **515 (HFBC-87)** only. See also No. **1739.1**.

SECTION C. Map of CIRAF Zones



GEOGRAPHICAL ZONES FOR HIGH FREQUENCY BROADCASTING (CIRAF ZONES)

ZONES GEOGRAPHIQUES POUR LA RADIODIFFUSION A HAUTES FREQUENCES (ZONES CIRAF)

ZONAS GEOGRAFICAS PARA RADIODIFUSION POR ALTAS FRECUENCIAS (ZONAS CIRAF)

Note – Information concerning the test points associated with these CIRAF Zones and quadrants is given in the IFRB Technical Standards.

APPENDIX 3

Orb-88

Notices Relating to Space Radiocommunications and Radio Astronomy Stations

(See Articles **11**, **13** and **14**)

Section I. General Instructions

1. A separate notice shall be sent to the International Frequency Registration Board for the purpose of:

a) coordinating under No. **1060** frequency assignments of a geostationary-satellite network, taking into account the characteristics of its associated stations (see Section II of this Appendix);

b) coordinating under No. **1060** frequency assignments to a specific earth station (see Section II of this Appendix);

c) coordinating under No. **1060** frequency assignments to a typical earth station not previously so coordinated (see Section II of this Appendix);

d) coordinating under No. **1107** frequency assignments to an earth station (see Section III of this Appendix);

e) notifying each frequency assignment to a space station of a geostationary, non-geostationary or deep-space satellite network, taking into account the characteristics of its associated stations (see Section II of this Appendix);

f) notifying each frequency assignment to an earth station (see Section III of this Appendix);

g) notifying each frequency assignment to be received by a radio astronomy station (see Section IV of this Appendix);

h) notifying any change in the characteristics of a frequency assignment recorded in the Master International Frequency Register (hereinafter called the *Master Register*);

i) notifying any total deletion of a frequency assignment recorded in the Master Register.

2. When notices are submitted under Nos. **1488** to **1491** for frequency assignments to a space station and associated earth stations that together are to form a satellite network, for transmission and reception by the space station or any associated earth station, a single notice may be submitted that covers all basic characteristics of the network and listing the assigned frequencies as prescribed in this Appendix. However, when individual notices are submitted under Nos. **1488** to **1491** for frequency assignments to an earth or space station for transmitting or for frequency assignments to be used for reception by an earth or space station, separate notices shall be submitted to the Board for each station. In each of these cases, when the basic characteristics are identical with the exception of the frequency, a single notice may be submitted covering all basic characteristics and listing the assigned frequencies.

A transmitting or receiving earth station, the basic characteristics of which may cause more interference or require more protection than those of a typical earth station associated with a previously notified network, may be associated with that network, as a new type of associated earth station, when it has been successfully coordinated under the provisions of No. **1060** as part of the network.

3. In the case of a satellite system employing multiple space stations with the same general characteristics, a separate notice shall be submitted to the Board for each space station for transmitting or receiving assignments:

- when it is aboard a geostationary satellite;
- when it is aboard a non-geostationary satellite, except when a number of satellites have the same radio frequency characteristics and orbital characteristics (excluding the ascending node position); in the latter case, one notice covering all such space stations may be submitted to the Board.

4. The notices and basic characteristics shall also be used for seeking agreement in accordance with Article **14** of the Radio Regulations.

5. The following information, when appropriate, shall be shown on the notice:

a) the national serial number of the notice and the date on which the notice is sent to the Board;

b) the name of the notifying administration;

c) whether the notice reflects:

1) first notification and, if so, whether it is an addition (ADD), modification (MOD) or deletion (SUP);
2) resubmission of the notice;
3) a request for coordination in accordance with No. **1060**;
4) a request for coordination in accordance with No. **1107**;
5) notification in accordance with No. **1488**;
6) a request for agreement in accordance with Article **14** of the Radio Regulations;
7) a request for the assistance of the IFRB;

d) reference to the IFRB weekly circular special section providing the advance publication information required in accordance with No. **1042**;

e) reference to the IFRB weekly circular special section providing the coordination information required in accordance with No. **1060**;

f) reference to the IFRB weekly circular special section providing the information required in accordance with Article **14** of the Radio Regulations;

g) characteristics as outlined in Sections II, III or IV of this Appendix as appropriate;

h) any other information which the administration considers to be relevant, for instance: an indication that the assignment concerned would operate in accordance with No. **342**; any factors taken into account when applying Appendix **28** to the Radio Regulations for determination of the coordination area; or whether the transmissions of the station are to be permanently switched off after a certain period.

Section II. Notices Relating to Coordination under No. 1060 of Satellite Networks, and Notification of Space Stations

2.A General characteristics to be provided for the satellite network

2.A.1 Identity of the satellite network

Indicate the identity of the space station(s).

2.A.2 Date of bringing into use [3]

a) In the case of a new assignment, indicate the date (actual or foreseen, as appropriate) of bringing the frequency assignment into use.

b) Whenever the assignment is changed in any of its basic characteristics (except in the case of a change in Item 2.A.1), the date to be given shall be that of the latest change (actual or foreseen, as appropriate).

2.A.3 Operating administration or company

Give the name of the operating administration or company and the postal and telegraphic addresses of the administration to which communications should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the space station (see Article **22** of the Radio Regulations).

2.A.4 Orbital information

a) In the case of a space station aboard a geostationary satellite indicate the nominal geographical longitude on the geostationary-satellite orbit and the planned longitudinal tolerance and inclination excursion. Indicate also in the case where a geostationary satellite is intended to communicate with an earth station:

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;

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

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 any 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 of the space station(s) and the number of satellites used.

2.A.5 Coordination

Give the name of any administration with which coordination has been successfully effected in accordance with No. **1060** and, if appropriate, the name of any administration with which coordination has been sought but not completed.

2.A.6 Agreements

a) Give, if appropriate, the name of any administration with which agreement has been reached to exceed the limits prescribed in these Regulations.

b) Give, if appropriate, the name of any administration with which agreement has been reached in accordance with Article **14** of the Radio Regulations.

2.B Characteristics of the satellite network for reception at the space station

All the information required in sub-section 2.B is to be provided for each satellite receiving beam if a network is to be coordinated or notified.

Information related to satellite receiving beam

2.B.1 Name of satellite receiving beam

Indicate, for a geostationary satellite, the name of the satellite receiving antenna beam and whether it is a steerable or reconfigurable antenna beam.

2.B.2 Service area or associated transmitting station(s)

a) When the associated transmitting stations are earth stations, indicate the service area or areas of the satellite beam on the Earth.

b) When the associated transmitting stations are space stations, identify each station by reference to the notification thereof or in any other appropriate manner.

2.B.3 Assigned frequency (frequencies)

Indicate the assigned frequency (frequencies), as defined in No. **142**, in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive and in GHz above 10 500 MHz.

If the basic characteristics are identical, with the exception of the frequency, a single notice may be submitted covering all basic characteristics and listing the assigned frequencies.

2.B.4 Assigned frequency band

Indicate the bandwidth of the assigned frequency band in kHz (see No. **141**).

2.B.5 Class of station(s) and nature of service

Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10**.

2.B.6 Space station receiving antenna characteristics

a) In the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station, indicate whether the receiving antenna beam will point in a fixed direction or will have a steerable beam (see No. **183**) capability.

b) In the case of a space station aboard a geostationary satellite, indicate the name of the satellite antenna beam by a three character code. For steerable beams, the last character shall be an "R".

c) In the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station via a receiving antenna pointing in a fixed direction, indicate the maximum isotropic gain (dBi) and the gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite onto a plane perpendicular to the axis from the centre of the Earth to the satellite. The space station antenna gain contours shall be drawn as isolines of the isotropic gain, at least for -2, -4, -6, -10 and -20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain, when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite. Whenever possible the gain contours of the space station receiving antenna should also be provided in the form of a numerical equation.

d) In the case of a space station aboard a geostationary satellite where a steerable beam is used, data on the radiation characteristics shall be provided as follows:

1) if the effective boresight area (see No. **168A**) is identical with the global or nearly global service area, provide only the maximum isotropic antenna gain (dBi). The maximum antenna gain is applicable to all points on the Earth's visible surface;

2) if the effective boresight area (see No. **168A**) is less than the global or nearly global service area, provide the maximum antenna gain and the effective antenna gain contours (see No. **168B**). These contours shall be provided as defined in *c*) above.

e) [1] In the case of a space station aboard a geostationary satellite, include, in the antenna gain contours of *c)* and *d)* 2) above, the effect of the planned longitudinal tolerance, inclination excursion and pointing accuracy of the antenna.

f) In the case of a space station aboard a geostationary satellite in which the antenna radiation beam is directed towards another satellite, also indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference.

g) In the case of a space station aboard a non-geostationary satellite, indicate the isotropic gain of the space station receiving antenna in the direction of maximum radiation (dBi) and indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference.

h) [1] Indicate the type of polarization of the antenna. In the case of circular polarization, indicate the direction of polarization (see Nos. **148** and **149**). In the case of linear polarization, indicate the angle (in degrees) measured anticlockwise in a plane normal to the beam axis from the equatorial plane to the electric vector of the wave as seen from the satellite. Indicate also whether consent is given to the general use of this information in determining the need for coordination with other satellite networks according to Appendix **29** of the Radio Regulations.

i) Indicate, for a geostationary satellite, the pointing accuracy of the antenna.

j) 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 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 orbital longitude.

2.B.7 Receiving system noise temperature

Indicate, in kelvins, the total receiving system noise temperature referred to the output of the receiving antenna of the space station.

Information related to associated transmitting station(s)

This information is to be provided for each type of transmitting station associated with each space station receiving antenna beam.

2.B.8 Type and identity of the associated transmitting station(s)

Indicate whether the associated transmitting station is another space station, a typical earth station of the network, or a specific earth station.

When the associated transmitting station is:

a) another space station, indicate its characteristics by reference to the notification thereof or in any other appropriate manner;

b) a typical earth station of the network, the characteristics provided under the following items of sub-section 2.B shall represent the limiting characteristics for any earth station conforming to that type for the purpose of coordination under No. **1060**;

c) a specific earth station, the characteristics provided under the following items of sub-section 2.B only apply to that earth station and shall include the identity of the earth station and the geographical coordinates of the antenna site for the purpose of coordination under No. **1060**.

The remaining information required in sub-section 2.B is to be provided for each associated earth station or typical earth station.

2.B.9 Class of station(s) and nature of service

Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10** to the Radio Regulations.

2.B.10 Earth station transmitting antenna characteristics

a) Indicate the isotropic gain (dBi) of the antenna in the direction of maximum radiation (see No. **154**).

b) Indicate the beamwidth in degrees between the half power points (describe in detail if not symmetrical).

c) Either attach the measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation) or indicate the reference radiation diagram to be used for coordination.

d)[1] Indicate the type of polarization of the transmitted wave in the direction of maximum radiation; also indicate the direction in the case of circular polarization and the plane in the case of linear polarization (see Nos. **148** and **149**).

2.B.11 Class of emission, necessary bandwidth and description of the transmission

In accordance with Article **4** and Appendix **6** of the Radio Regulations:

a) indicate the class of emission and the necessary bandwidth;

b)[1] indicate the carrier frequency or frequencies of the emission(s);

c)[1] indicate, for each carrier, the class of emission, necessary bandwidth and description of transmission;

d)[1] indicate, for the carrier having the smallest bandwidth of the assignments in the system, the class of emission, necessary bandwidth and a description of the transmission.

2.B.12 Power characteristics of the earth station transmission

a)[1] Indicate for each carrier the peak envelope power (dBW) supplied to the input of the antenna.

b) Indicate the total peak envelope power (dBW) and the maximum power density (dB(W/Hz))[4] supplied to the input of the antenna averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

c)[1] Indicate for each carrier the minimum value of the peak envelope power supplied to the input of the antenna.

d)[1] Indicate for each carrier type[8] (see 2.B.13), the maximum power density (dB(W/Hz))[4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

e)[1] Indicate the maximum aggregate power (dBW) of all carriers (per transponder, if applicable) supplied to the input of the antenna and their aggregate bandwidth. If this corresponds to the bandwidth of a transponder, so indicate.

2.B.13[1] Modulation characteristics

For each carrier, according to the nature of the signal modulating the carrier and the type of modulation, indicate the following characteristics:

a) carrier frequency modulated by a frequency-division multi-channel telephony baseband (FDM/FM) or by a signal that can be represented by a multi-channel telephony baseband: indicate the lowest and highest frequencies of the baseband and the r.m.s. frequency deviation of the test tone as a function of baseband frequency;

b) carrier frequency modulated by a television signal: indicate the standard of the television signal (including, where appropriate, the standard used for colour), the frequency deviation for the reference frequency of the pre-emphasis characteristic and the pre-emphasis characteristic itself; also indicate, where applicable, the characteristics of the multiplexing of the video signal with the sound signal(s) or other signals;

c) carrier phase-shift modulated by a digital signal: indicate the bit rate and the number of phases;

d) amplitude modulated carrier (including single sideband): indicate as precisely as possible the nature of the modulating signal and the kind of amplitude modulation used;

e) for all other types of modulation, provide such particulars as may be useful for an interference study;

f) for any type of modulation, as applicable, indicate the characteristics of energy dispersal, such as the peak-to-peak frequency deviation (MHz) and the sweep frequency (kHz) of the energy dispersal waveform.

2.C Characteristics of the satellite network for transmission from the space station

All the information required in sub-section 2.C is to be provided for each satellite transmitting beam if a network is to be coordinated or notified.

Information related to satellite transmitting beam

2.C.1 Name of the satellite transmitting beam

Indicate, for a geostationary satellite, the name of the satellite transmitting antenna beam and whether it is a steerable or reconfigurable antenna beam.

2.C.2 Service area or associated receiving station(s)

a) If the associated receiving stations are earth stations, indicate the service area or areas of the satellite beam on the Earth.

b) If the associated receiving stations are space stations, identify each station by reference to the notification thereof or in any other appropriate manner.

2.C.3 Space station transmitting antenna characteristics

a) In the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station, indicate whether the transmitting antenna beam will point in a fixed direction or will have a steerable beam (see No. **183**) capability.

b) In the case of a space station aboard a geostationary satellite, indicate the name of the satellite antenna beam by a three character code. For steerable beams, the last character shall be an "R".

c) In the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station via a transmitting antenna pointing in a fixed direction, indicate the maximum isotropic gain (dBi) and the gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite onto a plane perpendicular to the axis from the centre of the Earth to the satellite. The space station antenna gain contours shall be drawn as isolines of the isotropic gain at least for -2, -4, -6, -10 and -20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain, when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite. Whenever possible the gain contours of the space station transmitting antenna should also be provided in the form of a numerical equation.

d) In the case of a space station aboard a geostationary satellite where a steerable beam is used, data on the radiation characteristics shall be provided as follows:

1) if the effective boresight area (see No. **168A**) is identical with the global or nearly global service area, provide only the maximum isotropic antenna gain (dBi). The maximum antenna gain is applicable to all points on the Earth's visible surface;

2) if the effective boresight area (see No. **168A**) is less than the global or nearly global service area, provide the maximum antenna gain and the effective antenna gain contours (see No. **168B**). These contours shall be provided as defined in *c)* above.

e)[1] In the case of a space station aboard a geostationary satellite, include, in the antenna gain contours of *c)* and *d)* 2) above, the effect of the planned longitudinal tolerance, inclination excursion and pointing accuracy of the antenna.

f) In the case of a space station aboard a geostationary satellite in which the antenna radiation beam is directed towards another satellite, also indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference.

g) In the case of a space station aboard a non-geostationary satellite, indicate the isotropic gain of the space station transmitting antenna in the direction of maximum radiation (dBi) and indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference.

h)[1] Indicate the type of polarization of the radiation emitted by the antenna. In the case of circular polarization, indicate the direction of polarization (see Nos. **148** and **149**). In the case of linear polarization, indicate the angle (in degrees) measured anticlockwise in a plane normal to the beam axis from the equatorial plane to the electric vector of the wave as seen from the satellite.

i) For a geostationary satellite, indicate the pointing accuracy of the antenna.

j) 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 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 orbital longitude.

2.C.4 Assigned frequency (frequencies)

Indicate the assigned frequency (frequencies), as defined in No. **142**, in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive and in GHz above 10 500 MHz.

If the basic characteristics are identical, with the exception of the frequency, a single notice may be submitted covering all basic characteristics and listing the assigned frequencies.

2.C.5 Assigned frequency band

Indicate the bandwidth of the assigned frequency band in kHz (see No. **141**).

2.C.6 Class of station(s) and nature of service

Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10** to the Radio Regulations.

2.C.7 Class of emission, necessary bandwidth and description of the transmission [6]

In accordance with Article **4** and Appendix **6** of the Radio Regulations:

a) indicate the class of emission and the necessary bandwidth;

b) [1] indicate the carrier frequency or frequencies of the emission(s);

c) [1] indicate, for each carrier, the class of emission, necessary bandwidth and description of transmission;

d)[1] indicate, for the carrier having the smallest bandwidth of the assignments in the system, the class of emission, necessary bandwidth and a description of the transmission.

2.C.8 Power characteristics of the space station transmission [6]

a)[1] Indicate for each carrier the peak envelope power (dBW) supplied to the input of the antenna.

b) Indicate the maximum power density (dB(W/Hz)) [4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz or averaged over the worst 1 MHz band for carriers above 15 GHz.

c)[1] Indicate for each carrier the minimum value of the peak envelope power supplied to the input of the antenna.

d) Indicate the maximum total peak envelope power (dBW) supplied to the input of the antenna for each contiguous satellite bandwidth and this bandwidth. For a satellite transponder, this corresponds to the maximum saturated peak envelope power and the bandwidth of each transponder.

e)[1] Indicate for each carrier type [8] (see item 2.C.9), the maximum power density (dB(W/Hz)) [4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

2.C.9 [1] Modulation characteristics [6]

For each carrier, according to the nature of the signal modulating the carrier and the type of modulation, indicate the following characteristics:

a) carrier frequency modulated by a frequency-division multichannel telephony baseband (FDM/FM) or by a signal that can be represented by a multi-channel telephony baseband: indicate the lowest and highest frequencies of the baseband and the r.m.s. frequency deviation of the test tone as a function of baseband frequency;

b) carrier frequency modulated by a television signal: indicate the standard of the television signal (including, where appropriate, the standard used for colour), the frequency deviation for the reference frequency of the pre-emphasis characteristic and the pre-emphasis characteristic itself; also indicate, where applicable, the characteristics of the multiplexing of the video signal with the sound signal(s) or other signals;

c) carrier phase-shift modulated by a digital signal: indicate the bit rate and the number of phases;

d) amplitude-modulated carrier (including single side-band): indicate as precisely as possible the nature of the modulating signal and the kind of amplitude modulation used;

e) for all other types of modulation, provide such particulars as may be useful for an interference study;

f) for any type of modulation, as applicable, indicate the characteristics of energy dispersal, such as the peak-to-peak frequency deviation (MHz) and the sweep frequency (kHz) of the energy dispersal waveform.

Information related to associated receiving station(s)

This information is to be provided for each type of receiving station associated with each space station transmitting antenna beam.

2.C.10 Type and identity of the associated receiving station(s)

Indicate whether the associated receiving station is another space station, a typical earth station of the network, or a specific earth station.

When the associated receiving station is:

a) another space station, indicate its characteristics by reference to the notification thereof or in any other appropriate manner;

b) a typical earth station of the network, the characteristics provided under the following items of sub-section 2.C shall represent the limiting characteristics for any earth station conforming to that type for the purpose of coordination under No. **1060**;

c) a specific earth station, the characteristics provided under the following items of sub-section 2.C only apply to that earth station and shall include the identity of the earth station and the geographical coordinates of the antenna site for the purpose of coordination under No. **1060**.

The remaining information required in sub-section 2.C is to be provided for each associated earth station or typical earth station.

2.C.11 Class of station(s) and nature of service

Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10** of the Radio Regulations.

2.C.12 Earth station receiving antenna characteristics

a) Indicate the isotropic gain (dBi) of the antenna in the direction of maximum radiation (see No. **154**).

b) Indicate the beamwidth in degrees between the half-power points (describe in detail if not symmetrical).

c) Either attach the measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation) or indicate the reference radiation diagram to be used for coordination.

d)[1] Indicate the type of polarization of the antenna. In the case of circular polarization, indicate the direction of polarization (see Nos. **148** and **149**). In the case of linear polarization, indicate the plane of polarization. Indicate also if consent is given to the general use of this information in determining the need for coordination with other satellite networks according to Appendix **29** of the Radio Regulations.

2.C.13 Noise temperature of the associated receiving station(s)

Indicate, in kelvins, the lowest total receiving system noise temperature referred to the output of the receiving antenna of the earth station under clear sky conditions. This value shall be indicated for the nominal value of the angle of elevation when the associated transmitting station is aboard a geostationary satellite and, in other cases, for the minimum value of angle of elevation.

2.D Overall link characteristics

For simple frequency-changing transponders on board a geostationary satellite, the following information is to be provided.

2.D.1 Connection between Earth-to-space and space-to-Earth frequencies in the network

Indicate, in tabular form the connection between up-link and down-link frequency assignments in each transponder for each intended combination of receiving and transmitting beams.

2.D.2 Transmission gains and associated equivalent satellite link noise temperatures

For each entry under 2.D.1 indicate in tabular form:

a) the lowest equivalent satellite link noise temperature and the associated transmission gain under the conditions defined in 2.C.13 (see No. **168**);

b) the values of transmission gain and associated equivalent satellite 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.

Section III. Notices Relating to Coordination under No. 1107 and Notification of Earth Stations

3.A General characteristics to be provided for an earth station

3.A.1 Identity and location of the earth station

a) Indicate the type of station.

b)[2] Indicate the name by which the station is known or the name of the locality in which it is situated.

c) Indicate the country or geographical area in which the station is located. Symbols from the Preface to the International Frequency List should be used.

d)[2] Indicate the geographical coordinates of each transmitting and receiving antenna site comprising the earth station (longitude and latitude in degrees and minutes). Indicate also the seconds [7] with an accuracy of one-tenth of a minute.

3.A.2 Date of bringing into use

a) In the case of a new assignment, indicate the date (actual or foreseen, as appropriate) of bringing into use of the frequency assignment.

b) Whenever any of the basic characteristics of the assignment are changed (except in the case of a change in 3.A.1 *b)*), the date to be given shall be that of the latest change (actual or foreseen, as appropriate).

3.A.3 Operating administration or company

Give the name of the operating administration or company and the postal and telegraphic addresses of the administration to which communications should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the station (see Article **22** of the Radio Regulations).

3.A.4 Class of station(s) and nature of service

Indicate the class of station and nature of service performed, using the symbols shown in Appendix **10** to the Radio Regulations.

3.A.5 Space station(s) with which communication is to be established

a) Identify the associated space station(s) by reference to the notification thereof or in any other appropriate manner.

b) In the case of a geostationary satellite, indicate also its orbital position.

3.A.6 Coordination

Give the name of any administration with which the use of this frequency has been successfully coordinated in accordance with Nos. **1060** and **1107** and, if appropriate, the name of any administration with which coordination has been sought but not completed.

3.A.7 Agreements

a) Give, if appropriate, the name of any administration with which agreement has been reached to exceed the limits prescribed in these Regulations.

b) Give, if appropriate, the name of any administration with which agreement has been reached in accordance with Article **14** of the Radio Regulations.

3.B Characteristics of the transmitting earth station

3.B.1 Name of the satellite receiving beam [5]

Indicate the name of the satellite receiving antenna beam.

3.B.2 Assigned frequency (frequencies)

Indicate the assigned frequency (frequencies), as defined in No. **142**, in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive and in GHz above 10 500 MHz.

3.B.3 Assigned frequency band

Indicate the bandwidth of the assigned frequency band in kHz (see No. **141**).

3.B.4 Class of emission, necessary bandwidth and description of the transmission

In accordance with Article **4** and Appendix **6** of the Radio Regulations:

a) indicate the class of emission and the necessary bandwidth;

b)[1] indicate the carrier frequency or frequencies of the emission(s);

c)[1] indicate, for each carrier, the class of emission, necessary bandwidth and description of transmission;

d)[1] indicate, for the carrier having the smallest bandwidth of the assignments in the system, the class of emission, necessary bandwidth and a description of the transmission.

3.B.5 Earth station transmitting antenna characteristics

a) Indicate the isotropic gain (dBi) of the antenna in the direction of maximum radiation (see No. **154**).

b) Indicate the beamwidth in degrees between the half-power points (describe in detail if not symmetrical).

c) Either attach the measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation) or indicate the reference radiation diagram to be used for coordination.

d)[2] Indicate graphically the horizon elevation angle for each azimuth around the earth station.

e)[2] Indicate in degrees from the horizontal plane the planned minimum operating angle of elevation of the antenna in the direction of maximum radiation, having due regard to possible inclined-orbit operation of the associated space station.

f)[2] Indicate in degrees, clockwise from True North, the planned range of operating azimuthal angles for the direction of maximum radiation, having due regard to possible inclined-orbit operation of the associated space station.

g)[1] Indicate the type of polarization of the transmitted wave in the direction of maximum radiation; also indicate the direction in the case of circular polarization and the plane in the case of linear polarization (see Nos. **148** and **149**).

h)[2] Indicate the altitude (metres) of the antenna above mean sea level.

3.B.6 Power characteristics of the transmission

a)[1] Indicate for each carrier the peak envelope power (dBW) supplied to the input of the antenna.

b) Indicate the total peak envelope power (dBW) and the maximum power density (dB(W/Hz))[4] supplied to the input of the antenna averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

c)[1] Indicate for each carrier the minimum value of the peak envelope power supplied to the input of the antenna.

d)[1,5] Indicate for each carrier type[8] (see 3.B.7), the maximum power density (dB(W/Hz))[4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

e)[1,5] Indicate the maximum aggregate power (dBW) of all carriers (per transponder, if applicable) supplied to the input of the antenna and their aggregate bandwidth. If this corresponds to the bandwidth of a transponder, so indicate.

3.B.7[1] Modulation characteristics [5]

For each carrier, according to the nature of the signal modulating the carrier and the type of modulation, indicate the following characteristics:

a) carrier frequency modulated by a frequency-division multi-channel telephony baseband (FDM/FM) or by a signal that can be represented by a multi-channel telephony baseband: indicate the lowest and highest frequencies of the baseband and the r.m.s. frequency deviation of the test tone as a function of baseband frequency;

b) carrier frequency modulated by a television signal: indicate the standard of the television signal (including, where appropriate, the standard used for colour), the frequency deviation for the reference frequency of the pre-emphasis characteristic and the pre-emphasis characteristic itself; also indicate, where applicable, the characteristics of the multiplexing of the video signal with the sound signal(s) or other signals;

c) carrier phase-shift modulated by a digital signal: indicate the bit rate and the number of phases;

d) amplitude-modulated carrier (including single side-band): indicate as precisely as possible the nature of the modulating signal and the kind of amplitude modulation used;

e) for all other types of modulation, provide such particulars as may be useful for an interference study;

f) for any type of modulation, as applicable, indicate the characteristics of energy dispersal, such as the peak-to-peak frequency deviation (MHz) and the sweep frequency (kHz) of the energy dispersal waveform.

3.C Characteristics of the receiving earth station

3.C.1 Name of the satellite transmitting beam[5]

Indicate the name of the satellite transmitting antenna beam.

3.C.2 Assigned frequency (frequencies)

Indicate the assigned frequency (frequencies), as defined in No. **142**, of the emission to be received, in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive and in GHz above 10 500 MHz.

3.C.3 Assigned frequency band

Indicate the bandwidth of the assigned frequency band in kHz (see No. **141**).

3.C.4 Class of emission, necessary bandwidth and description of the transmission

In accordance with Article **4** and Appendix **6** of the Radio Regulations:

a) indicate the class of emission and the necessary bandwidth of the transmission to be received;

b)[1] indicate the carrier frequency or frequencies of the emissions to be received;

c)[1] indicate, for each carrier to be received, the class of emission, necessary bandwidth and description of the transmission;

d)[1] indicate, for the carrier having the smallest bandwidth of the assignments in the system, the class of emission, necessary bandwidth and a description of the transmission.

The information required in the two items 3.C.5 and 3.C.6 is needed additionally for the notification of a typical earth station.

3.C.5 Power characteristics of the space station transmission [5]

a)[1] Indicate for each carrier the peak envelope power (dBW) supplied to the input of the antenna.

b) Indicate the maximum power density (dB(W/Hz)) [4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz or averaged over the worst 1 MHz band for carriers above 15 GHz.

c)[1] Indicate for each carrier the minimum value of the peak envelope power supplied to the input of the antenna.

d) Indicate the maximum total peak envelope power (dBW) supplied to the input of the antenna for each contiguous satellite bandwidth and this bandwidth. For a satellite transponder, this corresponds to the maximum saturated peak envelope power and the bandwidth of each transponder.

e)[1] Indicate for each carrier type[8] (see item 3.C.6), the maximum power density (dB(W/Hz))[4] supplied to the input of the antenna, averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz.

3.C.6[1] Modulation characteristics[5]

For each carrier, according to the nature of the signal modulating the carrier and the type of modulation, indicate the following characteristics:

a) carrier frequency modulated by a frequency-division multichannel telephony baseband (FDM/FM) or by a signal that can be represented by a multi-channel telephony baseband: indicate the lowest and highest frequencies of the baseband and the r.m.s. frequency deviation of the test tone as a function of baseband frequency;

b) carrier frequency modulated by a television signal: indicate the standard of the television signal (including, where appropriate, the standard used for colour), the frequency deviation for the reference frequency of the pre-emphasis characteristic and the pre-emphasis characteristic itself; also indicate, where applicable, the characteristics of the multiplexing of the video signal with the sound signal(s) or other signals;

c) carrier phase-shift modulated by a digital signal: indicate the bit rate and the number of phases;

d) amplitude-modulated carrier (including single side-band): indicate as precisely as possible the nature of the modulating signal and the kind of amplitude modulation used;

e) for all other types of modulation, provide such particulars as may be useful for an interference study;

f) for any type of modulation, as applicable, indicate the characteristics of energy dispersal, such as the peak-to-peak frequency deviation (MHz) and the sweep frequency (kHz) of the energy dispersal waveform.

3.C.7 Earth station receiving antenna characteristics

a) Indicate the isotropic gain (dBi) of the antenna in the direction of maximum radiation (see No. **154**).

b) Indicate the beamwidth in degrees between the half-power points (describe in detail if not symmetrical).

c) Either attach the measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation) or indicate the reference radiation diagram to be used for coordination.

d)[2] Indicate graphically the horizon elevation angle for each azimuth around the earth station.

e)[2] Indicate in degrees from the horizontal plane the planned minimum operating angle of elevation of the antenna in the direction of maximum radiation, having due regard to possible inclined-orbit operation of the associated space station.

f)[2] Indicate in degrees, clockwise from True North, the planned range of operating azimuthal angles for the direction of maximum radiation, having due regard to possible inclined-orbit operation of the associated space station.

g)[1] Indicate the type of polarization of the transmitted wave in the direction of maximum radiation; also indicate the direction in the case of circular polarization and the plane in the case of linear polarization (see Nos. **148** and **149**).

h)[2] Indicate the altitude (metres) of the antenna above mean sea level.

3.C.8 Noise temperature, equivalent satellite link noise temperature and transmission gain

a) Indicate, in kelvins, the lowest total receiving system noise temperature referred to the output of the receiving antenna of the earth station under clear sky conditions. This value shall be indicated for the nominal value of the angle of elevation when the associated transmitting station is aboard a geostationary satellite and, in other cases, for the minimum value of angle of elevation.

b) For each associated condition of operation when simple frequency-changing transponders are used on the associated space station aboard a geostationary satellite:

1) indicate the lowest equivalent satellite link noise temperatures under the conditions of *a)* above for each assignment (see No. **168**);

2) indicate the value of transmission gain associated with each equivalent satellite link noise temperature given in *b)* 1) above. 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.

Section IV. Notices Relating to Frequencies to be Received by Radio Astronomy Stations

4.A General characteristics to be provided for radio astronomy stations

4.A.1 Date of bringing into use

a) Indicate the date (actual or foreseen, as appropriate) when reception of the frequency band begins.

b) Whenever there is a change in any of the basic characteristics, as shown in this Section (except in the case of a change in 4.A.2 *b)*), the date to be given shall be that of the latest change (actual or foreseen, as appropriate).

4.A.2 Name and location of the station

a) Insert the letters "RA".

b) Indicate the name by which the station is known or the name of the locality in which it is situated, or both.

c) Indicate the country or geographical area in which the station is located. Symbols from the Preface to the International Frequency List should be used.

d) Indicate the geographical coordinates of the station site (longitude and latitude in degrees and minutes).

4.A.3 Regular hours of reception

Indicate in UTC the regular hours of reception on the observed frequency.

4.A.4 Operating administration or company

Give the name of the operating administration or company and the postal and telegraphic addresses of the administration to which communications should be sent on urgent matters regarding interference and questions referring to the technical operation of stations (see Article **22** of the Radio Regulations).

4.B Technical characteristics of radio astronomy stations

4.B.1 Observed frequency

Indicate the centre of the frequency band observed, in kHz up to 28 000 kHz inclusive, in MHz above 28 000 kHz to 10 500 MHz inclusive and in GHz above 10 500 MHz.

4.B.2 Bandwidth

Indicate the bandwidth of the frequency band (kHz) observed by the station.

4.B.3 Antenna characteristics

Indicate the antenna type and dimensions, effective area and angular coverage in azimuth and elevation.

4.B.4 Noise temperature

Indicate, in kelvins, the overall receiving system noise temperature referred to the output of the receiving antenna.

4.B.5 Class of observations

Indicate the class of observations to be taken on the frequency band shown in item 4.B.2. Class A observations are those in which the sensitivity of the equipment is not a primary factor. Class B observations are those of such a nature that they can be made only with advanced low-noise receivers using the best techniques.

Section V. Forms of Notice

The Board shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences.

The following footnotes are applicable within Appendix 3:

[1] This information need only be furnished when such information has been used as a basis to effect coordination with another administration. This information may be optionally provided in a request for coordination under No. **1060** (see Resolution **69 (Orb-88)**).

[2] Not required for notification of a typical earth station.

[3] See also Resolution **4 (Rev.Orb-88).**

[4] The most recent version of CCIR Report 792 should be used to the extent applicable in calculating the maximum power density.

[5] Not required for coordination under No. **1107**.

[6] This item is also to be provided for each associated receiving earth station or typical receiving earth station.

[7] This information need only be furnished if the coordination area of the earth station overlaps the territory of another administration.

[8] For details of carrier types, see relevant CCIR texts.

APPENDIX 4

Orb-88

Advance Publication Information to Be Furnished for a Satellite Network

(see Article **11**)

Section A. General Instructions

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

A.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), overall link characteristics (Section E), and characteristics for space-to-space relay (Section F). In addition, the administration, or one acting on behalf of a group of named administrations submitting the advance information, may provide, as supplementary information, data for interference calculations for the purpose of inter-network coordination (Section G).

Section B. General Characteristics to Be Furnished for a Satellite Network

B.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.

B.2 Date of bringing into use [1]

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

B.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.

B.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 tolerance and inclination excursion. 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;

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 therefore.

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.

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[1] See also Resolution **4 (Rev.Orb-88)**.

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 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

C.1 Earth-to-space service area(s)

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

C.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** of the Radio Regulations.

C.3 Frequency range

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

C.4 Power characteristics of the transmitted wave

a) For each Earth-to-space service area, indicate the maximum spectral power density (dB(W/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 concerned) for each size of transmitting earth station antenna and, if available, the total peak envelope power (dBW) and the necessary bandwidth of this emission.

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[1] The most recent version of CCIR Report 792 should be used to the extent applicable in calculating the maximum power density per Hz.

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 equivalent 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.

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

C.5 Characteristics of space station receiving antennas

Provide information for each receiving satellite antenna beam:

a) in the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station, indicate whether the receiving antenna beam will be pointing in a fixed direction or has a steerable beam (see No. **183**) capability;

b) in the case of a space station aboard a geostationary satellite, indicate the name of the satellite antenna beam by a three character code. For steerable beams, the last character shall be an "R";

c) in the case of a space station aboard a geostationary satellite employing a receiving antenna pointing in a fixed direction, indicate the maximum isotropic gain (dBi) and the gain contours plotted on a map of the Earth's surface, preferably using a radial projection from the satellite in a plane perpendicular to the axis from the centre of the Earth to the satellite. The space station antenna gain contours shall be drawn as isolines of the isotropic gain at least for

−2, −4, −6, −10 and −20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite. Whenever possible the gain contours of the space station receiving antenna should also be provided in the form of a numerical equation;

d) in the case of a space station aboard a geostationary satellite using a steerable beam, data on the radiation characteristics shall be provided as follows:

1) when the effective boresight area (see No. **168A**) is identical with the global or nearly global service area, provide only the maximum isotropic antenna gain (dBi). The maximum antenna gain is applicable to all points on the Earth's visible surface;

2) when the effective boresight area (see No. **168A**) is less than the global or nearly global service area, provide the maximum antenna gain and, to the extent practicable, the effective antenna gain contours (see No. **168B**). These contours shall be provided as defined in *c)* above. If the gain contours are not provided, then the maximum antenna gain is applicable to all points on the Earth's visible surface;

e) in the case of a space station aboard a geostationary satellite in which the antenna radiation beam is directed towards another satellite, also indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference;

f) in the case of a space station aboard a non-geostationary satellite, indicate the isotropic gain of the space station receiving antenna in the direction of maximum radiation (dBi) and indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference;

g) 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 Nos. **148** and **149**);

h) 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.

C.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, indicate, in kelvins, the lowest total receiving system noise temperature referred to the output of the receiving antenna.

C.7 Necessary bandwidth

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

C.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 (MHz) and the sweep frequency (kHz) of the energy dispersal waveform.

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

D.1 Space-to-Earth service area(s)

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

D.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** of the Radio Regulations.

D.3 Frequency range

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

D.4 Power characteristics of the transmission

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

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

c) If available, indicate the minimum carrier power delivered to the antenna of the space station for narrow-band carriers.

D.5 Characteristics of space station transmitting antennas

Provide information for each transmitting satellite antenna beam:

a) in the case of a space station aboard a geostationary satellite that is intended to communicate with an earth station, indicate whether the transmitting antenna beam will be pointing in a fixed direction or has a steerable beam (see No. **183**) capability;

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[1] The most recent version of CCIR Report 792 should be used to the extent applicable in calculating the maximum power density per herz.

b) in the case of a space station aboard a geostationary satellite, indicate the name of the satellite antenna beam by a three character code. For steerable beams, the last character shall be an "R";

c) in the case of a space station aboard a geostationary satellite employing a transmitting antenna pointing in a fixed direction, indicate the maximum isotropic gain (dBi) and the gain contours plotted on a map of the 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 space station antenna gain contours shall be drawn as isolines of the isotropic gain at least for -2, -4, -6, -10 and -20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain, when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite. Whenever possible, the gain contours of the space station transmitting antenna should also be provided in the form of a numerical equation;

d) when a steerable beam is used, data on the radiation characteristics shall be provided as follows:

1) when the effective boresight area (see No. **168A**) is identical with the global or nearly global service area, provide only the maximum isotropic antenna gain (dBi). The maximum antenna gain is applicable to all points on the Earth's visible surface;

2) when the effective boresight area (see No. **168B**) is less than the global or nearly global service area, provide the maximum antenna gain and, to the extent practicable, the effective antenna gain contours (see No. **168B**). These contours shall be provided as defined in *c)* above. If the gain contours are not provided, then the maximum antenna gain is applicable to all points on the Earth's visible surface;

e) in the case of a space station aboard a geostationary satellite in which the antenna radiation beam is directed towards another satellite also indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference;

f) in the case of a space station aboard a non-geostationary satellite, indicate the isotropic gain of the space station transmitting antenna in the direction of maximum radiation (dBi) and indicate the antenna radiation pattern, taking the gain in the direction of maximum radiation as a reference;

g) 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 Nos. **148** and **149**);

h) 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.

D.6 Necessary bandwidth

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

D.7 Modulation characteristics

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

D.8 Characteristics of receiving earth stations

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

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 below.

Section E. Overall Link Characteristics

E.1 Relationship between Earth-to-space and space-to-Earth frequency bands

Indicate, preferably in tabular form, for each usage[1], when available, the frequency bands to be used for corresponding up-link and down-link beams.

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[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), or when up-link beams are connected to different down-link beams with their respective associated frequency bands.

E.2 Transmission gains and associated equivalent satellite link noise temperatures

For each space-to-Earth service area and for each projected usage[1] when simple frequency-changing transponders are used on a geostationary space station, indicate preferably in tabular form:

a) the lowest equivalent satellite link noise temperature and the associated value of transmission gain; and

b) the values of transmission gain and associated equivalent satellite 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 space station receiving antenna to the output of the earth station receiving antenna. For each projected usage, indicate also the receiving antenna(s) of the space station to which each simple frequency-changing transponder will be connected.

Section F. Characteristics to Be Furnished for Space-to-Space Relays

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) (e.i.r.p.) on the beam axis.

[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), or when up-link beams are connected to different down-link beams with their respective associated frequency bands.

Section G. Supplementary Information (if available)

G.1 General

Supplementary information may be provided by an administration or one acting on behalf of a group of named administrations which so desire. This information may be used for interference calculations associated with the advance publication process. The information may consist of part or all of the data contained in the following items which are not exhaustive but provide an indication of the type of information which may be supplied.

The attention of administrations is also drawn to techniques for assessing potential interference which may facilitate reaching an agreement between administrations under the provisions of this Appendix. These techniques may be found in the relevant CCIR texts.

G.2 Earth-to-space direction

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

a) class 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 telecommand (except for coding data).

G.3 Space-to-Earth direction

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

a) class of emission, 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 transmitting antenna for each type of carrier;

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

G.4 Any other information which may be useful

Section H. Forms of Notice for Provision of Advance Publication Information

The Board shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences.

APPENDIX 5

Information to Be Supplied in Accordance with Nos. 1682 to 1684

(See Article **16**)

Initial allotment	Additional allotment	Replacement allotment (No. **1721**)
☐	☐	☐

1. Country or area of allotment ....

2. 2.1 Proposed frequency — Carrier .... kHz; Assigned .... kHz

   2.2 Alternative proposed frequency — Carrier .... kHz; Assigned .... kHz

   2.3 Frequency to be replaced (No. **1721**) — Carrier .... kHz; Assigned .... kHz

3. 3.1 Main service area ....

   3.2 Maximum length of circuit in kilometres ....

4. Nature of service (e.g. CP, CO, CV or OT) ....

5. Class of emission ....

6. Peak envelope power in kW ....

7. Transmitting antenna characteristics (for details see Appendix **1**):

   7.1 In the case of a non-directional antenna, insert the symbol ND ....

   7.2 In the case of a directional antenna, indicate:

   a) the azimuth of maximum radiation ....

   b) the angular width of main lobe ....

   c) relative gain of the antenna in dB ....

8. Planned scheduled hours of operation of the proposed frequency .... to .... h (UTC)

9. Indicate, if possible:

   a) the estimated peak hours of traffic .... to .... h (UTC)

   b) the estimated daily volume of traffic in minutes ....

10. Planned date of first use of channel ....
(month) (year)

APPENDIX 6

Additional Characteristics for the Classification of Emissions; Determination of Necessary Bandwidths Including Examples for their Calculation and Associated Examples for the Designation of Emissions

(See Article **4**)

PART A

Additional Characteristics for the Classification of Emissions

Article **4** of these Regulations describes the basic characteristics, with three symbols, for the classification of emissions. For a more complete description of an emission, two optional additional characteristics should be added.

The optional additional characteristics (see also Recommendation **62**) are:

Fourth symbol – Details of signal(s)

Fifth symbol – Nature of multiplexing

Where the fourth or the fifth symbol is not used this should be indicated by a dash where each symbol would otherwise appear.

1. *Fourth symbol* – Details of signal(s)

1.1	Two-condition code with elements of differing numbers and/or durations	A
1.2	Two-condition code with elements of the same number and duration without error-correction	B
1.3	Two-condition code with elements of the same number and duration with error-correction	C

1.4	Four-condition code in which each condition represents a signal element (of one or more bits)	D
1.5	Multi-condition code in which each condition represents a signal element (of one or more bits)	E
1.6	Multi-condition code in which each condition or combination of conditions represents a character	F
1.7	Sound of broadcasting quality (monophonic)	G
1.8	Sound of broadcasting quality (stereophonic or quadraphonic)	H
1.9	Sound of commercial quality (excluding categories given in sub-paragraphs 1.10 and 1.11)	J
1.10	Sound of commercial quality with the use of frequency inversion or band-splitting	K
1.11	Sound of commercial quality with separate frequency-modulated signals to control the level of demodulated signal	L
1.12	Monochrome	M
1.13	Colour	N
1.14	Combination of the above	W
1.15	Cases not otherwise covered	X

2. *Fifth symbol* – Nature of multiplexing

2.1	None	N
2.2	Code-division multiplex*	C
2.3	Frequency-division multiplex	F

* This includes bandwidth expansion techniques.

2.4	Time-division multiplex	T
2.5	Combination of frequency-division multiplex and time-division multiplex	W
2.6	Other types of multiplexing	X

PART B

Determination of Necessary Bandwidths Including Examples for their Calculation and Associated Examples for the Designation of Emissions

For the full designation of an emission, the necessary bandwidth, indicated in four characters, shall be added just before the classification symbols. When used, the necessary bandwidth shall be determined by one of the following methods:

1) use of the formulae included in the following table which also gives examples of necessary bandwidths and designation of corresponding emissions;

2) computation in accordance with CCIR Recommendations [1];

3) measurement, in cases not covered by 1) or 2) above.

However, the necessary bandwidth so determined is not the only characteristic of an emission to be considered in evaluating the interference that may be caused by that emission.

[1] See also Recommendation **63**.

In the formulation of the table, the following terms have been employed:

B_n	=	Necessary bandwidth in hertz
B	=	Modulation rate in bauds
N	=	Maximum possible number of black plus white elements to be transmitted per second, in facsimile
M	=	Maximum modulation frequency in hertz
C	=	Sub-carrier frequency in hertz
D	=	Peak deviation, i.e., half the difference between the maximum and minimum values of the instantaneous frequency. The instantaneous frequency in hertz is the time rate of change in phase in radians divided by 2π
t	=	Pulse duration in seconds at half-amplitude
t_r	=	Pulse rise time in seconds between 10% and 90% amplitude
K	=	An overall numerical factor which varies according to the emission and which depends upon the allowable signal distortion
N_c	=	Number of baseband channels in radio systems employing multi-channel multiplexing
f_p	=	Continuity pilot sub-carrier frequency (Hz) (continuous signal utilized to verify performance of frequency-division multiplex systems).

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
I. NO MODULATING SIGNAL			
Continuous wave emission	—	—	NONE
II. AMPLITUDE MODULATION			
1. Signal with Quantized or Digital Information			
Continuous wave telegraphy, Morse code	$B_n = BK$ $K = 5$ for fading circuits $K = 3$ for non-fading circuits	25 words per minute; $B = 20$, $K = 5$ Bandwidth: 100 Hz	100HA1AAN
Telegraphy by on-off keying of a tone modulated carrier, Morse code	$B_n = BK + 2M$ $K = 5$ for fading circuits $K = 3$ for non-fading circuits	25 words per minute; $B = 20$, $M = 1\ 000$ $K = 5$ Bandwidth: 2 100 Hz = 2.1 kHz	2K10A2AAN
Selective calling signal using sequential single frequency code, single-sideband full carrier	$B_n = M$	Maximum code frequency is: 2 110 Hz $M = 2\ 110$ Bandwidth: 2 110 Hz = 2.11 kHz	2K11H2BFN
Direct-printing telegraphy using a frequency shifted modulating sub-carrier, with error-correction, single-sideband, suppressed carrier (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$	$B = 50$ $D = 35$ Hz (70 Hz shift) $K = 1.2$ Bandwidth: 134 Hz	134HJ2BCN

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Telegraphy, multi-channel with voice frequency, error-correction, some channels are time-division multiplexed, single-sideband, reduced carrier	B_n = highest central frequency $+ M + DK$ $M = \frac{B}{2}$	15 channels; highest central frequency is: 2 805 Hz $B = 100$ $D = 42.5$ Hz (85 Hz shift) $K = 0.7$ Bandwidth: 2 885 Hz = 2.885 kHz	2K89R7BCW
2. Telephony (Commercial Quality)			
Telephony, double-sideband (single channel)	$B_n = 2M$	$M = 3\ 000$ Bandwidth: 6 000 Hz = 6 kHz	6K00A3EJN
Telephony, single-sideband, full carrier (single channel)	$B_n = M$	$M = 3\ 000$ Bandwidth: 3 000 Hz = 3 kHz	3K00H3EJN
Telephony, single-sideband, suppressed carrier (single channel)	$B_n = M -$ lowest modulation frequency	$M = 3\ 000$ lowest modulation frequency is 300 Hz Bandwidth: 2 700 Hz = 2.7 kHz	2K70J3EJN
Telephony with separate frequency modulated signal to control the level of demodulated speech signal, single-sideband, reduced carrier (Lincompex) (single channel)	$B_n = M$	Maximum control frequency is 2 990 Hz $M = 2\ 990$ Bandwidth: 2 990 Hz = 2.99 kHz	2K99R3ELN
Telephony with privacy, single-sideband, suppressed carrier (two or more channels)	$B_n = N_c M -$ lowest modulation frequency in the lowest channel	$N_c = 2$ $M = 3\ 000$ lowest modulation frequency is 250 Hz Bandwidth: 5 750 Hz = 5.75 kHz	5K75J8EKF

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Telephony, independent sideband (two or more channels)	B_n = sum of M for each sideband	2 channels $M = 3\ 000$ Bandwidth: 6 000 Hz = 6 kHz	6K00B8EJN
3. Sound Broadcasting			
Sound broadcasting, double-sideband	$B_n = 2M$ M may vary between 4 000 and 10 000 depending on the quality desired	Speech and music, $M = 4\ 000$ Bandwidth: 8 000 Hz = 8 kHz	8K00A3EGN
Sound broadcasting, single-sideband, reduced carrier (single channel)	$B_n = M$ M may vary between 4 000 and 10 000 depending on the quality desired	Speech and music, $M = 4\ 000$ Bandwidth: 4 000 Hz = 4 kHz	4K00R3EGN
Sound broadcasting, single-sideband, suppressed carrier	$B_n = M$ – lowest modulation frequency	Speech and music, $M = 4\ 500$ lowest modulation frequency = 50 Hz; Bandwidth: 4 450 Hz = 4.45 kHz	4K45J3EGN
4. Television			
Television, vision and sound	Refer to relevant CCIR documents for the bandwidths of the commonly used television systems	Number of lines = 625; Nominal video bandwidth: 5 MHz Sound carrier relative to video carrier = 5.5 MHz; Total vision bandwidth: 6.25 MHz; FM sound bandwidth including guardbands: 750 kHz RF channel bandwidth: 7 MHz	6M25C3F -- 750KF3EGN

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
5. Facsimile			
Analogue facsimile by sub-carrier frequency modulation of a single-sideband emission with reduced carrier, monochrome	$B_n =$ $C + \frac{N}{2} + DK$ $K = 1.1$ (typically)	$N = 1\ 100$ corresponding to an index of cooperation of 352 and a cycler rotation speed of 60 rpm. Index of cooperation is the product of the drum diameter and number of lines per unit length. $C = 1\ 900$ $D = 400$ Hz Bandwidth: 2 890 Hz = 2.89 kHz	2K89R3CMN
Analogue facsimile; frequency modulation of an audio frequency sub-carrier which modulates the main carrier, single-sideband suppressed carrier	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\ 100$ $D = 400$ Hz Bandwidth: 1 980 Hz = 1.98 kHz	1K98J3C --
6. Composite Emissions			
Double-sideband, television relay	$B_n = 2C + 2M + 2D$	Video limited to 5 MHz, audio on 6.5 MHz frequency modulated sub-carrier, sub-carrier deviation = 50 kHz: $C = 6.5 \times 10^6$ $D = 50 \times 10^3$ Hz $M = 15\ 000$ Bandwidth: 13.13×10^6 Hz = 13.13 MHz	13M1A8W --

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Double-sideband radio-relay system, frequency division multiplex	$B_n = 2M$	10 voice channels occupying baseband between 1 kHz and 164 kHz; M = 164 000 Bandwidth: 328 000 Hz = 328 kHz	328KA8E --
Double-sideband emission of VOR with voice (VOR = VHF omnidirectional radio range)	$B_n = 2Cmax + 2M + 2DK$ $K = 1$ (typically)	The main carrier is modulated by: – a 30 Hz sub-carrier – a carrier resulting from a 9 960 Hz tone frequency modulated by a 30 Hz tone – a telephone channel – a 1 020 Hz keyed tone for continual Morse identification. $Cmax$ = 9 960 M = 30 D = 480 Hz Bandwidth: 20 940 Hz = 20.94 kHz	20K9A9WWF
Independent sidebands; several telegraph channels with error-correction together with several telephone channels with privacy; frequency division multiplex	B_n = sum of M for each sideband	Normally composite systems are operated in accordance with standardized channel arrangements (e.g. CCIR Rec. 348-2). 3 telephone channels and 15 telegraphy channels require the bandwidth 12 000 Hz = 12 kHz	12K0B9WWF

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
III-A. FREQUENCY MODULATION			
1. Signal with Quantized or Digital Information			
Telegraphy without error-correction (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85$ Hz (170 Hz shift) Bandwidth: 304 Hz	304HF1BBN
Telegraphy, narrow-band direct-printing with error-correction (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85$ Hz (170 Hz shift) Bandwidth: 304 Hz	304HF1BCN
Selective calling signal	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85$ Hz (170 Hz shift) Bandwidth: 304 Hz	304HF1BCN
Four-frequency duplex telegraphy	$B_n = 2M + 2DK$ B = Modulation rate in bauds of the faster channel. If the channels are synchronized: $M = \frac{B}{2}$ (otherwise $M = 2B$) $K = 1.1$ (typically)	Spacing between adjacent frequencies = 400 Hz; Synchronized channels $B = 100$ $M = 50$ $D = 600$ Hz Bandwidth: 1 420 Hz = 1.42 kHz	1K42F7BDX
2. Telephony (Commercial Quality)			
Commercial telephony	$B_n = 2M + 2DK$ $K = 1$ (typically, but under certain conditions a higher value may be necessary)	For an average case of commercial telephony, $D = 5\,000$ Hz $M = 3\,000$ Bandwidth: 16 000 Hz = 16 kHz	16K0F3EJN

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
3. Sound Broadcasting			
Sound broadcasting	$B_n = 2M + 2DK$ $K = 1$ (typically)	Monaural $D = 75\,000$ Hz $M = 15\,000$ Bandwidth: 180 000 Hz = 180 kHz	180KF3EGN
4. Facsimile			
Facsimile by direct frequency modulation of the carrier; black and white	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\,100$ elements/sec; $D = 400$ Hz Bandwidth: 1 980 Hz = 1.98 kHz	1K98F1C --
Analogue facsimile	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\,100$ elements/sec; $D = 400$ Hz Bandwidth: 1 980 Hz = 1.98 kHz	1K98F3C --
5. Composite Emissions (see Table III-B)			
Radio-relay system, frequency division multiplex	$B_n = 2f_p + 2DK$ $K = 1$ (typically)	60 telephone channels occupying baseband between 60 kHz and 300 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 331 kHz produces 100 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 2.02 = 1.52 \times 10^6$ Hz; $f_p = 0.331 \times 10^6$ Hz; Bandwidth: 3.702×10^6 Hz = 3.702 MHz	3M70F8EJF

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Radio-relay system, frequency division multiplex	$B_n = 2M + 2DK$ $K = 1$ (typically)	960 telephone channels occupying baseband between 60 kHz and 4 028 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 4 715 kHz produces 140 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 5.5 = 4.13 \times 10^6$ Hz; $M = 4.028 \times 10^6$; $f_p = 4.715 \times 10^6$; $(2M + 2DK) > 2f_p$ Bandwidth: 16.32×10^6 Hz = 16.32 MHz	16M3F8EJF
Radio-relay system, frequency division multiplex	$B_n = 2f_p$	600 telephone channels occupying baseband between 60 kHz and 2 540 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 8 500 kHz produces 140 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 4.36 = 3.28 \times 10^6$ Hz; $M = 2.54 \times 10^6$; $K = 1$; $f_p = 8.5 \times 10^6$; $(2M + 2\,DK) < 2f_p$ Bandwidth: 17×10^6 Hz = 17 MHz	17M0F8EJF
Stereophonic sound broadcasting with multiplexed subsidiary telephony sub-carrier	$B_n = 2M + 2DK$ $K = 1$ (typically)	Pilot tone system; $M = 75\,000$ $D = 75\,000$ Hz Bandwidth: 300 000 Hz = 300 kHz	300KF8EHF

III-B. MULTIPLYING FACTORS FOR USE IN COMPUTING D, PEAK FREQUENCY DEVIATION, IN FM FREQUENCY DIVISION MULTIPLEX (FM / FDM) MULTI-CHANNEL EMISSIONS

For FM / FDM systems the necessary bandwidth is:

$$B_n = 2M + 2DK$$

The value of D, or peak frequency deviation, in these formulae for B_n is calculated by multiplying the rms value of per-channel deviation by the appropriate "Multiplying factor" shown below.

In the case where a continuity pilot of frequency f_p exists above the maximum modulation frequency M, the general formula becomes:

$$B_n = 2f_p + 2DK$$

In the case where the modulation index of the main carrier produced by the pilot is less than 0.25, and the rms frequency deviation of the main carrier produced by the pilot is less than or equal to 70% of the rms value of per-channel deviation, the general formula becomes either

$$B_n = 2f_p \quad \text{or} \quad B_n = 2M + 2DK$$

whichever is greater.

Number of telephone channels N_c	Multiplying factor[1]	
	(peak factor) x antilog	$\left[\dfrac{\text{value in dB above modulation reference level}}{20}\right]$
$3 < N_c < 12$	4.47 x antilog	$\left[\dfrac{\text{a value in dB specified by the equipment manufacturer or station licensee, subject to administration approval}}{20}\right]$
$12 \leqslant N_c < 60$	3.76 x antilog	$\left[\dfrac{2.6 + 2 \log N_c}{20}\right]$

[1] In the above chart, the multipliers 3.76 and 4.47 correspond to peak factors of 11.5 dB and 13.0 dB, respectively.

Number of telephone channels N_C	Multiplying factor[1]
	(peak factor) x antilog $\left[\dfrac{\text{value in dB above modulation reference level}}{20}\right]$
$60 \leqslant N_C < 240$	3.76 x antilog $\left[\dfrac{-1 + 4 \log N_C}{20}\right]$
$N_C \geqslant 240$	3.76 x antilog $\left[\dfrac{-15 + 10 \log N_C}{20}\right]$

[1] In the above chart, the multiplier 3.76 corresponds to a peak factor of 11.5 dB.

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
IV. PULSE MODULATION			
1. Radar			
Unmodulated pulse emission	$B_n = \frac{2K}{t}$ K depends upon the ratio of pulse duration to pulse rise time. Its value usually falls between 1 and 10 and in many cases it does not need to exceed 6	Primary Radar Range resolution: 150 m $K = 1.5$ (triangular pulse where $t \simeq t_r$, only components down to 27 dB from the strongest are considered) Then $t = \frac{2\text{x (range resolution)}}{\text{velocity of light}}$ $= \frac{2 \times 150}{3 \times 10^8}$ $= 1 \times 10^{-6}$ seconds Bandwidth: 3×10^6 Hz = 3 MHz	3M00P0NAN
2. Composite Emissions			
Radio-relay system	$B_n = \frac{2K}{t}$ $K = 1.6$	Pulse position modulated by 36 voice channel baseband; pulse width at half amplitude = 0.4 μs Bandwidth: 8×10^6 Hz = 8 MHz (Bandwidth independent of the number of voice channels)	8M00M7EJT

APPENDIX 7
HFBC-87 Mob-87

Table of Transmitter Frequency Tolerances

(See Article **5**)

1. Frequency tolerance is defined in Article **1** and is expressed in parts in 10^6, unless otherwise indicated.

2. The power shown for the various categories of stations is the peak envelope power for single-sideband transmitters and the mean power for all other transmitters, unless otherwise indicated. The term "power of a radio transmitter" is defined in Article **1**.

3. For technical and operational reasons, certain categories of stations may need more stringent tolerances than those shown in the table.

Frequency Bands (lower limit exclusive, upper limit inclusive) and Categories of Stations	Tolerances applicable until 1 January 1990 to transmitters installed before 2 January 1985	Tolerances applicable to transmitters installed after 1 January 1985 and to all transmitters after 1 January 1990
1	2	3
Band: **9 kHz to 535 kHz**		
1. *Fixed Stations:*		
— 9 kHz to 50 kHz	1 000	100
— 50 kHz to 535 kHz	200	50
2. *Land Stations:*		
a) Coast Stations:		100 *1) 2)*
— power 200 W or less	500 *1)*	
— power above 200 W	200 *1)*	
b) Aeronautical Stations	100	100

1	2	3
3. *Mobile Stations:*		
a) Ship Stations	1 000 *3)*	200 *3) 4)*
b) Ship's Emergency Transmitters	5 000	500 *5)*
c) Survival Craft Stations	5 000	500
d) Aircraft Stations	500	100
4. *Radiodetermination Stations*	100	100
5. *Broadcasting Stations*	10 Hz	10 Hz
Band: **535 kHz to 1 606.5 kHz (1 605 kHz in Region 2)**		
Broadcasting Stations	10 Hz *6)*	10 Hz *6)*
Band: **1 606.5 kHz (1 605 kHz in Region 2) to 4 000 kHz**		
1. *Fixed Stations:*		
— power 200 W or less	100	100 *7) 8)*
— power above 200 W	50	50 *7) 8)*
2. *Land Stations:*		
— power 200 W or less	100 *1) 9) 10)*	100 *1) 2) 7) 9) 10)*
— power above 200 W	50 *1) 9) 10)*	50 *1) 2) 7) 9) 10)*
3. *Mobile Stations:*		
a) Ship Stations	200 *3) 11)*	40 Hz *3) 4) 12)*
b) Survival Craft Stations	300	100
c) Emergency Position-Indicating Radiobeacons	300	100
d) Aircraft Stations	100 *10)*	100 *10)*
e) Land Mobile Stations	200	50 *13)*
4. *Radiodetermination Stations:*		
— power 200 W or less	100	20 *14)*
— power above 200 W	50	10 *14)*
5. *Broadcasting Stations*	20	10 Hz *15)*

1	2	3
Band: **4 MHz to 29.7 MHz**		
1. *Fixed Stations:*		
— power 500 W or less	50	
— power above 500 W	15	
a) Single-sideband and independent-sideband emissions:		
— power 500 W or less		50 Hz
— power above 500 W		20 Hz
b) Class F1B emissions		10 Hz
c) Other classes of emission:		
— power 500 W or less		20
— power above 500 W		10
2. *Land Stations:*		
a) Coast Stations:		20 Hz *1) 2) 16)*
— power 500 W or less	50 *1) 9)*	
— power above 500 W and less than or equal to 5 kW	30 *1) 9)*	
— power above 5 kW	15 *1) 9)*	
b) Aeronautical Stations:		
— power 500 W or less	100 *10)*	100 *10)*
— power above 500 W	50 *10)*	50 *10)*
c) Base Stations:		20 *7)*
— power 500 W or less	100	
— power above 500 W	50	
3. *Mobile Stations:*		
a) Ship Stations:		
1) Class A1A emissions	50 *17) 18)*	10
2) Emissions other than Class A1A	50 *3) 11)*	50 Hz *3) 4) 19)*

1	2	3
b) Survival Craft Stations	200	50
c) Aircraft Stations	100 *10)*	100 *10)*
d) Land Mobile Stations	200	40 *20)*
4. *Broadcasting Stations*	15	10 Hz *15) 21)*
5. *Space Stations*		20
6. *Earth Stations*		20
Band: **29.7 MHz to 100 MHz**		
1. *Fixed Stations:*		
— power 200 W or less	50	
— power above 200 W	30	
— power 50 W or less		30
— power above 50 W		20
2. *Land Stations:*		20
— power 15 W or less	50	
— power above 15 W	20	
3. *Mobile Stations:*		20 *22)*
— power 5 W or less	100	
— power above 5 W	50	
4. *Radiotermination Stations*	200	50
5. *Broadcasting Stations (other than television):*		2 000 Hz *23)*
— power 50 W or less	50	
— power above 50 W	20	

1	2	3
6. *Broadcasting Stations (television sound and vision):*		500 Hz *24) 25)*
— power 50 W or less	100	
— power above 50 W	1 000 Hz	
7. *Space Stations*		20
8. *Earth Stations*		20
Band: **100 MHz to 470 MHz**		
1. *Fixed Stations:*		
— power 50 W or less	50	20 *26)*
— power above 50 W	20	10
2. *Land Stations:*		
a) Coast Stations	10	10
b) Aeronautical Stations	50	20 *28)*
c) Base Stations:		
— power 5 W or less	50	
— power above 5 W	20	
— in the band 100 - 235 MHz		15 *29)*
— in the band 235 - 401 MHz		7 *29)*
— in the band 401 - 470 MHz		5 *29)*
3. *Mobile Stations:*		
a) Ship Stations and Survival Craft Stations:		
— in the band 156 - 174 MHz	10	10
— outside the band 156 - 174 MHz	50 *30) 31)*	50 *31)*
b) Aircraft Stations	50	30 *28)*
c) Land Mobile Stations:		
— power 5 W or less	50	
— power above 5 W	20	

1	2	3
— in the band 100 - 235 MHz		15 *29)*
— in the band 235 - 401 MHz		7 *29) 32)*
— in the band 401 - 470 MHz		5 *29) 32)*
4. *Radiodetermination Stations*	50 *30) 33)*	50 *33)*
5. *Broadcasting Stations (other than television)*	20	2 000 Hz *23)*
6. *Broadcasting Stations (television sound and vision):*		500 Hz *24) 25)*
— power 100 W or less	100	
— power above 100 W	1 000 Hz	
7. *Space Stations*		20
8. *Earth Stations*		20
Band: **470 MHz to 2 450 MHz**		
1. *Fixed Stations:*		
— power 100 W or less	300 *34)*	100
— power above 100 W	100 *35)*	50
2. *Land Stations*	300	20 *36)*
3. *Mobile Stations*	300	20 *36)*
4. *Radiodetermination Stations*	500 *33)*	500 *33)*
5. *Broadcasting Stations (other than television)*	100	100
6. *Broadcasting Stations (television sound and vision)* in the band 470 MHz to 960 MHz:		500 Hz *24) 25)*
— power 100 W or less	100	
— power above 100 W	1 000 Hz	
7. *Space Stations*		20
8. *Earth Stations*		20

1	2	3
Band: **2 450 MHz to 10 500 MHz**		
1. *Fixed Stations:*		
— power 100 W or less	300 *34)*	200
— power above 100 W	100 *35)*	50
2. *Land Stations*	300	100
3. *Mobile Stations*	300	100
4. *Radiodetermination Stations*	2 000 *33)*	1 250 *33)*
5. *Space Stations*		50
6. *Earth Stations*		50
Band: **10.5 GHz to 40 GHz**		
1. *Fixed Stations*	500	300
2. *Radiodetermination Stations*	7 500 *33)*	5 000 *33)*
3. *Broadcasting Stations*		100
4. *Space Stations*		100
5. *Earth Stations*		100

Notes in the Table of Transmitter Frequency Tolerances

1) For coast station transmitters used for direct-printing telegraphy or for data transmission, the tolerance is:

– 5 Hz for narrow-band phase-shift keying;

– 15 Hz for frequency-shift keying for transmitters in use or installed before 2 January 1992;

– 10 Hz for frequency-shift keying for transmitters installed after 1 January 1992.

2) For coast station transmitters used for digital selective calling, the tolerance is 10 Hz. This tolerance applies to transmitters installed after 1 January 1992 and to all transmitters after the date of full implementation of the GMDSS (See Resolution **331 (Mob-87)**).

3) For ship station transmitters used for direct-printing telegraphy or for data transmission, the tolerance is:

- 5 Hz for narrow-band phase-shift keying;
- 40 Hz for frequency-shift keying for transmitters in use or installed before 2 January 1992;
- 10 Hz for frequency-shift keying for transmitters installed after 1 January 1992.

4) For ship station transmitters used for digital selective calling, the tolerance is 10 Hz. This tolerance applies to transmitters installed after 1 January 1992 and to all transmitters after the date of full implementation of the GMDSS (See Resolution **331 (Mob-87)**).

5) If the emergency transmitter is used as the reserve transmitter for the main transmitter, the tolerance for ship station transmitters applies.

6) In countries covered by the North American Regional Broadcasting Agreement (NARBA) the tolerance of 20 Hz may continue to be applied.

7) For single-sideband radiotelephone transmitters except at coast stations, the tolerance is:

- 50 Hz in the bands 1 606.5 (1 605 Region 2) - 4 000 kHz and 4 - 29.7 MHz, for peak envelope powers of 200 W or less and 500 W or less, respectively;
- 20 Hz in the bands 1 606.5 (1 605 Region 2) - 4 000 kHz and 4 - 29.7 MHz, for peak envelope powers above 200 W and 500 W, respectively;

8) For radiotelegraphy transmitters whith frequency-shift keying the tolerance is 10 Hz.

9) For coast station single-sideband radiotelephone transmitters the tolerance is 20 Hz.

10) For single-sideband transmitters operating in the frequency bands 1 606.5 (1 605 Region 2) - 4 000 kHz and 4 - 29.7 MHz which are allocated exclusively to the aeronautical mobil (R) service, the tolerance on the carrier (reference) frequency is:

a) for all aeronautical stations, 10 Hz;

b) for all aircraft stations operating on international services, 20 Hz;

c) for aircraft stations operating exclusively on national services, 50 Hz *.

11) For ship station single-sideband radiotelephone transmitters, the tolerance is:

a) in the band 1 606.5 (1 605 in Region 2) - 4 000 kHz:

- 100 Hz for transmitters installed before 2 January 1982;
- 50 Hz for transmitters installed after 1 January 1982;

b) in the band 4 000 - 27 500 kHz:

- 100 Hz for transmitters installed before 2 January 1978;
- 50 Hz for transmitters installed after 1 January 1978.

12) For A1A emissions the tolerance is 50 parts in 10^6.

13) For transmitters used for single-sideband radiotelephony or for frequency-shift keying radiotelegraphy the tolerance is 40 Hz.

14) For radiobeacon transmitters in the band 1 606.5 (1 605 Region 2) - 1 800 kHz the tolerance is 50 parts in 10^6.

15) For A3E emissions with carrier power of 10 kW or less the tolerance is 20 parts in 10^6, 15 parts in 10^6 and 10 parts in 10^6 in the bands 1 606.5 (1 605 Region 2) - 4 000 kHz, 4 - 5.95 MHz and 5.95 - 29.7 MHz respectively.

16) For A1A emissions the tolerance is 10 parts in 10^6.

17) In the A1A Morse working frequency bands, a frequency tolerance of 200 parts in 10^6 may be applicable to existing transmitters, provided that the emissions are contained within the band in question.

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* *Note:* In order to achieve maximum intelligibility, it is suggested that administrations encourage the reduction of this tolerance to 20 Hz.

18) In the A1A Morse calling frequency bands, frequency tolerances of 40 parts in 10^6 in the bands between 4 MHz and 23 MHz and of 30 parts in 10^6 in the 25 MHz band are recommended as far as possible.

19) For ship station transmitters in the band 26 175 - 27 500 kHz, on board small craft, with a carrier power not exceeding 5 W in or near coastal waters and utilizing A3E or F3E and G3E emissions, the frequency tolerance is 40 parts in 10^6.

20) The tolerance is 50 Hz for single-sideband radiotelephone transmitters, except for those transmitters operating in the band 26 175 - 27 500 kHz, and not exceeding a peak envelope power of 15 W, for which the basic tolerance of 40 parts in 10^6 applies.

21) It is suggested that administrations avoid carrier frequency differences of a few hertz, which cause degradations similar to periodic fading. This could be avoided if the frequency tolerance were 0.1 Hz, a tolerance which would be suitable for single-sideband emissions. *

22) For non-vehicular mounted portable equipment with a transmitter mean power not exceeding 5 W, the tolerance is 40 parts in 10^6.

23) For transmitters of a mean power of 50 W or less operating at frequencies below 108 MHz a tolerance of 3 000 Hz applies.

24) In the case of television stations of:

– 50 W (vision peak envelope power) or less in the band 29.7 - 100 MHz;

– 100 W (vision peak envelope power) or less in the band 100 - 960 MHz

and which receive their input from other television stations or which serve small isolated communities, it may not, for operational reasons, be possible to maintain this tolerance. For such stations, the tolerance is 2 000 Hz.

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* *Note*: The single-sideband system adopted for the bands exclusively allocated to HF broadcasting does not require a frequency tolerance less than 10 Hz. The above-mentioned degradation occurs when the ratio of wanted-to-interfering signal is well below the required protection ratio. This remark is equally valid for both double- and single-sideband emissions.

For stations of 1 W (vision peak envelope power) or less this tolerance may be relaxed further to:

- 5 kHz in the band 100 - 470 MHz;
- 10 kHz in the band 470 - 960 MHz.

25) For transmitters for system M (NTSC) the tolerance is 1 000 Hz. However, for low power transmitters using this system note *24)* applies.

26) For multi-hop radio-relay systems employing direct frequency conversion the tolerance is 30 parts in 10^6.

27) For coast and ship station transmitters in the band 156 - 174 MHz put into service after 1 January 1973 a tolerance of 10 parts in 10^6 shall apply. This tolerance is applicable to all transmitters, including survival craft stations, after 1 January 1983.

28) For a channel spacing of 50 kHz the tolerance is 50 parts in 10^6.

29) These tolerances apply to channel spacings equal to or greater than 20 kHz.

30) This tolerance is not applicable to survival craft stations operating on the frequency 243 MHz.

31) For transmitters used by on-board communication stations a tolerance of 5 parts in 10^6 shall apply.

32) For non-vehicular mounted portable equipment with a transmitter mean power not exceeding 5 W the tolerance is 15 parts in 10^6.

33) Where specific frequencies are not assigned to radar stations, the bandwidth occupied by the emissions of such stations shall be maintained wholly within the band allocated to the service and the indicated tolerance does not apply.

34) For transmitters using time-division multiplex the tolerance of 300 may be increased to 500.

35) This tolerance applies only to such emissions for which the necessary bandwidth does not exceed 3 000 kHz; for larger bandwidth emissions a tolerance of 300 applies.

36) In applying this tolerance administrations should be guided by the latest relevant CCIR Recommendations.

APPENDIX 8

Table of Maximum Permitted Spurious Emission Power Levels

(See Article 5)

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.

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.

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.

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. More stringent levels may also be fixed by specific agreement between the administrations concerned.

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

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 MHz 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

(continued)

(continued)

235 MHz to 960 MHz	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.	
— mean power above 25 watts		60 decibels 20 milliwatts (Notes 10, 11)
— mean power 25 watts or less		40 decibels 25 microwatts (Notes 10, 11)
960 MHz to 17.7 GHz		
— mean power above 10 watts		50 decibels 100 milliwatts (Notes 10, 11, 12, 13)
— mean power 10 watts or less		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 **66**).

Notes in the Table of Maximum Permitted Spurious Emission Power Levels

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.

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.

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.

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.

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.

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

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, while a reduction below 50 milliwatts is not mandatory, a minimum attenuation of 60 decibels shall be provided.

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.

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

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.

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.

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, when available (see Recommendation **66**).

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 **66**).

APPENDIX 9
Mob-87

Service Documents [1]

(See Articles **10**, **12**, **13**, **17** and **26**)

List I. International Frequency List

The IFRB shall establish and keep up to date the column headings of the International Frequency List to meet fully the statutory provisions of Appendices **1** and **3** and related decisions of future conferences. Furthermore, the IFRB shall introduce the necessary improvements in the presentation of the list, without in any way altering the basic data specified in the Radio Regulations.

List II. List of Fixed Stations Operating International Circuits

Names of countries arranged in alphabetical order of abbreviations.
Names of stations in alphabetical order.

Name of the transmitting station	Call sign (identification)	Assigned frequency (kHz or MHz)	Locality(ies) or area(s) with which communication is established	Remarks
1	2	3	4	5

[1] The format of these documents may be modified as the situation requires.

List IV. List of Coast Stations

Part I. Tables of general or specific interest

Part II. Alphabetical index of coast stations

Name of the station	See Part III page	Name of the station	See Part III page	Name of the station	See Part III page

Part III. Particulars of coast stations

Names of countries arranged in alphabetical order of abbreviations.
Names of stations in alphabetical order.

Name of the station[1]	Call sign[2, 3]	Emission				Service		Charges[9, 10]	Geographical coordinates of the transmitting antenna (longitude and latitude in degrees, minutes and seconds)	Remarks[11, 12]
		Frequencies kHz or MHz		Class	Power (kW)[6]	Nature[7, 8]	Hours of service (UTC)			
1	2	3a[4]	3b[5]	4	5	6	7	8	9	10

1 Indicate for each country the coast station or coast stations to which radiotelegrams intended for high-frequency transmission to ship stations should be sent.

2 Indicate if maritime mobile service identity is provided.

3 The call sign of the station shall be followed, where appropriate, by the maritime mobile service identity or the identification number or the selective calling signal, in brackets, that the station uses.

4 Transmitting frequencies. The normal working frequency is printed in heavy type.

5 Watch and/or receiving frequencies or channels.

6 In the case of directive antennae, indicate under the power, the azimuth of the direction or directions of maximum gain, in degrees, beginning from True North clockwise.

7 Indicate if selective calling is provided and, if so, the system employed.

8 Indicate if narrow-band direct-printing telegraphy is provided.

9 The land-line telegraph charge of the country to which the coast station is subject and the charge applied by this country to telegrams destined for adjacent countries are given in Part IV of this List.

10 If the accounts for charges are settled by a private enterprise, the name and address of such private enterprise should, if necessary, be stated.

11 Indicate if radar service is provided.

12 The List should contain information concerning the times of transmission of traffic lists, and the hours of watchkeeping of the coast station on the various frequencies, etc. Coast or coast earth stations open to public correspondence and providing service for transmission and reception of radiotelegrams by radiotelephony shall be indicated in the List of Coast Stations.

Part IV. Inland telegraph rates and rates for telegram destined for adjacent countries, etc.

The Annex containing a List of Coast Stations and Coast Earth Stations participating in the GMDSS (see No. **2202C**) shall be published as shown below:

Part A. Particulars of coast stations participating in MF, HF and VHF watch-keeping using digital selective calling techniques

Name of the coast station	Maritime mobile service identity	Emission				Service		Geographical coordinates of the transmitting antenna (longitude and latitude in degrees, minutes and seconds)	Remarks
		Frequencies (kHz or MHz)		Class	Power (kW)[3]	Mode of operation[4]	Hours of service (UTC)		
1	2	3a[1]	3b[2]	4	5	6	7	8	9

[1] Transmitting frequencies.

[2] Watch and/or receiving frequencies or channels.

[3] In the case of directive antennas, indicates under "power" the azimuth of the direction or directions of maximum gain, in degrees, clockwise beginning from True North.

[4] Indicate whether radiotelephony and/or a narrow-band direct-printing system is provided.

Part B. Particulars of coast earth stations

Name of the coast earth station	Ocean region [1]	Service			Geographical coordinates of the transmitting antenna (longitude and latitude in degrees, minutes and seconds)	Remarks
		Nature of service [2]	Hours of service (UTC)	Charges [3]		
1	2	3	4	5	6	7

[1] Indicate the ocean region(s) in which the service is provided.

[2] Indicate whether the station is capable of providing:

a) distress and safety communications, including distress alerting with ship earth stations capable of using direct-printing techniques only;

b) the transmission of maritime safety information.

[3] Indicate the charges, if any, applicable to subsequent distress and safety communications after the initial distress alert.

Part C. Particulars of coast stations transmitting to ships navigational and meteorological warnings and urgent information by means of narrow-band direct-printing techniques

Name of the coast station	Frequencies (kHz) [1]	Call sign/identification character [2]	Times of transmission	Nature of service [3]	Language used	Power (kW) [4]	Geographical coordinates of the transmitting antenna (longitude and latitude in degrees, minutes and seconds)	Remarks
1	2	3	4	5	6	7	8	9

[1] Indicate on which frequency(ies) information is transmitted.

[2] Indicate the maritime mobile service identity number or the identification number. In the case of the international NAVTEX service, indicate the B1 character.

[3] Indicate which kinds of information (navigational and meteorological warnings, ice reports, etc.) are provided.

[4] In the case of directive antennas, indicate under "power" the azimuth of the direction or directions of maximum gain, in degrees, clockwise beginning from True North.

List V. List of Ship Stations

Particulars of ship stations
and ship earth stations

The information concerning these stations shall be published as shown below:

Name of ship	Call sign	Country	Auxiliary installations	Class of ship	Nature of service	Hours of service	Telegraph transmission frequency bands	Telephone transmission frequency bands	Accounting authority	Remarks
1	2	3	4	5	6	7	8	9	10	11

Column 1 The stations shall be arranged in alphabetical order of the names of the ships, irrespective of nationality. In the case of duplication of names, the name of the ship shall be followed by the call sign (separated from the name by a fraction bar).

Column 2 Call sign. This column also contains the maritime mobile service identity or the selective call number or both, where appropriate.

Column 3 Country having jurisdiction over the station (indicated by the appropriate symbol).

Column 4 Auxiliary installations, including information concerning:

a) number of lifeboats fitted with radio apparatus, and

b) optionally, types and number of emergency position-indicating radiobeacons, satellite emergency position-indicating radiobeacons and search and rescue radar transponders, the operating frequency or frequency band being indicated by one of the following letters:

A =	2 182	kHz
B =	121.5	MHz
C =	243	MHz
D =	156.525	MHz
E =	406 - 406.1	MHz
F =	1 645.5 - 1 646.5	MHz
G =	9 200 - 9 500	MHz

A figure following the letter indicates the number of radiobeacons.

Columns 5 to 7 In the form of service symbols (see Appendix **10**). In addition, the symbols used in Column 5 to designate the class of ship are given in Part I of the List.

Columns 8 and 9 Indication of the frequency bands and classes of emission by means of the following symbols:

Radiotelegraphy		*Radiotelephony*	
S =	Frequency bands used in the maritime mobile-satellite service	S =	Frequency bands used in the maritime mobile-satellite service
W =	110 - 150 kHz	T =	1 605 - 4 000 kHz
X =	415 - 535 kHz	U =	4 000 - 27 500 kHz
Y =	1 605 - 3 800 kHz	V =	156 - 174 MHz
Z =	4 000 - 27 500 kHz		

These symbols should, where necessary, be followed by references to brief notes and indications of the frequencies for which the transmitters are adjusted, which shall appear at the end of the List.

Column 10 The accounting authority identification code (AAIC).

Column 11 When two or more ship stations of the same nationality bear the same name, and no distinguishing particulars are shown in Columns 1, 2 or 5, the name of the licensee or the owner of the ship shall be given in this column.

In addition, if there is no room in the appropriate column, further information relating to Columns 1 to 10 may be given in Column 11 by means of a note reference. This column may comprise several lines.

If narrow-band direct-printing telegraphy is provided, indicate the system employed.

List VI. List of Radiodetermination and Special Service Stations

(For navigational purposes, this List should be used with caution. See Article **35** of the Radio Regulations.)

Part A. Alphabetical index of stations.

Name of the station	Call sign	Nature of the service	See part B, page
1	2	3	4

Part B. Particulars of stations.

1. *Direction-finding stations*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Geographical co-ordinates (longitude and latitude in degrees, minutes and seconds) of: *a)* the receiving antenna of the direction-finding station *b)* the transmitting antenna of the direction-finding station *c)* the transmitting antenna of the station mentioned in Column 8	Call sign	Frequencies (kHz or MHz) and classes of emission			Power (kW)	Name and call sign of the station with which communication should be established if the direction-finding station is not equipped with a transmitter	Charges	Remarks *a)* sectors in which bearings are normally accurate and references to national or international publications other than the present list; *b)* hours of service (UTC), etc.
			For calling the direction-finding station	For transmitting to the direction-finding station the signals necessary for taking bearings	For the transmision of the bearings by the direction-finding station				
1	2	3	4	5	6	7	8	9	10

2. *Radiobeacon stations*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Geographical coordinates of the transmitting antenna of the radiobeacon (longitude and latitude in degrees, minutes and seconds)	Characteristic signal of the radiobeacon	Call sign of the radiobeacon (if any)	Emission			Normal range in nautical miles	Name and call sign of the station to which requests for the emission of beacon signals may be addressed	Frequency to be used to call the station indicated in Column 9 (kHz or MHz)	Remarks *a)* sectors normally reliable and references to national or international publications other than this list; *b)* hours of service (UTC); *c)* description of the emission; *d)* charges, etc.
				Frequency (kHz or MHz)	Class	Frequency of modulation (if any) (Hz)				
1	2	3	4	5	6	7	8	9	10	11

3. *Ocean-station vessels*

Ocean Regions in alphabetical order.
Names of stations in alphabetical order.

Name of the station	Geographical position assigned to the station	Call sign of the station vessel	Frequency for calling the station (kHz or MHz)	Radiobeacon					Direction-finding			Remarks
				Characteristic signal	Transmitting frequency (kHz or MHz)	Class of emission	Frequency of modulation (if any) (Hz)	Normal range in nautical miles	Frequency for transmitting to the station the signals necessary for taking bearings (kHz or MHz)	Frequency for the transmission by the station of the bearings (kHz or MHz)	Power of the transmitter (kW)	*a)* references to national or international publications other than this list; *b)* hours of service (UTC); *c)* description of the radiobeacon emission.
1	2	3	4	5	6	7	8	9	10	11	12	13

4. *Direction-finder calibration stations*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Geographical coordinates of the transmitting antenna of the radiobeacon (longitude and latitude in degrees, minutes and seconds)	Characteristic signal	Call sign of the radiobeacon (if any)	Emission			Normal range in nautical miles	Name and call sign of the station to which requests may be addressed	Frequency to be used to call the station mentioned in Column 9 (kHz or MHz)	Remarks *a)* sectors normally reliable and references to national or international publications other than this list; *b)* hours of service (UTC); *c)* description of the emission; *d)* charges, etc.
				Frequency (kHz or MHz)	Class	Frequency of modulation (if any) (Hz)				
1	2	3	4	5	6	7	8	9	10	11

5. *Stations transmitting standard frequency and time signals*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Times of emission (UTC)	Method[1]
1	2	3	4	5	6

[1] General instructions concerning time signals.

6. ——————

7. *Stations transmitting regular meteorological bulletins*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Times of emission (UTC)	Remarks[1]
1	2	3	4	5	6

[1] General instructions concerning meteorological bulletins including code used.

8. *Stations transmitting notices to navigators*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Times of emission (UTC)	Remarks
1	2	3	4	5	6

9. *Stations transmitting medical advice*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Hours of service (UTC)	Remarks
1	2	3	4	5	6

10. *Stations transmitting epidemiological bulletins*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Times of emission (UTC)	Remarks
1	2	3	4	5	6

11. *Stations transmitting Ursigrams*

Names of the countries arranged in alphabetical order of abbreviations.
Names of the stations in alphabetical order.

Name of the station	Call sign	Frequencies (kHz or MHz)	Class of emission	Times of emission (UTC)	Remarks and nature of information
1	2	3	4	5	6

12. *Fixed earth stations in the maritime radiodetermination-satellite service*

Names of the countries notifying the stations in alphabetical order of country symbols.
Names of stations in alphabetical order.

		Transmission of radiodetermination information			Reception of radio-determination information				Remarks
Name by which station is known	Geographical coordinates (in degrees and minutes) of the transmitter site	Frequency (MHz or GHz)	Class of emission, necessary bandwidth and description of transmission	Power (kW)	Frequency (MHz or GHz)	Class of emission, necessary bandwidth and description of transmission	Identity of associated space station(s)	Operating administration or company	Special methods of modulation, charges, etc. All stations listed provide a maritime radiodetermination-satellite service except where otherwise indicated, in which case a station provides only a radiolocation or radionavigation-satellite service.
1	2	3a	3b	3c	4a	4b	5	6	7

13. Space stations in the maritime radiodetermination-satellite service

Names of the countries notifying the stations in alphabetical order of country symbols.
Names of stations by alphabetical and/or numerical order of designation of stations.

		Transmission of radiodetermination information to ships			Reception of radio-determination information from ships				Remarks
Identity of the station	Frequency (MHz or GHz)	Class of emission, necessary bandwidth and description of transmission	Power (W)	Frequency (MHz or GHz)	Class of emission, necessary bandwidth and description of transmission	Service area or areas on the Earth	Name of locality and country in which the associated fixed earth station(s) is (are) located	Operating administration or company	Orbital information, special channelling arrangements, special modulation methods, charges, etc. All stations listed provide a maritime radiodetermination-satellite service except where otherwise, indicated, in which case a station provides only a radiolocation-satellite service or radionavigation-satellite service.
1	2a	2b	2c	3a	3b	4	5	6	7

Note: The Secretary-General, if he considers it necessary, may introduce in this list additional sections to cover new systems that may be developed and used.

List VIII. List of International Monitoring Stations

(See Article **20**)

Note: Throughout this List those stations nominated by administrations, which may participate in the international monitoring system, are marked (IMS).

Part I. Centralizing offices

Names of countries arranged in alphabetical order of abbreviations.

- National centralizing office (postal and telegraphic address, telephone number, any other information)

Part II. Monitoring of emissions from stations of terrestrial radiocommunication services

A. Particulars of monitoring stations carrying out frequency measurements

Names of countries arranged in alphabetical order of abbreviations.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degree and minutes)
- Hours of service (UTC)
- Ranges of measurable frequencies (kHz, MHz or GHz)
- Accuracy of measurements [1]
- Remarks

[1] Indicate the maximum attainable accuracy for each frequency range.

B. Particulars of monitoring stations carrying out field strength or power flux-density measurements

Names of countries arranged in alphabetical order of abbreviations.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degrees and minutes)
- Hours of service (UTC)
- Ranges of frequencies (kHz, MHz or GHz)
- Maximum and minimum values of measurable field strengths or power flux-densities
- Accuracy of measurements in dB [1]
- Remarks

C. Particulars of monitoring stations carrying out direction-finding measurements

Names of countries arranged in alphabetical order of abbreviations.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degrees, minutes and seconds)
- Hours of service (UTC)
- Ranges of frequencies (kHz, MHz or GHz)
- Type of antennae in use
- Remarks

[1] Indicate the maximum attainable accuracy for each frequency range.

D. Particulars of monitoring stations carrying out bandwidth measurements

Names of countries arranged in alphabetical order of abbreviations.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degrees and minutes)
- Hours of service (UTC)
- Ranges of frequencies (kHz, MHz or GHz)
- Method(s) of measurement [1]
- Resolution at -60 dB (if appropriate)
- Remarks

E. Particulars of monitoring stations carrying out automatic spectrum occupancy surveys

Names of countries arranged in alphabetical order of abbreviations.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degrees and minutes)
- Hours of service (UTC)
- Ranges of frequencies (kHz, MHz or GHz)
- Method(s) employed
- Remarks

---

[1] See the relevant CCIR Recommendations and Reports.

Part III. Monitoring of emissions from stations of space radiocommunication services

Particulars of monitoring stations carrying out measurements related to stations in the space radiocommunication services.

Names of countries arranged in alphabetical order of symbols.

Names of stations in alphabetical order.

- Name and geographical coordinates of the station (longitude and latitude in degrees, minutes and seconds)
- Hours of service (UTC)
- Information on antennae in use (e.g. diameter or gain as a function of frequency; slew rate, if applicable; etc.)
- Range of azimuth and elevation angles
- Maximum attainable accuracy in determining orbital positions of space stations
- Information on system polarization
- Système noise temperature
- Ranges of frequencies with the maximum attainable accuracy of frequency measurement for each frequency range
- Ranges of frequencies in which field strength or power flux-density measurements can be performed
- Minimum value of measurable field strength or power flux-density with indication of attainable accuracy of measurement

- Information available for bandwidth measurement [1]
- Information available for spectrum occupancy measurements
- Information available for orbit occupancy measurements
- Remarks

List VIII A. List of Space Radiocommunication Stations and Radio Astronomy Stations

The Board shall prepare and keep up to date the contents of this List grouped in such a way as to permit administrations to more easily identify all stations pertaining to a given satellite network. Furthermore, the Board shall introduce the necessary improvements in the presentation of the List without in any way altering the basic data specified in the Radio Regulations.

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[1] See the relevant CCIR Recommendations and Reports.

APPENDIX 10
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Service Document Symbols

(See Article **26** and Appendix **9**)

■	Station classified as situated in a region of heavy traffic (see Article **60**) ("TI") [1]
○	By day ("HJ") [1]
●	By night ("HN") [1]
[ ]	A ship which carries lifeboats fitted with radio apparatus; a number inside the square brackets shows the number of such lifeboats ("S") [1]
AL	Aeronautical radionavigation land station
AM	Aeronautical radionavigation mobile station
AT	Amateur station
AX	Aeronautical fixed station
BC	Broadcasting station, sound
BT	Broadcasting station, television
C	Continuous operation during hours shown
CA	Cargo ship
CO	Station open to official correspondence exclusively

[1] The symbol shown in parentheses may be used in notifications and service documents.

CP Station open to public correspondence

CR Station open to limited public correspondence

CV Station open exclusively to correspondence of a private agency

D30° Directive antenna having maximum radiation in the direction of 30° (expressed in degrees from True North, from 0 to 360 clockwise)

DR Directive antenna provided with a reflector

EA Space station in the amateur-satellite service

EB Space station in the broadcasting-satellite service (sound broadcasting)

EC Space station in the fixed-satellite service

ED Space telecommand space station

EF Space station in the radiodetermination-satellite service

EG Space station in the maritime mobile-satellite service

EH Space research space station

EI Space station in the mobile-satellite service

EJ Space station in the aeronautical mobile-satellite service

EK Space tracking space station

EM Meteorological-satellite space station

EN Space station in the radionavigation-satellite service

EO Space station in the aeronautical radionavigation-satellite service

EQ Space station in the maritime radionavigation-satellite service

ER Space telemetering space station

EU Space station in the land mobile-satellite service

EV	Space station in the broadcasting-satellite service (television)
EX	Experimental station
FA	Aeronautical station
FB	Base station
FC	Coast station
FD	Aeronautical station in the aeronautical mobile (R) service
FG	Aeronautical station in the aeronautical mobile (OR) service
FL	Land station
FP	Port station
FR	Receiving station only, connected with the general network of telecommuniction channels
FS	Land station established solely for the safery of life
FX	Fixed station
GMT	Greenwich Mean Time
GS	Station on board a warship or a military or naval aircraft
H	Schedule operation
H8	8-hour service provided by a ship station of the third category
H16	16-hour service provided by a ship station of the second category
H24	Continuous service throughout the twenty-four hours
HJ	Day service
HN	Night service
HT	Transition period service

HX	Intermittent service throughout the twenty-four hours, or station having no specific working hours
I	Intermittent operation during the time indicated
LR	Radiolocation land station
MA	Aircraft station
ME	Space station
ML	Land mobile station
MO	Mobile station
MR	Radiolocation mobile station
MS	Ship station
ND	Non-directional antenna
NL	Maritime radionavigation land station
NR	Radionavigation mobile station
OD	Oceanographic data station
OE	Oceanographic data interrogating station
OT	Station open exclusively to operational traffic of the service concerned
PA	Passenger ship
RA	Radio astronomy station
RC	Non-directional radiobeacon
RD	Directional radiobeacon
RG	Radio direction-finding station
RM	Maritime radionavigation mobile station
RN	Radionavigation land station
RT	Revolving radiobeacon
SM	Meteorological aids station

SS	Standard frequency and time signal station
TA	Space operation earth station in the amateur-satellite service
TB	Aeronautical earth station
TC	Earth station in the fixed-satellite service
TD	Space telecommand earth station
TE	Satellite EPIRB in the mobile-satellite service
TF	Fixed earth station in the radiodetermination-satellite service
TG	Ship earth station
TH	Earth station in the space research service
TI	Coast earth station
TJ	Aircraft earth station
TK	Space tracking earth station
TL	Mobile earth station in the radiodetermination-satellite service
TM	Earth station in the meteorological-satellite service
TN	Fixed earth station in the radionavigation-satellite service
TO	Mobile earth station in the aeronautical radionavigation-satellite service
TP	Receiving earth station
TQ	Mobile earth station in the maritime radionavigation-satellite service
TR	Space telemetering earth station
TS	Television, sound channel
TT	Earth station in the space operation service
TU	Land mobile earth station
TV	Television, vision channel
TX	Fixed earth station in the maritime radionavigation-satellite service

TY	Base earth station
TZ	Fixed earth station in the aeronautical radionavigation-satellite service
UA	Mobile earth station
UM	Mobile earth station in the radionavigation-satellite service
UTC	Coordinated Universal Time
VA	Land earth station

(The symbols may be modified as the situation requires.)

APPENDIX 11
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Documents with Which Stations on Board Ships and Aircraft Shall be Provided

(see Articles **24**, **26**, **44**, **46**, **49**, **55**, **57**, **59** and Appendix **9**)

Section I. Ship Stations for Which a Morse Radiotelegraph Installation is Required by International Agreement

These stations shall be provided with:

1. the licence prescribed by Article **24**;

2. certificates of the operator or operators;

3. a log in which the following are recorded as they occur, together with the time of the occurrence, unless administrations have adopted other arrangements for recording all information which the log should contain:

   a) all communications relating to distress traffic in full;

   b) urgency and safety communications;

   c) observance of watch on the international distress frequency during silence periods;

   d) communications exchanged between the ship station and land or mobile stations;

   e) service incidents of all kinds;

   f) if the ship's rules permit, the position of the ship at least once a day;

   g) the opening and closing of each period of service;

4. the Alphabetical List of Call Signs of Stations used in the Maritime Mobile Service;

5. the List of Coast Stations;

6. the List of Ship Stations (the carriage of the supplement is optional);

7. the List of Radiodetermination and Special Service Stations;

8. the Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services;

9. telegraph tariffs of the countries for which the station most frequently accepts radiotelegrams.

Section II. Other Ship Stations with Morse Radiotelegraph Facilities

These stations shall be provided with the documents mentioned in items 1 to 6, 8 and 9 of Section I.

Section III. Ship Stations for Which a Radiotelephone Installation Is Required by International Agreement

These stations shall be provided with:

1. the licence prescribed by Article **24**;

2. certificates of the operator or operators;

3. a log in which the following are recorded as they occur, together with the time of the occurrence, unless administrations have adopted other arrangements for recording all information which the log should contain:

   a) a summary of all communications relating to distress, urgency and safety traffic;

   b) a reference to important service incidents;

   c) if the ship's rules permit, the position of the ship at least once a day;

4. a list of coast stations with which communications are likely to be conducted, showing watchkeeping hours, frequencies and charges;

5. the provisions of the Radio Regulations and of the CCITT Resolutions and Recommendations applicable to the maritime mobile radiotelephone service, or the Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services.

Section IV. Other Ship Radiotelephone Stations

These stations shall be provided with:

1. the documents mentioned in items 1 and 2 of Section III;

2. the documents mentioned in items 3, 4 and 5 of Section III, in accordance with the requirements of the administrations concerned.

Section V. Ship Stations Equipped with Multiple Installations

These stations shall be provided with:

1. for each installation, if necessary, the documents mentioned in items 1 to 3 of Section I, or in items 1, 2 and 3 of Section III;

2. for only one installation, the other documents mentioned in Sections I or III, as appropriate.

Section VA. Stations on Board Ships for which a GMDSS Installation is Required by International Agreement

These stations shall be provided with:

1. the licence prescribed by Article **24**;

2. the certificates prescribed in Article **56**;

3. a log in which the following are recorded as they occur, together with the time of their occurrence, unless administrations have adopted other arrangements for recording all information which the log should contain:

   a) a summary of communications relating to distress, urgency and safety traffic;

   b) a reference to important service incidents;

   c) if the ship's rules permit, the position of the ship at least once a day;

4. the Alphabetical List of Call Signs and/or Numerical Table of Identities of Stations Used by the Maritime Mobile Service and Maritime Mobile-Satellite Service (Coast, Coast Earth, Ship, Ship Earth, Radiodetermination and Special Service Stations), Ship and Ship Earth Stations, Maritime Mobile Service Identities and Selective Call Numbers or Signals, and Coast and Coast Earth Stations, Maritime Mobile Service Identities and Identification Numbers or Signals (List VIIA);

5. the annex referred to in No. **2202C** giving the particulars of coast stations and coast earth stations participating in the GMDSS (see also Nos. **N 3075** and **N 3077**); a list of coast stations and coast earth stations with which communications are likely to be established, showing watch-keeping hours, frequencies and charges; and a list of coast stations and coast earth stations providing navigational and meteorological warnings and other urgent information for ships (see Article **26** and Appendix **9**);

6. the List of Ship Stations (the carriage of the supplement is optional);

7. the Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services.

Note – Administrations may, under appropriate circumstances (for example, when ships are sailing only within range of VHF coast stations) exempt ships from the carriage of the documents mentioned in paragraphs 4 to 7 above.

Section VI. Stations on Board Aircraft

These stations shall be provided with:

1. the documents mentioned in items 1 and 2 of Section I;

2. a log, unless administrations have adopted other arrangements for recording all information which the log should contain;

3. the documents containing official information relating to stations which the aircraft station may use for the execution of its service.

APPENDIX 12

Hours of Service for Ship Stations of the Second and Third Categories

(See Articles **26** and **58**)

Section I. Table

Hours of Service Ship's Time or Zone Time (See No. **4058** and **4059**)	
16 hours (H16)	8 hours (H8)
from to 0000 - 0400 h 0800 - 1200 h 1600 - 1800 h 2000 - 2200 h plus 4 hours (see No. **4058**)	from to 0800 - 1200 h 1800 - 2200 h [a)] plus 2 hours (see No. **4059**)

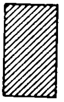
a) Two continuous hours of service between 1800 and 2200 hours, ship's time or zone time, at times decided by the administration, master or responsible person.

Section II. Diagram and Map

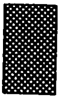
Note a: This diagram indicates the *fixed* and *elected* hours of service maintained by ships of the second and third categories in terms of zone time. (The hours of service shown exclude those which are determined by the administration, master, or responsible person.)

The *fixed* hours of watch are shown thus:

I) for ships of the second category:



II) for ships of the second and third categories:

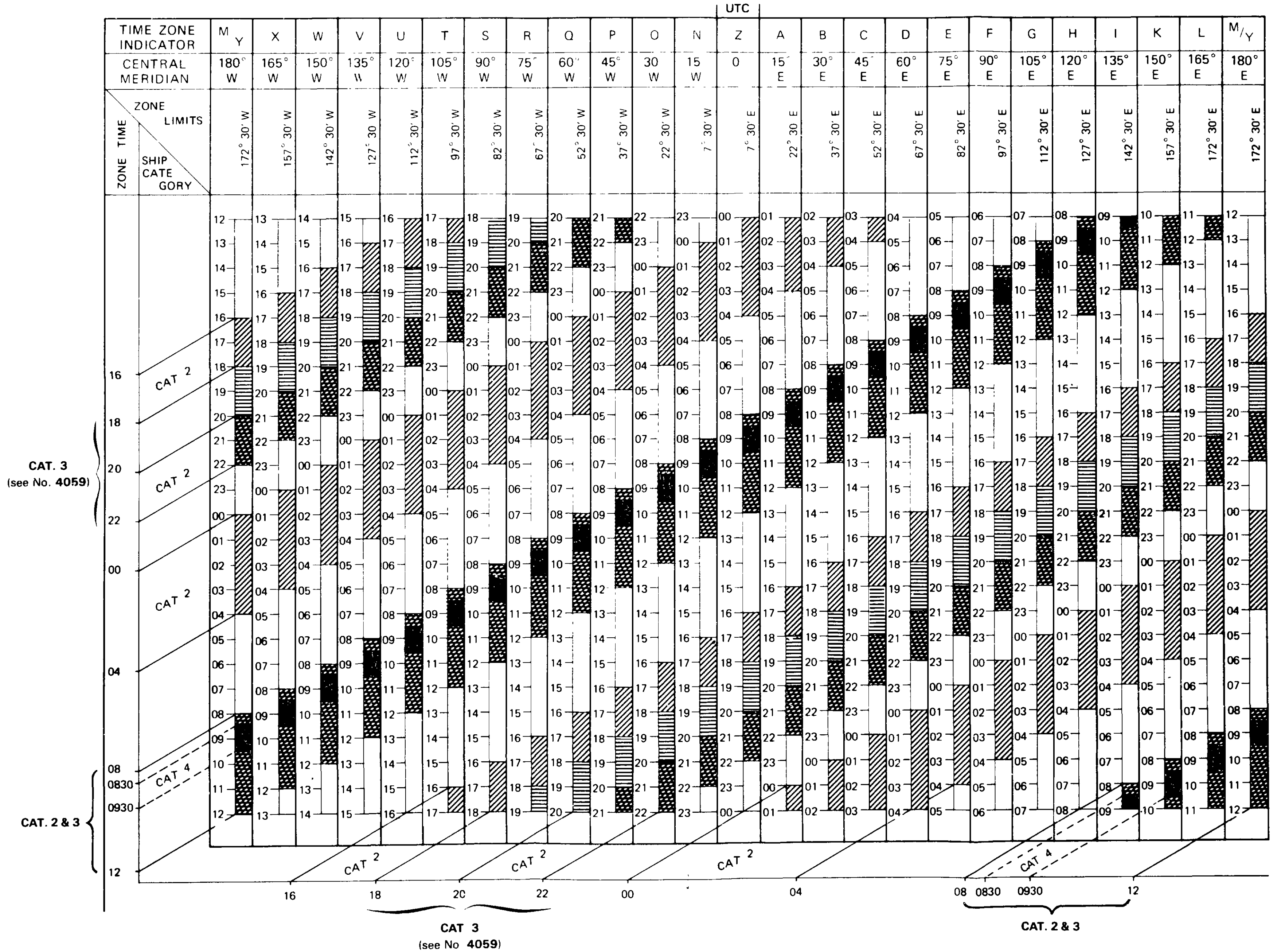


III) for ships of the third category, period over which two continuous hours of service may be elected:

Note b: Also shown (in black) is the specific service 0830-0930 that ships of the fourth category are encouraged to provide (see No. **4062**).

DIAGRAM

TIME ZONES AND HOURS OF SERVICE OF SHIP STATIONS



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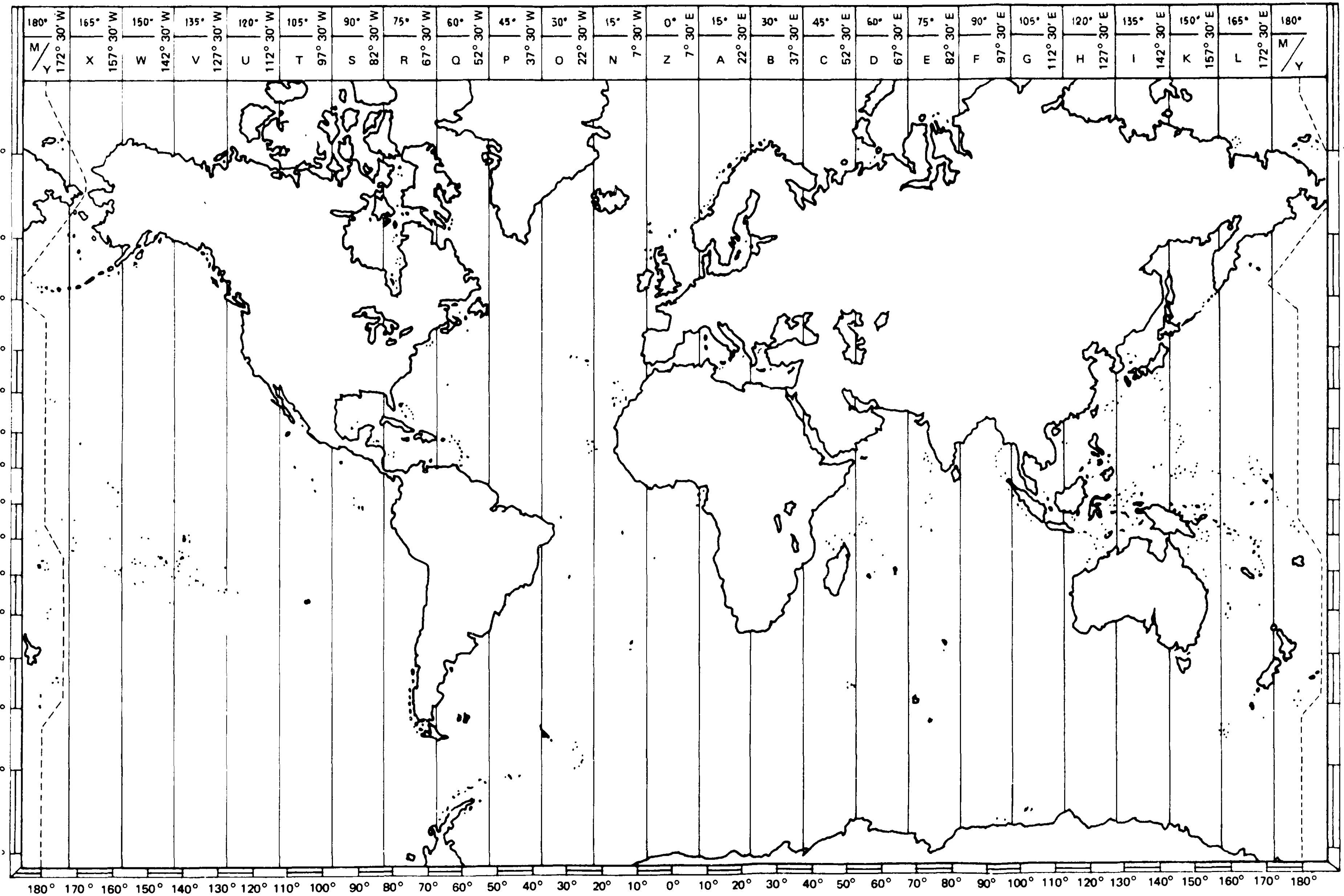
MAP

TIME ZONES



APPENDIX 13
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Miscellaneous Abbreviations and Signals to Be Used in Radiotelegraphy Communications Except in the Maritime Mobile Service

(See Article **52**)

Section I. Q Code
Introduction

1. The series of groups QRA to QUZ, listed in this Appendix, are for use by all services.

2. The QAA to QNZ series are reserved for the aeronautical service. These series are not listed in these Regulations. The QOA to QQZ series are reserved for the maritime services *.

3. Certains Q code abbreviations may be given an affirmative or negative sense by sending YES or NO respectively, immediately following the abbreviation.

4. The meanings assigned to Q code abbreviations may be amplified or completed by the addition of other appropriate groups, call signs, place names, figures, numbers, etc. It is optional to fill in the blanks shown in parentheses. Any data which are filled in where blanks appear shall be sent in the same order as shown in the text of the following tables.

5. Q code abbreviations are given the form of a question when followed by a question mark. When an abbreviation is used as a question and is followed by additional or complementary information, the question mark should follow this information.

6. Q code abbreviations with numbered alternative significations shall be followed by the appropriate figure to indicate the exact meaning intended. This figure shall be sent immediately following the abbreviation.

7. All times shall be given in Coordinated Universal Time (UTC) unless otherwise indicated in the question or reply.

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* *Note by the General Secretariat:* Series QOA to QQZ are shown in Appendix **14**.

Abbreviations Available for All Services

A. List of Abbreviations in Alphabetical Order

Abbreviation	Question	Answer or Advice
QRA	What is the name of your station?	The name of my station is . . .
QRB	How far approximately are you from my station?	The approximate distance between our stations is . . . nautical miles (*or* kilometres).
QRC	By what private enterprise (*or* state administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise . . . (*or* state administration).
QRD	Where are you bound for and where are you from?	I am bound for . . . from . . .
QRE	What is your estimated time of arrival at . . . (*or* over . . .) *(place)*?	My estimated time of arrival at . . . (*or* over . . .) *(place)* is . . . hours.
QRF	Are you returning to . . . *(place)*?	I am returning to . . . *(place)*. *or* Return to . . . *(place)*.
QRG	Will you tell me my exact frequency (*or* that of . . .)?	Your exact frequency (*or* that of . . .) is . . . kHz (*or* MHz).
QRH	Does my frequency vary?	Your frequency varies.
QRI	How is the tone of my transmission?	The tone of your transmission is . . . 1. good 2. variable 3. bad.
QRJ	How many radiotelephone calls have you to book?	I have . . . radiotelephone calls to book.

Abbreviation	Question	Answer or Advice
QRK	What is the intelligibility of my signals (*or* those of . . .)?	The intelligibility of your signals (*or* those of . . .) is . . . 1. bad 2. poor 3. fair 4. good 5. excellent.
QRL	Are you busy?	I am busy (*or* I am busy with . . .). Please do not interfere.
QRM	Are you being interfered with?	I am being interfered with (1. nil 2. slightly 3. moderately 4. severely 5. extremely).
QRN	Are you troubled by static?	I am troubled by static (1. nil 2. slightly 3. moderately 4. severely 5. extremely).
QRO	Shall I increase transmitter power?	Increase transmitter power.
QRP	Shall I decrease transmitter power?	Decrease transmitter power.
QRQ	Shall I send faster?	Send faster (. . . words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at . . . words per minute.
QRS	Shall I send more slowly?	Send more slowly (. . . words per minute).

Abbreviation	Question	Answer or Advice
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRW	Shall I inform ... that you are calling him on ... kHz (*or* MHz)?	Please inform ... that I am calling him on ... kHz (*or* MHz).
QRX	When will you call me again?	I will call you again at ... hours (on ... kHz (*or* MHz)).
QRY	What is my turn? *(Relates to communication.)*	Your turn is Number ... *(or according to any other indication). (Relates to communication.)*
QRZ	Who is calling me?	You are being called by ... (on ... kHz (*or* MHz)).
QSA	What is the strength of my signals (*or* those of ...)?	The strength of your signals (*or* those of ...) is ... 1. scarcely perceptible 2. weak 3. fairly good 4. good 5. very good.
QSB	Are my signals fading?	Your signals are fading.
QSC	Are you a cargo vessel?	I am a cargo vessel.
QSD	Is my keying defective?	Your keying is defective.
QSE	What is the estimated drift of the survival craft?	The estimated drift of the survival craft is ... *(figures and units).*

Abbreviation	Question	Answer or Advice
QSF	Have you effected rescue?	I have effected rescue and am proceeding to ... base (with ... persons injured requiring ambulance).
QSG	Shall I send ... telegrams at a time?	Send ... telegrams at a time.
QSH	Are you able to home on your D/F equipment?	I am able to home on my D/F equipment (on station ...).
QSI		I have been unable to break in on your transmission. *or* Will you inform ... *(call sign)* that I have been unable to break in on his transmission (on ... kHz (*or* MHz)).
QSJ	What is the charge to be collected to ... including your internal charge?	The charge to be collected to ... including my internal charge is ... francs.
QSK	Can you hear me between your signals and if so can I break in on your transmission?	I can hear you between my signals; break in on my transmission.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.
QSM	Shall I repeat the last telegram which I sent you (*or* some previous telegram)?	Repeat the last telegram which you sent me (*or* telegram(s) number(s) ...).
QSN	Did you hear me (*or* ... *(call sign)*) on ... kHz (*or* MHz)?	I did hear you (*or* ... *(call sign)*) on ... kHz (*or* MHz).
QSO	Can you communicate with ... direct (*or* by relay)?	I can communicate with ... direct (*or* by relay through ...).

Abbreviation	Question	Answer or Advice
QSP	Will you relay to . . . free of charge?	I will relay to . . . free of charge.
QSQ	Have you a doctor on board (*or* is . . . *(name of person)* on board)?	I have a doctor on board (*or* . . . *(name of person)* is on board).
QSR	Shall I repeat the call on the calling frequency?	Repeat your call on the calling frequency; did not hear you (*or* have interference).
QSS	What working frequency will you use?	I will use the working frequency . . . kHz *(normally only the last three figures of the frequency need be given)*.
QSU	Shall I send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .)?	Send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .).
QSV	Shall I send a series of Vs on this frequency (*or* . . . kHz (*or* MHz))?	Send a series of Vs on this frequency (*or* . . . kHz (*or* MHz)).
QSW	Will you send on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .)?	I am going to send on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .).
QSX	Will you listen to . . . *(call sign(s))* on . . . kHz (*or* MHz)?	I am listening to . . . *(call sign(s))* on . . . kHz (*or* MHz).
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (*or* on . . kHz (*or* MHz)).
QSZ	Shall I send each word or group more than once?	Send each word or group twice (*or* . . . times).
QTA	Shall I cancel telegram number . . .?	Cancel telegram number . . .
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.

Abbre-viation	Question	Answer or Advice
QTC	How many telegrams have you to send?	I have . . . telegrams for you (*or* for . . .).
QTD	What has the rescue vessel or rescue aircraft recovered?	. . . *(identification)* has recovered . . . 1. . . . *(number)* survivors 2. wreckage 3. . . . *(number)* bodies.
QTE	What is my TRUE bearing from you?	Your TRUE bearing from me is . . . degrees at . . . hours.
	or	*or*
	What is my TRUE bearing from . . . *(call sign)*?	Your TRUE bearing from . . . *(call sign)* was . . . degrees at . . . hours.
	or	*or*
	What is the TRUE bearing of . . . *(call sign)* from . . . *(call sign)*?	The TRUE bearing of . . . *(call sign)* from . . . *(call sign)* was . . . degrees at . . . hours.
QTF	Will you give me the position of my station according to the bearings taken by the D/F stations which you control?	The position of your station according to the bearings taken by the D/F stations which I control was . . . latitude, . . . longitude *(or other indication of position)*, class . . . at . . . hours.
QTG	Will you send two dashes of ten seconds each followed by your call sign (repeated . . . times) (on . . . kHz (*or* MHz))?	I am going to send two dashes of ten seconds each followed by my call sign (repeated . . . times) (on . . . kHz (*or* MHz)).
	or	*or*
	Will you request . . . to send two dashes of ten seconds followed by his call sign (repeated . . . times) on . . . kHz (*or* MHz)?	I have requested . . . to send two dashes of ten seconds followed by his call sign (repeated . . . times) on . . . kHz (*or* MHz).

Abbre-viation	Question	Answer or Advice
QTH	What is your position in latitude and longitude *(or according to any other indication)*?	My position is ... latitude, ... longitude *(or according to any other indication)*.
QTI	What is your TRUE track?	My TRUE track is ... degrees.
QTJ	What is your speed? *(Requests the speed of a ship or aircraft through the water or air respectively.)*	My speed is ... knots (*or* ... kilometres per hour *or* ... statute miles per hour). *(Indicates the speed of a ship or aircraft through the water or air respectively.)*
QTK	What is the speed of your aircraft in relation to the surface of the Earth?	The speed of my aircraft in relation to the surface of the Earth is ... knots (*or* ... kilometres per hour *or* ... statute miles per hour).
QTL	What is your TRUE heading?	My TRUE heading is ... degrees.
QTM	What is your MAGNETIC heading?	My MAGNETIC heading is ... degrees.
QTN	At what time did you depart from ... *(place)*?	I departed from ... *(place)* at ... hours.
QTO	Have you left dock (*or* port)? *or* Are you airborne?	I have left dock (*or* port). *or* I am airborne.
QTP	Are you going to enter dock (*or* port)? *or* Are you going to alight (*or* land)?	I am going to enter dock (*or* port). *or* I am going to alight (*or* land).
QTQ	Can you communicate with my station by means of the International Code of Signals?	I am going to communicate with your station by means of the International Code of Signals.
QTR	What is the correct time?	The correct time is ... hours.

Abbre-viation	Question	Answer or Advice
QTS	Will you send your call sign for tuning purposes or so that your frequency can be measured now (*or* at ... hours) on ... kHz (*or* MHz)?	I will send my call sign for tuning purposes or so that my frequency may be measured now (*or* at ... hours) on ... kHz (*or* MHz).
QTT		The identification signal which follows is superimposed on another transmission.
QTU	What are the hours during which your station is open?	My station is open from ... to ... hours.
QTV	Shall I stand guard for you on the frequency of ... kHz (*or* MHz) (from ... to ... hours)?	Stand guard for me on the frequency of ... kHz (*or* MHz) (from ... to ... hours).
QTW	What is the condition of survivors?	Survivors are in ... condition and urgently need ...
QTX	Will you keep your station open for further communication with me until further notice (*or* until ... hours)?	I will keep my station open for further communication with you until further notice (*or* until ... hours).
QTY	Are you proceeding to the position of incident and if so when do you expect to arrive?	I am proceeding to the position of incident and expect to arrive at ... hours (on ... *(date)*).
QTZ	Are you continuing the search?	I am continuing the search for ... (aircraft, ship, survival craft, survivors or wreckage).
QUA	Have you news of ... *(call sign)*?	Here is news of ... *(call sign)*.
QUB	Can you give me in the following order information concerning: the direction in degrees TRUE and speed of the surface wind; visibility; present weather; and amount, type and height of base of cloud above surface elevation at ... *(place of observation)*?	Here is the information requested: ... *(The units used for speed and distances should be indicated.)*

Abbre-viation	Question	Answer or Advice
QUC	What is the number *(or other indication)* of the last message you received from me (*or* from ... *(call sign)*)?	The number *(or other indication)* of the last message I received from you (*or* from ... *(call sign)*) is ...
QUD	Have you received the urgency signal sent by ... *(call sign of mobile station)*?	I have received the urgency signal sent by ... *(call sign of mobile station)* at ... hours.
QUE	Can you use telephony in ... *(language)*, with interpreter if necessary; if so, on what frequencies?	I can use telephony in ... *(language)* on ... kHz (*or* MHz).
QUF	Have you received the distress signal sent by ... *(call sign of mobile station)*?	I have received the distress signal sent by ... *(call sign of mobile station)* at ... hours.
QUG	Will you be forced to alight (*or* land)?	I am forced to alight (*or* land) immediately. *or* I shall be forced to alight (*or* land) at ... *(position or place)* at ... hours.
QUH	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... *(units)*.
QUI	Are your navigation lights working?	My navigation lights are working.
QUJ	Will you indicate the TRUE track to reach you (*or* ...)?	The TRUE track to reach me (*or* ...) is ... degrees at ... hours.
QUK	Can you tell me the condition of the sea observed at ... *(place or coordinates)*?	The sea at ... *(place or coordinates)* is ...

Abbre-viation	Question	Answer or Advice
QUL	Can you tell me the swell observed at ... *(place or coordinates)*?	The swell at ... *(place or coordinates)* is ...
QUM	May I resume normal working?	Normal working may be resumed.
QUN	Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...
QUO	Shall I search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*?	Please search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*.
QUP	Will you indicate your position by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights?	My position is indicated by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights.
QUQ	Shall I train my searchlight nearly vertical on a cloud, occulting if possible and, if your aircraft is seen, deflect the beam up wind and on the water (*or* land) to facilitate your landing?	Please train your searchlight on a cloud, occulting if possible and, if my aircraft is seen or heard, deflect the beam up wind and on the water (*or* land) to facilitate my landing.

Abbre-viation	Question	Answer or Advice
QUR	Have survivors . . . 1. received survival equipment 2. been picked up by rescue vessel 3. been reached by ground rescue party?	Survivors . . . 1. are in possession of survival equipment dropped by . . . 2. have been picked up by rescue vessel 3. have been reached by ground rescue party.
QUS	Have you sighted survivors or wreckage? If so, in what position?	Have sighted . . . 1. survivors in water 2. survivors on rafts 3. wreckage in position . . . latitude, . . . longitude *(or according to any other indication).*
QUT	Is position of incident marked?	Position of incident is marked by . . . 1. flame or smoke float 2. sea marker 3. sea marker dye 4. . . . *(specify other marking).*
QUU	Shall I home ship or aircraft to my position?	Home ship or aircraft . . . *(call sign)* . . . 1. to your position by transmitting your call sign and long dashes on . . kHz (*or* MHz) 2. by transmitting on . . . kHz (*or* MHz) TRUE track to reach you.
QUW	Are you in the search area designated as . . . *(designator or latitude and longitude)*?	I am in the . . . *(designation)* search area.
QUY	Is position of survival craft marked?	Position of survival craft was marked at . . hours by . . . 1. flame or smoke float 2. sea marker 3. sea marker dye 4. . . . *(specify other marking)*

B. Lists of Signals According to the Nature of Questions, Answer or Advice

Abbre-viation	Question	Answer or Advice
	Name	
QRA	What is the name of your station?	The name of my station is . . .
	Route	
QRD	Where are you bound for and where are you from?	I am bound for . . . from . . .
	Position	
QRB	How far approximately are you from my station?	The approximate distance between our stations is . . . nautical miles (*or* kilometres).
QTH	What is your position in latitude and longitude *(or according to any other indication)*?	My position is . . . latitude, . . . longitude *(or according to any other indication)*.
QTN	At what time did you depart from . . . *(place)*?	I departed from . . . *(place)* at . . . hours.
	Quality of Signals	
QRI	How is the tone of my transmission?	The tone of your transmission is . . . 1. good 2. variable 3. bad.
QRK	What is the intelligibility of my signals (*or* those of . . .)?	The intelligibility of your signals (*or* those of . . .) is . . . 1. bad 2. poor 3. fair 4. good 5. excellent.

Abbre-viation	Question	Answer or Advice
	Strength of Signals	
QRO	Shall I increase transmitter power?	Increase transmitter power.
QRP	Shall I decrease transmitter power?	Decrease transmitter power.
QSA	What is the strength of my signals (*or* those of . . .)?	The strength of your signals (*or* those of . . .) is . . . 1. scarcely perceptible 2. weak 3. fairly good 4. good 5. very good.
QSB	Are my signals fading?	Your signals are fading.
	Keying	
QRQ	Shall I send faster?	Send faster (. . . words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at . . . words per minute.
QRS	Shall I send more slowly?	Send more slowly (. . . words per minute).
QSD	Is my keying defective?	Your keying is defective.
	Interference	
QRM	Are you being interfered with?	I am being interfered with (1. nil 2. slightly 3. moderately 4. severely 5. extremely).

Abbre-viation	Question	Answer or Advice
	Interference (cont.)	
QRN	Are you troubled by static?	I am troubled by static (1. nil 2. slightly 3. moderately 4. severely 5. extremely).
	Adjustment of Frequency	
QRG	Will you tell me my exact frequency (*or* that of . . .)?	Your exact frequency (*or* that of . . .) is . . . kHz (*or* MHz).
QRH	Does my frequency vary?	Your frequency varies.
QTS	Will you send your call sign for tuning purposes or so that your frequency can be measured now (*or* at . . . hours) on . . . kHz (*or* MHz)?	I will send my call sign for tuning purposes or so that my frequency may be measured now (*or* at . . . hours) on . . . kHz (*or* MHz).
	Choice of Frequency and/or Class of Emission	
QSN	Did you hear me (*or* . . . *(call sign)*) on . . . kHz (*or* MHz)?	I did hear you (*or* . . . *(call sign)*) on . . . kHz (*or* MHz).
QSS	What working frequency will you use?	I will use the working frequency . . . kHz *(normally only the last three figures of the frequency need be given)*.
QSU	Shall I send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .)?	Send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .).
QSV	Shall I send a series of Vs on this frequency (*or* . . . kHz (*or* MHz))?	Send a series of Vs on this frequency (*or* . . . kHz (*or* MHz)).

Abbreviation	Question	Answer or Advice
	Choice of Frequency and/or Class of Emission (cont.)	
QSW	Will you send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...)?	I am going to send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...).
QSX	Will you listen to ... *(call sign(s))* on ... kHz (*or* MHz)?	I am listening to ... *(call sign(s))* on ... kHz (*or* MHz).
	Change of Frequency	
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (*or* on ... kHz (*or* MHz)).
	Establishing Communication	
QRL	Are you busy?	I am busy (*or* I am busy with ...). Please do not interfere.
QRV	Are you ready?	I am ready.
QRX	When will you call me again?	I will call you again at ... hours (on ... kHz (*or* MHz)).
QRY	What is my turn? *(Relates to communication.)*	Your turn is Number ... *(or according to any other indication). (Relates to communication.)*
QRZ	Who is calling me?	You are being called by ... (on ... kHz (*or* MHz)).
QSC	Are you a cargo vessel?	I am a cargo vessel.
QSR	Shall I repeat the call on the calling frequency?	Repeat your call on the calling frequency; did not hear you (*or* have interference).
QTQ	Can you communicate with my station by means of the International Code of Signals?	I am going to communicate with your station by means of the International Code of Signals.

Abbreviation	Question	Answer or Advice
	Establishing Communication (cont.)	
QUE	Can you use telephony in ... *(language)*, with interpreter if necessary; if so, on what frequencies?	I can use telephony in ... *(language)* on ... kHz (*or* MHz).
	Time	
QTR	What is the correct time?	The correct time is ... hours.
QTU	What are the hours during which your station is open?	My station is open from ... to ... hours.
	Charges	
QRC	By what private enterprise (*or* state administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise ... (*or* state administration).
QSJ	What is the charge to be collected to ... including your internal charge?	The charge to be collected to ... including my internal charge is ... francs.
	Transit	
QRW	Shall I inform ... that you are calling him on ... kHz (*or* MHz)?	Please inform ... that I am calling him on ... kHz (*or* MHz).
QSO	Can you communicate with ... direct (*or* by relay)?	I can communicate with ... direct (*or* by relay through ...).
QSP	Will you relay to ... free of charge?	I will relay to ... free of charge.
QSQ	Have you a doctor on board (*or* is ... *(name of person)* on board)?	I have a doctor on board (*or* ... *(name of person)* is on board).
QUA	Have you news of ... *(call sign)*?	Here is news of ... *(call sign)*.

Abbre-viation	Question	Answer or Advice
	Transit (cont.)	
QUC	What is the number *(or other indication)* of the last message you received from me (*or* from ... *(call sign)*)?	The number *(or other indication)* of the last message I received from you (*or* from ... *(call sign)*) is ...
	Exchange of Correspondence	
QRJ	How many radiotelephone calls have you to book?	I have ... radiotelephone calls to book.
QRU	Have you anything for me?	I have nothing for you.
QSG	Shall I send ... telegrams at a time?	Send ... telegrams at a time.
QSI		I have been unable to break in on your transmission. *or* Will you inform ... *(call sign)* that I have been unable to break in on his transmission (on ... kHz (*or* MHz)).
QSK	Can you hear me between your signals and if so can I break in on your transmission?	I can hear you between my signals; break in on my transmission.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.
QSM	Shall I repeat the last telegram which I sent you (*or* some previous telegram)?	Repeat the last telegram which you sent me (*or* telegram(s) number(s) ...).
QSZ	Shall I send each word or group more than once?	Send each word or group twice (*or* ... times).
QTA	Shall I cancel telegram number ...?	Cancel telegram number ...

Abbre-viation	Question	Answer or Advice
	Exchange of Correspondence (cont.)	
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have ... telegrams for you (*or* for ...).
QTV	Shall I stand guard for you on the frequency of ... kHz (*or* MHz) (from ... to ... hours)?	Stand guard for me on the frequency of ... kHz (*or* MHz) (from ... to ... hours).
QTX	Will you keep your station open for further communication with me until further notice (*or* until ... hours)?	I will keep my station open for further communication with you until further notice (*or* until ... hours).
	Movement	
QRE	What is your estimated time of arrival at ... (*or* over ...) *(place)*?	My estimated time of arrival at ... (*or* over ...) *(place)* is ... hours.
QRF	Are you returning to ... *(place)*?	I am returning to ... *(place)*. *or* Return to ... *(place)*.
QSH	Are you able to home on your D/F equipment?	I am able to home on my D/F equipment (on station ...).
QTI	What is your TRUE track?	My TRUE track is ... degrees.
QTJ	What is your speed? *(Requests the speed of a ship or aircraft through the water or air respectively.)*	My speed is ... knots (*or* ... kilometres per hour *or* ... statute miles per hour). *(Indicates the speed of a ship or aircraft through the water or air respectively.)*

Abbreviation	Question	Answer or Advice
	Movement (cont.)	
QTK	What is the speed of your aircraft in relation to the surface of the Earth?	The speed of my aircraft in relation to the surface of the Earth is ... knots (*or* ... kilometres per hour *or* ... statute miles per hour).
QTL	What is your TRUE heading?	My TRUE heading is ... degrees.
QTM	What is your MAGNETIC heading?	My MAGNETIC heading is ... degrees.
QTN	At what time did you depart from ... *(place)*?	I departed from ... *(place)* at ... hours.
QTO	Have you left dock (*or* port)? *or* Are you airborne?	I have left dock (*or* port). *or* I am airborne.
QTP	Are you going to enter dock (*or* port)? *or* Are you going to alight (*or* land)?	I am going to enter dock (*or* port). *or* I am going to alight (*or* land).
QUG	Will you be forced to alight (*or* land)?	I am forced to alight (*or* land) immediately. *or* I shall be forced to alight (*or* land) at ... *(position or place)* at ... hours.
QUJ	Will you indicate the TRUE track to reach you (*or* ...)?	The TRUE track to reach me (*or* ...) is ... degrees at ... hours.
QUN	Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...

Abbre-viation	Question	Answer or Advice
	Meteorology	
QUB	Can you give me in the following order information concerning: the direction in degrees TRUE and speed of the surface wind; visibility; present weather; and amount, type and height of base of cloud above surface elevation at ... *(place of observation)*?	Here is the information requested: ... *(The units used for speed and distances should be indicated.)*
QUH	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... *(units).*
QUK	Can you tell me the condition of the sea observed at ... *(place or coordinates)*?	The sea at ... *(place or coordinates)* is ...
QUL	Can you tell me the swell observed at ... *(place or coordinates)*?	The swell at ... *(place or coordinates)* is ...
	Radio Direction-Finding	
QTE	What is my TRUE bearing from you?	Your TRUE bearing from me is ... degrees at ... hours.
	or	*or*
	What is my TRUE bearing from ... *(call sign)*?	Your TRUE bearing from ... *(call sign)* was ... degrees at ... hours.
	or	*or*
	What is the TRUE bearing of ... *(call sign)* from ... *(call sign)*?	The TRUE bearing of ... *(call sign)* from ... *(call sign)* was ... degrees at ... hours.
QTF	Will you give me the position of my station according to the bearings taken by the D/F stations which you control?	The position of your station according to the bearings taken by the D/F stations which I control was ... latitude, ... longitude *(or other indication of position)*, class ... at ... hours.

Abbre-viation	Question	Answer or Advice
	Radio Direction-Finding (cont.)	
QTG	Will you send two dashes of ten seconds each followed by your call sign (repeated ... times) (on ... kHz (*or* MHz))?	I am going to send two dashes of ten seconds each followed by my call sign (repeated ... times) (on ... kHz (*or* MHz)).
	or	*or*
	Will you request ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kHz (*or* MHz)?	I have requested ... to send two dashes of ten seconds followed by his call sign (repeated ... times) on ... kHz (*or* MHz).
	Suspension of Work	
QRT	Shall I stop sending?	Stop sending.
QUM	May I resume normal working?	Normal working may be resumed.
	Urgency	
QUD	Have you received the urgency signal sent by ... *(call sign of mobile station)*?	I have received the urgency signal sent by ... *(call sign of mobile station)* at ... hours.
QUG	Will you be forced to alight (*or* land)?	I am forced to alight (*or* land) immediately.
		or
		I shall be forced to alight (*or* land) at .. *(position or place)* at ... hours.
	Distress	
QUF	Have you received the distress signal sent by ... *(call sign of mobile station)*?	I have received the distress signal sent by ... *(call sign of mobile station)* at ... hours.
QUM	May I resume normal working?	Normal working may be resumed.
	Search and Rescue	
QSE	What is the estimated drift of the survival craft?	The estimated drift of the survival craft is ... *(figures and units)*.

Abbreviation	Question	Answer or Advice
	Search and Rescue (cont.)	
QSF	Have you effected rescue?	I have effected rescue and am proceeding to ... base (with ... persons injured requiring ambulance).
QTD	What has the rescue vessel or rescue aircraft recovered?	... *(identification)* has recovered ... 1. ... *(number)* survivors 2. wreckage 3. ... *(number)* bodies.
QTW	What is the condition of survivors?	Survivors are in ... condition and urgently need ...
QTY	Are you proceeding to the position of incident and if so when do you expect to arrive?	I am proceeding to the position of incident and expect to arrive at ... hours (on ... *(date)*).
QTZ	Are you continuing the search?	I am continuing the search for ... (aircraft, ship, survival craft, survivors or wreckage).
QUI	Are your navigation lights working?	My navigation lights are working.
QUN	Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed?	My position, TRUE course and speed are ...
QUO	Shall I search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*?	Please search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*.

Abbre-viation	Question	Answer or Advice
	Search and Rescue (cont.)	
QUP	Will you indicate your position by . . . 1. searchlight 2. black smoke trail 3. pyrotechnic lights?	My position is indicated by . . . 1. searchlight 2. black smoke trail 3. pyrotechnic lights.
QUQ	Shall I train my searchlight nearly vertical on a cloud, occulting if possible and, if your aircraft is seen, deflect the beam up wind and on the water (*or* land) to facilitate your landing?	Please train your searchlight on a cloud, occulting if possible and, if my aircraft is seen or heard, deflect the beam up wind and on the water (*or* land) to facilitate my landing.
QUR	Have survivors . . . 1. received survival equipment 2. been picked up by rescue vessel 3. been reached by ground rescue party?	Survivors . . . 1. are in possession of survival equipment dropped by . . . 2. have been picked up by rescue vessel 3. have been reached by ground rescue party.
QUS	Have you sighted survivors or wreckage? If so, in what position?	Have sighted . . . 1. survivors in water 2. survivors on rafts 3. wreckage in position . . . latitude, . . . longitude *(or according to any other indication).*
QUT	Is position of incident marked?	Position of incident is marked by . . . 1. flame or smoke float 2. sea marker 3. sea marker dye 4. . . . *(specify other marking).*

Abbre-viation	Question	Answer or Advice
	Search and Rescue (cont.)	
QUU	Shall I home ship or aircraft to my position?	Home ship or aircraft ... *(call sign)* ... 1. to your position by transmitting your call sign and long dashes on ... kHz (*or* MHz) 2. by transmitting on ... kHz (*or* MHz) TRUE track to reach you.
QUW	Are you in the search area designated as ... *(designator or latitude and longitude)*?	I am in the ... *(designation)* search area.
QUY	Is position of survival craft marked?	Position of survival craft was marked at ... hours by ... 1. flame or smoke float 2. sea marker 3. sea marker dye 4. ... *(specify other marking)*.
	Identification	
QTT		The identification signal which follows is superimposed on another transmission.

Section II. Miscellaneous Abbreviations and Signals

Abbreviation or Signal	Definition
AA	All after ... *(used after a question mark to request a repetition).*
AB	All before ... *(used after a question mark to request a repetition).*
ADS	Address *(used after a question mark to request a repetition).*
$\overline{\text{AR}}$	End of transmission *(· — · — · to be sent as one signal).*
$\overline{\text{AS}}$	Waiting period *(· — · · · to be sent as one signal).*
BK	Signal used to interrupt a transmission in progress.
BN	All between ... and ... *(used after a question mark to request a repetition).*
BQ	A reply to an RQ.
CFM	Confirm (*or* I confirm).
CL	I am closing my station.
COL	Collate (*or* I collate).
CP	General call to two or more specified stations *(see Article* **52***).*
CQ	General call to all stations *(see Article* **52***).*
CS	Call sign *(used to request a call sign).*
$\overline{\text{DDD}}$	Used to identify the transmission of the distress message by a station not itself in distress *(see No.* **3164***).*
DE	"From ..." *(used to precede the call sign of the calling station).*
DF	Your bearing at ... hours was ... degrees, in the doubtful sector of this station, with a possible error of ... degrees.
DO	Bearing doubtful. Ask for another bearing later (*or* at ... hours).
E	East (cardinal point).
ER	Here ...
ETA	Estimated time of arrival.
ITP	The punctuation counts.
K	Invitation to transmit.
KMH	Kilometres per hour.
KTS	Nautical miles per hour *(knots).*
MIN	Minute (*or* Minutes).

Abbreviation or Signal	Definition
MPH	Statute miles per hour.
MSG	Prefix indicating a message to or from the master of a ship concerning its operation or navigation.
N	North (cardinal point).
NIL	I have nothing to send to you.
NO	No *(negative)*.
NW	Now.
OK	We agree (*or* It is correct).
OL	Ocean Letter.
P	Prefix indicating a private radiotelegram.
PBL	Preamble *(used after a question mark to request a repetition)*.
R	Received.
REF	Reference to . . . (*or* Refer to . . .).
RPT	Repeat (*or* I repeat) (*or* Repeat . . .).
RQ	Indication of a request.
S	South (cardinal point).
SIG	Signature *(used after a question mark to request a repetition)*.
SLT	Radiomaritime Letter.
$\overline{\text{SOS}}$	Distress Signal *(· · · — — — · · · to be sent as one signal)*.
SS	Indicator preceding the name of a ship station.
SVC	Prefix indicating a service telegram.
SYS	Refer to your service telegram.
TFC	Traffic.
TR	Used by a land station to request the position and next port of call of a mobile station *(see No.* **3691***)*; used also as a prefix to the reply.
TTT	This group when sent three times constitutes the safety signal *(see No.* **3221***)*.
TU	Thank you.
TXT	Text *(used after a question mark to request a repetition)*.
$\overline{\text{VA}}$	End of work *(· · · — · — to be sent as one signal)*.
W	West (cardinal point).

Abbreviation or Signal	Definition
WA	Word after ... *(used after a question mark to request a repetition).*
WB	Word before ... *(used after a question mark to request a repetition).*
WD	Word(s) *or* Group(s).
XQ	Prefix used to indicate an operating communication in the fixed service.
XXX	This group when sent three times constitutes the urgency signal *(see No.* **3196***).*
YES	Yes *(affirmative).*

APPENDIX 14

Mob-83 Mob-87

Miscellaneous Abbreviations and Signals to Be Used for Radiocommunications in the Maritime Mobile Service

(See Articles **37**, **63** and **65**)

Section I. Q Code

Introduction

1. The series of groups listed in this Appendix range from QOA to QUZ.

2. The QOA to QQZ series are reserved for the maritime mobile service.

3. Certain Q code abbreviations may be given an affirmative or negative sense by sending, immediately following the abbreviation, the letter C or the letters NO (in radiotelephony spoken as: CHARLIE or NO).

4. The meanings assigned to Q code abbreviations may be amplified or completed by the appropriate addition of other groups, call signs, place names, figures, numbers, etc. It is optional to fill in the blanks shown in parentheses. Any data which are filled in where blanks appear shall be sent in the same order as shown in the text of the following tables.

5. Q code abbreviations are given the form of a question when followed by a question mark in radiotelegraphy and RQ (ROMEO QUEBEC) in radiotelephony. When an abbreviation is used as a question and is followed by additional or complementary information, the question mark (or RQ) should follow this information.

6. Q code abbreviations with numbered alternative significations shall be followed by the appropriate figure to indicate the exact meaning intended. This figure shall be sent immediately following the abbreviation.

7. All times shall be given in Coordinated Universal Time (UTC) unless otherwise indicated in the question or reply.

8. An asterisk * following a Q code abbreviation means that this signal has a meaning similar to a signal appearing in the International Code of Signals.

Abbreviations Available for the Maritime Mobile Service

A. List of Abbreviations in Alphabetical Order

Abbre-viation	Question	Answer or Advice
QOA	Can you communicate by radiotelegraphy (500 kHz)?	I can communicate by radiotelegraphy (500 kHz).
QOB	Can you communicate by radiotelephony (2 182 kHz)?	I can communicate by radiotelephony (2 182 kHz).
QOC	Can you communicate by radiotelephony (channel 16 — frequency 156.80 MHz)?	I can communicate by radiotelephony (channel 16 — frequency 156.80 MHz).
QOD	Can you communicate with me in ... 0. Dutch 5. Italian 1. English 6. Japanese 2. French 7. Norwegian 3. German 8. Russian 4. Greek 9. Spanish?	I can communicate with you in ... 0. Dutch 5. Italian 1. English 6. Japanese 2. French 7. Norwegian 3. German 8. Russian 4. Greek 9. Spanish.
QOE	Have you received the safety signal sent by ... *(name and/or call sign)*?	I have received the safety signal sent by ... *(name and/or call sign)*.
QOF	What is the commercial quality of my signals?	The quality of your signals is ... 1. not commercial 2. marginally commercial 3. commercial.
QOG .	How many tapes have you to send?	I have ... tapes to send.
QOH	Shall I send a phasing signal for ... seconds?	Send a phasing signal for ... seconds.
QOI	Shall I send my tape?	Send your tape.
QOJ	Will you listen on ... kHz (*or* MHz) for signals of emergency position-indicating radiobeacons?	I am listening on ... kHz (*or* MHz) for signals of emergency position-indicating radiobeacons.

Abbreviation	Question	Answer or Advice
QOK	Have you received the signals of an emergency position-indicating radiobeacon on ... kHz (*or* MHz)?	I have received the signals of an emergency position-indicating radiobeacon on ... kHz (*or* MHz).
QOL	Is your vessel fitted for reception of selective calls? If so, what is your selective call number or signal?	My vessel is fitted for the reception of selective calls. My selective call number or signal is ...
QOM	On what frequencies can your vessel be reached by a selective call?	My vessel can be reached by a selective call on the following frequency/ies ... (periods of time to be added if necessary).
QOO	Can you send on any working frequency?	I can send on any working frequency.
QOT	Do you hear my call; what is the approximate delay in minutes before we may exchange traffic?	I hear your call; the approximate delay is ... minutes.
QRA	What is the name of your vessel (*or* station)?	The name of my vessel (*or* station) is ...
QRB	How far approximately are you from my station?	The approximate distance between our stations is ... nautical miles (*or* kilometres).
QRC	By what private enterprise (*or* state administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise ... (*or* state administration).
QRD	Where are you bound for and where are you from?	I am bound for ... from ...
QRE	What is your estimated time of arrival at ... (*or* over ...) *(place)*?	My estimated time of arrival at ... (*or* over ...) *(place)* is ... hours.

Abbre-viation	Question	Answer or Advice
QRF	Are you returning to ... *(place)*?	I am returning to ... *(place)*. *or* Return to ... *(place)*.
QRG	Will you tell me my exact frequency (*or* that of ...)?	Your exact frequency (*or* that of ...) is ... kHz (*or* MHz).
QRH	Does my frequency vary?	Your frequency varies.
QRI	How is the tone of my transmission?	The tone of your transmission is ... 1. good 2. variable 3. bad.
QRJ	How many radiotelephone calls have you to book?	I have ... radiotelephone calls to book.
QRK	What is the intelligibility of my signals (*or* those of ... *(name and/or call sign)*)?	The intelligibility of your signals (*or* those of ... *(name and/or call sign)*) is ... 1. bad 2. poor 3. fair 4. good 5. excellent.
QRL	Are you busy?	I am busy (*or* I am busy with ... *(name and/or call sign)*). Please do not interfere.
QRM	Is my transmission being interfered with?	Your transmission is being interfered with ... 1. nil 2. slightly 3. moderately 4. severely 5. extremely.

Abbreviation	Question	Answer or Advice
QRN	Are you troubled by static?	I am troubled by static . . . 1. nil 2. slightly 3. moderately 4. severely 5. extremely.
QRO	Shall I increase transmitter power?	Increase transmitter power.
QRP	Shall I decrease transmitter power?	Decrease transmitter power.
QRQ	Shall I send faster?	Send faster (. . . words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at . . . words per minute.
QRS	Shall I send more slowly?	Send more slowly (. . . words per minute).
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRW	Shall I inform . . . that you are calling him on . . . kHz (*or* MHz)?	Please inform . . . that I am calling him on . . . kHz (*or* MHz).
QRX	When will you call me again?	I will call you again at . . . hours on . . . kHz (*or* MHz).
QRY	What is my turn? *(Relates to communication.)*	Your turn is Number . . . *(or according to any other indication). (Relates to communication.)*
QRZ	Who is calling me?	You are being called by . . . (on . . . kHz (*or* MHz)).

Abbreviation	Question	Answer or Advice
QSA	What is the strength of my signals (*or* those of . . . *(name and/or call sign)*)?	The strength of your signals (*or* those of . . . *(name and/or call sign)*) is . . . 1. scarcely perceptible 2. weak 3. fairly good 4. good 5. very good.
QSB	Are my signals fading?	Your signals are fading.
QSC	Are you a low traffic ship station?	I am a low traffic ship station.
QSD	Are my signals mutilated?	Your signals are mutilated.
QSE*	What is the estimated drift of the survival craft?	The estimated drift of the survival craft is . . . *(figures and units)*.
QSF*	Have you effected rescue?	I have effected rescue and am proceeding to . . . base (with . . . persons injured requiring ambulance).
QSG	Shall I send . . . telegrams at a time?	Send . . . telegrams at a time.
QSH	Are you able to home with your direction-finding equipment?	I am able to home with my direction-finding equipment (on . . . *(name and/or call sign)*).
QSI		I have been unable to break in on your transmission. *or* Will you inform . . . *(name and/or call sign)* that I have been unable to break in on his transmission (on . . . kHz (*or* MHz)).

Abbre-viation	Question	Answer or Advice
QSJ	What is the charge to be collected to ... including your internal charge?	The charge to be collected to ... including my internal charge is ... francs.
QSK	Can you hear me between your signals and if so may I break in on your transmission?	I can hear you between my signals; break in on my transmission.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.
QSM	Shall I repeat the last telegram which I sent you (*or* some previous telegram)?	Repeat the last telegram which you sent me (*or* telegram(s) number(s) ...).
QSN	Did you hear me (*or* ... *(name and/or call sign)*) on ... kHz (*or* MHz)?	I did hear you (*or* ... *(name and/or call sign)*) on ... kHz (*or* MHz).
QSO	Can you communicate with .. *(name and/or call sign)* direct (*or* by relay)?	I can communicate with ... *(name and/or call sign)* direct (*or* by relay through ...).
QSP	Will you relay to ... *(name and/or call sign)* free of charge?	I will relay to ... *(name and/or call sign)* free of charge.
QSQ	Have you a doctor on board (*or* is ... *(name of person)* on board)?	I have a doctor on board (*or* ... *(name of person)* is on board).
QSR	Shall I repeat the call on the calling frequency?	Repeat your call on the calling frequency; did not hear you (*or* have interference).
QSS	What working frequency will you use?	I will use the working frequency ... kHz (*or* MHz) *(in the high frequency bands normally only the last three figures of the frequency need be given)*.
QSU	Shall I send or reply on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...)?	Send or reply on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...).

Abbreviation	Question	Answer or Advice
QSV	Shall I send a series of Vs (*or* signs) for adjustment on this frequency (*or* on ... kHz (*or* MHz))?	Send a series of Vs (*or* signs) for adjustment on this frequency (*or* on ... kHz (*or* MHz)).
QSW	Will you send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...)?	I am going to send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...).
QSX	Will you listen to ... *(name and/or call sign(s))* on ... kHz (*or* MHz), or in the bands .../channels ...?	I am listening to ... *(name and/or call sign(s))* on ... kHz (*or* MHz), or in the bands .../channels ...
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (*or* on ... kHz (*or* MHz)).
QSZ	Shall I send each word or group more than once?	Send each word or group twice (*or* ... times).
QTA	Shall I cancel telegram (*or* message) number ...?	Cancel telegram (*or* message) number ...
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have ... telegrams for you (*or* for ... *(name and/or call sign)*).
QTD*	What has the rescue vessel or rescue aircraft recovered?	... *(identification)* has recovered ... 1. ... *(number)* survivors 2. wreckage 3. ... *(number)* bodies.

Abbreviation	Question	Answer or Advice
QTE	What is my TRUE bearing from you?	Your TRUE bearing from me is . . . degrees at . . . hours.
	or	*or*
	What is my TRUE bearing from . . . *(name and/or call sign)*?	Your TRUE bearing from . . . *(name and/or call sign)* was . . . degrees at . . . hours.
	or	*or*
	What is the TRUE bearing of . . . *(name and/or call sign)* from . . . *(name and/or call sign)*?	The TRUE bearing of . . . *(name and/or call sign)* from . . . *(name and/or call sign)* was . . . degrees at . . . hours.
QTF	Will you give me my position according to the bearings taken by the direction-finding stations which you control?	Your position according to the bearings taken by the direction-finding stations which I control was . . . latitude, . . . longitude *(or other indication of position)*, class . . . at . . . hours.
QTG	Will you send two dashes of ten seconds each (*or* carrier) followed by your call sign (*or* name) (repeated . . . times) on . . . kHz (*or* MHz)?	I am going to send two dashes of ten seconds each (*or* carrier) followed by my call sign (*or* name) (repeated . . . times) on . . . kHz (*or* MHz).
	or	*or*
	Will you request . . . *(name and/or call sign)* to send two dashes of ten seconds each (*or* carrier) followed by his call sign (*and/or* name) (repeated . . . times) on . . . kHz (*or* MHz)?	I have requested . . . *(name and/or call sign)* to send two dashes of ten seconds each (*or* carrier) followed by his call sign (*and/or* name) (repeated . . . times) on . . . kHz (*or* MHz).

Abbre-viation	Question	Answer or Advice
QTH	What is your position in latitude and longitude *(or according to any other indication)*?	My position is . . . latitude, . . . longitude *(or according to any other indication)*.
QTI*	What is your TRUE course?	My TRUE course is . . . degrees.
QTJ*	What is your speed? *(Requests the speed of a ship or aircraft through the water or air respectively.)*	My speed is . . . knots (*or* kilometres per hour *or* . . . statute miles per hour). *(Indicates the speed of a ship or aircraft through the water or air respectively.)*
QTK*	What is the speed of your aircraft in relation to the surface of the Earth?	The speed of my aircraft in relation to the surface of the Earth is . . . knots (*or* . . . kilometres per hour *or* . . . statute miles per hour).
QTL*	What is your TRUE heading?	My TRUE heading is . . . degrees.
QTM*	What is your MAGNETIC heading?	My MAGNETIC heading is . . . degrees.
QTN	At what time did you depart from . . . *(place)*?	I departed from . . . *(place)* at . . . hours.
QTO	Have you left dock (*or* port)? *or* Are you airborne?	I have left dock (*or* port). *or* I am airborne.
QTP	Are you going to enter dock (*or* port)? *or* Are you going to alight (*or* land)?	I am going to enter dock (*or* port). *or* I am going to alight (*or* land).
QTQ	Can you communicate with my station by means of the International Code of Signals (INTERCO)?	I am going to communicate with your station by means of the International Code of Signals (INTERCO).

Abbreviation	Question	Answer or Advice
QTR	What is the correct time?	The correct time is ... hours.
QTS	Will you send your call sign (*and/or* name) for ... seconds?	I will send my call sign (*and/or* name) for ... seconds.
QTT		The identification signal which follows is superimposed on another transmission.
QTU	What are the hours during which your station is open?	My station is open from ... to ... hours.
QTV	Shall I stand guard for you on the frequency of ... kHz (*or* MHz) (from ... to ... hours)?	Stand guard for me on the frequency of ... kHz (*or* MHz) (from ... to ... hours).
QTW*	What is the condition of survivors?	Survivors are in ... condition and urgently need ...
QTX	Will you keep your station open for further communication with me until further notice (*or* until ... hours)?	I will keep my station open for further communication with you until further notice (*or* until ... hours).
QTY*	Are you proceeding to the position of incident and if so when do you expect to arrive?	I am proceeding to the position of incident and expect to arrive at ... hours (on ... *(date)*).
QTZ*	Are you continuing the search?	I am continuing the search for ... (aircraft, ship, survival craft, survivors or wreckage).
QUA	Have you news of ... *(name and/or call sign)*?	Here is news of ... *(name and/or call sign)*.
QUB*	Can you give me in the following order information concerning: the direction in degrees TRUE and speed of the surface wind; visibility; present weather; and amount, type and height of base of cloud above surface elevation at ... *(place of observation)*?	Here is the information requested: ... *(The units used for speed and distances should be indicated.)*

Abbreviation	Question	Answer or Advice
QUC	What is the number *(or other indication)* of the last message you received from me (*or* from ... *(name and/or call sign)*)?	The number *(or other indication)* of the last message I received from you (*or* from ... *(name and/or call sign)*) is ...
QUD	Have you received the urgency signal sent by ... *(name and/or call sign)*?	I have received the urgency signal sent by ... *(name and/or call sign)* at ... hours.
QUE	Can you speak in ... *(language)*, with interpreter if necessary; if so, on what frequencies?	I can speak in ... *(language)* on ... kHz (*or* MHz).
QUF	Have you received the distress signal sent by ... *(name and/or call sign)*?	I have received the distress signal sent by ... *(name and/or call sign)* at ... hours.
QUH*	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... *(units)*.
QUM	May I resume normal working?	Normal working may be resumed.
QUN	1. *When directed to all stations:* Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed? 2. *When directed to a single station:* Please indicate your position, TRUE course and speed.	My position, TRUE course and speed are ...
QUO*	Shall I search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*?	Please search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*.

Abbreviation	Question	Answer or Advice
QUP*	Will you indicate your position by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights?	My position is indicated by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights.
QUR*	Have survivors ... 1. received survival equipment 2. been picked up by rescue vessel 3. been reached by ground rescue party?	Survivors ... 1. are in possession of survival equipment dropped by ... 2. have been picked up by rescue vessel 3. have been reached by ground rescue party.
QUS*	Have you sighted survivors or wreckage? If so, in what position?	Have sighted ... 1. survivors in water 2. survivors on rafts 3. wreckage in position ... latitude, ... longitude *(or according to any other indication)*.
QUT*	Is position of incident marked?	Position of incident is marked by ... 1. flame or smoke float 2. sea marker 3. sea marker dye 4. ... *(specify other marking)*.
QUU*	Shall I home ship or aircraft to my position?	Home ship or aircraft ... *(name and/or call sign)* ... 1. to your position by sending your call sign and long dashes on ... kHz (*or* MHz) 2. by sending on ... kHz (*or* MHz) TRUE track to reach you.
QUW*	Are you in the search area designated as ... *(designator or latitude and longitude)*?	I am in the ... *(designation)* search area.
QUX	Do you have any navigational warnings or gale warnings in force?	I have the following navigational warning(s) or gale warning(s) in force: ...

Abbre-viation	Question	Answer or Advice
QUY*	Is position of survival craft marked?	Position of survival craft was marked at ... hours by ... 1. flame or smoke float 2. sea marker 3. sea marker dye 4. ... *(specify other marking)*.
QUZ	May I resume restricted working?	Distress phase still in force; restricted working may be resumed.

B. Lists of Signals According to the Nature of Questions, Answer or Advice

Abbre-viation	Question	Answer or Advice
	Name	
QRA	What is the name of your vessel (*or* station)?	The name of my vessel (*or* station) is . . .
	Route	
QRD	Where are you bound for and where are you from?	I am bound for . . . from . . .
	Position	
QRB	How far approximately are you from my station?	The approximate distance between our stations is . . . nautical miles (*or* kilometres).
QTH	What is your position in latitude and longitude *(or according to any other indication)*?	My position is . . . latitude, . . . longitude *(or according to any other indication)*.
QTN	At what time did you depart from . . . *(place)*?	I departed from . . . *(place)* at . . . hours.
	Quality of Signals	
QOF	What is the commercial quality of my signals?	The quality of your signals is . . . 1. not commercial 2. marginally commercial 3. commercial.
QRI	How is the tone of my transmission?	The tone of your transmission is . . . 1. good 2. variable 3. bad.
QRK	What is the intelligibility of my signals (*or* those of . . . *(name and/or call sign)*)?	The intelligibility of your signals (*or* those of . . . *(name and/or call sign)*) is . . . 1. bad 2. poor 3. fair 4. good 5. excellent.

Abbre-viation	Question	Answer or Advice
	Strength of Signals	
QRO	Shall I increase transmitter power?	Increase transmitter power.
QRP	Shall I decrease transmitter power?	Decrease transmitter power.
QSA	What is the strength of my signals (*or* those of . . . *(name and/or call sign)*)?	The strength of your signals (*or* those of . . . *(name and/or call sign)*) is . . . 1. scarcely perceptible 2. weak 3. fairly good 4. good 5. very good.
QSB	Are my signals fading?	Your signals are fading.
	Keying	
QRQ	Shall I send faster?	Send faster (. . . words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at . . . words per minute.
QRS	Shall I send more slowly?	Send more slowly (. . . words per minute).
QSD	Are my signals mutilated?	Your signals are mutilated.
	Interference	
QRM	Is my transmission being interfered with?	Your transmission is being interfered with . . . 1. nil 2. slightly 3. moderately 4. severely 5. extremely.

Abbre-viation	Question	Answer or Advice
	Interference (cont.)	
QRN	Are you troubled by static?	I am troubled by static . . . 1. nil 2. slightly 3. moderately 4. severely 5. extremely.
	Adjustment of Frequency	
QRG	Will you tell me my exact frequency (*or* that of . . .)?	Your exact frequency (*or* that of . . .) is . . . kHz (*or* MHz).
QRH	Does my frequency vary?	Your frequency varies.
QTS	Will you send your call sign (*and/or* name) for . . . seconds?	I will send my call sign (*and/or* name) for . . . seconds.
	Choice of Frequency and/or Class of Emission	
QOO	Can you send on any working frequency?	I can send on any working frequency.
QSN	Did you hear me (*or* . . . *(name and/or call sign)*) on . . . kHz (*or* MHz)?	I did hear you (*or* . . . *(name and/or call sign)*) on . . . kHz (*or* MHz).
QSS	What working frequency will you use?	I will use the working frequency . . . kHz (*or* MHz) *(in the high frequency bands normally only the last three figures of the frequency need be given).*
QSU	Shall I send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .)?	Send or reply on this frequency (*or* on . . . kHz (*or* MHz)) (with emissions of class . . .).
QSV	Shall I send a series of Vs (*or* signs) for adjustment on this frequency (*or* on . . . kHz (*or* MHz))?	Send a series of Vs (*or* signs) for adjustment on this frequency (*or* on . . . kHz (*or* MHz)).

Abbreviation	Question	Answer or Advice
	Choice of Frequency and/or Class of Emission (cont.)	
QSW	Will you send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...)?	I am going to send on this frequency (*or* on ... kHz (*or* MHz)) (with emissions of class ...).
QSX	Will you listen to ... *(name and/or call sign(s))* on ... kHz (*or* MHz), or in the bands .../channels ...?	I am listening to ... *(name and/or call sign(s))* on ... kHz (*or* MHz), or in the bands .../channels ...
	Change of Frequency	
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (*or* on ... kHz (*or* MHz)).
	Establishing Communication	
QOA	Can you communicate by radiotelegraphy (500 kHz)?	I can communicate by radiotelegraphy (500 kHz).
QOB	Can you communicate by radiotelephony (2 182 kHz)?	I can communicate by radiotelephony (2 182 kHz).
QOC	Can you communicate by radiotelephony (channel 16 — frequency 156.80 MHz)?	I can communicate by radiotelephony (channel 16 — frequency 156.80 MHz).
QOD	Can you communicate with me in ... 0. Dutch 5. Italian 1. English 6. Japanese 2. French 7. Norwegian 3. German 8. Russian 4. Greek 9. Spanish?	I can communicate with you in ... 0. Dutch 5. Italian 1. English 6. Japanese 2. French 7. Norwegian 3. German 8. Russian 4. Greek 9. Spanish.
QOT	Do you hear my call; what is the approximate delay in minutes before we may exchange traffic?	I hear your call; the approximate delay is ... minutes.

Abbreviation	Question	Answer or Advice
	Establishing Communication (cont.)	
QRL	Are you busy?	I am busy (*or* I am busy with ... *(name and/or call sign)*). Please do not interfere.
QRV	Are you ready?	I am ready.
QRX	When will you call me again?	I will call you again at ... hours on ... kHz (*or* MHz).
QRY	What is my turn? *(Relates to communication.)*	Your turn is Number ... *(or according to any other indication). (Relates to communication.)*
QRZ	Who is calling me?	You are being called by ... (on ... kHz (*or* MHz)).
QSC	Are you a low traffic ship station?	I am a low traffic ship station.
QSR	Shall I repeat the call on the calling frequency?	Repeat your call on the calling frequency; did not hear you (*or* have interference).
QTQ	Can you communicate with my station by means of the International Code of Signals (INTERCO)?	I am going to communicate with your station by means of the International Code of Signals (INTERCO).
QUE	Can you speak in ... *(language)*, with interpreter if necessary; if so, on what frequencies?	I can speak in ... *(language)* on ... kHz (*or* MHz).
	Selective Calls	
QOL	Is your vessel fitted for reception of selective calls? If so, what is your selective call number or signal?	My vessel is fitted for the reception of selective calls. My selective call number or signal is ...

Abbre-viation	Question	Answer or Advice
	Selective Calls (cont.)	
QOM	On what frequencies can your vessel be reached by a selective call?	My vessel can be reached by a selective call on the following frequency/ies . . . (periods of time to be added if necessary).
	Time	
QTR	What is the correct time?	The correct time is . . . hours.
QTU	What are the hours during which your station is open?	My station is open from . . . to . . . hours.
	Charges	
QRC	By what private enterprise (*or* state administration) are the accounts for charges for your station settled?	The accounts for charges of my station are settled by the private enterprise . . . (*or* state administration).
QSJ	What is the charge to be collected to . . . including your internal charge?	The charge to be collected to . . . including my internal charge is . . . francs.
	Transit	
QRW	Shall I inform . . . that you are calling him on . . . kHz (*or* MHz)?	Please inform . . . that I am calling him on . . . kHz (*or* MHz).
QSO	Can you communicate with . . . *(name and/or call sign)* direct (*or* by relay)?	I can communicate with . . . *(name and/or call sign)* direct (*or* by relay through . . .).
QSP	Will you relay to . . . *(name and/or call sign)* free of charge?	I will relay to . . . *(name and/or call sign)* free of charge.
QSQ	Have you a doctor on board (*or* is . . . *(name of person)* on board)?	I have a doctor on board (*or* . . . *(name of person)* is on board).
QUA	Have you news of . . . *(name and/or call sign)*?	Here is news of . . . *(name and/or call sign)*.

Abbre-viation	Question	Answer or Advice
	Transit (cont.)	
QUC	What is the number *(or other indication)* of the last message you received from me (*or* from ... *(name and/or call sign)*)?	The number *(or other indication)* of the last message I received from you (*or* from ... *(name and/or call sign)*) is ...
	Exchange of Correspondence	
QOG	How many tapes have you to send?	I have ... tapes to send.
QOH	Shall I send a phasing signal for ... seconds?	Send a phasing signal for ... seconds.
QOI	Shall I send my tape?	Send your tape.
QRJ	How many radiotelephone calls have you to book?	I have ... radiotelephone calls to book.
QRU	Have you anything for me?	I have nothing for you.
QSG	Shall I send ... telegrams at a time?	Send ... telegrams at a time.
QSI		I have been unable to break in on your transmission. *or* Will you inform ... *(name and/or call sign)* that I have been unable to break in on his transmission (on ... kHz (*or* MHz)).
QSK	Can you hear me between your signals and if so may I break in on your transmission?	I can hear you between my signals; break in on my transmission.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.
QSM	Shall I repeat the last telegram which I sent you (*or* some previous telegram)?	Repeat the last telegram which you sent me (*or* telegram(s) number(s) ...).

Abbre-viation	Question	Answer or Advice
	Exchange of Correspondence (cont.)	
QSZ	Shall I send each word or group more than once?	Send each word or group twice (*or* ... times).
QTA	Shall I cancel telegram (*or* message) number ...?	Cancel telegram (*or* message) number ...
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have ... telegrams for you (*or* for ... *(name and/or call sign)*).
QTV	Shall I stand guard for you on the frequency of ... kHz (*or* MHz) (from ... to ... hours)?	Stand guard for me on the frequency of ... kHz (*or* MHz) (from ... to ... hours).
QTX	Will you keep your station open for further communication with me until further notice (*or* until ... hours)?	I will keep my station open for further communication with you until further notice (*or* until ... hours).
	Movement	
QRE	What is your estimated time of arrival at ... (*or* over ...) *(place)*?	My estimated time of arrival at ... (*or* over ...) *(place)* is ... hours.
QRF	Are you returning to ... *(place)*?	I am returning to ... *(place)*. *or* Return to ... *(place)*.
QSH	Are you able to home with your direction-finding equipment?	I am able to home with my direction-finding equipment (on ... *(name and/or call sign)*).
QTI*	What is your TRUE course?	My TRUE course is ... degrees.

Abbre-viation	Question	Answer or Advice
	Movement (cont.)	
QTJ*	What is your speed? *(Requests the speed of a ship or aircraft through the water or air respectively.)*	My speed is ... knots (*or* kilometres per hour *or* ... statute miles per hour). *(Indicates the speed of a ship or aircraft through the water or air respectively.)*
QTK*	What is the speed of your aircraft in relation to the surface of the Earth?	The speed of my aircraft in relation to the surface of the Earth is ... knots (*or* ... kilometres per hour *or* ... statute miles per hour).
QTL*	What is your TRUE heading?	My TRUE heading is ... degrees.
QTM*	What is your MAGNETIC heading?	My MAGNETIC heading is ... degrees.
QTN	At what time did you depart from ... *(place)*?	I departed from ... *(place)* at . . hours.
QTO	Have you left dock (*or* port)? *or* Are you airborne?	I have left dock (*or* port). *or* I am airborne.
QTP	Are you going to enter dock (*or* port)? *or* Are you going to alight (*or* land)?	I am going to enter dock (*or* port). *or* I am going to alight (*or* land).
QUN	1. *When directed to all stations:* Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed? 2. *When directed to a single station:* Please indicate your position, TRUE course and speed.	My position, TRUE course and speed are ...

Abbre-viation	Question	Answer or Advice
	Meteorology	
QUB*	Can you give me in the following order information concerning: the direction in degrees TRUE and speed of the surface wind; visibility; present weather; and amount, type and height of base of cloud above surface elevation at ... *(place of observation)*?	Here is the information requested: ... *(The units used for speed and distances should be indicated.)*
QUH*	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level is ... *(units)*.
QUX	Do you have any navigational warnings or gale warnings in force?	I have the following navigational warning(s) or gale warning(s) in force: ...
	Radio Direction-Finding	
QTE	What is my TRUE bearing from you?	Your TRUE bearing from me is ... degrees at ... hours.
	or	*or*
	What is my TRUE bearing from ... *(name and/or call sign)*?	Your TRUE bearing from ... *(name and/or call sign)* was ... degrees at ... hours.
	or	*or*
	What is the TRUE bearing of ... *(name and/or call sign)* from ... *(name and/or call sign)*?	The TRUE bearing of ... *(name and/or call sign)* from ... *(name and/or call sign)* was ... degrees at ... hours.
QTF	Will you give me my position according to the bearings taken by the direction-finding stations which you control?	Your position according to the bearings taken by the direction-finding stations which I control was ... latitude, ... longitude *(or other indication of position)*, class ... at ... hours.

Abbre-viation	Question	Answer or Advice
	Radio Direction-Finding (cont.)	
QTG	Will you send two dashes of ten seconds each (*or* carrier) followed by your call sign (*or* name) (repeated ... times) on ... kHz (*or* MHz)?	I am going to send two dashes of ten seconds each (*or* carrier) followed by my call sign (*or* name) (repeated ... times) on ... kHz (*or* MHz).
	or	*or*
	Will you request ... *(name and/or call sign)* to send two dashes of ten seconds each (*or* carrier) followed by his call sign (*and/or* name) (repeated ... times) on ... kHz (*or* MHz)?	I have requested ... *(name and/or call sign)* to send two dashes of ten seconds each (*or* carrier) followed by his call sign (*and/or* name) (repeated ... times) on ... kHz (*or* MHz).
	Suspension of Work	
QRT	Shall I stop sending?	Stop sending.
QUM	May I resume normal working?	Normal working may be resumed.
QUZ	May I resume restricted working?	Distress phase still in force; restricted working may be resumed.
	Safety	
QOE	Have you received the safety signal sent by ... *(name and/or call sign)*?	I have received the safety signal sent by ... *(name and/or call sign)*.
QUX	Do you have any navigational warnings or gale warnings in force?	I have the following navigational warning(s) or gale warning(s) in force: ...
	Urgency	
QUD	Have you received the urgency signal sent by ... *(name and/or call sign)*?	I have received the urgency signal sent by ... *(name and/or call sign)* at ... hours.

Abbre-viation	Question	Answer or Advice
	Distress	
QOJ	Will you listen on ... kHz (*or* MHz) for signals of emergency position-indicating radiobeacons?	I am listening on ... kHz (*or* MHz) for signals of emergency position-indicating radiobeacons.
QOK	Have you received the signals of an emergency position-indicating radiobeacon on ... kHz (*or* MHz)?	I have received the signals of an emergency position-indicating radiobeacon on ... kHz (*or* MHz).
QUF	Have you received the distress signal sent by ... *(name and/or call sign)*?	I have received the distress signal sent by ... *(name and/or call sign)* at ... hours.
QUM	May I resume normal working?	Normal working may be resumed.
QUZ	May I resume restricted working?	Distress phase still in force; restricted working may be resumed.
	Search and Rescue	
QSE*	What is the estimated drift of the survival craft?	The estimated drift of the survival craft is ... *(figures and units)*.
QSF*	Have you effected rescue?	I have effected rescue and am proceeding to ... base (with ... persons injured requiring ambulance).
QTD*	What has the rescue vessel or rescue aircraft recovered?	... *(identification)* has recovered ... 1. ... *(number)* survivors 2. wreckage 3. ... *(number)* bodies.
QTW*	What is the condition of survivors?	Survivors are in ... condition and urgently need ...
QTY*	Are you proceeding to the position of incident and if so when do you expect to arrive?	I am proceeding to the position of incident and expect to arrive at ... hours (on ... *(date)*).

Abbreviation	Question	Answer or Advice
	Search and Rescue (cont.)	
QTZ*	Are you continuing the search?	I am continuing the search for ... (aircraft, ship, survival craft, survivors or wreckage).
QUN	1. *When directed to all stations:* Will vessels in my immediate vicinity ... *or* (in the vicinity of ... latitude, ... longitude) *or* (in the vicinity of ...) please indicate their position, TRUE course and speed? 2. *When directed to a single station:* Please indicate your position, TRUE course and speed.	My position, TRUE course and speed are ...
QUO*	Shall I search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication)*?	Please search for ... 1. aircraft 2. ship 3. survival craft in the vicinity of ... latitude, ... longitude *(or according to any other indication).*
QUP*	Will you indicate your position by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights?	My position is indicated by ... 1. searchlight 2. black smoke trail 3. pyrotechnic lights.
QUR*	Have survivors ... 1. received survival equipment 2. been picked up by rescue vessel 3. been reached by ground rescue party?	Survivors ... 1. are in possession of survival equipment dropped by ... 2. have been picked up by rescue vessel 3. have been reached by ground rescue party.

Abbreviation	Question	Answer or Advice
	Search and Rescue (cont.)	
QUS*	Have you sighted survivors or wreckage? If so, in what position?	Have sighted ... 1. survivors in water 2. survivors on rafts 3. wreckage in position ... latitude, ... longitude *(or according to any other indication)*.
QUT*	Is position of incident marked?	Position of incident is marked by ... 1. flame or smoke float 2. sea marker 3. sea marker dye 4. ... *(specify other marking)*.
QUU*	Shall I home ship or aircraft to my position?	Home ship or aircraft ... *(name and/or call sign)* ... 1. to your position by sending your call sign and long dashes on ... kHz (*or* MHz) 2. by sending on ... kHz (*or* MHz) TRUE track to reach you.
QUW*	Are you in the search area designated as ... *(designator or latitude and longitude)*?	I am in the ... *(designation)* search area.
QUY*	Is position of survival craft marked?	Position of survival craft was marked at ... hours by ... 1. flame or smoke float 2. sea marker 3. sea marker dye 4. ... *(specify other marking)*.
QUZ	May I resume restricted working?	Distress phase still in force; restricted working may be resumed.
	Identification	
QTT		The identification signal which follows is superimposed on another transmission.

Section II. Miscellaneous Abbreviations and Signals

Abbreviation or Signal	Definition
AA	All after ... *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
AB	All before ... *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
ADS	Address *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
$\overline{\text{AR}}$	End of transmission.
$\overline{\text{AS}}$	Waiting period.
BK	Signal used to interrupt a transmission in progress.
BN	All between ... and ... *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
BQ	A reply to an RQ.
$\overline{\text{BT}}$	Signal to mark the separation between different parts of the same transmission.
C	Yes *or* "The significance of the previous group should be read in the affirmative".
CFM	Confirm (*or* I confirm).
CL	I am closing my station.
COL	Collate (*or* I collate).
CORRECTION	Cancel my last word *or* group. The correct word *or* group follows *(used in radiotelephony, spoken as KOR-REK-SHUN).*

Note: When used in radiotelegraphy, a bar over the letters composing a signal denotes that the letters are to be sent as one signal

Abbreviation or Signal	Definition
CP	General call to two or more specified stations *(see Article* **63***).*
CQ	General call to all stations.
CS	Call sign *(used to request a call sign).*
DE	"From . . . " *(used to precede the name or other identification of the calling station).*
DF	Your bearing at . . . hours was . . . degrees, in the doubtful sector of this station, with a possible error of . . . degrees.
DO	Bearing doubtful. Ask for another bearing later (*or* at . . . . hours).
DSC	Digital selective calling.
E	East (cardinal point) *(see No.* **3098***).*
ETA	Estimated time of arrival.
INTERCO	International Code of Signals groups follow *(used in radiotelephony, spoken as IN-TER-CO).*
K	Invitation to transmit.
$\overline{\text{KA}}$	Starting signal.
KTS	Nautical miles per hour *(knots).*
MIN	Minute *(or* Minutes).
MSG	Prefix indicating a message to or from the master of a ship concerning its operation or navigation.
MSI	Maritime safety information.
N	North (cardinal point) *(see No.* **3098***).*
NBPD	Narrow-band direct-printing telegraphy.
NIL	I have nothing to send to you.
NO	No *(negative).*
NW	Now.
NX	Notice to Mariners (*or* Notice to Mariners follows).
OK	We agree (*or* It is correct).
OL	Ocean letter.

Abbreviation or Signal	Definition
P	Prefix indicating a private radiotelegram.
PBL	Preamble *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
PSE	Please.
R	Received
RCC	Rescue coordination centre.
REF	Reference to ... (*or* Refer to ...).
RPT	Repeat (*or* I Repeat) (*or* Repeat ...).
RQ	Indication of a request.
S	South (cardinal point) *(see No.* **3098***).*
SAR	Search and Rescue.
SIG	Signature *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
SLT	Radiomaritime Letter.
SVC	Prefix indicating a service telegram.
SYS	Refer to your service telegram.
TFC	Traffic.
TR	Used by a land station to request the position and next port of call of a mobile station *(see Nos.* **4741** *and* **4942***)*; used also as a prefix to the reply.
TU	Thank you.
TXT	Text *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
$\overline{\text{VA}}$	End of work.
W	West (cardinal point) *(see No.* **3098***).*

Abbreviation or Signal	Definition
WA	Word after . . . *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
WB	Word before . . . *(used after a question mark in radiotelegraphy or after RQ in radiotelephony (in case of language difficulties) or after RPT, to request a repetition).*
WD	Word(s) *or* Group(s).
WX	Weather report (*or* Weather report follows).
XQ	Prefix used to indicate the transmission of a service note.
YZ	The words which follow are in plain language.

APPENDIX 15

SINPO and SINPFEMO Codes

(See CCIR Recommendation 251)

SINPO signal reporting code

Rating scale	S	I	N	P	O
	Signal strength	Degrading effect of			Overall rating
		Interference	Noise	Propagation disturbance	
5	Excellent	Nil	Nil	Nil	Excellent
4	Good	Slight	Slight	Slight	Good
3	Fair	Moderate	Moderate	Moderate	Fair
2	Poor	Severe	Severe	Severe	Poor
1	Barely audible	Extreme	Extreme	Extreme	Unusable

SINPFEMO signal reporting code

Rating scale	S	I	N	P	F	E	M	O
	Signal strength	Degrading effect of			Frequency of fading	Modulation		Overall rating
		Interference	Noise	Propagation disturbance		Quality	Depth	
5	Excellent	Nil	Nil	Nil	Nil	Excellent	Maximum	Excellent
4	Good	Slight	Slight	Slight	Slow	Good	Good	Good
3	Fair	Moderate	Moderate	Moderate	Moderate	Fair	Fair	Fair
2	Poor	Severe	Severe	Severe	Fast	Poor	Poor or Nil	Poor
1	Barely audible	Extreme	Extreme	Extreme	Very fast	Very poor	Continuously overmodulated	Unusable

Special remarks:

a) A signal report shall consist of the code word SINPO or SINPFEMO followed by a group of five or eight numerals, rating, respectively, the five or eight characteristics of the particular signal code.

b) The letter X shall be used instead of a numeral for characteristics not rated.

c) Although the code word SINPFEMO is intended for radiotelephony, it may be used for radiotelegraphy.

d) The overall rating for radiotelegraphy shall be as indicated in Tables I and II.

TABLE I

Overall rating	Mechanized Operations
5. Excellent	4-channel time-division multiplex
4. Good	2-channel time-division multiplex
3. Fair	Marginal single start-stop printer
2. Poor	BKs, XQs and call signs readable
1. Unusable	Unreadable

TABLE II

Overall rating	Morse Operation
5. Excellent	High speed
4. Good	100 wpm
3. Fair	50 wpm
2. Poor	BKs, XQs and call signs readable
1. Unusable	Unreadable

e) The overall rating for telephony shall be as indicated in Table III.

TABLE III

Overall rating	Operating Condition	Quality
5. Excellent	Signal quality unaffected	Commercial
4. Good	Signal quality slightly affected	
3. Fair	Signal quality seriously affected; channel usable by operators or by experienced subscribers	Marginally commercial
2. Poor	Channel just usable by operators	Not commercial
1. Unusable	Channel unusable by operators	

APPENDIX 16

Mob-83 Mob-87

Channelling of the Maritime Mobile Radiotelephone Bands Between 4 000 kHz and 27 500 kHz

(See Article **60**, Section IV)

1. Radiotelephone channelling arrangements for the frequencies to be used by coast and ship stations in the bands allocated to the maritime mobile service are indicated in the following sections:

Section A – Table of single-sideband transmitting frequencies (in kHz) for duplex (two-frequency) operation;

Section B – Table of single-sideband transmitting frequencies (in kHz) for simplex (single-frequency) operation and for intership cross-band (two-frequency) operation;

Section C-1 – Table of recommended single-sideband transmitting frequencies (in kHz) for ship stations in the band 4 000 - 4 063 kHz shared with the fixed service;

Section C-2 – Table of recommended single-sideband transmitting frequencies (in kHz) for ship and coast stations in the band 8 100 - 8 195 kHz shared with the fixed service.

2. The technical characteristics for single-sideband transmitters are specified in Appendix **17**.

3. One or more series of frequencies from Section A (with the exception of those frequencies mentioned in paragraph 5 below) may be assigned to each coast station, which uses these frequencies associated in pairs (see No. **4381**); each pair consists of a transmitting and a receiving frequency. The series shall be selected with due regard to the areas served and so as to avoid, as far as possible, harmful interference between the services of different coast stations.

4. The frequencies in Section B are provided for worldwide common use by ships of all categories, according to traffic requirements, for ship transmissions to coast stations and for intership communication. They are also authorized for worldwide common use for transmissions by coast stations (simplex operation) provided the peak envelope power does not exceed 1 kW. (See Recommendation **304**.)

5. The following frequencies in Section A are allocated for calling purposes:

- Channel No. 421 in the 4 MHz band;
- Channel No. 606 in the 6 MHz band;
- Channel No. 821 in the 8 MHz band;
- Channel No. 1221 in the 12 MHz band;
- Channel No. 1621 in the 16 MHz band;
- Channel No. 1806 in the 18 MHz band;
- Channel No. 2221 in the 22 MHz band;
- Channel No. 2510 in the 25 MHz band.

The remaining frequencies in Sections A, B, C-1 and C-2 are working frequencies.

5A. For the use of the carrier frequencies:

4 125 kHz (Channel No. 421)

6 215 kHz (Channel No. 606)

8 291 kHz (Channel No. 833)

12 290 kHz (Channel No. 1221)

16 420 kHz (Channel No. 1621)

in Section A, by coast and ship stations for distress and safety purposes, see Article **38** and **N 38**.

6. *a)* Maritime radiotelephone stations using single-sideband emissions in the bands between 4 000 kHz and 27 500 kHz exclusively allocated to the maritime mobile service shall operate only on the carrier frequencies shown in the Sections A and B in conformity with the technical characteristics specified in Appendix **17**.

b) Ship stations, when using frequencies for single-sideband radiotelephony from the bands 4 000 - 4 063 kHz and ship and coast stations, when using frequencies for single-sideband radiotelephony in the band 8 100 - 8 195 kHz should operate on the carrier frequencies indicated in Sections C-1 and C-2 respectively. Technical characteristics of the equipment shall be those specified in Appendix **17**.

c) Stations employing the single-sideband mode shall use only class J3E emissions.

7. The channelling plan established in Section C-2 does not prejudice the rights of administrations to establish, and to notify assignments to stations in the maritime mobile service other than those using radiotelephony in the band 8 100 - 8 195 kHz, in conformity with the relevant provisions of these Regulations.

8. For the use and notification of channels Nos. 427, 428, 429, 607, 608, 832, 834, 835, 836, 837, 1233 up to and including 1241, 1642 up to an including 1656, 1801 up to and including 1805, 1807 up to and including 1815, 2241 up to and including 2253 and 2501 up to and including 2509, see Resolution **325 (Mob-87)**.

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Table of Single-Sideband Transmitting Frequencies For Duplex (Two-Frequency) Operation (in kHz)

4 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
401	4 357	4 358,4	4 065	4 066,4
402	4 360	4 361,4	4 068	4 069,4
403	4 363	4 364,4	4 071	4 072,4
404	4 366	4 367,4	4 074	4 075,4
405	4 369	4 370,4	4 077	4 078,4
406	4 372	4 373,4	4 080	4 081,4
407	4 375	4 376,4	4 083	4 084,4
408	4 378	4 379,4	4 086	4 087,4
409	4 381	4 382,4	4 089	4 090,4
410	4 384	4 385,4	4 092	4 093,4
411	4 387	4 388,4	4 095	4 096,4
412	4 390	4 391,4	4 098	4 099,4
413	4 393	4 394,4	4 101	4 102,4
414	4 396	4 397,4	4 104	4 105,4
415	4 399	4 400,4	4 107	4 108,4
416	4 402	4 403,4	4 110	4 111,4
417	4 405	4 406,4	4 113	4 114,4
418	4 408	4 409,4	4 116	4 117,4
419	4 411	4 412,4	4 119	4 120,4
420	4 414	4 415,4	4 122	4 123,4
421	4 417*	4 418,4*	4 125*[4]	4 126,4*
422	4 420	4 421,4	4 128	4 129,4
423	4 423	4 424,4	4 131	4 132,4
424	4 426	4 427,4	4 134	4 135,4
425	4 429	4 430,4	4 137	4 138,4
426	4 432	4 433,4	4 140	4 141,4
427[2]	4 435	4 436,4	4 143	4 144,4
428[1,2,3]	4 351	4 352,4	–	–
429[1,2,3]	4 354	4 355,4	–	–

6 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
601	6 501	6 502,4	6 200	6 201,4
602	6 504	6 505,4	6 203	6 204,4
603	6 507	6 508,4	6 206	6 207,4
604	6 510	6 511,4	6 209	6 210,4
605	6 513	6 514,4	6 212	6 213,4
606	6 516*	6 517,4*	6 215*[3]	6 216,4*
607[2]	6 519	6 520,4	6 218	6 219,4
608[1]	6 522	6 523,4	6 221	6 222,4

8 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
801	8 719	8 720,4	8 195	8 196,4
802	8 722	8 723,4	8 198	8 199,4
803	8 725	8 726,4	8 201	8 202,4
804	8 728	8 729,4	8 204	8 205,4
805	8 731	8 732,4	8 207	8 208,4
806	8 734	8 735,4	8 210	8 211,4
807	8 737	8 738,4	8 213	8 214,4
808	8 740	8 741,4	8 216	8 217,4
809	8 743	8 744,4	8 219	8 220,4
810	8 746	8 747,4	8 222	8 223,4
811	8 749	8 750,4	8 225	8 226,4
812	8 752	8 753,4	8 228	8 229,4
813	8 755	8 756,4	8 231	8 232,4
814	8 758	8 759,4	8 234	8 235,4
815	8 761	8 762,4	8 237	8 238,4
816	8 764	8 765,4	8 240	8 241,4
817	8 767	8 768,4	8 243	8 244,4
818	8 770	8 771,4	8 246	8 247,4
819	8 773	8 774,4	8 249	8 250,4
820	8 776	8 777,4	8 252	8 253,4
821	8 779*	8 780,4*	8 255*	8 256,4*
822	8 782	8 783,4	8 258	8 259,4
823	8 785	8 786,4	8 261	8 262,4
824	8 788	8 789,4	8 264	8 265,4
825	8 791	8 792,4	8 267	8 268,4
826	8 794	8 795,4	8 270	8 271,4
827	8 797	8 798,4	8 273	8 274,4
828	8 800	8 801,4	8 276	8 277,4
829	8 803	8 804,4	8 279	8 280,4
830	8 806	8 807,4	8 282	8 283,4
831	8 809	8 810,4	8 285	8 286,4
832[2]	8 812	8 813,4	8 288	8 289,4
833	8 291[7]	8 292,4	8 291[7]	8 292,4
834[2,3,4]	8 707	8 708,4	–	–
835[2,3,4]	8 710	8 711,4	–	–
836[2,3,4]	8 713	8 714,4	–	–
837[2,3,4]	8 716	8 717,4	–	–

12 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
1201	13 077	13 078,4	12 230	12 231,4
1202	13 080	13 081,4	12 233	12 234,4
1203	13 083	13 084,4	12 236	12 237,4
1204	13 086	13 087,4	12 239	12 240,4
1205	13 089	13 090,4	12 242	12 243,4
1206	13 092	13 093,4	12 245	12 246,4
1207	13 095	13 096,4	12 248	12 249,4
1208	13 098	13 099,4	12 251	12 252,4
1209	13 101	13 102,4	12 254	12 255,4
1210	13 104	13 105,4	12 257	12 258,4
1211	13 107	13 108,4	12 260	12 261,4
1212	13 110	13 111,4	12 263	12 264,4
1213	13 113	13 114,4	12 266	12 267,4
1214	13 116	13 117,4	12 269	12 270,4
1215	13 119	13 120,4	12 272	12 273,4
1216	13 122	13 123,4	12 275	12 276,4
1217	13 125	13 126,4	12 278	12 279,4
1218	13 128	13 129,4	12 281	12 282,4
1219	13 131	13 132,4	12 284	12 285,4
1220	13 134	13 135,4	12 287	12 288,4
1221	13 137*	13 138,4*	12 290*[illegible]	12 291,4*
1222	13 140	13 141,4	12 293	12 294,4
1223	13 143	13 144,4	12 296	12 297,4
1224	13 146	13 147,4	12 299	12 300,4
1225	13 149	13 150,4	12 302	12 303,4
1226	13 152	13 153,4	12 305	12 306,4
1227	13 155	13 156,4	12 308	12 309,4
1228	13 158	13 159,4	12 311	12 312,4
1229	13 161	13 162,4	12 314	12 315,4
1230	13 164	13 165,4	12 317	12 318,4
1231	13 167	13 168,4	12 320	12 321,4
1232	13 170	13 171,4	12 323	12 324,4
1233	13 173	13 174,4	12 326	12 327,4
1234	13 176	13 177,4	12 329	12 330,4
1235	13 179	13 180,4	12 332	12 333,4
1236	13 182	13 183,4	12 335	12 336,4
1237 } 2	13 185	13 186,4	12 338	12 339,4
1238	13 188	13 189,4	12 341	12 342,4
1239	13 191	13 192,4	12 344	12 345,4
1240	13 194	13 195,4	12 347	12 348,4
1241	13 197	13 198,4	12 350	12 351,4

16 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
1601	17 242	17 243,4	16 360	16 361,4
1602	17 245	17 246,4	16 363	16 364,4
1603	17 248	17 249,4	16 366	16 367,4
1604	17 251	17 252,4	16 369	16 370,4
1605	17 254	17 255,4	16 372	18 373,4
1606	17 527	17 258,4	16 375	16 376,4
1607	17 260	17 261,4	16 378	16 379,4
1608	17 263	17 264,4	16 381	16 382,4
1609	17 266	17 267,4	16 384	16 385,4
1610	17 269	17 270,4	16 387	16 388,4
1611	17 272	17 273,4	16 390	16 391,4
1612	17 275	17 276,4	16 393	16 394,4
1613	17 278	17 279,4	16 396	16 397,4
1614	17 281	17 282,4	16 399	16 400,4
1615	17 284	17 285,4	16 402	16 403,4
1616	17 287	17 288,4	16 405	16 406,4
1617	17 290	17 291,4	16 408	16 409,4
1618	17 293	17 294,4	16 411	16 412,4
1619	17 296	17 297,4	16 414	16 415,4
1620	17 299	17 300,4	16 417	16 418,4
1621	17 302*	17 303,4*	16 420*[illegible]	16 421,4*
1622	17 305	17 306,4	16 423	16 424,4
1623	17 308	17 309,4	16 426	16 427,4
1624	17 311	17 312,4	16 429	16 430,4
1625	17 314	17 315,4	16 432	16 433,4
1626	17 317	17 318,4	16 435	16 436,4
1627	17 320	17 321,4	16 438	16 439,4
1628	17 323	17 324,4	16 441	16 442,4
1629	17 326	17 327,4	16 444	16 445,4
1630	17 329	17 330,4	16 447	16 448,4
1631	17 332	17 333,4	16 450	16 451,4
1632	17 335	17 336,4	16 453	16 454,4
1633	17 338	17 339,4	16 456	16 457,4
1634	17 341	17 342,4	16 459	16 460,4
1635	17 344	17 345,4	16 462	16 463,4
1636	17 347	17 348,4	16 465	16 466,4
1637	17 350	17 351,4	16 468	16 469,4
1638	17 353	17 354,4	16 471	16 472,4
1639	17 356	17 357,4	16 474	16 475,4
1640	17 359	17 360,4	16 477	16 478,4
1641	17 362	17 363,4	16 480	16 481,4
1642	17 365	17 366,4	16 483	16 484,4
1643	17 368	17 369,4	16 486	16 487,4
1644	17 371	17 372,4	16 489	16 490,4
1645	17 374	17 375,4	16 492	16 493,4
1646	17 377	17 378,4	16 495	16 496,4
1647	17 380	17 381,4	16 498	16 499,4
1648	17 383	17 384,4	16 501	16 502,4
1649 } 2	17 386	17 387,4	16 504	16 505,4
1650	17 389	17 390,4	16 507	16 508,4
1651	17 392	17 393,4	16 510	16 511,4
1652	17 395	17 396,4	16 513	16 514,4
1653	17 398	17 399,4	16 516	16 517,4
1654	17 401	17 402,4	16 519	16 520,4
1655	17 404	17 405,4	16 522	16 523,4
1656	17 407	17 408,4	16 525	16 526,4

18/19 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
1801	19 755	19 756,4	18 780	18 781,4
1802	19 758	19 759,4	18 783	18 784,4
1803 } 2	19 761	19 762,4	18 786	18 787,4
1804	19 764	19 765,4	18 789	18 790,4
1805	19 767	19 768,4	18 792	18 793,4
1806	19 770*	19 771,4*	18 795*	18 796,4*
1807	19 773	19 774,4	18 798	18 799,4
1808	19 776	19 777,4	18 801	18 802,4
1809	19 779	19 780,4	18 804	18 805,4
1810	19 782	19 783,4	18 807	18 808,4
1811 } 2	19 785	19 786,4	18 810	18 811,4
1812	19 788	19 789,4	18 813	18 814,4
1813	19 791	19 792,4	18 816	18 817,4
1814	19 794	19 795,4	18 819	18 820,4
1815	19 797	19 798,4	18 822	18 823,4

22 MHz Band

Channel No	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
2201	22 696	22 697,4	22 000	22 001,4
2202	22 699	22 700,4	22 003	22 004,4
2203	22 702	22 703,4	22 006	22 007,4
2204	22 705	22 706,4	22 009	22 010,4
2205	22 708	22 709,4	22 012	22 013,4
2206	22 711	22 712,4	22 015	22 016,4
2207	22 714	22 715,4	22 018	22 019,4
2208	22 717	22 718,4	22 021	22 022,4
2209	22 720	22 721,4	22 024	22 025,4
2210	22 723	22 724,4	22 027	22 028,4
2211	22 726	22 727,4	22 030	22 031,4
2212	22 729	22 730,4	22 033	22 034,4
2213	22 732	22 733,4	22 036	22 037,4
2214	22 735	22 736,4	22 039	22 040,4
2215	22 738	22 739,4	22 042	22 043,4
2216	22 741	22 742,4	22 045	22 046,4
2217	22 744	22 745,4	22 048	22 049,4
2218	22 747	22 748,4	22 051	22 052,4
2219	22 750	22 751,4	22 054	22 055,4
2220	22 753	22 754,4	22 057	22 058,4
2221	22 756*	22 757,4*	22 060*	22 061,4*
2222	22 759	22 760,4	22 063	22 064,4
2223	22 762	22 763,4	22 066	22 067,4
2224	22 765	22 766,4	22 069	22 070,4
2225	22 768	22 769,4	22 072	22 073,4
2226	22 771	22 772,4	22 075	22 076,4
2227	22 774	22 775,4	22 078	22 079,4
2228	22 777	22 778,4	22 081	22 082,4
2229	22 780	22 781,4	22 084	22 085,4
2230	22 783	22 784,4	22 087	22 088,4
2231	22 786	22 787,4	22 090	22 091,4
2232	22 789	22 790,4	22 093	22 094,4
2233	22 792	22 793,4	22 096	22 097,4
2234	22 795	22 796,4	22 099	22 100,4
2235	22 798	22 799,4	22 102	22 103,4
2236	22 801	22 802,4	22 105	22 106,4
2237	22 804	22 805,4	22 108	22 109,4
2238	22 807	22 808,4	22 111	22 112,4
2239	22 810	22 811,4	22 114	22 115,4
2240	22 813	22 814,4	22 117	22 118,4
2241	22 816	22 817,4	22 120	22 121,4
2242	22 819	22 820,4	22 123	22 124,4
2243	22 822	22 823,4	22 126	22 127,4
2244	22 825	22 826,4	22 129	22 130,4
2245	22 828	22 829,4	22 132	22 133,4
2246	22 831	22 832,4	22 135	22 136,4
2247 } 2	22 834	22 835,4	22 138	22 139,4
2248	22 837	22 838,4	22 141	22 142,4
2249	22 840	22 841,4	22 144	22 145,4
2250	22 843	22 844,4	22 147	22 148,4
2251	22 846	22 847,4	22 150	22 151,4
2252	22 849	22 850,4	22 153	22 154,4
2253	22 852	22 853,4	22 156	22 157,4

25/26 MHz Band

Channel No.	Coast stations Carrier frequency	Coast stations Assigned frequency	Ship stations Carrier frequency	Ship stations Assigned frequency
2501	26 145	26 146,4	25 070	25 071,4
2502	26 148	26 149,4	25 073	25 074,4
2503	26 151	26 152,4	25 076	25 077,4
2504	26 154	26 155,4	25 079	25 080,4
2505 } 2	26 157	26 158,4	25 082	25 083,4
2506	26 160	26 161,4	25 085	25 086,4
2507	26 163	26 164,4	25 088	25 089,4
2508	26 166	26 167,4	25 091	25 092,4
2509	26 169	26 170,4	25 094	25 095,4
2510	26 172*	26 173,4*	25 097*	25 098,4*

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NOTES TO THE TABLE

1 These coast station frequencies may be paired with a ship station frequency from the table of simplex frequencies for ship and coast stations (see Section B) or with a frequency from the band 4 000 - 4 063 kHz (see Section C-1) to be selected by the administration concerned.

2 For the use and notification of these frequencies, see Resolution **325 (Mob-87)**.

3 These channels may also be used for simplex (single frequency) operation.

4 For the conditions of use of the carrier frequency 4 125 kHz, see Nos. **N 2980, N 2981, 2982, 4379** and **4380**.

5 For the conditions of use of the carrier frequency 6 215 kHz, see Nos. **2986** and **N 2993**.

6 These coast station frequencies may be paired with a ship station frequency form the table of simplex frequencies for ship and coast stations (see Section B) or with a frequency from the band 8 100 - 8 195 kHz (see Section C-2) to be selected by the administration concerned.

7 For the conditions of use of the carrier frequency 8 291 kHz, see No. **N 3001**.

8 For the conditions of use of the carrier frequency 12 290 kHz, see No. **N 3009**.

9 For the conditions of use of the carrier frequency 16 420 kHz, see No. **N 3017**.

* The frequencies followed by an asterisk are calling frequencies (see Nos. **4375** and **4376**).

SECTION B

Table of Single-Sideband Transmitting Frequencies for Simplex (Single-Frequency) Operation and for Intership Cross-Band (Two-Frequency) Operation (in kHz)

(See paragraph 4 of this Appendix)

4 MHz Band [1]		6 MHz Band		8 MHz Band [2]		12 MHz Band		16 MHz Band		18/19 MHz Band		22 MHz Band		25/26 MHz Band	
Carrier frequency	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**
4 146	4 147.4	6 224	6 225.4	8 294	8 295.4	12 353	12 354.4	16 528	16 529.4	18 825	18 826.4	22 159	22 160.4	25 100	25 101.4
4 149	4 150.4	6 227	6 228 4	8 297	8 298.4	12 356	12 357.4	16 531	16 532.4	18 828	18 829.4	22 162	22 163.4	25 103	25 104.4
		6 230	6 231.4			12 359	12 360.4	16 534	16 535.4	18 831	18 832.4	22 165	22 166 4	25 106	25 107.4
						12 362	12 363.4	16 537	16 538.4	18 834	18 835.4	22 168	22 169.4	25 109	25 110 4
						12 365	12 366 4	16 540	16 541.4	18 837	18 838.4	22 171	22 172.4	25 112	25 113.4
								16 543	16 544.4	18 840	18 841.4	22 174	22 175.4	25 115	25 116.4
								16 546	16 547.4	18 843	18 844.4	22 177	22 178.4	25 118	25 119.4

[1] These frequencies may be used for duplex operation with coast stations operating on Channels 428 and 429 (see Section A).

[2] These frequencies may be used for duplex operation with coast stations operating on Channels 834 up to and including 837 (see Section A).

SECTION C-1

Table of Recommended Single-Sideband Transmitting Frequencies (in kHz) for Ship Stations in the Band 4 000 - 4 063 kHz Shared with the Fixed Service

The frequencies in this Section may be used:

- for supplementing ship-to-shore channels for duplex operation in Section A;
- for intership simplex (single-frequency) and cross-band operation;
- for cross-band working with coast stations on channels in Section C-2;
- for duplex operation with coast stations working in the band 4 438 - 4 650 kHz;
- for duplex operation with Channels Nos. 428 and 429.

Channel No.	Carrier Frequency	Assigned Frequency	Channel No.	Carrier Frequency	Assigned Frequency
1	4 000 *	4 001.4 *	12	4 033	4 034.4
2	4 003 *	4 004.4 *	13	4 036	4 037.4
3	4 006	4 007.4	14	4 039	4 040.4
4	4 009	4 010.4	15	4 042	4 043.4
5	4 012	4 013.4	16	4 045	4 046.4
6	4 015	4 016.4	17	4 048	4 049.4
7	4 018	4 019.4	18	4 051	4 052.4
8	4 021	4 022.4	19	4 054	4 055.4
9	4 024	4 025.4	20	4 057	4 058.4
10	4 027	4 028.4	21	4 060	4 061.4
11	4 030	4 031.4			

* Administrations are requested to urge ship stations under their jurisdiction to refrain from using the band 4 000 - 4 005 kHz when navigating in Region 3 (see also No. **516**).

SECTION C-2

Table of Recommended Single-Sideband Transmitting Frequencies (in kHz) for Ship and Coast Stations in the Band 8 100 - 8 195 kHz Shared with the Fixed Service

(See paragraph 7 of this Appendix)

The frequencies in this Section may be used:

- for supplementing ship-to-shore and shore-to-ship channels for duplex operation in Section A;
- for intership simplex (single frequency) and cross-band operation;
- for cross-band working with ship stations on channels in Section C-1;
- for ship-to-shore or shore-to-ship simplex operation.
- for duplex operation with Channel Nos. 834, 835, 836 and 837.

Channel No.	Carrier Frequency	Assigned Frequency	Channel No.	Carrier Frequency	Assigned Frequency
1	8 101	8 102.4	17	8 149	8 150.4
2	8 104	8 105.4	18	8 152	8 153.4
3	8 107	8 108.4	19	8 155	8 156.4
4	8 110	8 111.4	20	8 158	8 159.4
5	8 113	8 114.4	21	8 161	8 162.4
6	8 116	8 117.4	22	8 164	8 165.4
7	8 119	8 120.4	23	8 167	8 168.4
8	8 122	8 123.4	24	8 170	8 171.4
9	8 125	8 126.4	25	8 173	8 174.4
10	8 128	8 129.4	26	8 176	8 177.4
11	8 131	8 132.4	27	8 179	8 180.4
12	8 134	8 135.4	28	8 182	8 183.4
13	8 137	8 138.4	29	8 185	8 186.4
14	8 140	8 141.4	30	8 188	8 189.4
15	8 143	8 144.4	31	8 191	8 192.4
16	8 146	8 147.4			

APPENDIX 17
Mob-87

Technical Characteristics of Single-Sideband Transmitters Used in the Maritime Mobile Service for Radiotelephony in the Bands Between 1 606.5 kHz (1 605 kHz Region 2) and 4 000 kHz and Between 4 000 kHz and 27 500 kHz

(See Article **60**, Section IV)

1. Power of the carrier:

For class J3E emissions the power of the carrier shall be at least 40 dB below the peak envelope power.

2. Coast and ship stations shall use only the upper sideband.

3. The transmitter audio-frequency band shall be 350 Hz to 2 700 Hz with a permitted amplitude variation of 6 dB.

4. The carrier frequencies shall be maintained within the tolerances specified in Appendix 7.

5. The unwanted frequency modulation of the carrier shall be sufficiently low to prevent harmful distortion.

6. When class H3E or J3E 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 tables:

a) Transmitters installed before 2 January 1982:

Separation Δ in kHz between the frequency of the unwanted emission[1] and the assigned frequency[4]	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 the unwanted emission power exceeding the power of 50 mW

Transmitters using suppressed carrier emission may, as far as concerns out-of-band emissions [2] and those spurious emissions [3] which are a result of the modulation process but do not fall in the spectrum of out-of-band emissions [2], 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 [4].

b) Transmitters installed after 1 January 1982:

Separation Δ in kHz between the frequency of the unwanted emission[1] and the assigned frequency[4]	Minimum attenuation below peak envelope power
$1.5 < \Delta \leqslant 4.5$	31 dB
$4.5 < \Delta \leqslant 7.5$	38 dB
$7.5 < \Delta$	43 dB without the unwanted emission power exceeding the power of 50 mW

For notes, see page AP17-3.

Transmitters using suppressed carrier emission may, as far as concerns out-of-band emissions [2] and those spurious emissions [3] which are a result of the modulation process but do not fall in the spectrum of out-of-band emissions [2], 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 [4].

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[1] *Unwanted emission:* See Article **1**, No. **140**.

[2] *Out-of-band emission:* See Article **1**, No. **138**.

[3] *Spurious emission:* See Article **1**, No. **139**.

[4] The assigned frequency is 1 400 kHz higher than the carrier frequency (see Article **60**, No. **4325**).

APPENDIX 18

Mob-83 Mob-87

Table of Transmitting Frequencies in the Band 156-174 MHz for Stations in the Maritime Mobile Service

(See Nos. **613**, **613A** and **613B** and Articles **59** and **60**)

Note 1: For assistance in understanding the Table, see notes *a)* to *p)* below.

Note 2: Channels 01 to 28, except 15 and 17, correspond to the channels of Appendix 18 to the Radio Regulations, Geneva, 1959, and channels 15, 17, and 60 to 88 correspond to those additional channels made available for assignment in accordance with the provisions of Appendix 18 Mar to the Radio Regulations, Geneva, 1967.

Note 3: Channel designators 60 to 88 were chosen for the additional channels in order to separate them clearly from the original channels.

Channel designators	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations		Ship movement		Public correspondence
		Ship stations	Coast stations		Single frequency	Two frequency	Single frequency	Two frequency	
60	*h)*	156.025	160.625			17		9	25
01		156.050	160.650			10		15	8
61		156.075	160.675			23		3	19
02		156.100	160.700			8		17	10
62		156.125	160.725			20		6	22
03		156.150	160.750			9		16	9
63		156.175	160.775			18		8	24
04		156.200	160.800			11		14	7
64		156.225	160.825			22		4	20
05		156.250	160.850			6		19	12
65		156.275	160.875			21		5	21
06	*g)*	156.300		1					
66		156.325	160.925			19		7	23
07		156.350	160.950			7		18	11
67	*k)*	156.375	156.375	9	10		9		
08		156.400		2					
68	*m)*	156.425	156.425		6		2		
09	*l)*	156.450	156.450	5	5		12		
69	*m)*	156.475	156.475	8	11		4		
10	*k)*	156.500	156.500	3	9		10		
70	*o)*	156.525	156.525	Digital selective calling for distress, safety and calling					
11	*m)*	156.550	156.550		3		1		
71	*m)*	156.575	156.575		7		6		
12	*m)*	156.600	156.600		1		3		
72	*l)*	156.625		6					
13	*p)*	156.650	156.650	4	4		5		
73	*k)*	156.675	156.675	7	12		11		
14	*m)*	156 700	156.700		2		7		
74	*m)*	156 725	156.725		8		8		

Channel designators	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations		Ship movement		Public correspondence
		Ship stations	Coast stations		Single frequency	Two frequency	Single frequency	Two frequency	
15	*j)*	156.750	156.750	11	14		14		
75			Guardband 156.7625 – 156.7875 MHz						
16		156.800	156.800	DISTRESS, SAFETY AND CALLING					
76			Guardband 156.8125 – 156.8375 MHz						
17	*j)*	156.850	156.850	12	13		13		
77		156.875		10					
18	*f)*	156.900	161.500			3		22	
78		156.925	161.525			12		13	27
19	*f)*	156.950	161.550			4		21	
79	*f) m)*	156.975	161.575			14		1	
20	*f)*	157.000	161.600			1		23	
80	*f) m)*	157.025	161.625			16		2	
21	*f)*	157.050	161.650			5		20	
81		157.075	161.675			15		10	28
22	*f)*	157.100	161.700			2		24	
82		157.125	161.725			13		11	26
23		157.150	161.750						5
83		157.175	161.775						16
24		157.200	161.800						4
84		157.225	161.825			24		12	13
25		157.250	161.850						3
85		157.275	161.875						17
26		157.300	161.900						1
86	*n)*	157.325	161.925						15
27		157.350	161.950						2
87		157.375	161.975						14
28		157.400	162.000						6
88	*h)*	157.425	162.025						18

NOTES REFERRING TO THE TABLE

a) The figures in the column headed "Intership" indicate the normal sequence in which channels should be taken into use by mobile stations.

b) The figures in the columns headed "Port operations", "Ship movement" and "Public correspondence" indicate the normal sequence in which channels should be taken into use by each coast station. However, in some cases, it may be necessary to omit channels in order to avoid harmful interference between the services of neighbouring coast stations.

c) Administrations may designate frequencies in the intership, port operations and ship movement services for use by light aircraft and helicopters to communicate with ships or participating coast stations in predominantly maritime support operations under the conditions specified in Nos. **4144**, **4148**, **4149**, **4150**, **4151**, **4152** and **4153**. However, the use of the channels which are shared with public correspondence shall be subject to prior agreement between interested and affected administrations.

d) The channels of the present Appendix, with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may also be used for highspeed data and facsimile transmissions, subject to special arrangement between interested and affected administrations.

e) The channels of the present Appendix, preferably two adjacent channels from the series 87, 28, 88, with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may be used for direct-printing telegraphy and data transmission, subject to special arrangement between interested and affected administrations.

f) The two-frequency channels for port operations (18, 19, 20, 21, 22, 79 and 80) may be used for public correspondence, subject to special arrangement between interested and affected administrations.

g) The frequency 156.300 MHz (channel 06) (see Nos. **2993**, **N 3035** and **4154**) may also be used for communication between ship stations and aircraft stations engaged in coordinated search and rescue operations. Ship stations shall avoid harmful interference to such communications on channel 06 as well as to communications between aircraft stations, ice-breakers and assisted ships during ice seasons.

h) Channels 60 and 88 can be used subject to special arrangements between interested and affected administrations.

i) The frequencies in this Table may also be used for radiocommunications on inland waterways in accordance with the conditions specified in No. **613**.

j) Channels 15 and 17 may also be used for on-board communications provided the effective radiated power does not exceed 1 W, and subject to the national regulations of the administration concerned when these channels are used in its territorial waters. (However, see Recommendation **305**.)

k) Within the European Maritime Area and in Canada these frequencies (channels 10, 67, 73) may also be used, if so required, by the individual administrations concerned, for communication between ship stations, aircraft stations and participating land stations engaged in coordinated search and rescue and anti-pollution operations in local areas, under the conditions specified in Nos. **4144**, **4148**, **4149**, **4150**, **4151**, **4152** and **4153**.

l) The preferred first three frequencies for the purpose indicated in note *c)* are 156.450 MHz (channel 09), 156.625 MHz (channel 72) and 156.675 MHz (channel 73).

m) These channels (68, 69, 11, 71, 12, 14, 74, 79 and 80) are the preferred channels for the ship movement service. They may, however, be used for the port operations service until required for the ship movement service if this should prove to be necessary in any specific area.

n) This channel (86) may be used as a calling channel if such a channel is required in an automatic radiotelephone system when such a system is recommended by the CCIR.

o) This channel (70) is to be used exclusively for digital selective calling for distress, safety and calling (see Resolution **323 (Mob-87)**).

p) Channel 13 is designated for use on a world-wide basis as a navigation safety communication channel, primarily for intership navigation safety communications. It may also be used for the ship movement and port operations services subject to the national regulations of the administrations concerned.

APPENDIX 19
Mob-87

Technical Characteristics for Transmitters and Receivers Used in the Maritime Mobile Service in the Band 156 - 174 MHz

(see Articles **59** and **60** and Appendix **18**)

1. Only frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation) shall be used.

2. The frequency deviation corresponding to 100% modulation shall approach ± 5 kHz as nearly as practicable. In no event shall the frequency deviation exceed ± 5 kHz.

3. The frequency tolerance for coast and ship stations shall be 10 parts in 10^6.

4. In transmission on any of the frequencies designated in Appendix **18**, the emission of each station shall be vertically polarized at the source.

5. The audio-frequency band shall be limited to 3 000 Hz.

6. It must be possible readily to reduce the mean power of a ship station transmitter to 1 W or less, except for digital selective calling equipment operating on 156.525 MHz (channel 70) in which case the power reduction facility is optional.

7. Stations using digital selective calling shall have the following capabilities:

   a) sensing to determine the presence of a signal on 156.525 MHz (channel 70), and *b)* automatic prevention of the transmission of a call, except for distress and safety calls, when the channel is occupied by calls.

8. The remaining characteristics of transmitters and receivers used for digital selective calling shall comply with the relevant CCIR Recommendations.

APPENDIX 20
Mob-87

Characteristics of Equipment Used for On-Board Communication in the Bands Between 450 and 470 MHz

(See Nos. **669** and **670**)

1. The equipment should be fitted with sufficient channels for satisfactory operation in the area of intended use.

2. The effective radiated power shall be limited to the minimum required for satisfactory operation, but shall in no case exceed 2 W. Wherever practicable the equipment should be fitted with a suitable device to reduce readily the output power by at least 10 dB.

3. In the case of equipment installed at a fixed point on the ship, the height of its antenna shall not be more than 3.5 metres above the level of the bridge.

4. Only frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation) shall be used.

5. The frequency deviation shall not exceed ± 5 kHz.

6. The frequency tolerance shall be 5 parts in 10^6.

7. The audio-frequency band shall be limited to 3 000 Hz.

8. Control, telemetry and other non-voice signals shall be coded in such a manner as to minimize the possibility of false response to interfering signals.

9. The frequencies specified in No. **669** for on-board communications may be used for single-frequency and two-frequency simplex operation.

10. For ships using these on-board communication frequencies in survival craft two-way radiotelephone stations, the survival craft equipment shall be capable of transmitting and receiving the frequency 457.525 MHz.

11. If the use of a repeater station is required on board a ship, the following frequency pairs shall be used (see also No. **670**):

457.525 MHz and 467.525 MHz
457.550 MHz and 467.550 MHz
457.575 MHz and 467.575 MHz

APPENDIX 21

Reports of International Monitoring of Emissions

(See Article **20**)

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;

c) time of measurement (UTC);

d) call sign or other means of identification, or both, of the station 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;

[1] The class of emission shall contain the basic characteristics listed in Article **4** and, if possible, the additional characteristics listed in Appendix **6**. 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).

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 (UTC);

d) call sign or other means of identification, or both, of the station 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 IFRB and contain if possible the following information:

a) identification of the monitoring station (administration or organization, and location);

b) date of measurement;

---

[1] See page AP21-1.

c) time of measurement (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 heard or recorded;

i) value of measured field strength or power flux-density or signal strength according to the QSA scale;

j) occupied bandwidth (indicate whether measured or estimated, or indicate 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.

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 (UTC);

---

[1] See page AP21-1.

d) call sign or other means of identification, or both, of the station 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 (UTC);

d) call sign or other means of identification, or both, of the station monitored;

e) class of emission [1];

f) assigned frequency;

g) value of measured field strength or power flux-density;

---

[1] See page AP21-1.

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 IFRB 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 (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) occupied bandwidth (indicate whether measured or estimated, or indicate the necessary bandwidth notified to the IFRB);

k) observed polarization;

l) information on orbit;

---

[1] See page AP21-1.

m) information as to the locality or area in which reception is intended, if known;

n) 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 measurement;

c) time of measurement (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) occupied bandwidth (indicate whether measured or estimated, or indicate the necessary bandwidth notified to the IFRB);

k) information as to the orbital position where 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.

---

[1] See page AP21-1

APPENDIX 22

Report of an Irregularity or of an Infringement of the Convention or the Radio Regulations [1]

(See Articles **21** and **22**)

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	. . . .
4.	Frequency used (kHz, MHz, GHz or THz)	. . . .
5.	Class of emission [2]	. . . .
6.	Class of station and nature of service, if known	. . . .
7.	Location [3, 4, 5]	. . . .

Particulars concerning the station, the centralizing office or inspection service reporting the irregularity or infringement:

8.	Name (in BLOCK letters)	. . . .
9.	Call sign or other identification (in BLOCK letters)	. . . .
10.	Nationality	. . . .
11.	Location [3, 4]	. . . .

Particulars of the irregularity or infringement:

12.	Name [6] of the station (in BLOCK letters) in communication with the station committing the irregularity or infringement	....
13.	Call sign or other identification (in BLOCK letters) of the station in communication with the station committing the irregularity or infringement	....
14.	Date and time [7]	....
15.	Nature of the irregularity or infringement [8]	....
16.	Extracts from ship log or other information supporting the report	....

Particulars concerning the transmitting station interfered with [9]:

17.	Name of the station (in BLOCK letters)	....
18.	Call sign or other identification (in BLOCK letters)	....
19.	Frequency assigned (kHz, MHz, GHz or THz)	....
20.	Frequency measured at the time of the interference	....
21.	Class of emission [2] and bandwidth (indicate whether measured or estimated, or indicate the necessary bandwidth notified to the IFRB)	....
22.	Receiving location [3] [4] (in BLOCK letters) where the interference was experienced	....

23. Certificate:
I certify that the foregoing report represents, to the best of my knowledge, a complete and accurate account of what took place.

Signatures [10] . . . .   Date: . . . .

. . . .

Instructions for filling in this form

[1] Each report shall refer to only one station (see note 6). If it is forwarded as a letter, it shall be in duplicate, and whenever practicable should be typewritten. It may also be forwarded as a telegram.

[2] The class of emission shall contain the basic characteristics listed in Article **4** and, if possible, the additional characteristics listed in Appendix **6**. 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).

[3] In the case of land, 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.

[4] 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.

[5] Where space stations are concerned, information shall be furnished on the orbit.

[6] If both communicating stations infringe the Regulations, a separate report shall be made for each of these stations.

[7] The time must be expressed as Coordinated Universal Time (UTC) by a group of four figures (0000 to 2359). If the infringement is prolonged or repeated, the dates and times shall be shown.

[8] A separate report is required for each irregularity or infringement, unless they are repeated within a short time.

[9] This information is to be given only in case of a complaint about interference.

[10] This report shall be signed by the operator who has reported the infringement and countersigned by the Master of the ship or person responsible for the 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 sending it.

For the use of the administration only

1. Company controlling the installation of the station against which complaint is made . . . .

2. Name of the operator of the station held responsible for the irregularity or infringement of the Regulations . . . .

3. Action taken . . . .

APPENDIX 23

Report of Harmful Interference

(See Article **22**)

Particulars concerning the station causing the interference:

a. Name, call sign or other means of identification . . . .

b. Frequency measured . . . . Date: . . . .

Time (UTC): . . . .

c. Class of emission [1] . . . .

d. Bandwidth (indicate whether measured or estimated) . . . .

e. Measured field strength or power flux-density [2] . . . .

Date: . . . .

Time (UTC): . . . .

f. Observed polarization . . . .

g. Class of station and nature of service . . . .

h. Location/position/area/bearing (QTE) . . . .

i. Location of the facility which made the above measurements . . . .

Particulars concerning the transmitting station interfered with:

j. Name, call sign or other means of identification . . . .

k. Frequency assigned . . . .

---

[1] The class of emission shall contain the basic characteristics listed in Article **4** and, if possible, the additional characteristics listed in Appendix **6**. 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).

[2] When measurements are not available, signal strengths according to the QSA scale should be provided.

l. Frequency measured . . . . Date: . . . .

Time (UTC): . . . .

m. Class of emission [1] . . . .

n. Bandwidth (indicate whether measured or estimated, or indicate the necessary bandwidth notified to the IFRB) . . . .

o. Location/position/area . . . .

p. Location of the facility which made the above measurements . . . .

Particulars furnished by the receiving station experiencing the interference:

q. Name of station . . . .

r. Location/position/area . . . .

s. Dates and times (UTC) of occurrence of harmful interference . . . .

t. Bearings (QTE) or other particulars . . . .

u. Nature of interference . . . .

v. Field strength or power flux-density of the wanted emission at the receiving station experiencing the interference [2] . . . .

Date: . . . .

Time (UTC): . . . .

w. Polarization of the receiving antenna or observed polarization . . . .

x. Action requested . . . .

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, 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.

For notes, see page AP23-1.

APPENDIX 24

Phonetic Alphabet and Figure Code

(See Articles **37** and **65**)

1. When it is necessary to spell out call signs, service abbreviations and words, the following letter spelling table shall be used:

<table>
<tr><th>Letter to be transmitted</th><th>Code word to be used</th><th>Spoken as*</th></tr>
<tr><td>A</td><td>Alfa</td><td><u>AL</u> FAH</td></tr>
<tr><td>B</td><td>Bravo</td><td><u>BRAH</u> VOH</td></tr>
<tr><td>C</td><td>Charlie</td><td><u>CHAR</u> LEE or <u>SHAR</u> LEE</td></tr>
<tr><td>D</td><td>Delta</td><td><u>DELL</u> TAH</td></tr>
<tr><td>E</td><td>Echo</td><td><u>ECK</u> OH</td></tr>
<tr><td>F</td><td>Foxtrot</td><td><u>FOKS</u> TROT</td></tr>
<tr><td>G</td><td>Golf</td><td>GOLF</td></tr>
<tr><td>H</td><td>Hotel</td><td>HOH <u>TELL</u></td></tr>
<tr><td>I</td><td>India</td><td><u>IN</u> DEE AH</td></tr>
<tr><td>J</td><td>Juliett</td><td><u>JEW</u> LEE <u>ETT</u></td></tr>
<tr><td>K</td><td>Kilo</td><td><u>KEY</u> LOH</td></tr>
<tr><td>L</td><td>Lima</td><td><u>LEE</u> MAH</td></tr>
<tr><td>M</td><td>Mike</td><td>MIKE</td></tr>
<tr><td>N</td><td>November</td><td>NO <u>VEM</u> BER</td></tr>
<tr><td>O</td><td>Oscar</td><td><u>OSS</u> CAH</td></tr>
</table>

* The syllables to be emphasized are underlined.

Letter to be transmitted	Code word to be used	Spoken as*
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIR RAH
T	Tango	TANG GO
U	Uniform	YOU NEE FORM or OO NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEY
Z	Zulu	ZOO LOO

2. When it is necessary to spell out figures or marks, the following table shall be used:

Figure or mark to be transmitted	Code word to be used	Spoken as**
0	Nadazero	NAH-DAH-ZAY-ROH
1	Unaone	OO-NAH-WUN
2	Bissotwo	BEES-SOH-TOO
3	Terrathree	TAY-RAH-TREE
4	Kartefour	KAR-TAY-FOWER
5	Pantafive	PAN-TAH-FIVE
6	Soxisix	SOK-SEE-SIX

* The syllables to be emphasized are underlined.

** Each syllable should be equally emphasized.

Figure or mark to be transmitted	Code word to be used	Spoken as*
7	Setteseven	SAY-TAY-SEVEN
8	Oktoeight	OK-TOH-AIT
9	Novenine	NO-VAY-NINER
Decimal point	Decimal	DAY-SEE-MAL
Full stop	Stop	STOP

3. However, stations of the same country, when communicating between themselves, may use any other table recognized by their administration.

* Each syllable should be equally emphasized.

APPENDIX 25

Frequency Allotment Plan for Coast Radiotelephone Stations Operating in the Exclusive Maritime Mobile Bands Between 4 000 kHz and 23 000 kHz

(See Nos. **4198** and **4212** of the Radio Regulations and Appendix **16**)

Note *a)*: The frequencies in Column 1 are assigned frequencies (see No. **142**) as listed in Appendix **16** to the Radio Regulations. Each frequency is followed, in parentheses, by the carrier frequency and the channel number. (See Section A of Appendix **16** to the Radio Regulations.)

Note *b)*: The coast radiotelephone stations operating in the exclusive maritime mobile bands between 4 000 kHz and 23 000 kHz must use the minimum power required to cover their service area. They may in no case use a peak envelope power above 10 kW per channel. (See No. **4373** of the Radio Regulations.)

* *Note by the General Secretariat:* Changes to the Frequency Allotment Plan adopted by the World Maritime Administrative Radio Conference, Geneva, 1974, resulting from the application of the procedures prescribed in Article **16** are indicated on pages AP25-97 and following.

Note *c)*: The Plan contained in this Appendix is updated in accordance with the procedure defined in Article **16** of the Radio Regulations.

Column 1	Column 2	Column 3
Assigned frequency (carrier frequency) (channel number)	Country or area	Observations

Column 3
Observations

ADD This allotment has been entered in the Plan as a result of the application of the procedure of Article **16**. The basic characteristics of the allotment are given, as published in Part B of the relevant Special Section of the IFRB Circular, in the *Table of Allotments Added to the Plan,* pages AP25-97 to AP25-109.

1	2	3
4 358.8 **(4 357.4)**		
(Ch. No. 401)	Germany (Federal Republic of) Australia Chile	 ADD
	Cook Islands Korea Cuba	
	Denmark Spain United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Indonesia Japan	
	Niue Island Norway Panama	 ADD
	Paraguay Western Samoa Somalia	
	South Africa Sweden Thailand	
	Turkey Ukraine Uruguay	
	U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (Far East) U.S.S.R. (North West) Yemen	
	Yugoslavia Zaire	

1	2	3
4 361.9 **(4 360.5)**		
(Ch. No. 402)	Alaska Albania Argentina	
	Bangladesh China United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Guam Hawaii Iran	
	Italy Japan Madagascar	
	Panama Papua New Guinea Poland	
	Puerto Rico United Kingdom Thailand	
	Tunisia U.S.S.R. (Southern Asia) U.S.S.R. (North West)	
4 365 **(4 363.6)**		
(Ch. No. 403)	Argentina Canada (East) Canada (North)	
	Canada (West) Denmark Spain	
	United States of America (Central) United States of America (East) United States of America (West)	
(cont.)	United States of America (South) Ethiopia Greece	

1	2	3
4 365 **(4 363.6)**		
(Ch. No. 403) *(cont.)*	Hawaii India (East) Iraq	
	Macao Mexico Monaco	
	Norway Panama Peru	ADD
	Puerto Rico Sri Lanka South Africa	
	Sweden Togo Ukraine	
	U.S.S.R. (Far East)	
4 368.1 **(4 366.7)**		
(Ch. No. 404)	Alaska Australia Bangladesh	
	Brazil Chile (South) China	
	Congo Ivory Coast United States of America (Central)	
	United States of America (East) United States of America (West) France	
	Guadeloupe (French Dep. of) Iran Israel	
(cont.)	Japan Martinique (French Dep. of) Mexico	

1	2	3
4 368.1 **(4 366.7)**		
(Ch. No. 404) *(cont.)*	New Caledonia and Dependencies Oman Easter Island	
	Poland Reunion (French Dep. of) S. Pierre and Miquelon (French Dep. of)	
	Senegal Thailand	
4 371.2 **(4 369.8)**		
(Ch. No. 405)	Alaska Australia (East) Brazil	
	Cameroon Canary Islands Chile	
	China Costa Rica United States of America (Central)	 ADD ADD
	United States of America (East) United States of America (West) United States of America (South)	
	France Gambia Greece	
	Hawaii Iran Jamaica	
	Netherlands German Democratic Republic Romania	
	Singapore South Africa Uruguay	
	U.S.S.R. (Southern Asia) U.S.S.R. (Europe) U.S.S.R. (Far East)	

1	2	3
4 374.3 **(4 372.9)**		
(Ch. No. 406)	Alaska Albania Saudi Arabia	
	Argentina China Cyprus	
	Colombia Congo Spain	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Fiji Finland	
	Guam Hawaii Iceland	
	Madagascar Panama Poland	
	Puerto Rico United Kingdom Sri Lanka	
	Tunisia	
4 377.4 **(4 376)**		
(Ch. No. 407)	Alaska Argentina Australia	ADD
	Barbados Cameroon Canada (Central)	
	Spain United States of America (East)	
(cont.)	United States of America (West)	

1	2	3
4 377.4 **(4 376)** (Ch. No. 407) *(cont.)*		
	Guam Hawaii India (East)	
	Iran Italy Japan	ADD
	Norway Netherlands Peru	
	Puerto Rico German Democratic Republic Singapore	
	South Africa Turkey U.S.S.R. (Northern Asia)	
	U.S.S.R. (North West)	
4 380.5 **(4 379.1)** (Ch. No. 408)	Alaska	
	Netherlands Antilles Argentina Belgium	
	Brazil Canada (East) Canada (West)	ADD
	United States of America (East) United States of America (West) Guam	
	Hawaii Indonesia Iran	
	Italy Japan Liberia	
(cont.)	Maldives Mexico Mozambique	ADD

1	2	3
4 380.5 **(4 379.1)**		
(Ch. No. 408) *(cont.)*	New Zealand Poland American Samoa	ADD
	Sudan Switzerland Yugoslavia	ADD
4 383.6 **(4 382.2)**	Saudi Arabia	
(Ch. No. 409)	Brazil China Cuba	
	Denmark United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) India (West)	
	Italy Norway Papua New Guinea	
	Philippines Qatar Sweden	 ADD
	Thailand Turkey Zaire	
4 386.7 **(4 385.3)**		
(Ch. No. 410)	Algeria Argentina (South) Bermuda	
	Canada (West) Canary Islands China	
(cont.)	United States of America (East) Greece Guam	

1	2	3
4 386.7 **(4 385.3)**		
(Ch. No. 410) *(cont.)*	Hungary Iran Israel	
	Jamaica Malta Mauritania	
	New Zealand Netherlands German Democratic Republic	
	Romania United Kingdom Seychelles (Republic of)	
	Sri Lanka	
4 389.8 **(4 388.4)**		
(Ch. No. 411)	Argentina (North) Bangladesh Belgium	
	Ecuador Spain United States of America (Central)	ADD
	United States of America (East) United States of America (West) Falkland Islands (Malvinas)	
	Hongkong Indonesia Iran	
	Italy Japan Kiribati	ADD ADD
	Liberia S. Paul and Amsterdam Islands Turkey	 ADD
	Ukraine U.S.S.R. (North West)	

1	2	3
4 392.9 **(4 391.5)**		
(Ch. No. 412)	Germany (Federal Republic of) Australia Costa Rica	ADD
	United States of America (East) United States of America (West) United States of America (South)	
	India (West) Iraq Italy	
	Japan Peru Philippines	
	Ukraine U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (North West) Yemen	
4 396 **(4 394.6)**		
(Ch. No. 413)	Azores Alaska Algeria	
	Germany (Federal Republic of) Angola Argentina	
	Bahrain Bangladesh Canada (East)	
	Canada (West) Cape Verde United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
(cont.)	Finland Greece Guam	

1	2	3
4 396 **(4 394.6)**		
(Ch. No. 413) *(cont.)*	Guinea-Bissau Hawaii Japan	
	Madeira Mexico Monaco	
	Panama Puerto Rico Portugal	
	Portuguese Timor Ukraine U.S.S.R. (Far East)	
4 399.1 **(4 397.7)**		
(Ch. No. 414)	Alaska Germany (Federal Republic of) Cyprus	
	Spain United States of America (East) United States of America (South)	
	Finland Indonesia Iceland	
	Japan Kenya Peru	
	Puerto Rico S. Helena U.S.S.R. (Europe)	
	U.S.S.R. (Far East)	
4 402.2 **(4 400.8)**		
(Ch. No. 415) *(cont.)*	Alaska Argentina Australia	

1	2	3
4 402.2 (4 400.8)		
(Ch. No. 415) *(cont.)*	China Denmark United States of America (East)	
	United States of America (West) United States of America (South) France	
	Greece Guam Hawaii	
	Iran Liberia Madagascar	
	Malaysia Norway Pakistan	
	Panama Puerto Rico Romania	
	U.S.S.R. (Europe) U.S.S.R. (North West)	
4 405.3 (4 403.9)		
(Ch. No. 416)	Alaska Bangladesh Brazil	
	United States of America (Central) United States of America (East) United States of America (West)	
	France Greece Hungary	
	Indonesia Iran Iceland	
(cont.)	Jamaica Japan Mauritius	

1	2	3
4 405.3 **(4 403.9)**		
(Ch. No. 416) *(cont.)*	Peru French Polynesia United Kingdom	
	U.S.S.R. (Europe)	
4 408.4 **(4 407)**		
(Ch. No. 417)	Argentina Australia Belgium	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Finland Hongkong	
	India (West) Japan Malaysia	
	Morocco Papua New Guinea United Kingdom	
	Tanzania Czechoslovakia Turkey	ADD
	U.S.S.R. (Far East) Yemen Yugoslavia	
4 411.5 **(4 410.1)**		
(Ch. No. 418)	Argentina Brazil Bulgaria	ADD
(cont.)	Canada (East) Canada (West) Cuba	

1	2	3
4 411.5 **(4 410.1)**		
(Ch. No. 418) *(cont.)*	Denmark Djibouti Egypt	
	Spain United States of America (Central) Hawaii	
	Indonesia Israel Italy	ADD
	Japan Mauritania Norway	
	Philippines Reunion (French Dep. of) Romania	
	S. Pierre and Miquelon (French Dep. of) Sweden U.S.S.R. (Southern Asia)	
4 414.6 **(4 413.2)**		
(Ch. No. 419)	Australia Brazil Chile	
	China Korea Ivory Coast	
	United States of America (West) United States of America (South) France	
	Guam Hawaii Iceland	
	Japan Kuwait Libya	
(cont.)	Pakistan Netherlands Puerto Rico	

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4 414.6 **(4 413.2)**		
(Ch. No. 419) *(cont.)*	German Democratic Republic Tanzania Czechoslovakia	ADD
	U.S.S.R. (North West) Yugoslavia	
4 417.7 **(4 416.3)**		
(Ch. No. 420)	Alaska Bulgaria Cameroon	
	Denmark United States of America (East) United States of America (West)	
	Guam Hawaii India (East)	
	Iran Italy Japan	
	Jordan Malaysia Morocco	
	Norway Panama Puerto Rico	
	Sweden Turkey U.S.S.R. (Southern Asia)	
	U.S.S.R. (Northern Asia)	
4 423.9 **(4 422.5)**		
(Ch. No. 422) *(cont.)*	Alaska Belgium Canada (West)	

1	2	3
4 423.9 **(4 422.5)**		
(Ch. No. 422) *(cont.)*	Canary Islands China Cuba	
	United States of America (East) United States of America (West) Finland	
	Greece Guiana (French Dep. of) Hungary	
	Indonesia Iraq Japan	
	Liberia Libya Morocco	
	United Kingdom Switzerland U.S.S.R. (Europe)	 ADD
4 427 **(4 425.6)**		
(Ch. No. 423)	Alaska Germany (Federal Republic of) Brazil	 ADD
	China United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Indonesia	
	Israel Italy Japan	
	Malta Pakistan Panama	ADD
	Papua New Guinea Poland Qatar	 ADD

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4 430.1 **(4 428.7)**		
(Ch. No. 424)	Alaska Algeria Argentina	
	Australia (East) Australia (West) China	ADD
	Denmark United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Greece	
	Guadeloupe (French Dep. of) Guam Hawaii	
	Morocco Martinique (French Dep. of) Norway	
	Panama Puerto Rico Sweden	ADD
	Switzerland Thailand	
4 433.2 **(4 431.8)**		
(Ch. No. 425)	Alaska Belgium Brazil	ADD
	Chile Denmark Spain	
	United States of America (Central) United States of America (East) United States of America (West)	
(cont.)	United States of America (South) Greece Guam	

1	2	3
4 433.2 **(4 431.8)**		
(Ch. No. 425) *(cont.)*	Hawaii Hungary Japan	
	Jordan Kuwait Libya	ADD
	Malaysia Norway New Zealand	
	Panama Netherlands Puerto Rico	
4 436.3 **(4 434.9)**		
(Ch. No. 426)	Azores Alaska Algeria	
	Angola Argentina Bulgaria	
	Cape Verde China Cyprus	
	Denmark United States of America (East) United States of America (West)	
	United States of America (South) Guam Guinea-Bissau	
	Hawaii Japan Lebanon	
	Madeira Mozambique Norway	
(cont.)	Panama Puerto Rico Portugal	

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4 436.3 **(4 434.9)**		
(Ch. No. 426) *(cont.)*	United Kingdom Thailand Portuguese Timor	

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6 507.8 **(6 506.4)** (Ch. No. 601)	Alaska Algeria Germany (Federal Republic of)	
	Saudi Arabia Argentina (Central) Argentina (South)	
	Bangladesh Canada (West) Chile (Central)	
	Chile (North) China Congo	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	Hawaii Hungary Indonesia	
	Iran Iraq Iceland	
	Italy Japan Libya	ADD
	Malaysia Maldives Mexico (East)	 ADD
	Mexico (West) New Caledonia and Dependencies New Zealand	 ADD
	Peru Puerto Rico Romania	
	Sri Lanka Czechoslovakia Ukraine	
	U.S.S.R. (Southern Asia) U.S.S.R. (Europe) Yugoslavia	

1	2	3
6 510.9 **(6 509.5)**		
(Ch. No. 602)	Alaska Bangladesh Belgium	
	Brazil Bulgaria Canada (East)	ADD
	Canada (West) Korea Costa Rica	 ADD
	Ivory Coast Ecuador United States of America (Central)	 ADD
	United States of America (East) United States of America (West) United States of America (South)	
	Fiji Guam Hawaii	ADD
	Indonesia Iran Italy	
	Kuwait Madagascar Monaco	
	Netherlands Peru Poland	
	Puerto Rico Portugal Singapore	
	South Africa Tunisia Turkey	
	U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (Far East) Yugoslavia	

1	2	3
6 514 **(6 512.6)**		
(Ch. No. 603)	Alaska Albania Algeria	
	Saudi Arabia Argentina Australia	ADD
	Bangladesh Bermuda Canada (North)	
	Canada (West) Cyprus Ivory Coast	
	Denmark Spain United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Guam Hawaii	
	Hungary India (East) Indonesia	
	Iran Iraq Iceland	
	Israel Japan Libya	
	Malta Mauritania Mexico	ADD
	Norway Peru Philippines	
(cont.)	Puerto Rico Romania Western Samoa	

1	2	3
6 514 **(6 512.6)**		
(Ch. No. 603) *(cont.)*	Sweden Thailand Togo	
	Ukraine U.S.S.R. (Far East) U.S.S.R. (North West)	
6 517.1 **(6 515.7)**		
(Ch. No. 604)	Alaska Netherlands Antilles Australia	ADD
	Bangladesh Brazil Bulgaria	ADD
	Cameroon Canada (West) Chile	
	China Spain United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Guam Hawaii Hongkong	
	Indonesia Iran Israel	
	Italy Madagascar Mauritania	
	Mexico Pakistan Papua New Guinea	
(cont.)	Peru Poland Puerto Rico	

1	2	3
6 517.1 **(6 515.7)**		
(Ch. No. 604) *(cont.)*	Tunisia Turkey Tuvalu	ADD
	U.S.S.R. (North West) Yugoslavia	
6 520.2 **(6 518.8)**		
(Ch. No. 605)	Alaska Algeria Bangladesh	
	Brazil Bulgaria Canada (East)	ADD
	Canada (West) Canary Islands Congo	
	Korea Costa Rica Denmark	ADD
	Egypt United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Ethiopia	
	France Guam Hawaii	ADD
	Hungary India (West) Indonesia	
	Iran Iraq Jamaica	
(cont.)	Japan Kuwait Libya	

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6 520.2 **(6 518.8)**		
(Ch. No. 605) *(cont.)*	Madagascar Norway New Zealand	ADD
	Netherlands Peru Philippines	
	Puerto Rico Sudan Sweden	ADD
	Thailand Ukraine Uruguay	
	U.S.S.R. (Far East) Yugoslavia	

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8 720.3 **(8 718.9)**		
(Ch. No. 801)	Alaska Bahrain Bangladesh	
	Chile Denmark Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Guam Hawaii Israel	
	Japan Malaysia Norway	
	Panama Puerto Rico Romania	
	South Africa Sweden U.S.S.R. (Northern Asia)	
8 723.4 **(8 722)**		
(Ch. No. 802)	Azores Alaska Algeria	
	Angola Argentina Australia	
	Cape Verde China Costa Rica	ADD
	United States of America (East) United States of America (South) Finland	
(cont.)	Greece Guinea-Bissau Hawaii	

1	2	3
8 723.4 **(8 722)**		
(Ch. No. 802) *(cont.)*	India (East) Iraq Madeira	
	Mozambique Netherlands Portugal	
	German Democratic Republic United Kingdom Sri Lanka	
8 726.5 **(8 725.1)**		
(Ch. No. 803)	Netherlands Antilles Belgium Canada (East)	
	Korea Cuba Spain	
	United States of America (Central) Norway Pakistan	
	Papua New Guinea Senegal South Africa	
	Sweden Switzerland Turkey	ADD
	U.S.S.R. (Europe) U.S.S.R. (Far East) U.S.S.R. (North West)	
8 729.6 **(8 728.2)**		
(Ch. No. 804)	Argentina Spain United States of America (East)	
(cont.)	United States of America (West) United States of America (South) Finland	

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8 729.6 **(8 728.2)**		
(Ch. No. 804) *(cont.)*	Greece Iraq Japan	
	Jordan Monaco Peru	ADD
	Poland Qatar Sierra Leone	ADD
	Singapore U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia)	
	U.S.S.R. (Far East)	
8 732.7 **(8 731.3)**		
(Ch. No. 805)	Albania Belgium Ecuador	ADD
	Spain United States of America (East) United States of America (West)	
	United States of America (South) Ethiopia Finland	
	Iran Iceland Israel	
	Japan Liberia New Caledonia and Dependencies	
	Papua New Guinea Netherlands South Africa	
	U.S.S.R. (Europe) U.S.S.R. (Far East)	

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8 735.8 **(8 734.4)**		
(Ch. No. 806)	Alaska Argentina Australia	ADD
	Bahrain Bangladesh Belgium	
	Ivory Coast Spain United States of America (East)	
	United States of America (West) Greece Guam	
	Hawaii Italy Japan	
	Panama Netherlands Poland	
	Puerto Rico American Samoa Thailand	ADD
	Ukraine	
8 738.9 **(8 737.5)**	Canada (West)	
(Ch. No. 807)	Chile Cyprus Congo	
	Cuba United States of America (Central) Iceland	
	Italy Japan Kuwait	ADD
(cont.)	Madagascar Malta Mauritania	ADD

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8 738.9 **(8 737.5)**		
(Ch. No. 807) *(cont.)*	New Zealand S. Helena Czechoslovakia	
	U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
8 742 **(8 740.6)**	Alaska	
(Ch. No. 808)	Saudi Arabia Argentina Bahamas	
	Denmark Spain United States of America (East)	
	United States of America (West) Greece Guam	
	Hawaii Italy Japan	ADD
	Norway Philippines Romania	
	Sri Lanka South Africa Sweden	
8 745.1 **(8 743.7)**		
(Ch. No. 809)	Algeria Australia (West) Canary Islands	
	Chile Cuba United States of America (East)	
(cont.)	United States of America (West) Finland Greece	

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8 745.1 **(8 743.7)**		
(Ch. No. 809) *(cont.)*	Iceland Japan Kuwait	
	Mexico Monaco Norway	
	Pakistan German Democratic Republic Czechoslovakia	
	Thailand	
8 748.2 **(8 746.8)**		
(Ch. No. 810)	Argentina Bangladesh Bulgaria	
	Canada (East) China Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Fiji Indonesia Iran	
	Japan Mozambique Norway	
	Poland Portuguese Timor Togo	
	Turkey Yugoslavia	

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8 751.3 **(8 749.9)**		
(Ch. No. 811)	Saudi Arabia Argentina Australia	
	Denmark United States of America (East) United States of America (West)	
	United States of America (South) France Hongkong	
	Hungary Japan Norway	
	Peru Sweden Turkey	
	Yugoslavia	
8 754.4 **(8 753)**	Alaska	
(Ch. No. 812)	Argentina (South) Belgium Canada (North)	
	China Spain United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Hawaii Indonesia Israel	
	Italy Jamaica Japan	ADD
(cont.)	New Zealand Pakistan Poland	

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8 754.4 **(8 753)**		
(Ch. No. 812) *(cont.)*	U.S.S.R. (Europe) U.S.S.R. (North West) Zaire	
8 757.5 **(8 756.1)**		
(Ch. No. 813)	Azores Alaska Algeria	
	Angola Australia Belgium	
	Cape Verde Chile (North) China	
	Denmark United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Greece	
	Guam Guinea-Bissau Hawaii	
	Hungary India (West) Madeira	
	Mozambique Norway Panama	
	Puerto Rico Portugal	
8 760.6 **(8 759.2)**		
(Ch. No. 814) *(cont.)*	Alaska Argentina Canada (West)	

1	2	3
8 760.6 **(8 759.2)**		
(Ch. No. 814) *(cont.)*	Cuba United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Greece	
	Hawaii Indonesia Italy	
	Japan Kiribati Liberia	 ADD
	Pakistan Philippines Thailand	
	U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (Far East)	
8 763.7 **(8 762.3)**		
(Ch. No. 815)	Germany (Federal Republic of) Australia (West) Belgium	
	Chile China Costa Rica	 ADD
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Guiana (French Dep. of) Iraq	
(cont.)	Japan Morocco Singapore	

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8 763.7 **(8 762.3)**		
(Ch. No. 815) *(cont.)*	U.S.S.R. (Europe) U.S.S.R. (North West) Zaire	
8 766.8 **(8 765.4)**		
(Ch. No. 816)	Alaska Argentina Barbados	
	China Congo Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Guam Hawaii	
	Indonesia Pakistan Puerto Rico	
	United Kingdom Tunisia U.S.S.R. (Europe)	
	U.S.S.R. (North West)	
8 769.9 **(8 768.5)**		
(Ch. No. 817)	Alaska Germany (Federal Republic of) Australia	
	Bangladesh Bermuda Canada (East)	
(cont.)	Chile Egypt United States of America (Central)	

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8 769.9 **(8 768.5)**		
(Ch. No. 817) *(cont.)*	United States of America (East) United States of America (West) United States of America (South)	
	France Guam Hawaii	
	Iran Mexico Nauru	 ADD
	Panama Philippines Puerto Rico	ADD
	Romania Sudan Thailand	 ADD
	U.S.S.R. (Europe) U.S.S.R. (Far East) Yemen	
8 773 **(8 771.6)**		
(Ch. No. 818)	Alaska Argentina Bulgaria	
	Cameroon China Cyprus	
	Denmark United States of America (East) United States of America (West)	
	Guam Hawaii Libya	
	Malaysia Norway Pakistan	
(cont.)	Panama Puerto Rico Seychelles (Republic of)	

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8 773 **(8 771.6)**		
(Ch. No. 818) *(cont.)*	Sweden Ukraine	
8 776.1 **(8 774.7)**		
(Ch. No. 819)	Alaska Brazil Canada (West)	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	Hawaii Indonesia Italy	
	Japan Panama Easter Island	ADD
	Reunion (French Dep. of) United Kingdom Thailand	
	U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (North West) Yemen	
8 779.2 **(8 777.8)**		
(Ch. No. 820)	Alaska Germany (Federal Republic of) Argentina	
(cont.)	Cyprus United States of America (East) United States of America (West)	

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8 779.2 **(8 777.8)**		
(Ch. No. 820) *(cont.)*	Greece Guam Hawaii	
	India (East) Iran Italy	
	Japan Panama Philippines	
	Puerto Rico German Democratic Republic Western Samoa	 ADD
	Tanzania U.S.S.R. (North West) Zaire	ADD
8 785.4 **(8 784)**		
(Ch. No. 822)	Australia Bangladesh Brazil	ADD
	China Ivory Coast United States of America (East)	
	United States of America (West) United States of America (South) Hungary	
	Iran Kenya Morocco	
	United Kingdom Switzerland Thailand	
	Ukraine Yugoslavia	

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8 788.5 **(8 787.1)**		
(Ch. No. 823)	Argentina Canada (East) Denmark	
	United States of America (West) Greece India (West)	ADD
	Iraq Italy Jamaica	
	Japan Norway Romania	
	Sweden Tanzania Portuguese Timor	ADD
	U.S.S.R. (Far East) U.S.S.R. (North West)	
8 791.6 **(8 790.2)**		
(Ch. No. 824)	Germany (Federal Republic of) Brazil China	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Iran Jamaica	
	Morocco Oman Peru	
	Poland Reunion (French Dep. of) Singapore	
	Switzerland Tunisia U.S.S.R. (North West)	

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8 794.7 **(8 793.3)** (Ch. No. 825)	Alaska Algeria Argentina	
	Barbados Canada (Central) Cook Islands	
	Denmark United States of America (East) United States of America (West)	
	United States of America (South) France Guadeloupe (French Dep. of)	
	Hungary India (East) Iran	
	Martinique (French Dep. of) Norway Philippines	
	S. Paul and Amsterdam Islands Sweden Ukraine	ADD ADD
	U.S.S.R. (Southern Asia) U.S.S.R. (Far East)	
8 797.8 **(8 796.4)**	Cameroon	
(Ch. No. 826)	Canada (West) China Colombia	
	United States of America (Central) United States of America (East) Guam	
	Indonesia Italy Japan	
(cont.)	Mexico Netherlands Qatar	 ADD

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8 797.8 **(8 796.4)**		
(Voie N° 826) *(suite)*	German Democratic Republic United Kingdom Ukraine	
8 800.9 **(8 799.5)**		
(Ch. No. 827)	Alaska Argentina Bangladesh	
	Korea Denmark Djibouti	
	Spain United States of America (East) United States of America (West)	
	Guam Hawaii Iran	
	Israel Macao Niue Island	
	Norway Panama Peru	
	Puerto Rico Sweden Yugoslavia	
8 804 **(8 802.6)**		
(Ch. No. 828)	Alaska Albania Germany (Federal Republic of)	
	Brazil United States of America (East) United States of America (West)	
(cont.)	France Guadeloupe (French Dep. of) Guam	

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8 804 **(8 802.6)**		
(Ch. No. 828) *(cont.)*	Hawaii Hungary Indonesia	
	Japan Lebanon Morocco	
	Martinique (French Dep. of) Mauritius Mauritania	
	Norway Panama Puerto Rico	
	Ukraine	
8 807.1 **(8 805.7)**		
(Ch. No. 829)	Australia Bangladesh Belgium	
	China Cyprus Denmark	
	United States of America (East) United States of America (West) United States of America (South)	
	Finland Gambia Iran	
	Libya Maldives Mexico	ADD
	Norway Paraguay French Polynesia	
	Sweden Ukraine	

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8 810.2 **(8 808.8)**		
(Ch. No. 830)	Brazil Bulgaria United States of America (South)	
	France India (West) Indonesia	
	Iran Papua New Guinea Peru	
	Poland Puerto Rico S. Pierre and Miquelon (French Dep. of)	
	U.S.S.R. (Southern Asia) U.S.S.R. (Far East) Yemen	
	Yugoslavia	
8 813.3 **(8 811.9)**		
(Ch. No. 831)	China Congo United States of America (West)	
	United States of America (South) Falkland Islands (Malvinas) Iran	
	Iceland Italy Japan	
	Madagascar Malaysia Morocco	
	Pakistan Puerto Rico German Democratic Republic	
	United Kingdom Switzerland Turkey	

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13 102.2 **(13 100.8)**		
(Ch. No. 1201)	Argentina Canada (North) China	
	Cyprus Spain United States of America (East)	
	United States of America (West) United States of America (South) Guiana (French Dep. of)	
	Indonesia Philippines Qatar	ADD
	United Kingdom Ukraine U.S.S.R. (Europe)	
	U.S.S.R. (Far East) U.S.S.R. (North West)	
13 105.3 **(13 103.9)**		
(Ch. No. 1202)	Saudi Arabia Bangladesh Chile	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Fiji Greece	
	Hungary Japan Morocco	
	German Democratic Republic United Kingdom Switzerland	
	Tunisia U.S.S.R. (Northern Asia)	

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13 108.4 **(13 107)**		
(Ch. No. 1203)	Azores Alaska Angola	
	Australia (East) Cape Verde China	
	Colombia Denmark United States of America (Central)	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece Guinea-Bissau Hawaii	
	Iraq Libya Madeira	
	Mozambique Norway Portugal	
	Sweden Portuguese Timor U.S.S.R. (Far East)	
13 111.5 **(13 110.1)**		
(Ch. No. 1204)	Alaska United States of America (East) United States of America (West)	
	United States of America (South) France Greece	
	Guam Hawaii Israel	
(cont.)	Japan Macao Norway	

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13 111.5 **(13 110.1)**		
(Ch. No. 1204) *(cont.)*	Panama Puerto Rico German Democratic Republic	
	Thailand U.S.S.R. (Europe)	
13 114.6 **(13 113.2)**		
(Ch. No. 1205)	Alaska Germany (Federal Republic of) Argentina	
	Bangladesh Ivory Coast Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Guam Hawaii Italy	
	Japan Mozambique Norway	
	New Caledonia and Dependencies Puerto Rico Portuguese Timor	
	Ukraine U.S.S.R. (Europe) Yemen	
13 117.7 **(13 116.3)**		
(Ch. No. 1206)	Albania Australia (West) China	
(cont.)	Spain United States of America (East) United States of America (West)	

1	2	3
13 117.7 **(13 116.3)**		
(Ch. No. 1206) *(cont.)*	United States of America (South) Finland Iran	
	Iceland Italy Japan	
	Madagascar Morocco Peru	
	German Democratic Republic United Kingdom Turkey	
13 120.8 **(13 119.4)**		
(Ch. No. 1207)	Azores Algeria Angola	
	Netherlands Antilles Belgium Canada (West)	
	Cape Verde China Ecuador	ADD
	Greece Iran Israel	
	Japan Madeira Mozambique	
	Nauru Netherlands Portugal	ADD
	Portuguese Timor U.S.S.R. (North West) Yugoslavia	

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13 123.9 **(13 122.5)**		
(Ch. No. 1208)	Germany (Federal Republic of) Argentina Bangladesh	
	China Cyprus Costa Rica	ADD
	United States of America (East) United States of America (South) Greece	
	Hungary Iceland Italy	ADD
	Japan Liberia U.S.S.R. (Europe)	
13 127 **(13 125.6)**		
(Ch. No. 1209)	Alaska Bahrain Brazil	
	Canada (West) Spain United States of America (East)	
	United States of America (West) United States of America (South) Finland	
	Indonesia Italy Japan	
	Mexico New Zealand Peru	
	Poland South Africa Turkey	
	U.S.S.R. (Europe) U.S.S.R. (North West)	

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13 130.1 **(13 128.7)**		
(Ch. No. 1210)	Chile Denmark Djibouti	
	Spain United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	India (West) Indonesia Norway	
	Reunion (French Dep. of) Romania Sweden	
	Switzerland Uruguay U.S.S.R. (Northern Asia)	ADD
	U.S.S.R. (Far East)	
13 133.2 **(13 131.8)**		
(Ch. No. 1211)	Alaska Brazil China	
	Cuba Denmark Spain	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Iraq Italy	
(cont.)	Japan Malaysia Norway	

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13 133.2 **(13 131.8)**		
(Ch. No. 1211) *(cont.)*	Easter Island Sweden U.S.S.R. (Southern Asia)	
	U.S.S.R. (Northern Asia)	
13 136.3 **(13 134.9)**		
(Ch. No. 1212)	Alaska Germany (Federal Republic of) Ivory Coast	
	United States of America (East) United States of America (South) Greece	
	Hawaii Indonesia Japan	
	Mauritius Peru Puerto Rico	
	Sudan U.S.S.R. (Europe) U.S.S.R. (Far East)	ADD
13 139.4 **(13 138)**		
(Ch. No. 1213)	Argentina Barbados Belgium	
	Canada (East) Canary Islands China	
	Korea Finland Greece	
(cont.)	India (East) Iran Iraq	

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13 139.4 **(13 138)**		
(Ch. No. 1213) *(cont.)*	Israel Italy Liberia	
	Norway Netherlands Western Samoa	
	U.S.S.R. (Northern Asia)	
13 142.5 **(13 141.1)**		
(Ch. No. 1214)	Alaska Australia Brazil	
	Canada (West) Cuba Denmark	
	United States of America (Central) United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	Hungary Iran Norway	
	Puerto Rico Sweden Thailand	
	U.S.S.R. (Far East)	
13 145.6 **(13 144.2)**		
(Ch. No. 1215) *(cont.)*	Algeria Belgium Cameroon	

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13 145.6 **(13 144.2)**		
(Ch. No. 1215) *(cont.)*	Denmark Spain United States of America (West)	
	United States of America (South) Greece India (West)	
	Iceland Israel Japan	
	Panama Netherlands Peru	
	Puerto Rico Romania Seychelles (Republic of)	
	Sweden	
13 148.7 **(13 147.3)**		
(Ch. No. 1216)	Alaska Albania Argentina	
	China Egypt United States of America (East)	
	United States of America (West) United States of America (South) Finland	
	Guam Hawaii Iran	
	Lebanon Malta Morocco	ADD
(cont.)	Panama Poland Puerto Rico	

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13 148.7 **(13 147.3)**		
(Ch. No. 1216) *(cont.)*	Singapore Turkey	
13 151.8 **(13 150.4)**		
(Ch. No. 1217)	Algeria Bulgaria Cuba	
	Denmark United States of America (Central) United States of America (East)	
	United States of America (West) United States of America (South) Greece	
	Guadeloupe (French Dep. of) Guam India (East)	
	Iraq Japan Martinique (French Dep. of)	
	Norway S. Helena Sweden	
	U.S.S.R. (Southern Asia) U.S.S.R. (Far East)	
13 154.9 **(13 153.5)**		
(Ch. No. 1218)	Alaska Germany (Federal Republic of) Bangladesh	
	Belgium Cameroon Canary Islands	
(cont.)	Chile United States of America (East) United States of America (West)	

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13 154.9 **(13 153.5)**		
(Ch. No. 1218) *(cont.)*	United States of America (South) Guam Hawaii	
	Iran Italy Japan	
	Niue Island Norway Panama	
	Puerto Rico Turkey U.S.S.R. (Europe)	
13 158 **(13 156.6)**		
(Ch. No. 1219)	Alaska Belgium Brazil	
	Bulgaria Denmark United States of America (East)	
	United States of America (West) United States of America (South) Japan	
	Morocco Norway Netherlands	
	Singapore Sweden Ukraine	
	U.S.S.R. (Europe) U.S.S.R. (Far East) U.S.S.R. (North West)	
13 161.1 **(13 159.7)**		
(Ch. No. 1220) *(cont.)*	Alaska Argentina Bangladesh	

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13 161.1 **(13 159.7)**		
(Ch. No. 1220) *(cont.)*	Bermuda United States of America (East) United States of America (West)	
	United States of America (South) Fiji Greece	
	Guam Hawaii Iran	
	Iceland Japan Jordan	 ADD
	Panama Philippines Poland	
	Puerto Rico German Democratic Republic Tunisia	 ADD
13 167.3 **(13 165.9)**		
(Ch. No. 1222)	Argentina Canada (East) Cook Islands	
	France Guadeloupe (French Dep. of) Hawaii	
	India (West) Iran Japan	
	Martinique (French Dep. of) Mexico Norway	
	Romania Turkey U.S.S.R. (Far East)	

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13 170.4 **(13 169)**		
(Ch. No. 1223)	Saudi Arabia Bangladesh Brazil	
	Denmark United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	Japan Morocco Norway	
	Sweden Czechoslovakia Ukraine	
13 173.5 **(13 172.1)**		
(Ch. No. 1224)	Alaska Germany (Federal Republic of) Chile	
	United States of America (East) United States of America (West) Finland	
	Guam Hawaii Jamaica	
	Japan Kuwait Monaco	
	New Zealand Panama Puerto Rico	
	United Kingdom Sri Lanka South Africa	
	Yugoslavia	

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13 176.6 **(13 175.2)**		
(Ch. No. 1225)	China Spain United States of America (East)	
	United States of America (South) Greece Iran	
	Madagascar Mexico Norway	
	Papua New Guinea Romania U.S.S.R. (North West)	
13 179.7 **(13 178.3)**		
(Ch. No. 1226)	Australia Bangladesh Chile	
	Denmark United States of America (East) United States of America (West)	
	United States of America (South) France Iran	
	Japan Norway Sweden	ADD
	Czechoslovakia Togo Turkey	
	U.S.S.R. (North West)	
13 182.8 **(13 181.4)**		
(Ch. No. 1227) *(cont.)*	Alaska Australia Spain	

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13 182.8 **(13 181.4)**		
(Ch. No. 1227) *(cont.)*	United States of America (East) United States of America (West) Finland	
	Guam Hawaii India (East)	
	Kuwait Panama Poland	
	Puerto Rico Switzerland Tanzania	ADD
	U.S.S.R. (Far East) Yugoslavia Zaire	
13 185.9 **(13 184.5)**		
(Ch. No. 1228)	Brazil Chile China	
	Cuba United States of America (Central) United States of America (East)	
	United States of America (West) Hungary Italy	ADD
	Maldives Norway Pakistan	ADD
	United Kingdom Ukraine U.S.S.R. (Europe)	
13 189 **(13 187.6)**		
(Ch. No. 1229) *(cont.)*	Argentina Australia Bulgaria	

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13 189 **(13 187.6)**		
(Ch. No. 1229) *(cont.)*	Canada (East) Korea United States of America (West)	
	France Japan Poland	
	Qatar U.S.S.R. (Southern Asia) U.S.S.R. (Northern Asia)	ADD
	U.S.S.R. (Europe) U.S.S.R. (North West) Yugoslavia	
13 192.1 **(13 190.7)**		
(Ch. No. 1230)	Argentina Bangladesh Cyprus	
	Costa Rica United States of America (East) United States of America (West)	ADD
	United States of America (South) Finland Hawaii	
	Italy Japan Mauritania	
	United Kingdom Switzerland Ukraine	
13 195.2 **(13 193.8)**		
(Ch. No. 1231)	Alaska Australia United States of America (East)	
(cont.)	United States of America (West) France Greece	

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13 195.2 **(13 193.8)**		
(Ch. No. 1231) *(cont.)*	Guam Hawaii Hongkong	
	Iran Libya Norway	
	Panama Paraguay Peru	
	Poland Puerto Rico	
13 198.3 **(13 196.9)**		
(Ch. No. 1232)	Alaska Algeria Argentina	
	United States of America (East) United States of America (West) Greece	
	Guam Hawaii Japan	
	Mauritania Pakistan Panama	ADD
	German Democratic Republic United Kingdom American Samoa	ADD
	U.S.S.R. (Southern Asia)	

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17 234.3 **(17 232.9)** (Ch. No. 1601)	Alaska Argentina Denmark	
	United States of America (East) United States of America (South) Hawaii	
	Japan Norway Seychelles (Republic of)	
	Sweden Tunisia Ukraine	
	U.S.S.R. (Europe) U.S.S.R. (North West)	
17 237.4 **(17 236)** (Ch. No. 1602)	Saudi Arabia Australia (East) Bangladesh	
	Cameroon United States of America (East) United States of America (West)	
	United States of America (South) Greece Morocco	
	United Kingdom U.S.S.R. (Northern Asia) U.S.S.R. (Europe)	
	U.S.S.R. (Far East)	
17 240.5 **(17 239.1)** (Ch. No. 1603) *(cont.)*	Alaska Argentina (North) Bangladesh	

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17 240.5 **(17 239.1)**		
(Ch. No. 1603) *(cont.)*	China Cyprus Denmark	
	United States of America (East) United States of America (West) United States of America (South)	
	Guadeloupe (French Dep. of) Hungary Italy	
	Malta Martinique (French Dep. of) Norway	ADD
	Sweden	
17 243.6 **(17 242.2)**		
(Ch. No. 1604)	Australia Canada (East) France	
	Greece Japan Mexico	
	Norway Romania	
17 246.7 **(17 245.3)**		
(Ch. No. 1605)	Denmark United States of America (East) United States of America (West)	
	France India (West) Iran	
(cont.)	Japan Norway Philippines	

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17 246.7 **(17 245.3)**		
(Ch. No. 1605) *(cont.)*	French Polynesia Sweden Ukraine	
	U.S.S.R. (Europe)	
17 249.8 **(17 248.4)**		
(Ch. No. 1606)	Bangladesh Brazil Cuba	
	United States of America (West) United States of America (South) Finland	
	Iceland Italy Japan	
	New Zealand Puerto Rico United Kingdom	
	Turkey U.S.S.R. (Europe)	
17 252.9 **(17 251.5)**		
(Ch. No. 1607)	Alaska Netherlands Antilles Canada (East)	
	United States of America (East) United States of America (West) United States of America (South)	
	Greece India (East) Iran	
(cont.)	Liberia Monaco Norway	

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17 252.9 **(17 251.5)**		
(Ch. No. 1607) *(cont.)*	Poland U.S.S.R. (Far East) U.S.S.R. (North West)	
17 256 **(17 254.6)**		
(Ch. No. 1608)	Canada (West) China Denmark	
	Italy Mauritania Norway	
	Peru South Africa Sweden	
	Czechoslovakia Turkey	
17 259.1 **(17 257.7)**	Saudi Arabia	
(Ch. No. 1609)	Belgium Cook Islands Costa Rica	ADD
	Spain United States of America (East) United States of America (West)	
	United States of America (South) Greece India (East)	
	Israel Japan U.S.S.R. (North West)	
17 262.2 **(17 260.8)**		
(Ch. No. 1610) *(cont.)*	Germany (Federal Republic of) Australia China	

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17 262.2 **(17 260.8)**		
(Ch. No. 1610) *(cont.)*	Egypt United States of America (East) United States of America (West)	
	United States of America (South) Indonesia Iran	
	Mauritania Norway Tunisia	
	Ukraine Uruguay U.S.S.R. (North West)	
17 265.3 **(17 263.9)**		
(Ch. No. 1611)	Brazil United States of America (East) United States of America (West)	
	United States of America (South) Finland Japan	
	Libya Malaysia Peru	
	United Kingdom Switzerland Turkey	
	Yugoslavia	
17 268.4 **(17 267)**		
(Ch. No. 1612)	Alaska Australia Cuba	
(cont.)	United States of America (East) United States of America (West) United States of America (South)	

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17 268.4 **(17 267)** (Ch. No. 1612) *(cont.)*	Guam Hawaii Morocco Pakistan Puerto Rico Ukraine U.S.S.R. (Europe) U.S.S.R. (Far East) U.S.S.R. (North West)	
17 271.5 **(17 270.1)** (Ch. No. 1613)	Alaska Belgium Brazil Spain United States of America (East) United States of America (West) United States of America (South) Greece Guam Hawaii Iran Israel Norway Panama Puerto Rico Romania Singapore U.S.S.R. (Far East)	
17 274.6 **(17 273.2)** (Ch. No. 1614) *(cont.)*	Canada (West) China Denmark Finland Italy Maldives Mexico	 ADD

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17 274.6 **(17 273.2)** (Ch. No. 1614) *(cont.)*	Niue Island Norway Sweden U.S.S.R. (Northern Asia)	
17 277.7 **(17 276.3)** (Ch. No. 1615)	Azores Angola Cape Verde Finland Guinea-Bissau Iran Iceland Madeira Mozambique Portugal United Kingdom Switzerland Portuguese Timor U.S.S.R. (Far East)	
17 280.8 **(17 279.4)** (Ch. No. 1616)	Alaska Germany (Federal Republic of) United States of America (East) United States of America (West) United States of America (South) Hawaii Iran Italy Japan Morocco Turkey U.S.S.R. (North West)	

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17 283.9 **(17 282.5)**		
(Ch. No. 1617)	Bangladesh Brazil Canary Islands	
	Denmark France Greece	
	Hungary Iran Israel	
	Mexico Norway Sweden	
	U.S.S.R. (Northern Asia) U.S.S.R. (Far East)	
17 287 **(17 285.6)**		
(Ch. No. 1618)	Argentina Bahrain Bermuda	
	Denmark India (West) Japan	
	Morocco Norway United Kingdom	
	Sweden Turkey Yugoslavia	
17 290.1 **(17 288.7)**		
(Ch. No. 1619)	Alaska United States of America (East) United States of America (West)	
(cont.)	France Greece Guam	

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17 290.1 **(17 288.7)** (Ch. No. 1619) *(cont.)*	. . . Hawaii Kuwait Liberia . . . Mauritius Norway Panama . . . Peru Puerto Rico German Democratic Republic . . . U.S.S.R. (Far East)	
17 293.2 **(17 291.8)** (Ch. No. 1620)	. . . United States of America (Central) United States of America (East) Japan . . . Libya Norway Turkey . . . Ukraine U.S.S.R. (Europe)	
17 299.4 **(17 298)** (Ch. No. 1622)	. . . Australia Bangladesh Denmark . . . France Greece Japan . . . Kuwait Norway Panama . . . Romania Sweden Switzerland	 ADD ADD

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17 302.5 (17 301.1)		
(Ch. No. 1623)	Alaska China Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Finland Guam Hawaii	
	Pakistan Panama Paraguay	
	Netherlands Puerto Rico Reunion (French Dep. of)	
	United Kingdom Ukraine	
17 305.6 (17 304.2)		
(Ch. No. 1624)	Germany (Federal Republic of) Bangladesh Spain	
	United States of America (East) United States of America (West) United States of America (South)	
	Italy Japan Western Samoa	
	U.S.S.R. (Europe)	
17 308.7 (17 307.3)		
(Ch. No. 1625) *(cont.)*	Alaska Belgium United States of America (East)	

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17 308.7 **(17 307.3)** (Ch. No. 1625) *(cont.)*	United States of America (West) United States of America (South) Greece Guam Hawaii Iran Iceland Japan Poland Puerto Rico	
17 311.8 **(17 310.4)** (Ch. No. 1626)	Canada (West) Cuba United States of America (East) Greece Iraq Netherlands Qatar U.S.S.R. (Northern Asia) U.S.S.R. (Far East) U.S.S.R. (North West)	 ADD
17 314.9 **(17 313.5)** (Ch. No. 1627)	Belgium Spain Greece Hungary Japan Norway Peru U.S.S.R. (Europe) Yugoslavia	

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17 318 **(17 316.6)**		
(Ch. No. 1628)	Bangladesh Cuba France	
	Greece Guadeloupe (French Dep. of) Iraq	
	Israel Martinique (French Dep. of) Romania	
	U.S.S.R. (Far East) U.S.S.R. (North West)	
17 321.1 **(17 319.7)**		
(Ch. No. 1629)	Algeria Australia Canada (East)	
	Costa Rica Greece Iran	ADD
	Japan Norway German Democratic Republic	
	Senegal	
17 324.2 **(17 322.8)**		
(Ch. No. 1630)	Alaska Belgium Spain	
	United States of America (East) United States of America (West) United States of America (South)	
(cont.)	Guam Hawaii India (West)	

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17 324.2 **(17 322.8)** (Ch. No. 1630) *(cont.)*	Iceland Panama Puerto Rico U.S.S.R. (Europe)	
17 327.3 **(17 325.9)** (Ch. No. 1631)	Algeria Bulgaria Chile China United States of America (East) Greece Iraq Poland Sudan Switzerland Togo	ADD
17 330.4 **(17 329)** (Ch. No. 1632)	Azores Alaska Argentina Bangladesh Cyprus United States of America (East) United States of America (West) United States of America (South) Hungary Japan Madagascar Madeira Pakistan Portugal United Kingdom	

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17 333.5 **(17 332.1)** (Ch. No. 1633)		
	Alaska Brazil China	
	United States of America (East) United States of America (West) France	
	Greece Guam Hawaii	
	Panama Poland Puerto Rico	
	German Democratic Republic South Africa U.S.S.R. (Southern Asia)	
17 336.6 **(17 335.2)** (Ch. No. 1634)		
	Germany (Federal Republic of) Canada (North) Korea	
	Ivory Coast Spain Greece	
	Japan Romania	
17 339.7 **(17 338.3)** (Ch. No. 1635)	Azores	
	Angola Australia Bangladesh	
	Bulgaria Cape Verde Denmark	
(cont.)	Guinea-Bissau Italy Japan	ADD

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17 339.7 **(17 338.3)**		
(Ch. No. 1635) *(cont.)*	Macao Madeira Mozambique	
	Norway Panama Portugal	ADD
	Sweden Portuguese Timor	
17 342.8 **(17 341.4)**		
(Ch. No. 1636)	Alaska Algeria United States of America (East)	
	United States of America (West) Finland Greece	
	Guam Hawaii India (East)	
	Japan Pakistan Panama	
	Netherlands Puerto Rico	
17 345.9 **(17 344.5)**		
(Ch. No. 1637)	Korea Spain Hongkong	
	Jamaica Madagascar New Zealand	
	United Kingdom U.S.S.R. (Southern Asia)	

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17 349 **(17 347.6)** (Ch. No. 1638)	Alaska	
	Bulgaria United States of America (East) United States of America (West)	
	Finland Guam Hawaii	
	Morocco Pakistan Poland	
	German Democratic Republic American Samoa Yugoslavia	ADD ADD
17 352.1 **(17 350.7)** (Ch. No. 1639)		
	Alaska Albania Germany (Federal Republic of)	
	Spain United States of America (East) United States of America (West)	
	Guam Hawaii Panama	
	Netherlands Puerto Rico Zaire	
17 355.2 **(17 353.8)** (Ch. No. 1640)	Barbados	
	Chile Greece Japan	
	Panama German Democratic Republic United Kingdom	ADD
	Sri Lanka Thailand U.S.S.R. (Europe)	

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17 358.3 **(17 356.9)**		
(Ch. No. 1641)	Algeria Denmark United States of America (East)	
	United States of America (West) United States of America (South) Iraq	
	Japan Norway Singapore	
	Sweden Ukraine	

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22 597.4 **(22 596)**		
(Ch. No. 2201)	Australia Cameroon China	
	Spain United States of America (East) United States of America (West)	
	United States of America (South) Greece Guam	
	Hungary U.S.S.R. (North West)	
22 600.5 **(22 599.1)**		
(Ch. No. 2202)	Argentina Bangladesh Canada (East)	
	Hungary Iran Italy	
	Mauritania Norway Peru	
	Ukraine U.S.S.R. (Far East)	
22 603.6 **(22 602.2)**		
(Ch. No. 2203)	Australia (East) Bulgaria Denmark	
	Iran Japan Morocco	
	Norway Panama Sweden	ADD

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22 606.7 **(22 605.3)**		
(Ch. No. 2204)	Argentina Canada (North) Finland	
	France Israel Kuwait	
	South Africa U.S.S.R. (Far East) U.S.S.R. (North West)	
	Yugoslavia	
22 609.8 **(22 608.4)**		
(Ch. No. 2205)	Algeria Australia United States of America (East)	
	United States of America (West) United States of America (South) Greece	
	Iran Netherlands U.S.S.R. (Europe)	
	U.S.S.R. (Far East) U.S.S.R. (North West)	
22 612.9 **(22 611.5)**		
(Ch. No. 2206)	Alaska United States of America (East) United States of America (West)	
	United States of America (South) Guam Hawaii	
(cont.)	India (West) Japan Morocco	

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22 612.9 **(22 611.5)**		
(Ch. No. 2206) *(cont.)*	Peru Poland Puerto Rico	
	United Kingdom South Africa Yugoslavia	
22 616 **(22 614.6)**		
(Ch. No. 2207)	Azores Germany (Federal Republic of) Bangladesh	
	Cape Verde China Costa Rica	 ADD
	Israel Madeira Portugal	
	Portuguese Timor Tunisia U.S.S.R. (Europe)	
22 619.1 **(22 617.7)**		
(Ch. No. 2208)	Argentina (North) Bulgaria Denmark	
	India (East) Italy Japan	 ADD
	Morocco Norway Panama	 ADD
	Sweden	

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22 622.2 **(22 620.8)**		
(Ch. No. 2209)	Alaska Belgium Korea	
	United States of America (East) United States of America (West) Greece	
	Guam Hawaii Morocco	
	Panama Poland Puerto Rico	
	Sudan U.S.S.R. (North West)	ADD
22 625.3 **(22 623.9)**		
(Ch. No. 2210)	Bangladesh Spain United States of America (East)	
	Finland Greece Japan	
	Netherlands Ukraine	
22 628.4 **(22 627)**		
(Ch. No. 2211)	Cuba Denmark Italy	
	Japan Norway Sweden	
	Ukraine	

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22 631.5 **(22 630.1)**		
(Ch. No. 2212)	Alaska Australia Cyprus	
	United States of America (East) United States of America (West) Guam	
	Hawaii Hungary Panama	
	Puerto Rico United Kingdom Singapore	
22 634.6 **(22 633.2)**		
(Ch. No. 2213)	Bulgaria Canada (East) Denmark	
	Spain Iraq Libya	
	Norway New Zealand Sweden	
	Turkey U.S.S.R. (Europe) U.S.S.R. (Far East)	
22 637.7 **(22 636.3)**		
(Ch. No. 2214)	Bangladesh Belgium China	
	Spain United States of America (East) United States of America (West)	
(cont.)	United States of America (South) Finland Iran	

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22 637.7 **(22 636.3)** (Ch. No. 2214) *(cont.)*	Switzerland Turkey Uruguay U.S.S.R. (North West)	
22 640.8 **(22 639.4)** (Ch. No. 2215)	United States of America (East) United States of America (West) United States of America (South) France Greece Iraq Japan Norway Peru Poland	
22 643.9 **(22 642.5)** (Ch. No. 2216)	Canada (West) Denmark United States of America (East) United States of America (South) Greece Guam Italy Japan Kuwait Mauritania Norway	

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22 647 **(22 645.6)**		
(Ch. No. 2217)	Alaska Germany (Federal Republic of) Bangladesh	
	Spain United States of America (East) United States of America (West)	
	Greece Guam Hawaii	
	Hongkong Iran Israel	
	Liberia Panama Peru	
	Puerto Rico	
22 650.1 **(22 648.7)**		
(Ch. No. 2218)	Alaska Cyprus Denmark	
	United States of America (East) United States of America (West) United States of America (South)	
	France Guam Hawaii	
	Norway Puerto Rico Sweden	
	Ukraine	

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22 653.2 **(22 651.8)**		
(Ch. No. 2219)	Bangladesh Belgium China	
	Cuba Greece Liberia	
	Monaco Poland Western Samoa	
22 656.3 **(22 654.9)**		
(Ch. No. 2220)	Canada (West) Greece German Democratic Republic	
	United Kingdom Senegal Switzerland	ADD
	Czechoslovakia	
22 662.5 **(22 661.1)**		
(Ch. No. 2222)	Azores Germany (Federal Republic of) Saudi Arabia	
	Cape Verde Korea United States of America (East)	
	United States of America (West) United States of America (South) Finland	
	Greece Madeira Maldives	ADD
	Portugal Portuguese Timor	

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22 665.6 **(22 664.2)**		
(Ch. No. 2223)	Alaska Germany (Federal Republic of) Australia	
	Bangladesh United States of America (East) United States of America (West)	
	Hawaii Italy Japan	
	Malta Puerto Rico Togo	ADD
	Turkey	
22 668.7 **(22 667.3)**		
(Ch. No. 2224)	Alaska Spain United States of America (East)	
	United States of America (West) Greece Guam	
	Hawaii Iraq Mauritius	
	Panama Puerto Rico German Democratic Republic	
22 671.8 **(22 670.4)**		
(Ch. No. 2225)	Algeria Belgium Chile	
(cont.)	Ivory Coast Greece India (West)	

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22 671.8 **(22 670.4)**		
(Ch. No. 2225) *(cont.)*	Iceland Japan Mexico	
22 674.9 **(22 673.5)**		
(Ch. No. 2226)	Albania Bangladesh China	
	Costa Rica Egypt France	ADD
	Iceland German Democratic Republic Romania	
22 678 **(22 676.6)**		
(Ch. No. 2227)	Algeria United States of America (East) United States of America (West)	
	United States of America (South) Greece Guadeloupe (French Dep. of)	
	India (East) Japan Martinique (French Dep. of)	
	Pakistan United Kingdom Ukraine	
22 681.1 **(22 679.7)**		
(Ch. No. 2228)	Australia Bangladesh Denmark	
(cont.)	United States of America (East) United States of America (West) Greece	

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22 681.1 **(22 679.7)**		
(Ch. No. 2228) *(cont.)*	Morocco Norway Sweden	
	U.S.S.R. (Far East)	
22 684.2 **(22 682.8)**		
(Ch. No. 2229)	Canada (East) Spain India (West)	
	Japan United Kingdom Thailand	
	Ukraine	
22 687.3 **(22 685.9)**		
(Ch. No. 2230)	Alaska Australia Spain	
	United States of America (East) United States of America (West) Guam	
	Hawaii Norway Panama	
	Puerto Rico German Democratic Republic Sweden	
	Turkey U.S.S.R. (Southern Asia)	

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22 690.4 **(22 689)** (Ch. No. 2231)	Alaska Saudi Arabia Canada (West) United States of America (East) United States of America (West) United States of America (South) Finland France Greece Japan Malaysia Niue Island U.S.S.R. (Europe)	
22 693.5 **(22 692.1)** (Ch. No. 2232)	Cuba Greece Iraq Netherlands Poland Switzerland U.S.S.R. (Europe) U.S.S.R. (Far East)	
22 696.6 **(22 695.2)** (Ch. No. 2233) *(cont.)*	Alaska Bangladesh Cook Islands United States of America (East) United States of America (West) United States of America (South) Greece Guam Hawaii	ADD

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22 696.6 **(22 695.2)**		
(Ch. No. 2233) *(cont.)*	Iran Norway Panama	
	Puerto Rico Romania	
22 699.7 **(22 698.3)**		
(Ch. No. 2234)	Argentina Denmark Indonesia	
	Japan Libya Mexico	
	Norway Romania Sweden	
22 702.8 **(22 701.4)**		
(Ch. No. 2235)	Alaska United States of America (East) United States of America (West)	
	United States of America (South) France Greece	
	Guam Hawaii Iran	
	Japan Puerto Rico Qatar	ADD
	U.S.S.R. (North West)	

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22 705.9 **(22 704.5)** (Ch. No. 2236)	Denmark Spain United States of America (East)	
	United States of America (West) Greece Iraq	
	Japan Norway New Zealand	
	Ukraine	
22 709 **(22 707.6)** (Ch. No. 2237)	Azores United States of America (East) United States of America (West)	
	United States of America (South) Iran Italy	
	Japan Madeira Norway	
	Portugal Romania	
22 712.1 **(22 710.7)** (Ch. No. 2238)	Algeria Germany (Federal Republic of) Australia	
	Brazil Greece Hungary	
(cont.)	Iraq Japan Mexico	

1	2	3
22 712.1 **(22 710.7)**		
(Ch. No. 2238) *(cont.)*	U.S.S.R. (Europe)	
22 715.2 **(22 713.8)**		
(Ch. No. 2239)	Alaska Belgium Spain	
	United States of America (East) United States of America (West) Guam	
	Hawaii India (East) Iran	
	Norway Panama Puerto Rico	
	Yugoslavia	
22 718.3 **(22 716.9)**		
(Ch. No. 2240)	Chile Greece Jamaica	
	Japan Madagascar Norway	
	Pakistan Tunisia	

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TABLE OF ALLOTMENTS ADDED TO THE PLAN

Column headings

1. Channel number (the corresponding carrier and assigned frequencies are indicated in Section A of Appendix **16** and in the present Appendix).

2. Country or area of allotment.

3.1 Main service area.

A number between 1 and 22 refers to a Zone defined on the Map of Maritime Zones appearing in the Preface to the International Frequency List.

3.2 Maximum length of circuit in kilometres.

4. Nature of service.

5. Class of emission.

6. Peak envelope power in kW.

7. Transmitting antenna characteristics.

7.1 In the case of a non-directional antenna, the symbol ND is entered in this column and columns 7.2a), b) and c) are left blank. In the case of a directional antenna, the symbol D is entered in this column and the characteristics are given in columns 7.2a), b) and c).

7.2a) Azimuth of maximum radiation. The symbol ROT entered in this column means that a rotatable antenna is used.

7.2b) Angular width of main lobe.

7.2c) Relative gain of the antenna in dB.

8. Planned scheduled hours of operation in the channel (UTC).

9.a) Estimated peak hours of traffic.

9.b) Estimated daily volume of traffic in minutes.

10. Special Section No./IFRB Circular No./Date (e.g. MAR/10/1305/280278).

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1	2	3		4	5	6	7				8	9		10
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
401	AUS	GF CARPENTARIA	800	CV	J3E	0.1	ND				2200-1000	2200-1000	30	MAR/54/1640/021084
401	PNR	9, 18	500	CP	J3E	1	ND				0000-1200		<25	AR16/84/1838/160888
403	PNR	9, 18	500	CP	J3E	1	ND				0800-1200		>25	AR16/84/1838/160888
405	CTR	9, 18	2000	CP	J3E	1	ND				0100-1200	0100-0500	50	AR16/83/1837/090888
405	USA	GREAT LAKES (CL USA)	800	CP	J3E	1 0.032	ND				1100-2300 2300-1100	1200-1800	180	MAR/50/1609/280284
407	AUS	–	800	CO CP	J3E R3E	5	ND				0000-2400			MAR/48/1602/100184
407	I	17	1200	CO	J3E	1.5	ND				0500-2200	0700-1100	60	MAR/58/1682/300785
408	B	–	800	CV	J3E	0.15	ND				0000-2400		120	MAR/69/1712/040386
408	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
408	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	84	9	2030-2200			AR16/80/1824/100588
408	SMA	SO PACIF	1000	CP	J3E	1	ND				1800-0400		30	MAR/10/1305/280278
409	QAT	6	2500	CP	J3E	1	ND				0000-2400			AR16/89/1886/250789
411	AMS	10	–	CP	J3E R3E	0.3	ND				0430-0445 0830-0845 1230-1245		5-25	MAR/15/1347/191278
411	EQA	–	800	CP	J3E	0.25	ND				0030-0530		30	AR16/90/1895/260989
411	I	17	–	CO	J3E	1.5	ND				0500-2200	0700-1100	60	AR16/75/1747/041186
411	KIR	–	500	CP	J3E	0.5	ND				0800-1800			MAR/59/1686/270885
412	CTR	9, 18	2000	CP	J3E	1	ND				0100-1200	0100-0500	50	AR16/83/1837/090888
417	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186
418	B	–	800	CV	J3E	0.15	ND				0000-2400	0700-1100	240	MAR/69/1712/040386
418	I	17	–	CO	J3E	1.5	ND				0500-2200	0700-1100	60	AR16/75/1747/041186
419	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/57/1680/160785
422	SUI	15, 17	4000	CP	J3E	5	D	ROT	30	8	1900-0200	2000-2200	20	MAR/62/1694/221085
423	B	–	800	CV	J3E	0.5	ND				0000-2400			MAR/16/1350/160179

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		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
423	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HN	2000-2100	60	MAR/41/1565/190483
423	QAT	GULF, INDN OC GULF, INDN OC GULF, INDN OC GULF, INDN OC	800 1500 1500 1500	CP	J3E R3E	5	ND D D D	 130 200 310	 60 60 60	 9 9 9	0000-2400		200	MAR/23/1412/010480
424	AUS	–	800	CO CP	J3E R3E	1	ND				0000-2400			MAR/48/1602/100184
424	PNR	9, 18	500	CP	J3E	1	ND				0800-1200		> 25	AR16/73/1742/300986
425	B	–	800	CV	J3E	0.5	ND				1000-2300	1900-2200	100	MAR/16/1350/160179
425	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				1700-0500			MAR/49/1604/240184
601	I	17	–	CO	J3E	1.5	ND				0400-2200	0600-1400	60	AR16/75/1747/041186
601	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
601	NCL	7, 8, 12	2500	CP	J3E	0.5	ND				0000-2400			AR16/71/1737/260886
602	B	–	800	CP	J3E	1	ND				0000-2400			MAR/69/1712/040386
602	CTR	9, 18	2000	CP	J3E	1	ND				0000-1300	0000-0400	40	AR16/83/1837/090888
602	EQA	–	800	CP	J3E	0.25	ND				0630-1000		30	AR16/90/1895/260989
602	FJI	12	1000	CP	J3E	1	ND				1800-0600	2000-0500	120	MAR/37/1519/180582
603	AUS	AUSTRALIAN COASTAL	4000	CP	J3E	1	ND				HX	HJ	30	MAR/55/1651/181284
603	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HJ	0900-1100	60	MAR/41/1565/190483
604	ATN	CL ATLANT, CARIB SEA, GF MEX	1500	CP	J3E R3E	1	ND				0000-0200 0600-1000		120	MAR/35/1495/171181
604	B	–	800	CP	J3E	1	ND				1000-1300 1700-2000			MAR/69/1712/040386
604	TUV	–	450	CP	J3E	1	ND				1800-1200	2000-0400	30	AR16/91/1897/101089
605	B	–	800	CP	J3E	1	ND				1000-1300 1700-2000			MAR/69/1712/040386
605	CTR	9, 18	2000	CP	J3E	1	ND				0000-1300	0000-0400	40	AR16/83/1837/090888

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		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
605	F	GOLFE DE GASCOGNE / BAY OF BISCAY / MAR CANTÁBRICO, MEDIT	2500	CP	J3E	10	ND				0600-0900 1700-2200	1800-2200	300	MAR/56/1679/090785
605	NZL	7, 8, 11, 12, 13	6000	CP	J3E	5	ND				0000-2400	0400-0900	90	MAR/63/1695/291085
605	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	70	13	2030-2200			AR16/80/1824/100588
802	CTR	9, 18	2000	CP	J3E	1	ND				0000-2400	1400-2400	200	AR16/83/1837/090888
803	SUI	15, 16, 17, 18, 19	6000	CP	J3E	10	D	ROT	30	8	0600-0200	0600-1000 1700-2200	50	MAR/62/1694/221085
804	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				0500-1700			MAR/49/1604/240184
804	QAT	GULF, RED SEA, INDN OC GULF, INDN OC GULF, RED SEA, INDN OC GULF, RED SEA, INDN OC, MEDIT	1500 2500 2500 2500	CP	J3E R3E	5	ND D D D	 130 200 310	 60 60 60	 10 10 10	0000-2400		200	MAR/23/1412/010480
805	EQA	–	800	CP	J3E	0.25	ND				1130-1730		30	AR16/90/1895/260989
806	AUS	COTE / COAST / COSTA: AUS NW, W, SW	2000	CP	J3E	1	ND				2100-0500	2100-0500	90	MAR/52/1631/310784
806	SMA	SO PACIF	3000	CP	J3E	1	ND				1800-0400		30	MAR/11/1310/040478
807	I	15, 17	–	CO	J3E	1.5	ND				0000-2400	0500-1300	60	AR16/75/1747/041186
807	MLT	MEDIT, NO E ATLANT, RED SEA, NO INDN OC	3000	CP	J3E R3E	1.5	ND				HJ	0100-1100	60	MAR/41/1565/190483
808	I	15, 17	–	CO	J3E	1.5	ND				0000-2400	1300-2100	60	AR16/75/1747/041186
812	I	15, 17	–	CO	J3E	1.5	ND				0000-2400	2100-0500	60	AR16/75/1747/041186
814	KIR	–	500	CP	J3E	0.5	ND				1800-0800			MAR/65/1702/171285
815	CTR	9, 18	2000	CP	J3E	1	ND				0000-2400	1400-2400	200	AR16/83/1837/090888
817	NRU	PACIF	2500	CP	J3E R3E	1	ND				2030-0500		3	MAR/28/1440/141080
817	PNR	9, 18	2000	CP	J3E	1	ND				1200-2300		>25	AR16/84/1838/160888
817	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	70	13	0430-0600			AR16/80/1824/100588
819	PNR	9, 18	2000	CP	J3E	1	ND				1200-2300		>25	AR16/84/1838/160888

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		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
820	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588
820	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186
822	AUS	COTE / COAST / COSTA: AUS N, NE	3000	CP	J3E	1	ND				HJ	HJ	90	MAR/64/1696/051185
823	TZA	6, 10, 19, 21	3200	CO CP	J3E	1	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186
823	USA	9	1200	CO	J3E	1	ND				1600-0400	1600-1800 0000-0200	180	AR16/92/1910/230190
825	AMS	10	–	CP	J3E R3E	0.3	ND				0445-0500 0845-0900 1245-1300		5-25	MAR/15/1347/191278
825	S	5, 6, 10, 15, 16, 17, 18, 19, 21		CP	J3E	10	D	10 50 130 170 210 250 310	60	11	0000-2400	0800-1000	90	AR16/70/1730/080786
826	QAT	6	2500	CP	J3E	1	ND				0000-2400			AR16/89/1886/250789
829	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
1201	QAT	6	2500	CP	J3E	1	ND				0400-0600 1400-1600			AR16/89/1886/250789
1207	EQA	–	800	CP	J3E	0.25	ND				1830-2330		30	AR16/90/1895/260989
1207	NRU	CL PACIF	3000	CP	J3E R3E	1	ND				HX	2000-0530	20	MAR/34/1475/300681
1208	CTR	9, 18	2000	CP	J3E	1	ND				0000-2400	1500-2300	200	AR16/83/1837/090888
1208	I	6, 15, 16, 17, 18	–	CO	J3E	1.5	ND				0300-2200	0600-1100	30	AR16/75/1747/041186
1210	SUI	6, 10, 15, 16, 17, 18, 19, 20, 21	9000	CP	J3E	10	D	ROT	30	8	0600-0200	0800-1200 1600-2100	60	MAR/62/1694/221085

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		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
1212	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	0400-0600			AR16/80/1824/100588
1216	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-2400			MAR/22/1399/030180
1220	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588
1220	JOR	6, 15, 17	5000	CP	J3E R3E	5	ND				0500-1700			MAR/49/1604/240184
1226	S	5, 6, 10, 15, 16, 17, 18, 19, 21		CP	J3E	10	D	10 50 130 170 210 250 310	60	11	0000-2400	0800-1000	90	AR16/70/1730/080786
1227	TZA	6, 10, 19, 21	3200	CO CP	J3E	5	ND				0700-1800	0800-1000 1500-1700	240	MAR/66/1707/280186
1228	I	6, 15, 16, 17, 18	–	CO	J3E	1.5	ND				2200-0500	2300-0200	30	AR16/75/1747/041186
1228	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
1229	QAT	GULF, RED SEA, INDN OC, MEDIT GULF, INDN OC GULF, RED SEA, INDN OC, MEDIT GULF, RED SEA, INDN OC, MEDIT	2000 3000 3000 3000	CP	J3E R3E	5	ND D D D	 130 200 310	 60 60 60	 11 11 11	0400-0600 1400-1600		200	MAR/23/1412/010480
1230	CTR	9, 18	2000	CP	J3E	1	ND				0000-2400	1500-2300	200	AR16/83/1837/090888
1232	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1200-2400		> 25	AR16/84/1838/160888
1232	SMA	SO PACIF	3000	CP	J3E	1	ND				1800-0400		30	MAR/11/1310/040478
1603	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-1159			MAR/21/1379/070879
1609	CTR	9, 18	2000	CP	J3E	1	ND				1600-2100	1700-2100	60	AR16/83/1837/090888
1614	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
1622	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1200-2400		> 25	AR16/84/1838/160888
1622	SUI	3, 4, 5, 6, 7, 9, 10, 15, 16, 17, 18, 19, 20, 21	10000	CP	J3E	10	D	ROT	30	8	0600-0200	0800-1700	60	MAR/62/1694/221085

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1	2	3		4	5	6	7				8	9		10
		3.1	3.2				7.1	7.2 a)	7.2 b)	7.2 c)		9a)	9b)	
1626	QAT	INDN OC, RED SEA, MEDIT INDN OC INDN OC, RED SEA, MEDIT RED SEA, MEDIT, ATLANT	4000 6000 6000 6000	CP	J3E R3E	10	ND D D D	 130 200 310	 60 60 60	 11 11 11	0600-0800 1200-1400		200	MAR/23/1412/010480
1629	CTR	9, 18	2000	CP	J3E	1	ND				1600-2300	1700-2100	60	AR16/83/1837/090888
1631	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	1230-1400			AR16/80/1824/100588
1635	I	5, 6, 7, 9, 10, 14, 15, 16, 18, 20, 21	–	CO	J3E	1.5	ND				0400-2400	0600-1600	30	AR16/75/1747/041186
1635	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1500-2400		>25	AR16/84/1838/160888
1638	SMA	SO PACIF	4000	CP	J3E	1	ND				1800-0400		30	MAR/10/1305/280278
1638	DDR	6, 15, 16, 17, 18, 19	6000	CP	J3E	10	ND				0400-2000		30	AR16/82/1827/310588
1640	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1500-2400		>25	AR16/84/1838/160888
2203	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1500-2400		>25	AR16/84/1838/160888
2207	CTR	9, 18	2000	CP	J3E	1	ND				1700-2200	1800-2100	50	AR16/83/1837/090888
2208	I	5, 6, 7, 9, 10, 14, 15, 16, 18, 20, 21	–	CO	J3E	1.5	ND				0500-2400	0700-2200	30	AR16/75/1747/041186
2208	PNR	9, 14, 16, 18	4000	CP	J3E	1	ND				1200-2400		>25	AR16/84/1838/160888
2209	SDN	5, 6, 7, 15, 16, 17	15000	CP	J3E	1.2	D	ROT	60	13	1200-1400			AR16/80/1824/100588
2220	SUI	6, 10, 18, 20, 21	14000	CP	J3E	10	D	ROT	70	8.5	0600-1800	0900-1600	60	MAR/27/1431/120880
2222	MLD	6	–	CO	J3E	1	D	300	120	5	0000-2400			AR16/79/1816/150388
2223	MLT	MEDIT, NO ATLANT	3000	CP	J3E R3E	1.5	ND				0000-1159			MAR/20/1372/190679
2226	CTR	9, 18	2000	CP	J3E	1	ND				1700-2200	1800-2100	50	AR16/83/1837/090888
2233	GRC	17 (MEDIT)	2600	CO	J3E	1	ND				0500-2200	0600, 1000, 2200	30	MAR/51/1621/220584
2235	QAT	INDN OC, MEDIT INDN OC INDN OC, MEDIT, ATLANT MEDIT, ATLANT	5000 8000 8000 8000	CP	J3E R3E	10	ND D D D	 130 200 310	 60 60 60	 11 11 11	0800-1200		200	MAR/23/1412/010480

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Note by the General Secretariat

Bringing up to date the Frequency Allotment Plan for Coast Radiotelephone Stations Operating in the Exclusive Maritime Mobile Band Between 4 000 kHz and 23 000 kHz

(Article **16** of the Radio Regulations)

June 1979 – First Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
AMS	St Paul and Amsterdam Islands	411 825
B	Brazil....................	423 425
MLT	Malta....................	1603 2223
SMA	American Samoa.........	408 806 1232 1638

3. The allotments of channels 411 and 825 to Kerguelen Islands have been deleted from the Plan at the request of the Administration concerned.

4. The present revision takes into account the deletion of the following allotments in application of No. **1720**:

Symbol	*Country or area*	*Channel(s)*
ASC	Ascension	414 808
BEN	Benin....................	412 605 809 1201 1624 2209
BER	Bermuda	2204
BHR	Bahrain..................	415 812 818
BOL	Bolivia	402 409 602 605 801 805 1204 1603 2209

4. *(cont.)*

Symbol	*Country or area*	*Channel(s)*
BRB	Barbados	405 412 605 822
CNR	Canaries	409 416 601 804 808 818 1208 1620 2226 2234
COG	Congo (Brazzaville)	1204 1216 1604 1609 2205 2208
COM	Comoro Islands	414
DOM	Dominican Republic	819
E	Spain	1228
EGY	Egypt	408 601 807 1203 1614 2233
FJI	Fiji	403 410 801 816
G	United Kingdom	809 812 814 824 1212 1214 1220 1222 1609 1626 1629 1635 2202 2214 2233 2240
GIB	Gibraltar	401 404 602 807 1212 1611 2212
GIL	Gilbert and Ellice Islands	411 814 1207 1607
GUB	Guyana	824
HKG	Hongkong	603 805 1227 1626 2218
HND	Honduras	402
IOB	Turks and Caicos Islands	401 816
IRQ	Iraq	1634 1639
KEN	Kenya	407 423 603 804 809 814 826 1208 1213 1229 1230 1624 2228
NHB	New Hebrides	406 808 818
PHL	Philippines	420 806 2220
SLM	Solomon Islands	830

These deletions have been published in Sub-section C of Special Section No. MAR/21/1397 of 7 August 1979.

5. The present revision contains the following modification of country name or area:

From		*To*		*Channel(s)*
AFI	French Territory of the Afars and Issas	DJI	Djibouti	418 827 1210

November 1980 – Second Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
MLT	Malta	1216
NRU	Nauru	817
QAT	Qatar	423 804 1229 1626 2235
SUI	Switzerland	2220

3. The present revision takes into account the deletion of the following allotments in application of No. **1720**:

Symbol	*Country or area*	*Channel(s)*
AGL	Angola	2207 2222
CBG	Khmer Republic	406 410 604 828 830 1206 1604 2203
CLM	Colombia	1615
CTI	Ivory Coast	1605 2203
ETH	Ethiopia	413 425 602 812 827 829 1201 1204 1214 1228 1231 1604 1611 1614 1620 1627 1640 2201 2212 2216 2226 2229 2234
GAB	Gabon	401 403 602 603 806 811 1201 1210 1614 1617 2211
GHA	Ghana	402 409 601 602 823 825 1202 1224 1616 1622 2213 2215
GMB	Gambia	831
GNB	Guinea-Bissau	1207
GTM	Guatemala	402
MOZ	Mozambique	2207 2222
NIG	Nigeria	414 423 425 601 604 605 801 817 819 1220 1225 1231 1625 1627 1640 2202 2204 2206
PAK	Pakistan	403 406 414 424 426 601 807 826 828 1201 1204 1207 1215 1608 2201 2209 2211 2218 2220

3. *(cont.)*

Symbol	*Country or area*	*Channel(s)*
PNR	Panama	401 403 424 602 817 819 1204
PRG	Paraguay	410 826 1217 1227 1637
PRU	Peru	1617 2211
STP	Sao Tome and Principe	413 426 802 813 1203 1207 1615 1635
SUR	Suriname	408 808 1207 1608
TGK	Tanzania (Tanganyika)	417 419 820 823 1227
TMP	Portuguese Timor	802 813
TUR	Turkey	822 828 1211 1227 1615 1624 2239
VEN	Venezuela	409 419 602 827 829 1203 1219 1604 1622 2203 2206
ZAN	Tanzania (Zanzibar)	417 419 820 823 1227

These deletions have been published in Sub-section C of Special Sections Nos. MAR/22/1399 of 3 January 1980 and MAR/29/1441 of 21 October 1980.

February 1984 – Third Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
ATN	Netherlands Antilles	604
AUS	Australia	407 424
FJI	Fiji	602
JOR	Jordan	425 804 1220
MLT	Malta	423 603 807
NRU	Nauru	1207
USA	United States of America	405

July 1986 – Fourth Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
AUS	Australia	401 603 806 822
B	Brazil	408 418 602 604 605
F	France	605
GRC	Greece	2233
I	Italy	407
KIR	Kiribati	411 814
NZL	New Zealand	605
S	Sweden	825 1226
SUI	Switzerland	422 803 1210 1622
TZA	Tanzania	417 419 820 823 1227

May 1988 – Fifth Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
DDR	German Democratic Republic	820 1220 1638
I	Italy	411 418 601 807 808 812 1208 1228 1635 2208
MLD	Maldives	408 601 829 1228 1614 2222
NCL	New-Caledonia and Dependencies	601
PNR	Panama	424
SDN	Sudan	408 605 817 1212 1631 2209

May 1990 – Sixth Revision

1. This revision of the Plan is published in accordance with No. **1722.**

2. The present revision contains the following new allotments:

Symbol	*Country or area*	*Channel(s)*
CTR	Costa Rica	405 412 602 605 802 815 1208 1230 1609 1629 2207 2226
EQA	Ecuador	411 602 805 1207
PNR	Panama	401 403 817 819 1232 1622 1635 1640 2203 2208
QAT	Qatar	409 826 1201
TUV	Tuvalu	604
USA	United States of America	823

APPENDIX 26

Frequency Allotment Plan for the Aeronautical Mobile Service and Related Information

This Appendix was published as a separate booklet. As far as the Aeronautical Mobile (R) Service is concerned, a revised Plan was adopted in 1978 by the World Administrative Radio Conference on the Aeronautical Mobile (R) Service: it is contained in Appendix **27 Aer2**. *However, the Plan adopted in 1959 for the Aeronautical Mobile (OR) Service remains in force, so that for this service reference should be made to Appendix* **26**, *furthermore, although this Appendix has been partially reviewed by WARC Mob-87 (see Final Acts of the Conference), its edition of 1959 is retained until the appropriate action is taken by a future competent world administrative radio conference and pending completion of the action referred in Resolution PL-B/2 of the Nice plenipotentiary Conference, 1989. Copies of Appendix* **26** *(1959 edition) as well as its partial revision by WARC Mob-87 are obtainable from the General Secretariat of the ITU.*

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APPENDIX 27 Aer2

Frequency Allotment Plan for the Aeronautical Mobile (R) Service and Related Information Between 2 850 kHz and 22 000 kHz

This Appendix is published as a separate booklet. It contains provisions relating exclusively to the Aeronautical Mobile (R) Service, which have replaced the provisions relating to this service that are contained in Appendix **26**. *Reference should therefore be made exclusively to Appendix* **27 Aer2** *as far as the Aeronautical Mobile (R) Service is concerned.*

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APPENDIX 28
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Method for the Determination of the Coordination Area Around an Earth Station in Frequency Bands Between 1 GHz and 40 GHz Shared Between Space and Terrestrial Radiocommunication Services

1. *Objectives*

The coordination area (see No. **165**) is determined by calculating, in all directions of azimuth from the earth station, the coordination distances (see No. **167**) and drawing to scale on an appropriate map the coordination contour (see No. **166**).

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 the case 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 I 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 $(100 - p)$% of the time.

$$L(p) = P_{t'} - P_r(p) \tag{1}$$

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.

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.

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* Primes refer to the parameters associated with the interfering station.

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:

$$L_b(p) = P_{t'} + G_{t'} + G_r - P_r(p) \tag{2}$$

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 $(100 - p)$% 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 II provides numerical and graphical methods to determine the angle between the earth station antenna main beam and the physical horizon, and also 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.

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);

* 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).

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 powers 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 powers 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 kelvins, 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 (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 pW0p (CCIR Recommendation 357-3) and the mean thermal noise power in a single hop may be assumed to be 25 pW0p. 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 pW0p (CCIR Recommendation 356-4), but the thermal noise contribution of the down-link is not likely to exceed 7 000 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: $M_0(p_0)$ (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 GHz 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:

$$W = 10 \log \left\{ \frac{\begin{array}{l}\text{Thermal noise power at}\\ \text{the output of the receiving}\\ \text{antenna in the reference}\\ \text{bandwidth}\end{array}}{\begin{array}{l}\text{Power of the interfering}\\ \text{emission at the radio fre-}\\ \text{quency in the reference}\\ \text{bandwidth, at the output}\\ \text{of the receiving antenna}\end{array}} \times \frac{\begin{array}{l}\text{Interference power in the}\\ \text{receiving system after de-}\\ \text{modulation}\end{array}}{\begin{array}{l}\text{Thermal noise power in}\\ \text{the receiving system after}\\ \text{demodulation}\end{array}} \right\} \qquad (5b)$$

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 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 broad-band 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 broad-band 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°30′ 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°30′ 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:

$$L_b(p) = A_0 + \beta d_1 + A_h \qquad (6)$$

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:

$$A_h = 20 \log (1 + 4.5 f^{1/2}\varepsilon) + f^{1/3}\varepsilon \quad \text{for } \varepsilon > 0° \qquad (7a)\,*$$

$$A_h = 8\,\varepsilon \quad \text{for } -0.5° \leqslant \varepsilon \leqslant 0° \qquad (7b)$$

$$A_h = -4 \quad \text{for } \varepsilon \leqslant -0.5° \qquad (7c)$$

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:

$$\beta = \beta_z + \beta_v + \beta_o \qquad (9)$$

---

* Equation (7a) and thus Fig. 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 **60**.

** Horizon angle is defined here as the angle viewed from the centre of the earth station antenna, between the horizontal plane and a ray that grazes the visible physical horizon in the direction concerned.

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):

$$\beta_v = 3.5 \times 10^{-4} \rho \left[\frac{1}{\left(1 - \frac{22.3}{f}\right)^2 + \frac{9}{f^2}} + \frac{1}{\left(1 + \frac{22.3}{f}\right)^2} \right] + 3 \times 10^{-6} \rho\, f^2 \tag{12}$$

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, $\rho = 1$ g/m^3
Zone B, $\rho = 2$ g/m^3
Zone C, $\rho = 5$ g/m^3

β_o depends on the frequency as follows:

$$\beta_o = 68 \times 10^{-4} \times f^2 \left\{ \frac{1}{(60 - f)^2} + \frac{1}{(60 + f)^2} + \frac{1}{(f^2 + 0.36)} \right\} \tag{13}$$

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.

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.

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* Horizon angle is defined here as the angle viewed from the centre of the earth station antenna, between the horizontal plane and a ray that grazes the visible physical horizon in the direction concerned.

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:

$$L_b(p) - A_0 - A_h = \beta_i \, d_i \qquad (16)$$

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:

$$L_b(p) - A_0 - A_h - \beta_i \, D_i = \beta_j \, d_j \qquad (17)$$

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:

$$L_b(p) - A_0 - A_h - \beta_i \, D_i - \beta_j \, D_j = \beta_k \, d_k \qquad (18)$$

from which d_k 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:

$$d_1 = D_i + D_j + d_k \quad \text{km} \qquad (19)$$

Annex III 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 Fig. 6 or in Table III, the coordination distance for propagation mode (1) shall be the value given in Fig. 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 Fig. 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:

$$L_2(0.01) = P_{t'} + \Delta G - P_r(p) - F(p,f) \qquad (20)$$

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:

$$L_2(0.01) = A_1 - A_2 + A_3 - A_4 - A_5 + A_6 \qquad (21)$$

in which:

$$A_1 = 157 + 20 \log d_r - 20 \log f \text{(dB)} \qquad (22)$$

where d_r is the rain-scatter distance (km).

$$A_2 = 26 + 14 \log R - 5.88 \times 10^{-5} (d_r - 40)^2 \text{(dB)} \qquad (23)$$

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.

$$A_3 = 0.005\,(f - 10)^{1.7}\, R^{0.4} \text{(dB)} \qquad \text{for } 10 < f < 40 \text{ GHz} \qquad (24a)$$

$$= 0 \text{(dB)} \qquad \text{for } f \leqslant 10 \text{ GHz} \qquad (24b)$$

$$A_4 = 10 \log \left[\frac{2.17}{\gamma \cdot D} \left(1 - 10^{-(\gamma \cdot D)/5}\right) \right] \text{(dB)} \qquad \text{for } f > 5 \text{ GHz} \qquad (25a)$$

$$= 0 \text{(dB)} \qquad \text{for } f \leqslant 5 \text{ GHz} \qquad (25b)$$

where D is the diameter of the rain cell in km (Table IV)

and

$$\gamma = 0.008\, R\,(f - 5) \qquad \text{for } f > 5 \text{ GHz} \qquad (26a)$$

$$= 0 \qquad \text{for } f \leqslant 5 \text{ GHz} \qquad (26b)$$

$$A_5 = 10 \log D \text{ (dB)} \qquad (27)$$

$$A_6 = d_o\, \beta_o + d_v\, \beta_v \qquad (28)$$

where:

$$d_o = 0.7\, d_r + 32 \text{ km} \qquad \text{for } d_r < 340 \text{ km} \qquad (29a)$$

$$= 270 \text{ km} \qquad \text{for } d_r \geqslant 340 \text{ km} \qquad (29b)$$

$$d_v = 0.7\, d_r + 32 \text{ km} \qquad \text{for } d_r < 240 \text{ km} \qquad (30a)$$

$$= 200 \text{ km} \qquad \text{for } d_r \geqslant 240 \text{ km} \qquad (30b)$$

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 alternative 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:

$$\Delta d = 5.88 \times 10^{-5} (d_r - 40)^2 \cot \varepsilon_s \qquad \text{(km)} \tag{31}$$

Alternatively, Δd may be determined from Fig. 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.

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 as 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 as equal to 100 km.

6. *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 Fig. 15.

7. *Mobile (except aeronautical mobile) earth stations*

For the purpose of establishing whether prior agreement with another administration under the provisions of Nos. **1108** to **1111** 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 and 6 and in Annex III 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 become available, and such change may require or strongly suggest corresponding amendments to the propagation-related material in this Appendix.

Resolution **60** 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	Fixed-Satellite Mobile-Satellite	Fixed-Satellite	Space Research	Fixed-Satellite Mobile-Satellite Meteorological-Satellite	Fixed-Satellite (5)	Fixed-Satellite	Fixed-Satellite (5)	Fixed-Satellite (5)	Fixed-Satellite
Frequency Bands (GHz)		1.427–1.429	2.655–2.690	5.725–7.075	7.145–7.235	7.900–8.400	10.7–11.7	12.5–14.5	14.5–14.8	17.7–18.1	27–37.5
Modulation at Terrestrial Station (1)		A	A	A	A	A	A	A	A	N	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	0.003
	n	2	1	2	2	2	2	2	2	1	1
	p (%)	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.003	0.003
	J (dB)	16	9	16	16	16	16	16	16	0	0
	M_0 (p_0) (dB)	17	17	17	17	17	17	17	17	30	30
	W (dB)	0	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	1×10^6
	G_r (dB) (2)	35	52(3)	45	47	47	50	50	50	50	50
	ΔG (dB)	−7	10(3)	3	5	5	8	8	8	8	8
	T_r (K)	750	500(3)	750	750	750	1500	1500	1500	3200	3200
Auxiliary Parameters	S (dBW) (4)	166	192	176	178	178	178	178	178	154	154
	P_r (p) (dBW) in B	−131	−140	−131	−131	−131	−128	−128	−128	−104	−104

(1) A = analogue modulation; N = digital modulation.
(2) Feeder losses are not included.
(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 I.
(5) The parameters associated with these columns are for feeder links to broadcasting satellites and are provisional pending further study by the CCIR: see Resolution 101.

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TABLE II

Parameters Required for the Determination of Coordination Distance for a Receiving Earth Station

Space Radiocommunication Service Designation		Space Operation (1)	Meteorological-Satellite (1)	Meteorological-Satellite	Space Research			Fixed-Satellite		Fixed-Satellite		Fixed-Satellite		Fixed-Satellite Meteorological-Satellite Mobile Satellite		Earth Exploration-Satellite (1)	Space Research		Fixed-Satellite		Meteorological-Satellite	Fixed-Satellite	Mobile-Satellite
					Near Earth, Unmanned, Space Operations	Near Earth, Manned	Deep Space										Near Earth	Deep Space					
Frequency Bands (GHz)		1 525 - 1 535	1 670 - 1.700	1.700 - 1 790	1.700 - 1.710 2.200 - 2 290	2.200 - 2.290	2.290 - 2 300	2.500 - 2.690		3.400 - 4.200		4.500 - 4.800		7.250 - 7 750		8.025 - 8 400	8 400 - 8.500		10 7 - 12.75		17.7 - 40.0		
Modulation at Earth Station (2)					–	–	–	A	N	A	N	A	N	A	N	–	–	–	A	N		N	
Interference Parameters and Criteria	p_0 (%)				0.1	0.001	0.001	0.03	0.003	0.03	0.003	0.03	0.003	0 03	0 003	1.0	0 1	0.001	0.03	0 003		0.003	
	n				1(9)	1	1	3	3	3	3	3	3	3	3		2	1	2	1		1	
	p (%)				0 1(9)	0 001	0.001	0 01	0 001	0 01	0 001	0.01	0 001	0 01	0 001		0 05	0.001	0.015	0.003		0.003	
	J (dB)				–	–	–	−8	0	−8	0	−8	0	−8	0		–	–	−8	0		0	
	$M_0(p_0)$ (dB)				–	–	–	17	5	17	5(3)	17	5(3)	17	5(3)		–	–	17	5(3)		5(3)	
	W (dB)				–	–	–	4	0	4	0	4	0	4	0		–	–	4	0		0	
Terrestrial Station Parameters	E (dBW) in B (8)	55	55	92(6)	62(4)(6)	62(4)(6)	62(4)(6)	92(6)	92(6)	55	55	92(6)	92(6)	55	55	55	25(4)	25(4)	55	55		35(5)	
	P_t (dBW) in B	13	13	40(6)	10(4)(6)	10(4)(6)	10(4)(6)	40(6)	40(6)	13	13	40(6)	40(6)	13	13	13	−17(4)	−17(4)	10	10		−10(5)	
	ΔG (dB)	0	0	10(6)	10(6)	10(6)	10(6)	10(6)	10(6)	0	0	10(6)	10(6)	0	0	0	0	0	3	3		3	
Reference Bandwidth (7)	B (Hz)			10^6	1	1	1	10^6	10^6	10^6	10^6	10^6	10^6	10^6	10^6	10^6	1	1	10^6	10^6		10^6	
Permissible Interference Power	$P_r(p)$ (dBW) in B				−216	−216	−222	–	–	–	–	–	–	–	–	−154	−216	−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 et 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 a radio frequency 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. If an administration believes that transhorizon systems do not need to be considered, the line-of-sight radio-relay parameters associated with the frequency band of 3 400 - 4 200 MHz may be used to determine the coordination area in accordance with paragraph 2.3.1.

([7]) In certain systems in 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.

([8]) For the definition of E, see Annex I.

([9]) n is taken to be 1 for earth stations supporting low orbit satellites. For earth stations supporting geostationary satellites, n takes a value of 2 and p becomes 0.05.

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	1 050	1 000	900	700
Zone C	1 400	1 350	1 200	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/m^3

TABLE V

Maximum Rain-Scatter Distances (km)

Rain-Climatic Zone	Percentage of Time		
	$0.001 \leqslant p < 0.01$	$0.01 \leqslant p < 0.1$	$p = 0.1$
1	540	470	390
2	470	390	330
3, 4 and 5	390	330	270

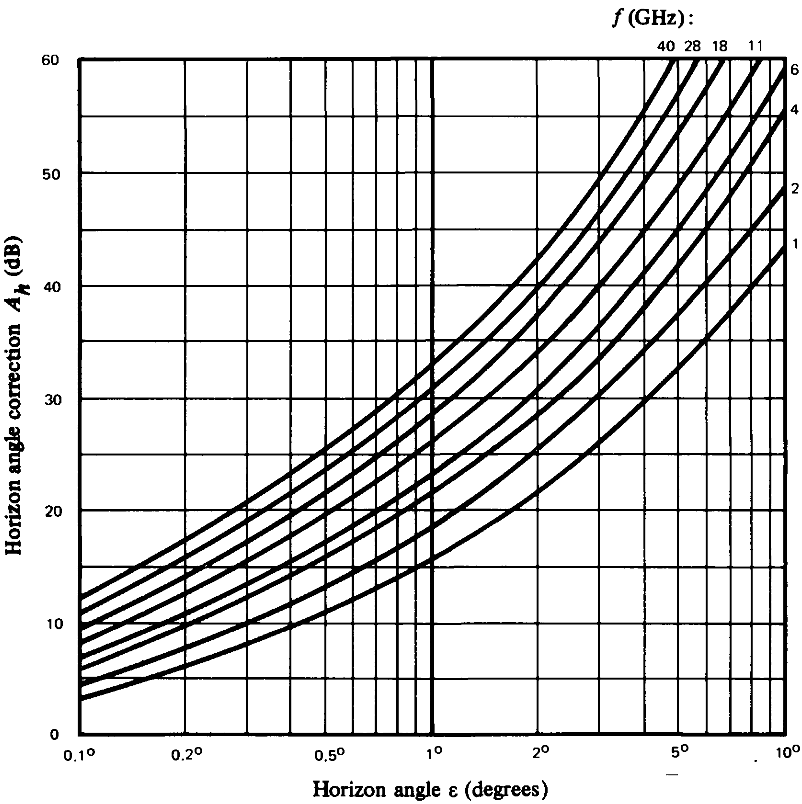


FIGURE 1

Horizon angle correction A_h as a function of horizon angle and frequency

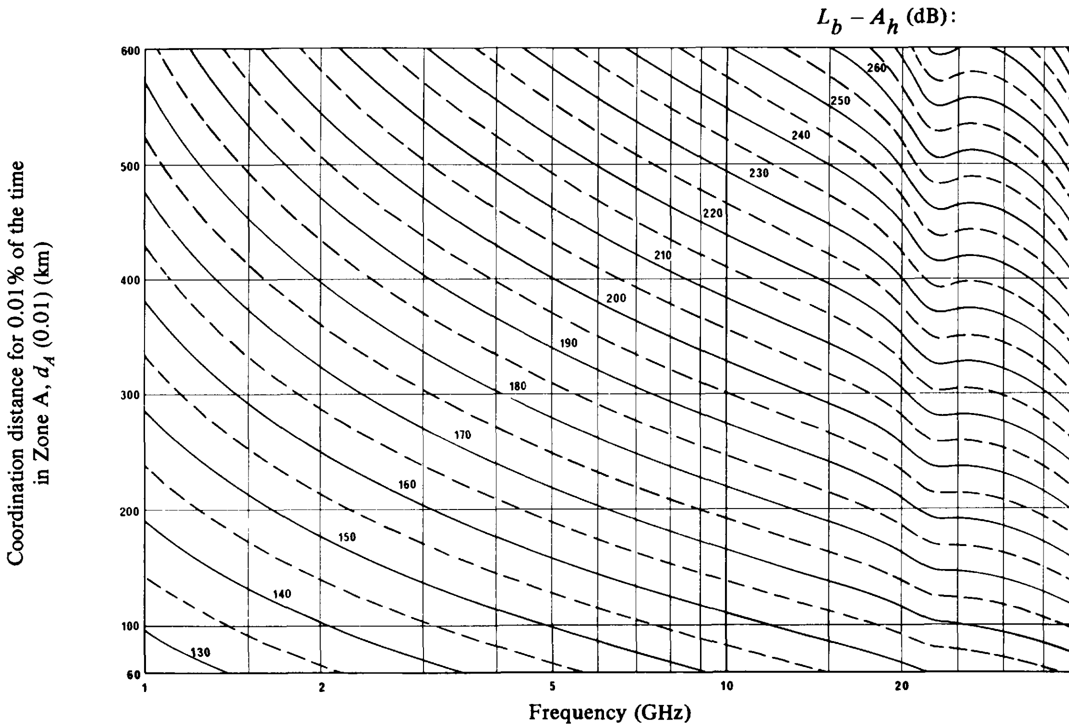


FIGURE 2

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

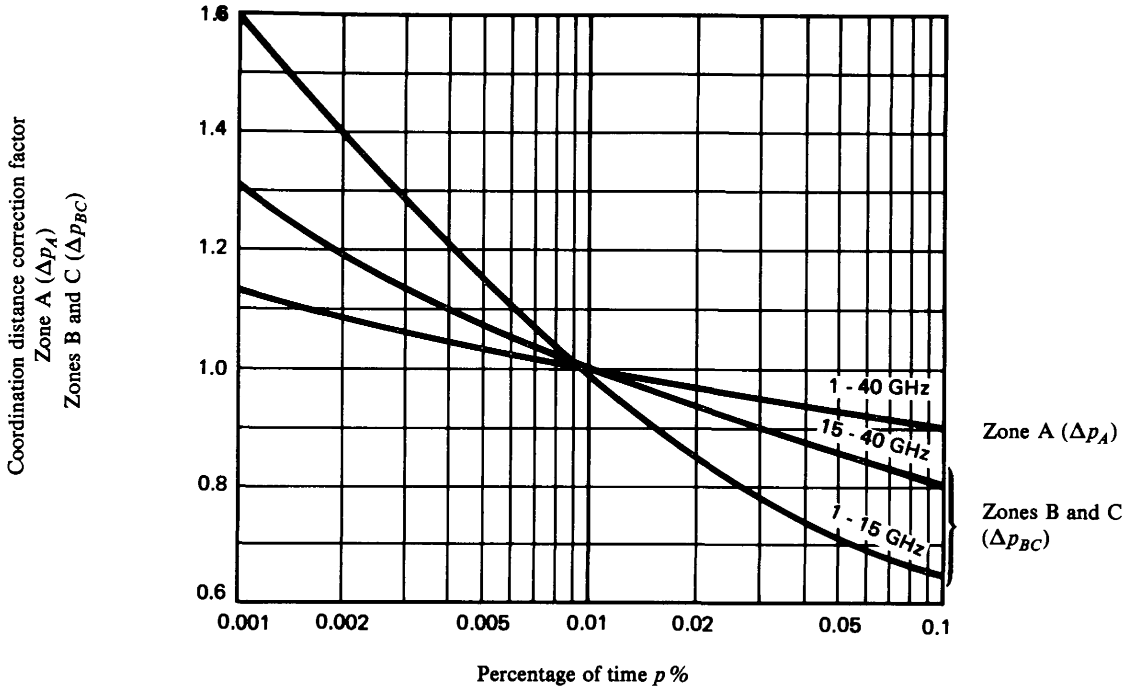


FIGURE 3

Coordination distance correction factor for propagation mode (1) for percentages of time other than 0.01

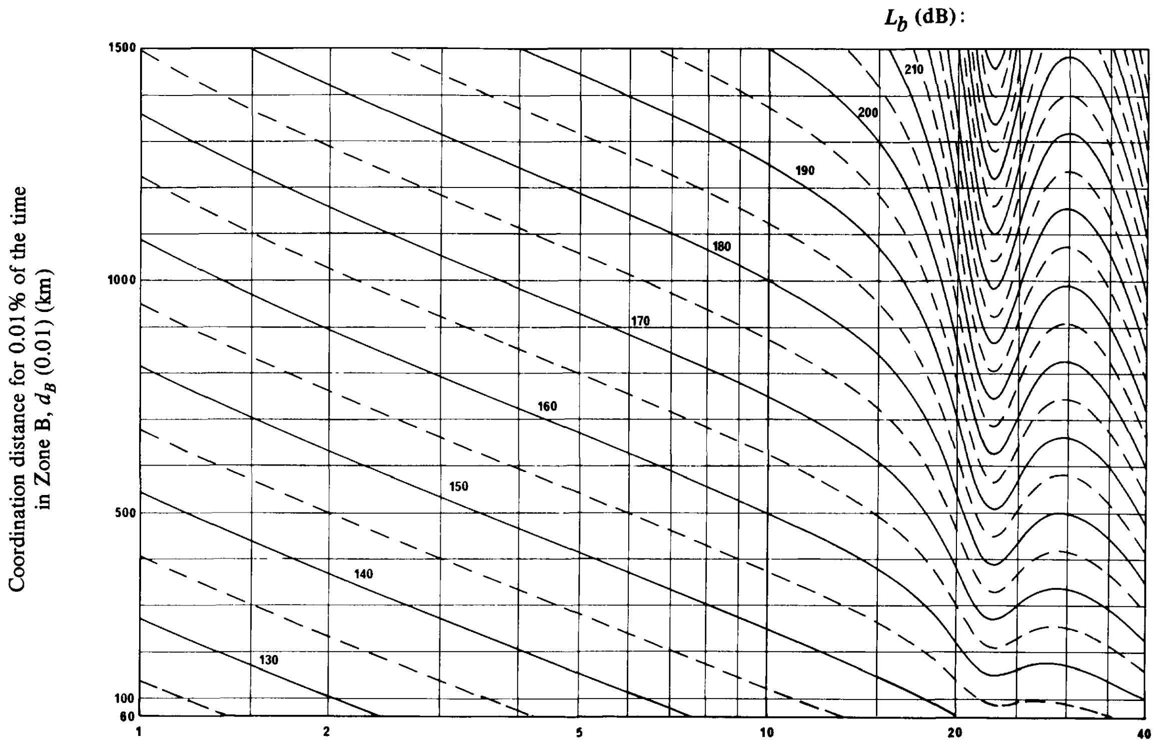


FIGURE 4

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

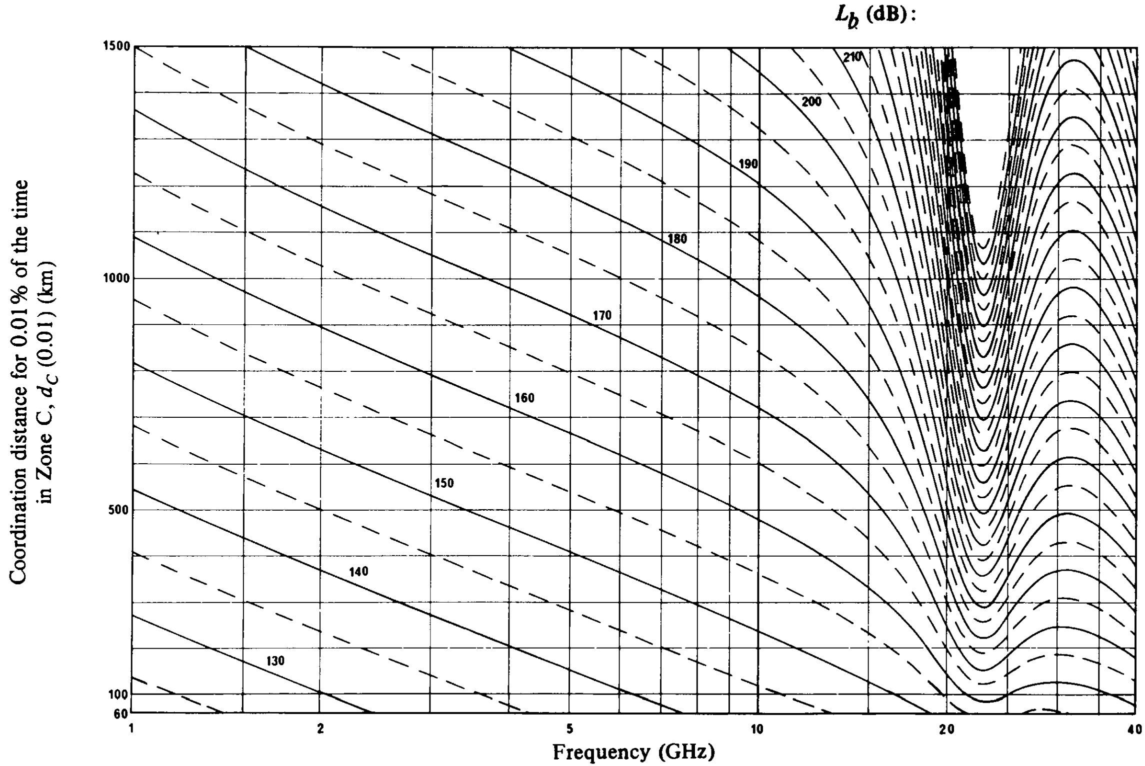


FIGURE 5

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

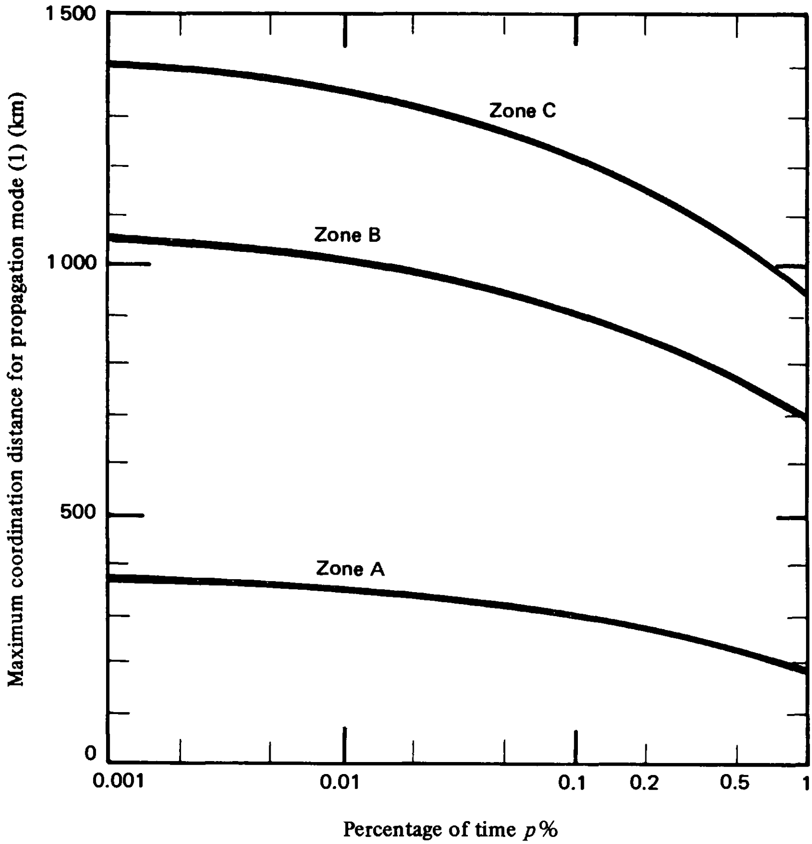


FIGURE 6

Maximum coordination distance for propagation mode (1) as a function of percentage of time

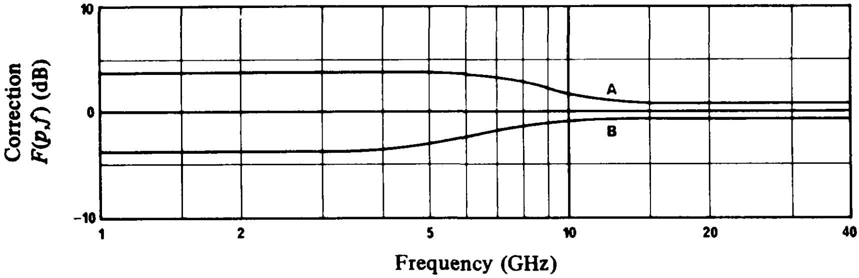


FIGURE 7

Correction for conversion from 0.01% of the time for all rain-climatic zones

Curve A: Conversion to 0.1%
Curve B: Conversion to 0.001%

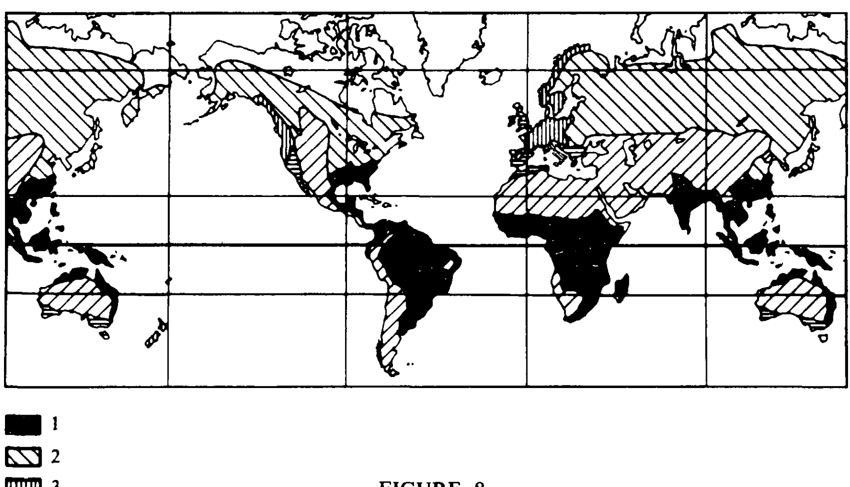


FIGURE 8

Regions corresponding to the five rain-climatic zones

(see §4.2)

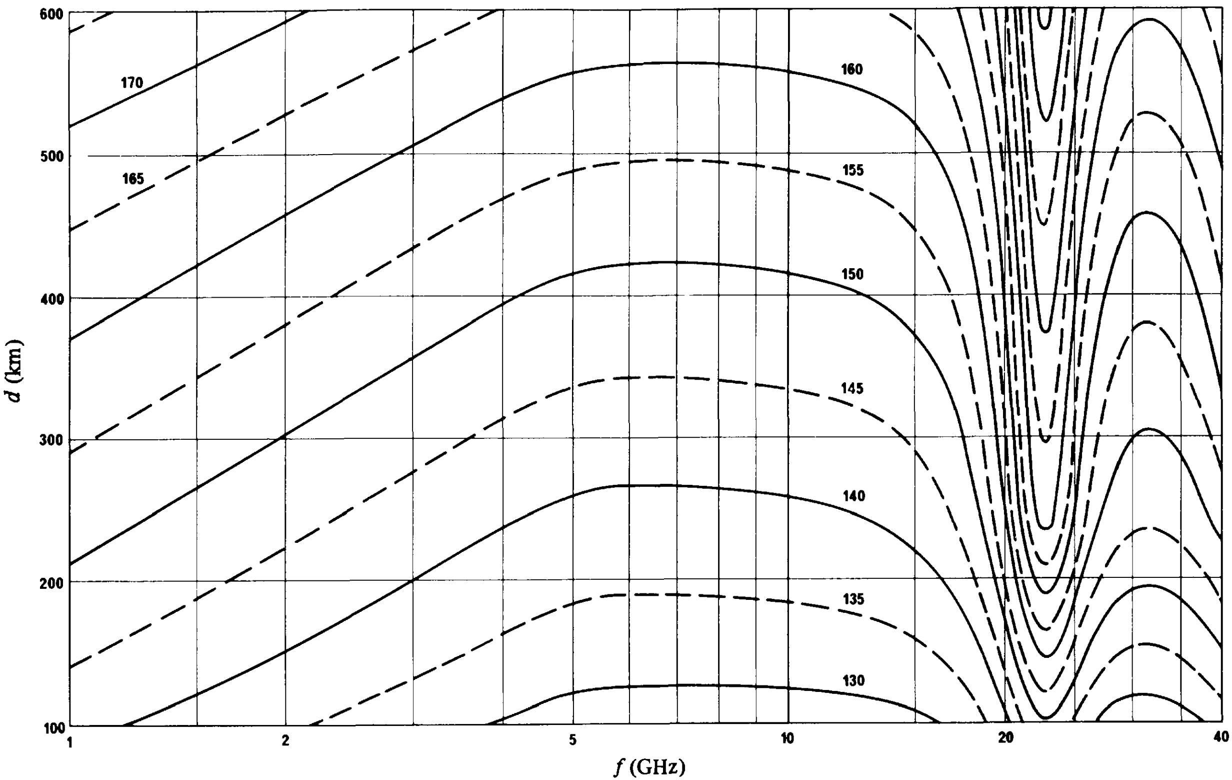


FIGURE 9

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.

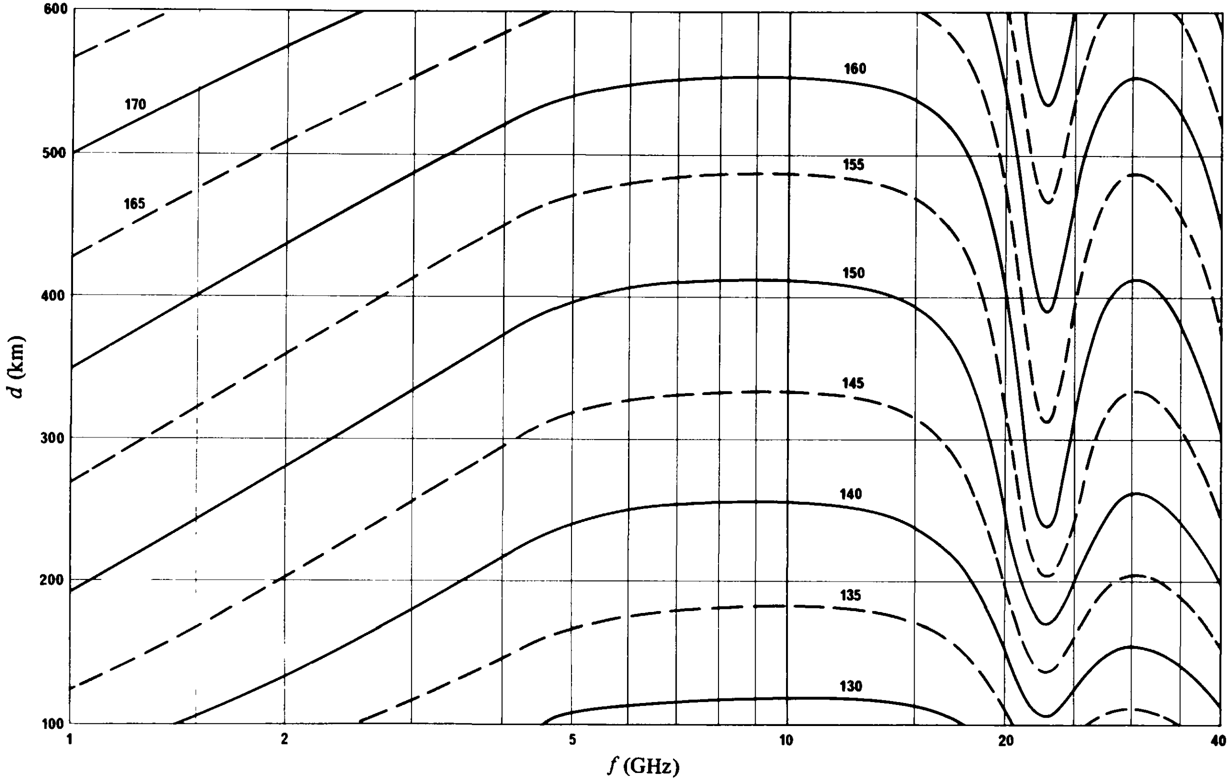


FIGURE 10

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.

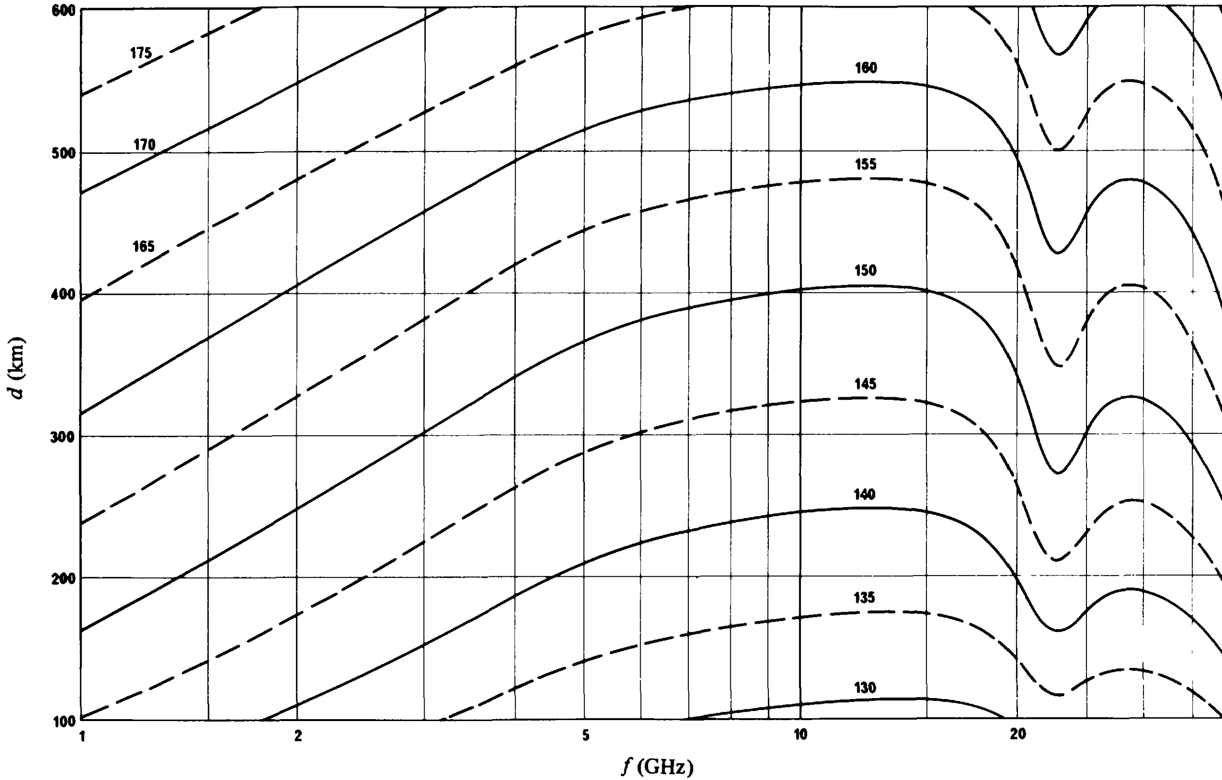


FIGURE 11

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.

AP28-35

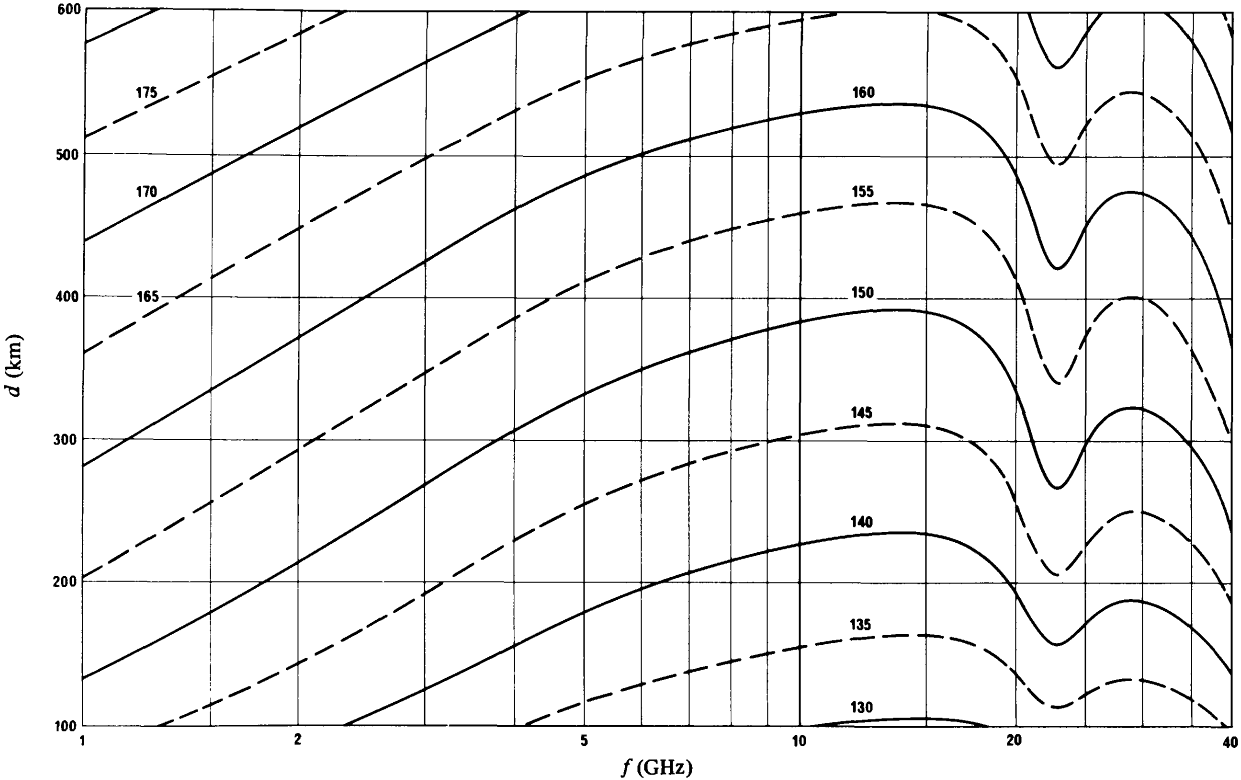


FIGURE 12

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.

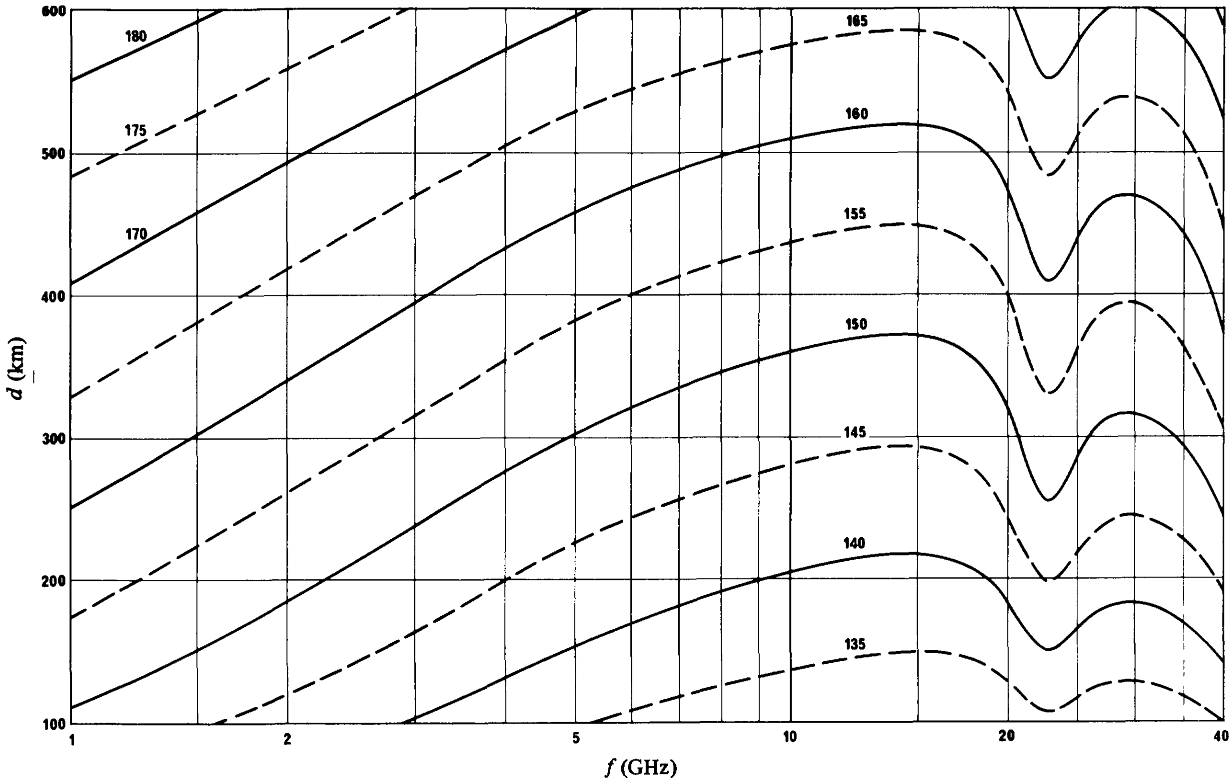


FIGURE 13

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.

AP28-37

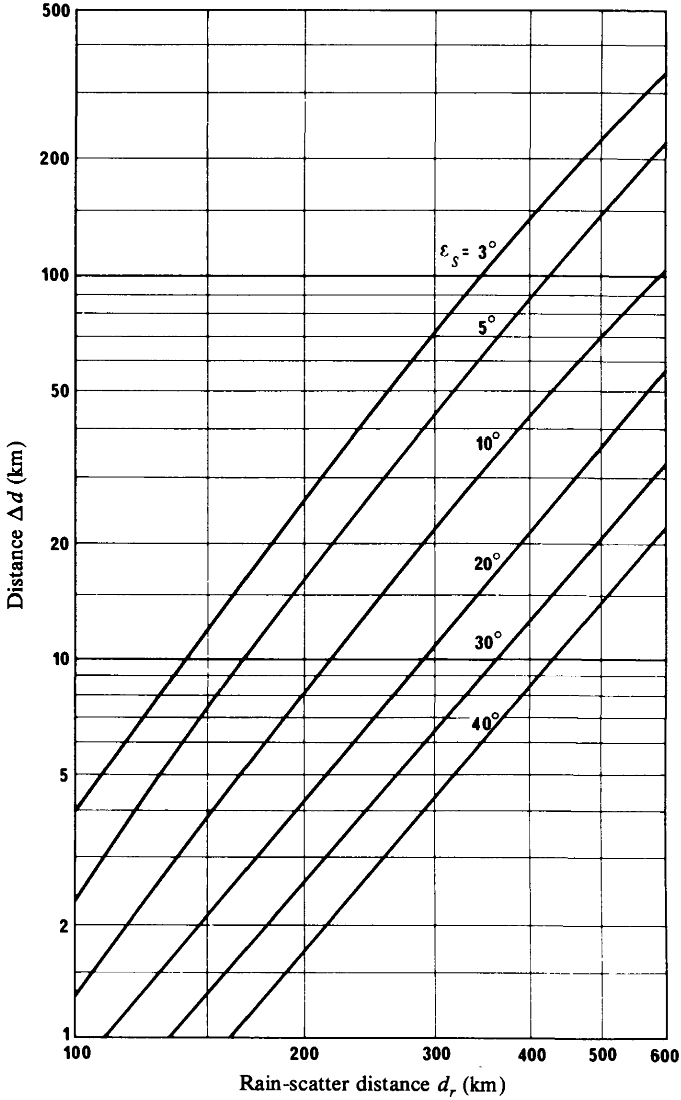


FIGURE 14

Distance Δd as a function of rain-scatter distance d_r and earth station antenna main beam elevation angle ε_s

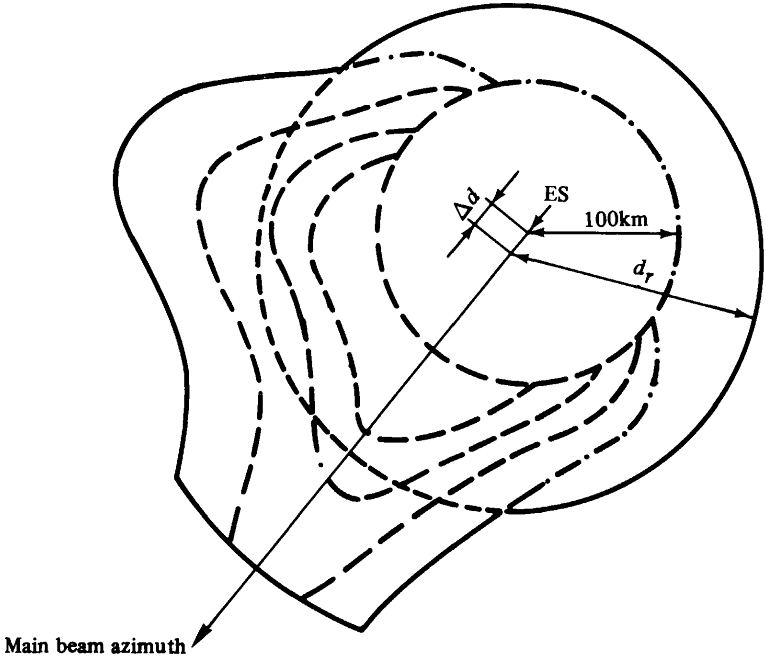


FIGURE 15

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.

ANNEX I

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:

$$S = G_r - P_r(p) \qquad (32)$$

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 (dBW) 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:

$$E = P_{t'} + G_{t'} \tag{33}$$

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 Fig. 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 mechanisms 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.

ANNEX II

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. Fig. II-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 $\varphi(\alpha)$*

With the correct arc or segment of arc chosen and suitably marked in Fig. II-1, the horizon profile ε (α) is added to the plot of Fig. II-1, as shown in Fig. II-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 Fig. II-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 $\varphi(\alpha)$ results.

3. *Numerical method for the determination of $\varphi(\alpha)$*

For this purpose the following equations may be used:

$$\psi = \text{arc cos } (\cos \zeta \cdot \cos \delta) \tag{34}$$

$$\alpha'_s = \text{arc cos } (\tan \zeta \cdot \cot \psi) \tag{35}$$

$\alpha_s = \alpha'_s + 180°$ for earth stations located in the northern hemisphere and satellites located west of the earth station (36a)

$\alpha_s = 180° - \alpha'_s$ for earth stations located in the northern hemisphere and satellites located east of the earth station (36b)

$\alpha_s = 360° - \alpha'_s$ for earth stations located in the southern hemisphere and satellites located west of the earth station (36c)

$\alpha_s \quad = \alpha'_s$ for earth stations located in the southern hemisphere and satellites located east of the earth station (36d)

$$\varepsilon_s \quad = \arctan\left(\frac{K - \cos\psi}{\sin\psi}\right) - \psi \tag{37}$$

$$\varphi(\alpha) = \arccos\left[\cos\varepsilon \cdot \cos\varepsilon_s \cdot \cos(\alpha - \alpha_s) + \sin\varepsilon \cdot \sin\varepsilon_s\right] \tag{38}$$

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 $\varphi(\alpha)$ 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:

$$G(\varphi) = G_{max} - 2.5 \times 10^{-3}\left(\frac{D}{\lambda}\varphi\right)^2 \quad \text{for } 0 < \varphi < \varphi_m \qquad (39a)$$

$$G(\varphi) = G_1 \quad \text{for } \varphi_m \leqslant \varphi < \varphi_r \qquad (39b)$$

$$G(\varphi) = 32 - 25 \log \varphi \quad \text{for } \varphi_r \leqslant \varphi < 48° \qquad (39c)$$

$$G(\varphi) = -10 \quad \text{for } 48° \leqslant \varphi \leqslant 180° \qquad (39d)$$

where:

D: antenna diameter, λ: wavelength — expressed in the same unit

G_1: gain of the first sidelobe $= 2 + 15 \log \frac{D}{\lambda}$

$$\varphi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \text{ (degrees)}$$

$$\varphi_r = 15.85 \left(\frac{D}{\lambda}\right)^{-06} \text{ (degrees)}$$

When it is not possible, for antennae with $\frac{D}{\lambda}$ of less than 100, to use the above reference antenna pattern and when neither measured data nor a relevant CCIR Recommendation accepted by the administrations concerned can be used instead, administrations may use the reference diagram as described below:

$$G(\varphi) = G_{max} - 2.5 \times 10^{-3}\left(\frac{D}{\lambda}\varphi\right)^2 \quad \text{for } 0 < \varphi < \varphi_m \qquad (40a)$$

$$G(\varphi) = G_1 \quad \text{for } \varphi_m \leqslant \varphi < 100\frac{\lambda}{D} \qquad (40b)$$

$$G(\varphi) = 52 - 10 \log \frac{D}{\lambda} - 25 \log \varphi \quad \text{for } 100\frac{\lambda}{D} \leqslant \varphi < 48° \qquad (40c)$$

$$G(\varphi) = 10 - 10 \log \frac{D}{\lambda} \quad \text{for } 48° \leqslant \varphi \leqslant 180° \qquad (40d)$$

where:

D: antenna diameter, λ: wavelength — expressed in the same unit

G_1: gain of the first sidelobe $= 2 + 15 \log \dfrac{D}{\lambda}$

$$\varphi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \text{ (degrees)}$$

The above patterns may be modified as appropriate to achieve a better representation of the actual antenna pattern.

In cases where $\dfrac{D}{\lambda}$ is not given, it may be estimated from the expression $20 \log \dfrac{D}{\lambda} \approx G_{max} - 7.7$, where G_{max} is the main lobe antenna gain in dB.

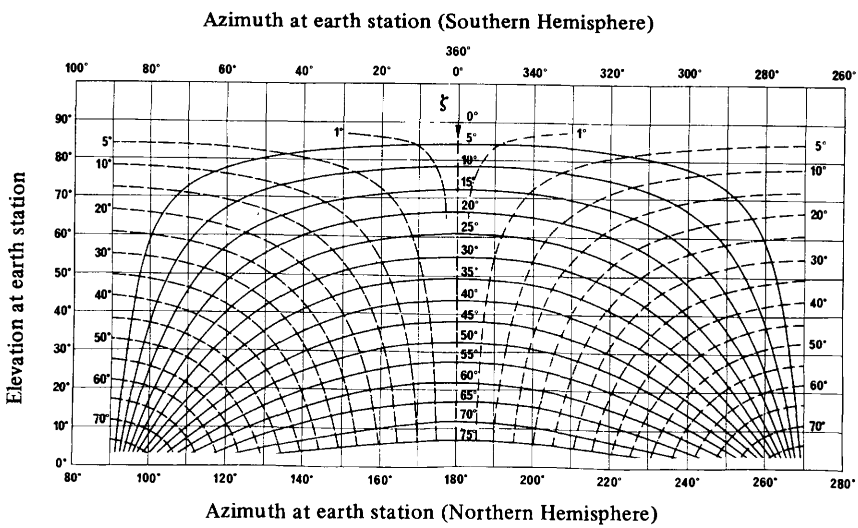


FIGURE II-1

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

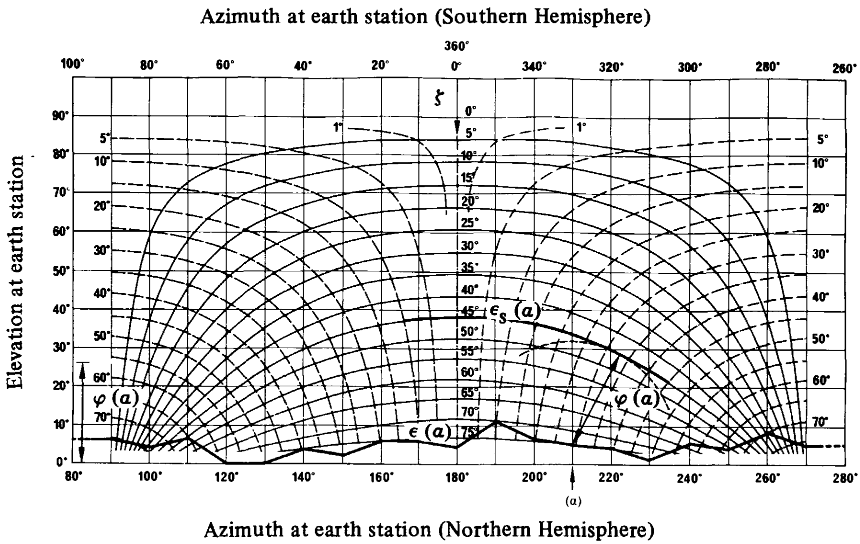


FIGURE II-2

Example of derivation of φ

Arc of geostationary-satellite orbit visible from earth station at terrestrial latitude ζ

Horizon profile $\varepsilon(\alpha)$

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 III

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 Fig. III-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 (Fig. III-1(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 Fig. III-1(b), this distance is 40 km;

1.7 the coordination distance is the sum of distances $0A_1$, 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 Fig. III-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 Fig. III-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 (Fig. III-2(a)).

In this case, the procedure to be applied should be as follows (Fig. III-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;

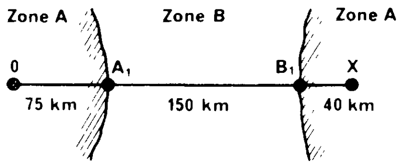
2.3 determine the distance, entirely in Zone C, that would give the coordination loss. Mark this distance (in this case it is 350 km) from the origin along the ordinate axis of the chart as indicated by the length 0C. Draw a straight line between points C and A;

2.4 at the point D draw a line parallel to the ordinate axis to intersect the line CA as indicated by X;

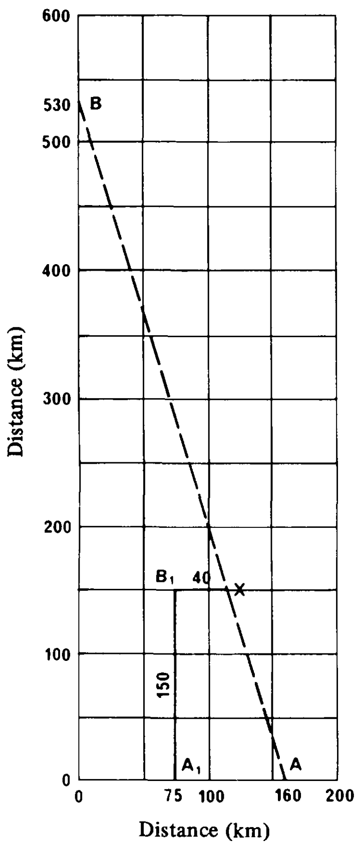
2.5 the distance between the points D and X, which is the unknown distance in Zone C, is found to be 85 km;

2.6 the coordination distance is then the sum of the distances $0A_1$, A_1B_1, and DX and in this example is equal to:

$$75 + 150 + 85 = 310 \text{ km}$$



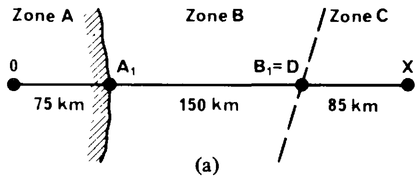
(a)



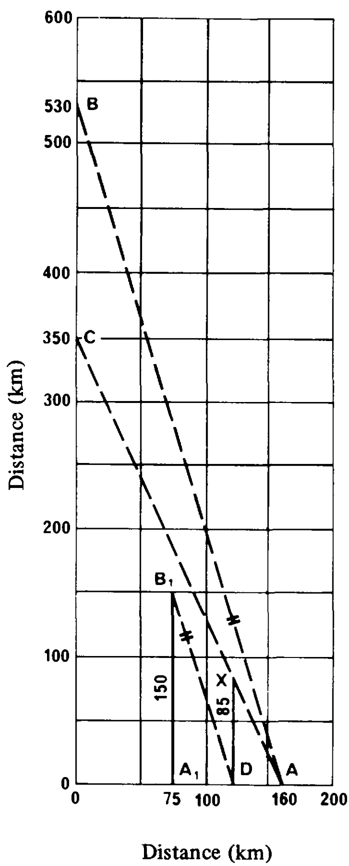
(b)

FIGURE III-1

Example of determination of coordination distance for mixed paths involving Zones A and B



(a)



(b)

FIGURE III-2

Example of determination of coordination distance for mixed paths involving Zones A, B and C

APPENDIX 29
Orb-88

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 No. **1060** is based on the concept that the noise temperature of a system subject to 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 subject to 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 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);

ΔT_e : apparent increase in the receiving system 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 in degrees 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.

[1] A method for calculation of the topocentric angular separation is given in Annex I.

θ_g : geocentric angular separation in degrees 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 [1] 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 [1] 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 satellite S or S′ is considered to be equal to l_u.

l_s : free-space transmission loss [1] on the inter-satellite link (numerical power ratio), evaluated from satellite S′ to satellite S;

---

[1] 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 **3** 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 **4**.

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 accepted by the administrations concerned 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:

$$\Delta T_s = \frac{p'_e \, g'_1(\theta_t) \, g_2(\delta_e)}{k l_u} \qquad (1)$$

$$\Delta T_e = \frac{p'_s \, g'_3(\eta_e) \, g_4(\theta_t)}{k l_d} \qquad (2)$$

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 § 3.2).

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:

$$\Delta T_s = \frac{p'_s \, g'_3 (\eta_s) \, g_2 (\delta_s)}{k l_s} \tag{8}$$

The apparent increase in equivalent link noise temperature is then given by:

$$\Delta T = \gamma \, \Delta T_s \tag{9}$$

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:

$$\Delta T' = \gamma' \Delta T'_s = \frac{\gamma' p_s \, g_3(\eta_{s'}) \, g'_2(\delta_s)}{k l_s} \tag{10}$$

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 No. **1060**. In this case, the apparent increase in the equivalent satellite link noise temperature shall be determined by the following expressions:

Case I $$\Delta T = \frac{\gamma \, \Delta T_s}{Y_u} + \frac{\Delta T_e}{Y_d}$$

Case II $$\Delta T = \frac{\gamma \, \Delta T_s}{Y_{ss}}$$

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 (anti-clockwise)
RHC = right-hand circular (clockwise)
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 *Use of information furnished under Appendix* **4**

When an administration elects to use information furnished under Appendix **4** with the calculation procedures of § 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.

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 6% [1].

– 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 $\frac{\Delta T'}{T'}$, with the threshold value, expressed as a percentage, shall be carried out in a similar manner.

[1] Values other than 6% are used in the application of Appendix **30 (Orb-85)** and Appendix **30A (Orb-88)**.

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 6% [1].

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 6% [1].

4. *Consideration of narrow-band and FM-TV 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.

For this special case, administrations are referred to relevant CCIR texts for guidance in facilitating subsequent coordination.

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[1] Values other than 6% are used in the application of Appendix **30 (Orb-85)** and Appendix **30A (Orb-88)**.

Conversely, administrations introducing new systems using SCPC transmissions may seek appropriate information from other administrations on their FM-TV transmissions.

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:

$$\theta_t = \text{arc cos}\left(\frac{d_1^2 + d_2^2 - \left(84\,332 \sin \frac{\theta_g}{2}\right)^2}{2\,d_1 \cdot d_2}\right)$$

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

Calculation of the Free-Space Transmission Loss

The free-space transmission loss L can be determined by using the following equation:

$$L = 20\,(\log f + \log d) + 32.45 \qquad \text{(dB)}$$

where:

f: frequency (MHz);

d: distance (km).

a) The distance d between an earth station and a geostationary satellite is given by the equation:

$$d = 42\,644 \sqrt{1 - 0.2954 \cos \psi} \qquad \text{(km)}$$

where:

$$\cos \psi = \cos \zeta \times \cos \beta$$

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:

$$d_s = 84\,332 \sin \frac{\theta_g}{2} \qquad \text{(km)}$$

where:

θ_g: geocentric angular separation as defined in § 2.1.

ANNEX III

Radiation Patterns for Earth Station Antennae to Be Used When They Are Not Published

When neither measured data nor relevant CCIR Recommendations accepted by the administrations concerned are available then administrations should use the reference patterns as described below (dB):

a) for values of $\frac{D}{\lambda} \geqslant 100$* (maximum gain $\geqslant 48$ dB approx.):

$$
\begin{array}{ll}
G(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda} \varphi \right)^2 & \text{for } 0 < \varphi < \varphi_m \\
G(\varphi) = G_1 & \text{for } \varphi_m \leqslant \varphi < \varphi_r \\
G(\varphi) = 32 - 25 \log \varphi & \text{for } \varphi_r \leqslant \varphi < 48° \\
G(\varphi) = -10 & \text{for } 48° \leqslant \varphi \leqslant 180°
\end{array}
$$

where:

D = antenna diameter, λ = wavelength — expressed in the same unit

φ = off-axis angle of the antenna, in degrees, equal to θ_t or θ_g as applicable

G_1 = gain of the first sidelobe = $2 + 15 \log \frac{D}{\lambda}$

$$\varphi_m = \frac{20\lambda}{D} \sqrt{G_{max} - G_1} \qquad \text{(degrees)}$$

$$\varphi_r = 15.85 \left(\frac{D}{\lambda} \right)^{-0.6} \qquad \text{(degrees)}$$

b) for values of $\frac{D}{\lambda} < 100$* (maximum gain < 48 dB approx.):

$$
\begin{array}{ll}
G(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda} \varphi \right)^2 & \text{for } 0 < \varphi < \varphi_m \\
G(\varphi) = G_1 & \text{for } \varphi_m \leqslant \varphi < 100 \frac{\lambda}{D} \\
G(\varphi) = 52 - 10 \log \frac{D}{\lambda} - 25 \log \varphi & \text{for } 100 \frac{\lambda}{D} \leqslant \varphi < 48° \\
G(\varphi) = 10 - 10 \log \frac{D}{\lambda} & \text{for } 48° \leqslant \varphi \leqslant 180°
\end{array}
$$

---

* 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.

The above patterns may be modified as appropriate to achieve a better representation of the actual antenna pattern.

ANNEX IV

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 θ_t are assumed to be equal to 5°.

For this angular separation and for an earth station antenna with $\frac{D}{\lambda}$ greater than 100, the reference radiation pattern $(32 - 25 \log \theta_t)$ 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 T and θ_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 **3** or **4**.

	Symbol *	Value	Unit
Up-link at 6 175 MHz	P'_e	−37	dB (W/Hz)
	$G'_1\ (\theta_t)$	14.5	dB
	$G_2\ (\delta_{e'})$	15.5	dB
	L_u	200	dB
Down-link at 3 950 MHz	P'_s	−57	dB (W/Hz)
	$G'_3\ (\eta_e)$	15.5	dB
	$G_4\ (\theta_t)$	14.5	dB
	L_d	196	dB
	$10 \log \gamma$	−15	dB
	T	105	K
	θ_t	5	degrees

3. *Calculation of* $\dfrac{\Delta T}{T}$

From equation (1)

$$
\begin{aligned}
10 \log \Delta T_s &= P'_e + G'_1\ (\theta_t) + G_2\ (\delta_{e'}) + 228.6 - L_u \\
&= -37 + 14.5 + 15.5 + 228.6 - 200 = 21.6 \text{ dBK}
\end{aligned}
$$

Therefore,

$$\Delta T_s = 145 \text{ K}$$

From equation (2)

$$
\begin{aligned}
10 \log \Delta T_e &= P'_s + G'_3\ (\eta_e) + G_4\ (\theta_t) + 228.6 - L_d \\
&= -57 + 15.5 + 14.5 + 228.6 - 196 = 5.6 \text{ dBK}
\end{aligned}
$$

Therefore,

$$\Delta T_e = 3.6 \text{ K}$$

* All capital symbols, except T, refer to parameters given in logarithmic units.

From equation (3)

$$\Delta T = \gamma \, \Delta T_s + \Delta T_e$$
$$= 0.032 \times 145 + 3.6 = 8.2 \text{ K}$$

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 6%, coordination between the two networks is required.

APPENDIX 30 (Orb-85)

Orb-85

Provisions for All Services and Associated Plans for the Broadcasting-Satellite Service in the Frequency Bands 11.7 - 12.2 GHz (in Region 3), 11.7 - 12.5 GHz (in Region 1) and 12.2 - 12.7 GHz (in Region 2)

(See Article **15**)

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ARTICLE 1

General Definitions

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

1.1 *1977 Conference:* World Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in the Frequency Bands 11.7 -12.2 GHz (in Regions 2 and 3) and 11.7 - 12.5 GHz (in Region 1), called in short World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977.

1.2 *1983 Conference:* Regional Administrative Radio Conference for the Planning in Region 2 of the Broadcasting-Satellite Service in the Frequency Band 12.2 - 12.7 GHz and Associated Feeder Links in the Frequency Band 17.3 - 17.8 GHz, called in short Regional Administrative Conference for the Planning of the Broadcasting-Satellite Service in Region 2 (RARC Sat-R2), Geneva, 1983.

1.3 *1985 Conference:* First Session of the Word Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1985, called in short WARC Orb-85.

1.4 *Regions 1 and 3 Plan:* The Plan for the Broadcasting-Satellite Service in the Frequency Bands 11.7 - 12.2 GHz in Region 3 and 11.7 - 12.5 GHz in Region 1 contained in this Appendix, together with any modifications resulting from the successful application of the procedures of Article 4 of this Appendix.

1.5 *Region 2 Plan:* The Plan for the Broadcasting-Satellite Service in the Frequency Band 12.2 - 12.7 GHz in Region 2 contained in this Appendix, together with any modifications resulting from the successful application of the procedures of Article 4 of this Appendix.

1.6 *Frequency assignment in conformity with the Plan:* Any frequency assignment which appears in the Regions 1 and 3 Plan or the Region 2 Plan or for which the procedure of Article 4 of this Appendix has been successfully applied.

ARTICLE 2

Frequency Bands

2.1 The provisions of this Appendix apply to the broadcasting-satellite service in the frequency bands between 11.7 GHz and 12.2 GHz in Region 3, between 11.7 GHz and 12.5 GHz in Region 1 and between 12.2 GHz and 12.7 GHz in Region 2 and to the other services to which these bands are allocated in Regions 1, 2 and 3, insofar as their relationship to the broadcasting-satellite service in these bands is concerned.

ARTICLE 3

Execution of the Provisions and Associated Plans

3.1 The Members of the Union in Regions 1, 2 and 3 shall adopt, for their broadcasting-satellite space stations[1] operating in the frequency bands referred to in this Appendix, the characteristics specified in the appropriate Regional Plan and the associated provisions.

3.2 The Members of the Union shall not change the characteristics specified in the Regions 1 and 3 Plan or in the Region 2 Plan, or bring into use assignments to broadcasting-satellite space stations or to stations in the

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[1] In Region 2, such stations may also be used for transmissions in the fixed-satellite service (space-to-Earth) in accordance with No. **846** of the Radio Regulations.

other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes of this Appendix.

ARTICLE 4

Procedure for Modifications to the Plans

4.1 When an administration intends to make a modification[1] to one of the Regional Plans, i.e. either:

a) to modify the characteristics of any of its frequency assignments to a space station[2] in the broadcasting-satellite service which are shown in the appropriate Regional Plan, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use; *or*

b) to include in the appropriate Regional Plan a new frequency assignment to a space station in the broadcasting-satellite service; *or*

c) to cancel a frequency assignment to a space station in the broadcasting-satellite service;

the following procedure shall be applied before any notification of the frequency assignment is made to the International Frequency Registration Board (see Article 5 of this Appendix);

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[1] The intention not to employ energy dispersal in accordance with paragraph 3.18 of Annex 5 shall be treated as a modification and thus subject to the appropriate provisions of this Article.

[2] The expression "frequency assignment to a space station", wherever it appears in this Article, shall be understood to refer to a frequency assignment associated with a given orbital position. See also Annex 7 and Resolution **43 (Orb-85)** for the orbital limitations.

4.1.1 Before an administration proposes to include in the Region 2 Plan under the provisions of paragraph 4.1 *b),* a new frequency assignment to a space station or to include in the Plan new frequency assignments to a space station whose orbital position is not designated in the Plan for this administration, all of the assignments to the service area involved should normally have been brought into service or have been notified to the Board in accordance with Article 5 of this Appendix. Should this not be the case, the administration concerned shall inform the Board of the reasons therefor.

4.2 The term "frequency assignment in conformity with the Plan" used in this and the following Articles is defined in Article 1.

4.3 *Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or inclusion in that Plan of a new frequency assignment*

For Regions 1 and 3:

4.3.1 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Regions 1 and 3 Plan, or the inclusion of a new frequency assignment in that Plan, shall seek the agreement of those administrations:

4.3.1.1 of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service in the same or adjacent channel which is in conformity with the Regions 1 and 3 Plan, or in respect of which proposed modifications to that Plan have already been published by the Board in accordance with the provisions of paragraph 4.3.5.1 or 4.3.6 of this Article; *or*

4.3.1.2 of Region 2 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Region 2 Plan, or in respect of which proposed modifications to that Plan have already been published by the Board in accordance with the provisions of paragraph 4.3.5.1 or 4.3.6 of this Article; *or*

4.3.1.3 identified in accordance with *resolves* 2 of Resolution **43 (Orb-85)**; *or*

4.3.1.4 having no frequency assignment in the broadcasting-satellite service in the channel concerned but in whose territory the power flux-density value exceeds the prescribed limit as a result of the proposed modification or having an assignment whose associated service area does not cover the whole of the territory of the administration, and in whose territory outside that service area the power flux-density from the broadcasting-satellite space station subject to this modification exceeds the prescribed limit as a result of the proposed modification; *or*

4.3.1.5 having a frequency assignment in the band 11.7 - 12.2 GHz in Region 2 or 12.2 - 12.5 GHz in Region 3 to a space station in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **1060** of the Radio Regulations, or those of paragraph 7.2.1 of this Appendix;

4.3.1.6 whose services are considered to be affected.

4.3.2 The services of an administration are considered to be affected when the limits shown in Annex 1 are exceeded.

For Region 2:

4.3.3 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Region 2 Plan, or the inclusion of a new frequency assignment in that Plan, shall seek the agreement of those administrations:

4.3.3.1 of Region 2 having a frequency assignment in the Region 2 Plan to a space station in the broadcasting-satellite service in the same or adjacent channel which is in conformity with that Plan, or in respect of which proposed modifications to that Plan have already been published by the Board in accordance with the provisions of paragraph 4.3.5.1 or 4.3.6 of this Article; *or*

4.3.3.2 of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Regions 1 and 3 Plan, or in respect of which proposed modifications to that Plan have already been published by the Board in accordance with the provisions of paragraph 4.3.5.1 or 4.3.6 of this Article; *or*

4.3.3.3 identified in accordance with *resolves* 1 of Resolution **43 (Orb-85)**; *or*

4.3.3.4 having no frequency assignment in the broadcasting-satellite service in the channel concerned but in whose territory the power flux-density value exceeds the prescribed limit as a result of the proposed modification or having an assignment whose associated service area does not cover the whole of the territory of the administration, and in whose territory outside that service area the power flux-density from the broadcasting-satellite space station subject to this modification exceeds the prescribed limit as a result of the proposed modification; *or*

4.3.3.5 having a frequency assignment in the band 12.5 - 12.7 GHz in Region 1 or 12.2 - 12.7 GHz in Region 3 to a space station in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **1060** of the Radio Regulations or those of paragraph 7.2.1 of this Appendix; *or*

4.3.3.6 having a frequency assignment to a space station in the broadcasting-satellite service in the band 12.5 - 12.7 GHz in Region 3 with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment and which

a) is recorded in the Master Register, *or*

b) has been coordinated or is being coordinated under the provisions of Resolution **33**, *or*

c) appears in a Region 3 Plan to be adopted at a future administrative radio conference, taking account of modifications to that Plan which may be introduced in accordance with the Final Acts of the Conference;

4.3.3.7 whose services are considered to be affected.

4.3.4 The services of an administration are considered to be affected when the limits shown in Annex 1 are exceeded.

For all Regions:

4.3.5 An administration intending to modify characteristics in one of the Regional Plans shall send to the Board, not earlier than five years but preferably not later than eighteen months before the date on which the assignment is to be brought into use, the relevant information listed in Annex 2. Modifications to that Plan involving additions under paragraph 4.1 *b)* shall lapse if the assignment is not brought into use by that date.

4.3.5.1 Where as a result of the intended modification the limits defined in Annex 1 are not exceeded, this fact shall be indicated when submitting to the Board the information required by paragraph 4.3.5. The Board shall then publish this information in a special section of its weekly circular.

4.3.5.2 In all other cases the administration shall notify the Board of the names of the administrations whose agreement it considers should be sought in order to arrive at the agreement referred to in paragraph 4.3.1 or 4.3.3, as well as of those with which agreement has already been reached.

4.3.6 The Board shall determine on the basis of Annex 1 the administrations whose frequency assignments are considered to be affected within the meaning of paragraph 4.3.1 or 4.3.3. The Board shall include the names of those administrations with the information received under paragraph 4.3.5.2 and shall publish the complete information in a special section of its weekly circular. The Board shall immediately send the results of its calculations to the administration proposing the modification to the appropriate Regional Plan.

4.3.7 The Board shall send a telegram to the administrations listed in the special section of the weekly circular drawing their attention to the information it contains and shall send them the results of its calculations.

4.3.8 An administration which feels that it should have been included in the list of administrations whose services are considered to be affected may, giving the technical reasons for so doing, request the Board to include its name. The Board shall study this request on the basis of Annex 1 and shall send a copy of the request with an appropriate recommendation to the administration proposing the modification to the appropriate Regional Plan.

4.3.9 Any modification to a frequency assignment which is in conformity with the appropriate Regional Plan or any inclusion in that Plan of a new frequency assignment which would have the effect of exceeding the limits specified in Annex 1 shall be subject to the agreement of all administrations whose services are considered to be affected.

4.3.10 The administration seeking agreement or the administration with which agreement is sought may request any additional technical information it considers necessary. The administrations shall inform the Board of such requests.

4.3.11 Comments from administrations on the information published pursuant to paragraph 4.3.6 should be sent either directly to the administration proposing the modification or through the Board. In any event the Board shall be informed that comments have been made.

4.3.12 An administration that has not notified its comments either to the administration seeking agreement or to the Board within a period of four months following the date of the weekly circular referred to in paragraph 4.3.5.1 or 4.3.6 shall be understood to have agreed to the proposed assignment. This time limit may be extended by up to three months for an administration that has requested additional information under paragraph 4.3.10 or for an administration that has requested the assistance of the Board under paragraph 4.3.20. In the latter case the Board shall inform the administrations concerned of this request.

4.3.13 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of paragraph 4.3.5 and the consequent procedure with respect to any other administration whose services might be affected as a result of modifications to the initial proposal.

4.3.14 If no comments have been received on the expiry of the periods specified in paragraph 4.3.12, or if agreement has been reached with the administrations which have made comments and with which agreement is necessary, the administration proposing the modification may continue with the appropriate procedure in Article 5 and shall inform the Board, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached.

4.3.15 The agreement of the administrations affected may also be obtained in accordance with this Article, for a specified period.

4.3.16 When the proposed modification to the appropriate Regional Plan involves developing countries, administrations shall seek all practicable solutions conducive to the economical development of the broadcasting-satellite systems of these countries.

4.3.17 The Board shall publish in a special section of its weekly circular the information received under paragraph 4.3.14 together with the names of any administrations with which the provisions of this Article have been successfully applied. The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan.

4.3.18 When an administration proposing to modify the characteristics of a frequency assignment or to make a new frequency assignment receives notice of disagreement from an administration whose agreement it has sought, it should first endeavour to solve the problem by exploring all possible means of meeting its requirement. If the problem still cannot be solved by such means, the administration whose agreement has been sought should endeavour to overcome the difficulties as far as possible, and shall state the technical reasons for any disagreement if the administration seeking the agreement requests it to do so.

4.3.19 If no agreement is reached between the administrations concerned, the Board shall carry out any study that may be requested by these administrations; the Board shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.3.20 An administration may at any stage in the procedure described, or before applying it, request the assistance of the Board, particularly in seeking the agreement of another administration.

4.3.21 The relevant provisions of Article 5 of this Appendix shall be applied when frequency assignments are notified to the Board.

4.4 *Cancellation of frequency assignments*

When a frequency assignment in conformity with one of the Regional Plans is no longer required, whether or not as a result of a modification, the administration concerned shall immediately so inform the Board. The Board shall publish this information in a special section of its weekly circular and delete the assignment from the appropriate Regional Plan.

4.5 *Master copy of the Plans*

4.5.1 *a)* The Board shall maintain an up-to-date master copy of the Regions 1 and 3 Plan taking account of the application of the procedure specified in this Article. The Board shall prepare a document listing the amendments to be made to the Plan as a result of modifications made in accordance with the procedure in this Article.

b) The Board shall maintain an up-to-date master copy of the Region 2 Plan, including the overall equivalent protection margins of each assignment, taking account of the application of the procedure specified in this Article. This master copy shall contain the overall equivalent protection margins derived from the Plan as established by the 1983 Conference and those derived from all modifications to the Plan as a result of the successful completion of the modification procedure described in this Article. The Board shall prepare a document listing the amendments to be made to the Plan as a result of modifications made in accordance with the procedure described in this Article.

4.5.2 The Secretary-General shall be informed by the Board of any modifications made to the Regional Plans and shall publish an up-to-date version of those Plans in an appropriate form when justified by the circumstances.

ARTICLE 5

Notification, Examination and Recording in the Master Register of Frequency Assignments to Space Stations in the Broadcasting-Satellite Service

5.1 *Notification*

5.1.1 Whenever an administration intends to bring into use a frequency assignment to a space station in the broadcasting-satellite service, it shall notify this frequency assignment to the Board. For this purpose, the notifying administration shall apply the following provisions.

5.1.2 For any notification under paragraph 5.1.1, an individual notice for each frequency assignment shall be drawn up as prescribed in Annex 2, the various sections of which specify the basic characteristics to be provided as appropriate. It is recommended that the notifying administration should also supply any other data it may consider useful.

5.1.3 Each notice must reach the Board not earlier than three years before the date on which the frequency assignment is to be brought into use. In any case, the notice must reach the Board not later than three months before that date[1].

5.1.4 Any frequency assignment the notice of which reaches the Board after the applicable period specified in paragraph 5.1.3 shall, where it is to be recorded, bear a remark in the Master Register to indicate that it is not in conformity with paragraph 5.1.3.

5.1.5 Any notice made under paragraph 5.1.1 which does not contain the characteristics specified in Annex 2 shall be returned by the Board immediately by airmail to the notifying administration with the relevant reasons.

5.1.6 Upon receipt of a complete notice, the Board shall include its particulars, with the date of receipt, in its weekly circular, which shall contain the particulars of all such notices received since the publication of the previous circular.

5.1.7 The circular shall constitute the acknowledgement to the notifying administration of the receipt of a complete notice.

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[1] Where appropriate, the notifying administration shall initiate the procedure for modifying the Plan concerned in sufficient time to ensure that this limit is observed. For Region 2, see also Resolution **42 (Orb-85)** and paragraph B of Annex 7.

5.1.8 Complete notices shall be considered by the Board in order of receipt. The Board shall not postpone its finding unless it lacks sufficient data to reach a decision; moreover, the Board shall not act upon any notice which has a technical bearing on an earlier notice still under consideration by the Board until it has reached a finding with respect to such earlier notice.

5.2 *Examination and recording*

5.2.1 The Board shall examine each notice:

a) with respect to its conformity with the Convention and the relevant provisions of the Radio Regulations (with the exception of those relating to *b), c)* and *d)* below);

b) with respect to its conformity with the appropriate Regional Plan; *or*

c) with respect to its conformity with the appropriate Regional Plan, however, having characteristics differing from those in the appropriate Regional Plan in one or more of the following aspects:

- use of a reduced e.i.r.p.,
- use of a reduced coverage area entirely situated within the coverage area appearing in the appropriate Regional Plan,
- use of other modulating signals in accordance with the provisions of paragraph 3.1.3 of Annex 5,
- use of the assignment for transmission in the fixed-satellite service in accordance with No. **846** of the Radio Regulations,
- use of an orbital position under the conditions specified in paragraph B of Annex 7; *or*

d) with respect to its conformity with the provisions of Resolution **42 (Orb-85)**.

5.2.2 Where the Board reaches a favourable finding with respect to paragraphs 5.2.1 *a)* and 5.2.1 *b)*, the frequency assignment of an administration shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations, all frequency assignments brought into use in conformity with the appropriate Regional Plan and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

5.2.2.1 Where the Board reaches a favourable finding with respect to paragraphs 5.2.1 *a)* and 5.2.1 *c)*, the frequency assignment shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations, all frequency assignments brought into use in conformity with the appropriate Regional Plan and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments. When recording these assignments, the Board shall indicate by an appropriate symbol the characteristics having a value different from that appearing in the appropriate Regional Plan.

5.2.2.2 Where the Board reaches a favourable finding with respect to paragraph 5.2.1 *a)* but an unfavourable finding with respect to paragraphs 5.2.1 *b)* and 5.2.1 *c)*, it shall examine the notice with respect to the successful application of the provisions of Resolution **42 (Orb-85)**. A frequency assignment for which the provisions of Resolution **42 (Orb-85)** have been successfully applied shall be recorded in the Master Register with an appropriate symbol to indicate its interim status. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations all frequency assignments brought into use following the successful application of the provisions of Resolution **42 (Orb-85)** and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

5.2.3 Whenever a frequency assignment is recorded in the Master Register, the finding reached by the Board shall be indicated by a symbol in Column 13a.

5.2.4 Where the Board reaches an unfavourable finding with respect to paragraphs 5.2.1 *a)*, 5.2.1 *b)* and 5.2.1 *c)*, the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

5.2.5 Where the notifying administration resubmits the notice and the finding of the Board becomes favourable with respect to the appropriate parts of paragraph 5.2.1, the notice shall be treated as in paragraph 5.2.2, 5.2.2.1 or 5.2.2.2, as appropriate.

5.2.6 If the notifying administration resubmits the notice without modification and insists on its reconsideration, and if the Board's finding with respect to paragraph 5.2.1 remains unfavourable, the notice is returned to the notifying administration in accordance with paragraph 5.2.4. In this case, the notifying administration undertakes not to bring into use the frequency assignment until the condition specified in paragraph 5.2.5 is fulfilled. For Regions 1, 2 and 3, in the event that the Board has been informed of agreement to modification of the Plan for a specified period of time in accordance with Article 4, the frequency assignment shall be recorded in the Master Register with a note indicating that the frequency assignment is valid only for the period specified. The notifying administration using the frequency assignment over a specified period shall not subsequently invoke this fact to justify the continued use of the frequency beyond the period specified unless it obtains the agreement of the administration(s) concerned.

5.2.7 If a frequency assignment notified in advance of bringing into use in conformity with paragraph 5.1.3 has received a favourable finding by the Board with respect to the provisions of paragraph 5.2.1, it shall be entered provisionally in the Master Register with a special symbol in the Remarks Column indicating the provisional nature of that entry.

5.2.8 When the Board has received confirmation that the frequency assignment has been brought into use, the Board shall remove the symbol in the Master Register.

5.2.9 The date in Column 2c shall be the date of bringing into use notified by the administration concerned. It is given for information only.

5.3 *Cancellation of entries in the Master Register*

5.3.1 If an administration has not confirmed the bringing into use of a frequency assignment under paragraph 5.2.8, the Board will make inquiries of the administration not earlier than six months after the expiry of the period specified in paragraph 5.1.3. On receipt of the relevant information, the Board will either modify the date of coming into use or cancel the entry.

5.3.2 If the use of any recorded frequency assignment is permanently discontinued, the notifying administration shall so inform the Board within three months, whereupon the entry shall be removed from the Master Register.

ARTICLE 6

Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Terrestrial Stations Affecting Broadcasting-Satellite Frequency Assignments in the Frequency Bands 11.7 - 12.2 GHz (in Region 3), 11.7 - 12.5 GHz (in Region 1) and 12.2 - 12.7 GHz (in Region 2)[1]

Section I. Coordination Procedure to Be Applied

6.1.1 Before notifying to the Board a frequency assignment to a terrestrial transmitting station, an administration shall initiate coordination with any other administration having a frequency assignment to a broadcasting tel-lite station in conformity with the appropriate Regional Plan if:

– the necessary bandwidths of the two transmissions overlap; *and*

[1] These procedures do not replace the procedures prescribed for terrestrial stations in Articles **11** and **12** of the Radio Regulations.

– the power flux-density which would be produced by the proposed terrestrial transmitting station exceeds the value derived in accordance with Annex 3 at one or more points on the edge of the service area which is within the coverage area of the broadcasting-satellite station of that administration.

6.1.2 For the purpose of effecting coordination, the administration responsible for the terrestrial station shall send to the administrations concerned, by the fastest possible means, a diagram drawn to an appropriate scale indicating the location of the terrestrial station and all other data of the proposed frequency assignment and the approximate date on which it is planned to bring the station into use.

6.1.3 An administration with which coordination is sought shall acknowledge receipt of the coordination data immediately by telegram. If no acknowledgement is received within fifteen days of dispatch, the administration seeking coordination may dispatch a telegram requesting acknowledgement of receipt of the coordination data, to which the receiving administration shall reply. Upon receipt of the coordination data, an administration with which coordination is sought shall promptly examine the matter with regard to interference[1] which would be caused to its frequency assignments in conformity with the appropriate Regional Plan and shall, within an overall period of two months from dispatch of the coordination data, either notify the administration requesting coordination of its agreement to the proposed assignment or, if this is impossible, indicate the reasons therefor and make such suggestions as it may be able to offer with a view to a satisfactory solution of the problem.

[1] The criteria to be employed in evaluating interference levels shall be based on the relevant CCIR Recommendations or, in the absence of such Recommendations, shall be agreed between the administrations concerned.

6.1.4 No coordination is required when an administration proposes to change the characteristics of an existing assignment in such a way as not to increase the level of interference to the service to be rendered by the broadcasting-satellite stations of other administrations.

6.1.5 An administration seeking coordination may request the Board to endeavour to effect coordination where:

a) an administration with which coordination is sought fails to acknowledge receipt under paragraph 6.1.3 within one month of dispatch of the coordination data;

b) an administration which has acknowledged receipt under paragraph 6.1.3 fails to give a decision within three months of dispatch of the coordination data;

c) the administration seeking coordination and an administration with which coordination is sought disagree on the acceptable level of interference; *or*

d) coordination is impossible for any other reason.

In so doing, the administration concerned shall provide the Board with the necessary information to enable it to endeavour to effect such coordination.

6.1.6 Either the administration seeking coordination or an administration with which coordination is sought, or the Board, may request any additional information which they may require to assess the level of interference to the services concerned.

6.1.7 Where the Board receives a request under paragraph 6.1.5 *a)*, it shall forthwith send a telegram to the administration concerned requesting immediate acknowledgement.

6.1.8 Where the Board receives an acknowledgement following its action under paragraph 6.1.7 or receives a request under paragraph 6.1.5 *b)*, it shall forthwith send a telegram to the administration concerned requesting an early decision on the matter.

6.1.9 Where the Board receives a request under paragraph 6.1.5 *d)*, it shall endeavour to effect coordination in accordance with the provisions of paragraph 6.1.2. Where the Board receives no acknowledgement of its request for coordination within the period specified in paragraph 6.1.3, it shall act in accordance with paragraph 6.1.7.

6.1.10 Where an administration fails to reply within one month of dispatch of the Board's telegram sent under paragraph 6.1.7 requesting an acknowledgement or fails to give a decision on the matter within two months of dispatch of the Board's telegram of request sent under paragraph 6.1.8, the administration with which coordination was sought shall be considered to have undertaken that no complaint will be made in respect of any harmful interference which may be caused by the terrestrial station being coordinated to the service rendered or to be rendered by its satellite-broadcasting station.

6.1.11 Where necessary, as part of the procedure under paragraph 6.1.5, the Board shall assess the level of interference. In any case, the Board shall inform the administrations concerned of the results obtained.

6.1.12 In the event of continuing disagreement between one administration seeking to effect coordination and one with which coordination has been sought, the administrations concerned may explore the possibility of reaching an agreement on the use of the proposed frequency assignment for a specified period.

Section II. Notification Procedure for Frequency Assignments

6.2.1 Any frequency assignment to a fixed, land or broadcasting station shall be notified to the International Frequency Registration Board if the use of the frequency concerned is capable of causing harmful interference to the service rendered or to be rendered by a broadcasting-satellite station of any other administration, or if it is desired to obtain international recognition of the use of the frequency [1].

6.2.2 For this notification, an individual notice for each frequency assignment shall be drawn up as prescribed in Section A of Appendix **1** to the Radio Regulations, which specifies the basic characteristics to be furnished as required. It is recommended that the notifying administration should also supply the additional data called for in that Section, together with such further data as it may consider appropriate.

6.2.3 Whenever practicable, each notice should reach the Board before the date on which the assignment is brought into use. The notice made in accordance with paragraph 6.2.2 must reach the Board not earlier than three years and not later than three months before the date on which the assignment is to be brought into use.

6.2.4 Any frequency assignment, the notice of which reaches the Board less than three months before it is brought into use shall, where it is to be recorded, bear a remark in the Master Register to indicate that it is not in conformity with paragraph 6.2.3.

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[1] The attention of administrations is specifically drawn to the provisions of Section I of this Article.

Section III. Procedure for the Examination of Notices and the Recording of Frequency Assignments in the Master Register

6.3.1 Whatever the means of communication, including telegraph, by which a notice is transmitted to the Board, it shall be considered complete if it contains at least the appropriate basic characteristics specified in Section A of Appendix **1** to the Radio Regulations.

6.3.2 Complete notices shall be considered by the Board in the order of their receipt.

6.3.3 Any incomplete notice shall be returned by the Board immediately, by airmail, to the notifying administration with the reasons therefor.

6.3.4 Upon receipt of a complete notice, the Board shall include the particulars thereof, with the date of receipt, in its weekly circular; this circular shall contain the particulars of all such notices received since publication of the previous circular.

6.3.5 The circular shall constitute the Board's acknowledgement to the notifying administration of the receipt of a complete notice.

6.3.6 Complete notices shall be considered by the Board in the order specified in paragraph 6.3.2. The Board may not postpone the formulation of a finding unless it lacks sufficient data to reach a decision; moreover, the Board shall not act upon any notice which has a technical bearing on an earlier notice still under consideration by the Board until it has reached a finding with respect to such earlier notice.

6.3.7 The Board shall examine each notice:

6.3.8 – with respect to its conformity with the Convention, the relevant provisions of the Radio Regulations and the provisions of this Appendix (with the exception of those relating to the coordination procedure and the probability of harmful interference);

6.3.9 – with respect to its conformity with the provisions of paragraph 6.1.1 relating to coordination of the use of the frequency assignment with the other administrations concerned;

6.3.10 – where appropriate, with respect to the probability of harmful interference to a broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan.

6.3.11 Depending upon the findings of the Board subsequent to the examination prescribed in paragraphs 6.3.8, 6.3.9 and 6.3.10, further action shall be as follows:

6.3.12 *Finding unfavourable with respect to paragraph 6.3.8*

6.3.13 Where the notice includes a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations, it shall be examined immediately with respect to paragraphs 6.3.9 and 6.3.10.

6.3.14 If the finding is favourable with respect to paragraph 6.3.9 or 6.3.10, as appropriate, the assignment shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d.

6.3.15 If the finding is unfavourable with respect to paragraph 6.3.9 or 6.3.10, as appropriate, the notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding. In such case the notifying administration shall undertake not to bring into use the frequency assignment until the condition specified in paragraph 6.3.14 can be fulfilled. However, the administrations concerned may explore the possibility of reaching an agreement on the use of the proposed frequency assignment for a specified period.

6.3.16 Where the notice does not include a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations, it shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

6.3.17 If the notifying administration resubmits the notice unchanged, it shall be treated in accordance with the provisions of paragraph 6.3.16.

6.3.18 If the notifying administration resubmits the notice with a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations, it shall be treated in accordance with the provisions of paragraphs 6.3.13 and 6.3.14 or 6.3.15, as appropriate.

6.3.19 If the notifying administration resubmits the notice with modifications which, after re-examination, result in a favourable finding by the Board with respect to paragraph 6.3.8, the notice shall be treated in accordance with the provisions of paragraphs 6.3.20 to 6.3.32. However, in any subsequent recording of the assignment, the date of receipt of the resubmitted notice by the Board shall be entered in Column 2d.

6.3.20 *Finding favourable with respect to paragraph 6.3.8*

6.3.21 Where the Board finds that the coordination procedure mentioned in paragraph 6.3.9 has been successfully applied with all administrations whose broadcasting-satellite services may be affected, the assignment shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d.

6.3.22 Where the Board finds that the coordination procedure mentioned in paragraph 6.3.9 has not been applied, and the notifying administration requests the Board to effect the required coordination, the Board shall take the appropriate action and shall inform the administrations concerned of the results obtained. If the Board's efforts are successful, the notice shall be treated in accordance with the provisions of paragraph 6.3.21. If the Board's efforts are unsuccessful, the notice shall be examined by the Board with respect to the provisions of paragraph 6.3.10.

6.3.23 Where the Board finds that the coordination procedure mentioned in paragraph 6.3.9 has not been applied and the notifying administration does not request the Board to effect the required coordination, the notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this action and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

6.3.24 Where the notifying administration resubmits the notice and the Board finds that the coordination procedure mentioned in paragraph 6.3.9 has been successfully applied with all administrations whose broadcasting-satellite services may be affected, the assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Board shall be entered in Column 2d. The date of the receipt of the resubmitted notice by the Board shall be entered in the Remarks Column.

6.3.25 Where the notifying administration resubmits the notice, requesting the Board to effect the required coordination, it shall be treated in accordance with the provisions of paragraph 6.3.22. However, in any subsequent recording of the assignment, the date of receipt of the resubmitted notice by the Board shall be entered in the Remarks Column.

6.3.26 Where the notifying administration resubmits the notice and states that it has been unsuccessful in its efforts to effect coordination, it shall be examined by the Board with respect to the provisions of paragraph 6.3.10. However, in any subsequent recording of the assignment, the date of receipt of the resubmitted notice by the Board shall be entered in the Remarks Column.

6.3.27 *Finding favourable with respect to paragraphs 6.3.8 and 6.3.10*

6.3.28 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.

6.3.29 *Finding favourable with respect to paragraph 6.3.8 but unfavourable with respect to paragraph 6.3.10*

6.3.30 The notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

6.3.31 Should the notifying administration resubmit the notice with modifications which result, after re-examination, in a favourable finding by the Board with respect to paragraph 6.3.10, the assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Board shall be entered in Column 2d. The date of receipt of the resubmitted notice by the Board shall be indicated in the Remarks Column.

6.3.32 Should the notifying administration resubmit the notice, either unchanged or with modifications which reduce the probability of harmful interference, but insufficiently to permit the provisions of paragraph 6.3.31 to be applied and should that administration insist upon reconsideration of the notice but the Board's finding remain unchanged, the notification shall again be returned to the notifying administration in accordance with paragraph 6.3.30. In such case, the notifying administration shall undertake not to bring into use the proposed frequency assignment until the condition specified in paragraph 6.3.31 can be fulfilled. However, the administrations concerned may explore the possibility of reaching an agreement on the use of the frequency assignment for a specified period. In that event the Board shall be notified of the agreement and the frequency assignment shall be recorded in the Master Register with a note indicating that the assignment is valid only for the specified period. The notifying administration using the frequency assignment during a specified period shall not subsequently use this circumstance to justify continued use of the frequency beyond this period unless it obtains the agreement of the administration or administrations concerned.

6.3.33 *Change in the basic characteristics of assignments already recorded in the Master Register*

6.3.34 Any notice of a change in the basic characteristics of an assignment already recorded in the Master Register, as specified in Appendix **1** to the Radio Regulations (except those entered in Columns 2c, 3 and 4a of the Master Register), shall be examined by the Board in accordance with the provisions of paragraphs 6.3.8 and 6.3.9 and, where appropriate, paragraph 6.3.10 and the provisions of paragraphs 6.3.12 to 6.3.32 inclusive shall be applied. Where the change should be recorded, the original assignment shall be amended according to the notice.

6.3.35 However, in the event of a change in the basic characteristics of an assignment which is in conformity with paragraph 6.3.8, should the Board reach a favourable finding with respect to paragraph 6.3.9 and, if applicable, paragraph 6.3.10, or find that the change does not increase the probability of harmful interference to assignments already recorded, the amended assignment shall retain the original date in Column 2d. In addition, the date of receipt by the Board of the notice relating to the change shall be entered in the Remarks Column.

6.3.36 The planned date of bringing into use of a frequency assignment may be extended on request of the notifying administration by three months. Where the administration states that, due to exceptional circumstances, it needs a further extension of this period, such extension may be granted, but it shall in no case exceed six months from the original planned date of bringing into use.

6.3.37 In applying the provisions of this Section, any resubmitted notice which is received by the Board more than two years after the date of its return by the Board shall be considered as a new notice.

6.3.38 *Recording of frequency assignments notified before being brought into use*

6.3.39 If a frequency assignment notified prior to its bringing into use has received a favourable finding by the Board with respect to paragraphs 6.3.8 and 6.3.9, and, where appropriate, 6.3.10, it shall be entered provisionally in the Master Register with a special symbol in the Remarks Column indicating the provisional nature of that entry.

6.3.40 Within one month after the date of bringing into use, either as originally notified or as modified in application of paragraph 6.3.36, the notifying administration shall confirm that the frequency assignment has been brought into use. When the Board is informed that the assignment has been brought into use, the special symbol shall be deleted from the Remarks Column.

6.3.41 If the Board fails to receive this confirmation within the period referred to in paragraph 6.3.40, the entry concerned shall be cancelled. The Board shall consult the administration concerned before taking such action.

ARTICLE 7

Procedures for Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Stations in the Fixed-Satellite Service in the Frequency Bands 11.7 - 12.2 GHz (in Region 2), 12.2 - 12.7 GHz (in Region 3) and 12.5 - 12.7 GHz (in Region 1), When Frequency Assignments to Broadcasting-Satellite Stations in Conformity with the Regions 1 and 3 Plan, or the Region 2 Plan, Respectively, Are Involved [1]

Section I. Procedure for the Advance Publication of Information on Planned Fixed-Satellite Systems

Publication of Information

7.1.1 An administration which intends to establish a fixed-satellite system shall, prior to the procedure described in paragraph 7.2.1, where applicable, send to the International Frequency Registration Board, not earlier than five years and preferably not later than two years before the date of bringing into service each satellite network of the planned system, the information listed in Appendix **4** to the Radio Regulations.

7.1.2 Any amendments to the information concerning a planned satellite system sent in accordance with paragraph 7.1.1 shall also be sent to the Board as soon as they become available.

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[1] These provisions do not replace the procedures prescribed in Articles **11** and **13** of the Radio Regulations when stations other than those of the broadcasting-satellite service are involved.

7.1.3 The Board shall publish the information sent under paragraphs 7.1.1 and 7.1.2 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. The circular telegram shall include the frequency bands to be used and, in the case of a geostationary satellite, the orbital location of the space station.

7.1.3.1 If the information is found to be incomplete, the Board shall publish it under paragraph 7.1.3 and immediately seek, from the administration concerned, any clarification and information not provided. In such cases, the period of three months specified in paragraph 7.1.4 shall count from the date of publication, under paragraph 7.1.3, of the complete information.

Comments on Published Information

7.1.4 If, after studying the information published under paragraph 7.1.3, any administration is of the opinion that interference which may be unacceptable may be caused to its frequency assignments in conformity with the appropriate Regional Plan, it shall, within three months after the date of the weekly circular publishing the information listed in Appendix **4** to the Radio Regulations, send its comments to the administration concerned. A copy of these comments shall also be sent to the Board. If no such comments are received from an administration within the period mentioned above, it may be assumed that that administration has no basic objections to the planned fixed-satellite network(s) of that system of which details have been published.

Resolution of Difficulties

7.1.5 An administration receiving comments sent in accordance with paragraph 7.1.4 shall endeavour to resolve any difficulties that may arise without considering the possibility of adjustment to broadcasting-satellite stations of other administrations. If no such means can be found, the administration concerned is then free to apply to other administrations concerned in order to solve these difficulties, provided that any modifications which may result to the appropriate Regional Plan are in accordance with Article 4.

7.1.6 In their attempts to resolve the difficulties mentioned above, administrations may seek the assistance of the Board.

Results of Advance Publication

7.1.7 An administration, on behalf of which details of planned satellite networks have been published in accordance with the provisions of paragraphs 7.1.1 and 7.1.2 shall, after the period of three months specified in paragraph 7.1.4, inform the Board whether or not comments provided for in paragraph 7.1.4 have been received and of the progress made in resolving any remaining difficulties. Additional information on the progress made in resolving any remaining difficulties shall be sent to the Board at intervals not exceeding six months prior to the commencement of coordination or the sending in of notices to the Board. 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 inform all administrations by circular telegram.

Commencement of Coordination or Notification Procedure

7.1.8 In complying with the provisions of paragraphs 7.1.5 and 7.1.6, an administration responsible for a planned fixed-satellite system shall, if necessary, defer its commencement of the coordination procedure of paragraph 7.2.1 or, where this is not applicable, the sending of its notices to the Board until five months after the date of the weekly circular containing the information listed in Appendix 4 to the Radio Regulations on the relevant satellite network. However, in respect of those administrations with which difficulties have been resolved or which have responded favourably, the coordination procedure, where applicable, may be commenced prior to the expiry of the five months mentioned above.

Section II. Coordination Procedures to Be Applied in Appropriate Cases

7.2.1 Before an administration notifies to the Board or brings into use any frequency assignment to a space station in the fixed-satellite service, it shall seek the agreement of any other administration having a frequency assignment in conformity with the appropriate Regional Plan, if:

a) any portion of the necessary bandwidth proposed for the space station in the fixed-satellite service falls within the necessary bandwidth associated with the frequency assignment to the broadcasting-satellite station; *and*

b) the power flux-density which would be produced by the proposed fixed-satellite assignment exceeds the value specified in Annex 4.

For this purpose, the administration seeking agreement shall send to any other such administration the information listed in Appendix **3** to the Radio Regulations.

7.2.2 No additional agreement is necessary when an administration proposes to change the characteristics of an existing assignment in such a way as will, in respect of the broadcasting-satellite service of another administration, meet the requirements of paragraph 7.2.1 above, or when this assignment has previously been the subject of an agreement and when the change will not cause any increase in the interference potential specified in that agreement.

7.2.3 An administration seeking coordination under paragraph 7.2.1 shall at the same time send to the Board a copy of the request for coordination together with the information listed in Appendix **3** to the Radio Regulations and the name(s) of the administration(s) whose agreement is sought. The Board shall determine on the basis of Annex 4 which frequency assignments in conformity with the appropriate Regional Plan are considered to be affected. The Board shall include the names of those administrations with the information received from the administration seeking coordination and shall publish this information in a special section of its weekly circular, together with a reference to the weekly circular in which details of the satellite system were published in accordance with Section I of this Article. When the weekly circular contains such information, the Board shall so inform all administrations by circular telegram.

7.2.4 An administration believing that it should have been included in the procedure under paragraph 7.2.1 shall have the right to request that it be brought into the procedure.

7.2.5 An administration whose agreement is sought under paragraph 7.2.1 shall acknowledge receipt of the coordination data immediately by telegram. If no acknowledgement is received within one month after the date of the weekly circular publishing the information under paragraph 7.2.3, the administration seeking coordination shall dispatch a telegram requesting acknowledgement, to which the receiving administration shall reply within a further period of one month. Upon receipt of the coordination data, an administration shall, having regard to the proposed date of bringing into use of the assignment for which agreement 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 agreement is sought under paragraph 7.2.1, and shall, within three months from the date of the relevant weekly circular, notify its agreement to the requesting administration. If the administration with which coordination is sought does not agree, it shall, within the same period, send to the administration seeking coordination 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.

7.2.6 An administration seeking coordination may request the Board to endeavour to effect coordination in those cases where:

a) an administration whose agreement is sought under paragraph 7.2.1 fails to acknowledge receipt, under paragraph 7.2.5, within two months after the date of the weekly circular publishing the information relating to the request for coordination;

b) an administration has acknowledged receipt under paragraph 7.2.5, but fails to give a decision within three months from the date of the relevant weekly circular;

[1] The criteria to be employed in evaluating interference levels shall be based upon the technical information contained in this Appendix or upon relevant CCIR Recommendations and shall be agreed between the administrations concerned.

c) there is disagreement between the administration seeking coordination and an administration whose agreement is sought as to the acceptable level of interference; *or*

d) agreement between administrations is not possible for any other reason.

In so doing, it shall furnish the Board with the necessary information to enable it to endeavour to effect such coordination.

7.2.7 Either the administration seeking coordination or an administration whose agreement is sought, or the Board, may request additional information which they may require to assess the level of interference to the services concerned.

7.2.8 Where the Board receives a request under paragraph 7.2.6 *a)*, it shall forthwith send a telegram to the administration whose agreement is sought requesting immediate acknowledgement.

7.2.9 Where the Board receives an acknowledgement following its action under paragraph 7.2.8, or where the Board receives a request under paragraph 7.2.6 *b)*, it shall forthwith send a telegram to the administration whose agreement is sought requesting an early decision on the matter.

7.2.10 Where the Board receives a request under paragraph 7.2.6 *d)*, it shall endeavour to effect coordination in accordance with the provisions of paragraph 7.2.1. The Board shall also, where appropriate, act in accordance with paragraph 7.2.3. Where the Board receives no acknowledgement to its request for coordination within the periods specified in paragraph 7.2.5, it shall act in accordance with paragraph 7.2.8.

7.2.11 Where an administration fails to reply within one month of dispatch of the Board's telegram requesting an acknowledgement sent under paragraph 7.2.8, or fails to give a decision on the matter within one month of dispatch of the Board's telegram of request under paragraph 7.2.9, it shall be deemed that the administration whose agreement was sought has undertaken:

a) that no complaint will be made in respect of any harmful interference which may be caused to the services rendered by its broadcasting-satellite stations by the use of the assignment for which coordination was requested;

b) that its broadcasting-satellite stations will not cause harmful interference to the use of the assignment for which coordination was requested.

7.2.12 Where necessary, as part of the procedure under paragraph 7.2.6, the Board shall assess the level of interference. In any case, the Board shall inform the administrations concerned of the results obtained.

7.2.13 In the event of continuing disagreement between one administration seeking to effect coordination and one whose agreement has been sought, provided that the assistance of the Board has been requested, the administration seeking coordination may, after five months from the date of the request for coordination, taking into consideration the provisions of paragraph 7.3.4, send its notice concerning the proposed assignment to the Board. In those circumstances the notifying administration shall undertake not to bring the frequency assignment into use until the condition in paragraph 7.4.11.2 can be fulfilled. But the administrations concerned may explore the possibility of reaching an agreement on the use of the proposed frequency assignment for a specified period.

Section III. Notification of Frequency Assignments

7.3.1 Any frequency assignment to a space station in the fixed-satellite service shall be notified to the Board:

a) if the use of the frequency concerned is capable of causing harmful interference to a frequency assignment of another administration which is in conformity with the appropriate Regional Plan [1]; *or*

b) if it is desired to obtain international recognition of the use of the frequency.

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[1] The attention of administrations is specifically drawn to the application of paragraph 7.2.1 above.

7.3.2 Similar notice shall be given for any frequency to be used for reception by an earth station where one or more of the conditions specified in paragraph 7.3.1 are applicable.

7.3.3 For any notification under paragraph 7.3.1 or 7.3.2, an individual notice for each frequency assignment shall be drawn up as prescribed in Appendix **3** to the Radio Regulations, the various Sections of which specify the basic characteristics to be furnished according to the case. The notifying administration shall furnish such further data as it considers appropriate.

7.3.4 Each notice must reach the Board not earlier than three years before the date on which the assignment is to be brought into use. The notice must reach the Board in any case not later than three months[1] before this date.

7.3.5 Any frequency assignment to an earth or space station, the notice of which reaches the Board after the applicable period specified in paragraph 7.3.4, shall, where it is to be recorded, bear a mark in the Master Register to indicate that it is not in conformity with paragraph 7.3.4.

Section IV. Procedure for the Examination of Notices and the Recording of Frequency Assignments in the Master Register

7.4.1 Any notice which does not contain at least those basic characteristics specified in Appendix **3** to the Radio Regulations shall be returned by the Board immediately, by airmail, to the notifying administration with the reasons therefor.

7.4.2 Upon receipt of a complete notice, the Board shall include the particulars thereof, with the date of receipt, in its weekly circular which shall contain the particulars of all such notices received since the publication of the previous circular.

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[1] The notifying administration shall take this limit into account when deciding, where appropriate, to initiate the coordination procedure(s).

7.4.3 The circular shall constitute the acknowledgement to the notifying administration of the receipt of a complete notice.

7.4.4 Complete notices shall be considered by the Board in the order of their receipt. The Board shall not postpone the formulation of a finding unless it lacks sufficient data to render a decision in connection therewith; moreover, the Board shall not act upon any notice which has a technical bearing on an earlier notice still under consideration by the Board, until it has reached a finding with respect to such earlier notice.

7.4.5 The Board shall examine each notice:

7.4.5.1 with respect to its conformity with the Convention, the relevant provisions of the Radio Regulations and the provisions of this Appendix (with the exception of those relating to the coordination procedures and the probability of harmful interference);

7.4.5.2 where appropriate, with respect to its conformity with the provisions of paragraph 7.2.1, relating to the coordination of the use of the frequency assignment with the other administrations concerned having a frequency assignment in conformity with the appropriate Regional Plan;

7.4.5.3 where appropriate, with respect to the probability of harmful interference to the service rendered or to be rendered by a broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan.

7.4.6 Depending upon the findings of the Board subsequent to the examination prescribed in paragraphs 7.4.5.1, 7.4.5.2 and 7.4.5.3, as appropriate, further action shall be as follows:

7.4.7 *Finding favourable with respect to paragraph 7.4.5.1 in cases where the provisions of paragraph 7.4.5.2 are not applicable*

7.4.7.1 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.

7.4.8 *Finding unfavourable with respect to paragraph 7.4.5.1*

7.4.8.1 Where the notice includes a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations and the finding is favourable with respect to paragraphs 7.4.5.2 and 7.4.5.3, as appropriate, the assignment shall be recorded in the Master Register. The date of receipt of notice by the Board shall be entered in Column 2d.

7.4.8.2 Where the notice includes a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations and the finding is unfavourable with respect to paragraph 7.4.5.2 or 7.4.5.3, as appropriate, the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding. In those circumstances the notifying administration shall undertake not to bring into use the frequency assignment until the condition in paragraph 7.4.8.1 can be fulfilled. The agreement of the administrations affected can also be obtained in accordance with this Article for a specified period. In that event the Board shall be notified of the agreement and the frequency assignment shall be recorded in the Master Register with a note indicating that the frequency assignment is valid only for the period specified. The notifying administration using the frequency assignment over a specified period shall not subsequently use this circumstance to justify continued use of the frequency beyond the period specified if it does not obtain the agreement of the administration(s) concerned. The date of receipt by the Board of the original notice shall be entered in Column 2d.

7.4.8.3 Where the notice does not include a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations, it shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding and with such suggestions as the Board may be able to offer with a view to the satisfactory solution of the problem.

7.4.8.4 If the notifying administration resubmits the notice unchanged, it shall be treated in accordance with the provisions of paragraph 7.4.8.3. If it is resubmitted with a specific reference to the fact that the station will be operated in accordance with the provisions of No. **342** of the Radio Regulations, it shall be treated in accordance with the provisions of paragraph 7.4.8.1 or 7.4.8.2, as appropriate. If it is resubmitted with modifications which, after re-examination, result in a favourable finding by the Board with respect to paragraph 7.4.5.1, it shall be treated as a new notice.

7.4.9 *Finding favourable with respect to paragraph 7.4.5.1 in cases where the provisions of paragraph 7.4.5.2 are applicable*

7.4.9.1 Where the Board finds that the coordination procedures mentioned in paragraph 7.4.5.2 have been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt by the Board of the notice shall be entered in Column 2d.

7.4.9.2 Where the Board finds that the coordination procedure mentioned in paragraph 7.4.5.2 has not been applied, and the notifying administration requests the Board to effect the required coordination, the Board shall take appropriate action and shall inform the administrations concerned of the results obtained. If the Board's efforts are successful, the notice shall be treated in accordance with paragraph 7.4.9.1. If the Board's efforts are unsuccessful, the notice shall be examined by the Board with respect to the provisions of paragraph 7.4.5.3.

7.4.9.3 Where the Board finds that the coordination procedure mentioned in paragraph 7.4.5.2 has not been applied, and the notifying administration does not request the Board to effect the required coordination, the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this action and with such suggestions as the Board may be able to offer with a view to the satisfactory solution of the problem.

7.4.9.4 Where the notifying administration resubmits the notice and the Board finds that the coordination procedure mentioned in paragraph 7.4.5.2 has been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Board shall be entered in Column 2d. The date of receipt by the Board of the resubmitted notice shall be entered in the Remarks Column.

7.4.9.5 Where the notifying administration resubmits the notice with a request that the Board effect the required coordination under paragraph 7.2.1, it shall be treated in accordance with the provisions of paragraph 7.4.9.2. However, in any subsequent recording of the assignment, the date of receipt by the Board of the resubmitted notice shall be entered in the Remarks Column.

7.4.9.6 Where the notifying administration resubmits the notice and states it has been unsuccessful in effecting the coordination, the Board shall inform the administrations concerned thereof. The notice shall be examined by the Board with respect to the provisions of paragraph 7.4.5.3. However, in any subsequent recording of the assignment, the date of receipt by the Board of the resubmitted notice shall be entered in the Remarks Column.

7.4.10 *Finding favourable with respect to paragraphs 7.4.5.1 and 7.4.5.3*

7.4.10.1 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.

7.4.11 *Finding favourable with respect to paragraph 7.4.5.1, but unfavourable with respect to paragraph 7.4.5.3*

7.4.11.1 The notice shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding and with such suggestions as the Board may be able to offer with a view to the satisfactory solution of the problem.

7.4.11.2 Should the notifying administration resubmit the notice with modifications which result, after re-examination, in a favourable finding by the Board with respect to paragraph 7.4.5.3, the assignment shall be recorded in the Master Register. The date of receipt by the Board of the original notice shall be entered in Column 2d. The date of receipt by the Board of the resubmitted notice shall be indicated in the Remarks Column.

7.4.11.3 Should the notifying administration resubmit the notice, either unchanged, or with modifications which decrease the probability of harmful interference, but not sufficiently to permit the provisions of paragraph 7.4.11.2 to be applied, and should that administration insist upon reconsideration of the notice, but should the Board's finding remain unchanged, the notification shall again be returned to the notifying administration in accordance with paragraph 7.4.11.1. In those circumstances, the notifying administration shall undertake not to bring into use the proposed frequency assignment until the condition in paragraph 7.4.11.2 can be fulfilled. The agreement of the administrations affected can also be obtained in accordance with this Article for a specified period. In that event the Board shall be notified of the agreement and the frequency assignment shall be recorded in the Master Register with a note in the Remarks Column indicating that the assignment is valid only for the specified period. The notifying administration using the frequency assignment over a specified period shall not subsequently use this circumstance to justify continued use of the frequency beyond the period specified if it does not obtain the agreement of the administration(s) concerned. The date of receipt by the Board of the original notice shall be entered in Column 2d.

7.4.12 *Change in the basic characteristics of assignments already recorded in the Master Register*

7.4.12.1 A notice of a change in the basic characteristics of an assignment in the fixed-satellite service already recorded, as specified in Appendix **3** to the Radio Regulations (except the name of the station or the name of the locality in which it is situated or the date of bringing into use), shall be examined by the Board in conformity with paragraph 7.4.5.1 and, where appropriate, paragraphs 7.4.5.2 and 7.4.5.3, and the provisions of paragraphs 7.4.7 to 7.4.11.3 inclusive shall apply. Where the change should be recorded, the original assignment shall be amended accordingly.

7.4.12.2 However, in the case of a change in the characteristics of an assignment which is in conformity with paragraph 7.4.5.1, should the Board reach a favourable finding with respect to paragraphs 7.4.5.2 and 7.4.5.3, where appropriate, or find that the changes do not increase the probability of harmful interference to frequency assignments in conformity with the appropriate Regional Plan, the amended assignment shall retain the original date in Column 2d. The date of receipt of the notice by the Board relating to the change shall be entered in the Remarks Column.

7.4.12.3 The projected date of bringing into use of a frequency assignment may be extended by four months at the request of the notifying administration. If the administration states that, due to exceptional circumstances, it needs a further extension of this period, such extension may be provided but it shall in no case exceed eighteen months from the original projected date of bringing into use.

7.4.12.4 In applying the provisions of this Section IV, any resubmitted notice which is received by the Board more than two years after the date of its return by the Board shall be considered as a new notice.

7.4.13 *Recording of frequency assignments in the fixed-satellite service notified before being brought into use*

7.4.13.1 If a frequency assignment notified in advance of bringing into use has received a favourable finding by the Board with respect to paragraph 7.4.5.1 and, where appropriate, paragraphs 7.4.5.2 and 7.4.5.3, it shall be entered provisionally in the Master Register with a special symbol in the Remarks Column indicating the provisional nature of that entry.

7.4.13.2 Within one month after the date of bringing into use, either as originally notified or as modified in application of paragraph 7.4.12.3, the notifying administration shall confirm that the frequency assignment has been brought into use. When the Board is informed that the assignment has been brought into use, the special symbol shall be deleted from the Remarks Column.

7.4.13.3 If the Board does not receive this confirmation within the period referred to in paragraph 7.4.13.2, the entry concerned shall be cancelled. The Board shall advise the administration concerned before taking such action.

Section V. Recording of Findings in the Master Register

7.5 In any case where a frequency assignment is recorded in the Master Register, the finding reached by the Board shall be indicated by a symbol in Column 13a. In addition, a remark indicating the reasons for any unfavourable finding shall be inserted in the Remarks Column.

Section VI. Categories of Frequency Assignments

7.6.1 The date in Column 2c shall be the date of putting into use notified by the administration concerned. It is given for information only.

7.6.2 If harmful interference is actually caused to the reception of any broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan, by the use of a frequency assignment to a space radiocommunication station subsequently recorded in the Master Register in accordance with the provisions of paragraph 7.4.11.3, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

7.6.3 If harmful interference to the reception of any broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan, is actually caused by the use of a frequency assignment which is not in conformity with paragraph 7.4.5.1, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

Section VII. Review of Findings

7.7.1 The review of a finding by the Board may be undertaken:

a) at the request of the notifying administration;

b) at the request of any other administration interested in the question, but only on the grounds of actual harmful interference;

c) on the initiative of the Board itself when it considers this is justified.

7.7.2 The Board, in the light of all the data at its disposal, shall review the matter, taking into account paragraph 7.4.5.1 and, where appropriate, paragraphs 7.4.5.2 and 7.4.5.3, and shall render an appropriate finding, informing the notifying administration prior either to the promulgation of its finding or to any recording action.

7.7.3 If the finding of the Board is then favourable it shall enter in the Master Register the changes that are required so that the entry shall appear in the future as if the original finding had been favourable.

7.7.4 If the finding with regard to the probability of harmful interference remains unfavourable, no change shall be made in the original entry.

Section VIII. Modification, Cancellation and Review of Entries in the Master Register

7.8 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.

7.8.1 Where the use of a recorded assignment to a station in the fixed-satellite service 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.

7.8.2 Whenever it appears to the Board, whether or not as a result of action under paragraph 7.8.1, that a recorded assignment to a space station in the fixed-satellite service 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.

7.8.3 If no reply is received within six months of action by the Board under paragraph 7.8.2, or if the reply does not confirm that the assignment to a space station in the fixed-satellite service is to be brought back into regular use within this six-month limit, a mark should be entered against the entry in the Master Register.

7.8.4 In case of permanent discontinuance of the use of any recorded frequency assignment, the notifying administration shall inform the Board within three months of such discontinuance, whereupon the entry shall be removed from the Master Register.

7.8.5 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, or is not being used in accordance with those basic characteristics, the Board shall consult the notifying administration and, subject to its agreement, shall either cancel or suitably modify or retain the basic characteristics of the entry.

7.8.6 If, in connection with an inquiry by the Board under paragraph 7.8.5, the notifying administration has failed to supply the Board within three months with the necessary or pertinent information, the Board shall make suitable entries in the Remarks Column of the Master Register to indicate the situation.

ARTICLE 8

Miscellaneous Provisions Relating to the Procedures

8.1 If so requested by any administration, the Board, using such means at its disposal as are appropriate in the circumstances, shall conduct a study of cases of alleged contravention or non-observance of these provisions or of harmful interference.

8.2 The Board shall thereupon prepare and forward to the administration or administrations concerned a report containing its findings and recommendations for the solution of the problem.

8.3 On receiving the Board's recommendations for the solution of the problem, an administration shall promptly acknowledge their receipt by telegram and shall indicate the action it intends to take. Where the Board's suggestions or recommendations are unacceptable to the administrations concerned, further efforts should be made by the Board to find an acceptable solution to the problem.

8.4 Where, as a result of a study, the Board submits to one or more administrations suggestions or recommendations for the solution of a problem, and where no reply has been received from one or more of these administrations within a period of three months, the Board shall consider that the suggestions or recommendations concerned are unacceptable to the administrations which did not answer. If it was the requesting administration which failed to answer within this period, the Board shall discontinue the study.

8.5 If so requested by any administration, particularly by an administration of a country in need of special assistance, the Board, using such means at its disposal as are appropriate in the circumstances, shall render the following assistance:

a) computation necessary in the application of Annexes 1, 3 and 4;

b) any other assistance of a technical nature for completion of the procedures in this Appendix.

8.6 In making a request to the Board under paragraph 8.5, the administration shall provide the Board with the necessary information.

ARTICLE 9

Power Flux-Density Limits Between 12.2 GHz and 12.7 GHz to Protect Terrestrial Services in Regions 1 and 3 from Interference from Region 2 Broadcasting-Satellite Space Stations

9.1 The power flux-density at the Earth's surface in Regions 1 and 3, produced by emissions from a space station in the broadcasting-satellite service in Region 2 for all conditions and for all methods of modulation shall not exceed the values given in Section 5 of Annex 1 on the territory of any country unless the administration of that country so agrees.

ARTICLE 10

The Plan for the Broadcasting-Satellite Service in the Frequency Band 12.2 - 12.7 GHz in Region 2

10.1 COLUMN HEADINGS OF THE PLAN

Col. 1 *Beam identification* (Column 1 contains the symbol designating the country or the geographical area taken from Table B.1 of the Preface to the International Frequency List followed by the symbol designating the service area).

Col. 2 *Nominal orbital position*, in degrees and hundredths of a degree.

Col. 3 *Channel number* (see Table 4 showing channel numbers and corresponding assigned frequencies).

Col. 4. *Boresight* geographical coordinates, in degrees and hundredths of a degree.

Col. 5. *Antenna beamwidth.* This column contains two figures corresponding to the major axis and the minor axis respectively of the elliptical cross-section half-power beam, in degrees and hundredths of a degree.

Col. 6. *Orientation of the ellipse* determined as follows: in a plane normal to the beam axis, the direction of a major axis of the ellipse is specified as the angle measured anti-clockwise from a line parallel to the equatorial plane to the major axis of the ellipse to the nearest degree.

Col. 7. *Polarization* (1 = direct, 2 = indirect).[1]

Col. 8. *E.i.r.p.* in the direction of maximum radiation, in dBW.

Col. 9. *Remarks.*

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[1] See Annex 5 (section 3.2) of this Appendix.

10.2 TEXT FOR SYMBOLS IN REMARKS COLUMN OF THE PLAN

1. Fast roll-off space station transmitting antenna as defined in Annex 5 (item 3.13.3).

2. Television standard with 625 lines using greater video bandwidth and necessary bandwidth of 27 MHz.

3. *Not used*

4. This assignment may be utilized in the geographical area of Anguilla (AIA) (which is in the beam area).

5. Feeder-link earth stations for this assignment may also be located in the territories of Puerto Rico and the United States Virgin Islands. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

6. Feeder-link earth stations for this assignment may also be located in the States of Alaska and Hawaii. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

7. The feeder-link earth station for this assignment may also be located at the point with geographical coordinates 3°31′ West, 48°46′ North. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

8. Feeder-link earth stations for this assignment may also be located at the points with the following geographical coordinates:

47°55′ West	15°47′ South	34°53′ West	08°04′ South
43°13′ West	22°55′ South	60°02′ West	03°06′ South
46°38′ West	23°33′ South	38°31′ West	12°56′ South
51°13′ West	30°02′ South	49°15′ West	16°40′ South

Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

9/GR . . . This assignment is part of a group, the number of which follows the symbol. The group consists of the beams and has the number of channels assigned to it as indicated in Table 1 below.

a) The overall equivalent protection margin to be used for the application of Article 4 and Resolution **42 (Orb-85)** shall be calculated on the following basis:

- for the calculation of interference to assignments that are part of a group, only the interference contributions from assignments that are not part of the same group are to be included; *and*

- for the calculation of interference from assignments belonging to a group to assignments that are not part of that same group, only the worst interference contribution from that group shall be used on a test point to test point basis.

b) If an administration notifies the same frequency in more than one beam of a group for use at the same time, the aggregated C/I produced by all emissions from that group shall not exceed the C/I calculated on the basis of *a)* above.

10. This assignment shall be brought into use only when the limits given in Table 2 are not exceeded or with the agreement of the affected administration identified in Table 3.

These administrations shall be informed by the notifying administration of changes in characteristics before these beams are brought into use.

TABLE 1

Group	Beams in the group	Number of channels assigned to the group
GR1	ALS00002 HWA00002 USAPSA02	32 channels
GR2	ALS00003 HWA00003 USAPSA03	32 channels
GR3	ARGINSU4 ARGSUR04	16 channels
GR4	ARGINSU5 ARGSUR05	12 channels
GR5	BOLAND01 CLMAND01 EQACAND1 EQAGAND1 PRUAND02 VENAND03	16 channels
GR6	B SU111 B SU211	32 channels
GR7	B CE311 B CE411 B CE511	32 channels
GR8	B NO611 B NO711 B NO811	32 channels
GR9	B SU112 B SU212 B CE312 B CE412	32 channels
GR10	CAN01101 CAN01201	32 channels
GR11	*Not used*	
GR12	CAN01203 CAN01303 CAN01403	32 channels
GR13	CAN01304 CAN01404 CAN01504	32 channels
GR14	CAN01405 CAN01505 CAN01605	32 channels
GR15	*Not used*	
GR16	CHLCONT4 CHLCONT6	16 channels
GR17	CHLCONT5 PAQPAC01 CHLPAC02	16 channels
GR18	CRBBER01 CRBBLZ01 CRBJMC01 CRBBAH01 CRBECO01	16 channels
GR19	EQACOO01 EQAGOO01	16 channels
GR20	PTRVIR01 USAEHO02	32 channels
GR21	PTRVIR02 USAEHO03	32 channels
GR22	VEN02VEN VEN11VEN	4 channels

TABLE 2

APPLICABLE CRITERIA

Symbol	P.F.D. Limit Criteria
a	Paragraph 3, Annex 1
b	Paragraph 5 *b)*, Annex 1
c	Paragraph 5 *c)*, Annex 1
d	Paragraph 5 *d)*, Annex 1

11. This assignment shall be brought into use only when the e.i.r.p. in the direction of all points situated within the service area and within the −3 dB contour of the "Metropole" beam (space-to-Earth) in the VIDEO-SAT-3 network as described in IFRB Special Section AR11/C/766 to Weekly Circular No. 1678 of 2 July 1985 does not exceed the limit 26.8 dBW.

12. This assignment shall be brought into use only when the e.i.r.p. in the direction of all points situated within the service area and within the −3 dB contour of the "Metropole" beam (space-to-Earth) in the VIDEO-SAT-3 network as described in IFRB Special Section AR11/C/766 to Weekly Circular No. 1678 of 2 July 1985 does not exceed the limit 26.8 dBW, and when the e.i.r.p. in the direction of all points situated within the service area and also between the −3 dB and −6 dB contours of the same beam does not exceed the limit 29.5 dBW.

TABLE 3

Beam name	Channels	Limit Crit. Ref Table 2	Countries or geographical areas affected
ALS00002	1, 4, 5, 6, 9, 10, 11, 14, 15, 16 All channels For channels 20 to 32	a c d	URS MNG/URS URS
ALS00003	1, 4, 5, 6, 9, 10, 11, 14, 15, 16 All channels For channels 20 to 32	a c d	URS URS URS
ARGINSU5	3, 7, 11, 15, 17, 19	b	NOR
ARGNORT4	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	b	AOE/ASC/AZR/CPV/E/GMB/GNB/GUI/MRC/MTN/POR/SEN
ARGNORT5	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	b	AFS/AGL/BOT/NMB/NOR/OCE/PTC/TKL/ZAI/ZMB/ZWE
ARGSUR04	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	b	ASC
ARGSUR05	3, 7, 11, 15, 17, 19	b	NOR
B CE311	For channels 1 to 20	b	AGL/ALG/CAF/CME/COG/GAB/GNE/NGR/NIG/NMB/STP/TCD/ZAI
B CE312	For channels 1 to 20 For channels 1 to 20 All channels	b c c	AFS/BDI/BOT/LSO/RRW/TZA/UGA/ZMB/ZWE MOZ/MWI/TZA ETH/KEN/SDN
B CE411	For channels 1 to 20	b	AGL/ALG/CAF/CME/COG/CVA/E/GAB/GNE/I/LBY/MLT/NGR/NIG/SMR/STP/TCD/TUN/ZAI
B CE412	For channels 1 to 20 All channels	c c	CYP/TUR ARS/EGY/ISR/SDN/URS

TABLE 3 *(cont.)*

Beam name	Channels	Limit Crit. Ref. Table 2	Countries or geographical areas affected
B CE511	For channels 1 to 20	b	CAF/CME/COG/GAB/GNE/NIG/NMB/NOR/STP/ZAI
B NO611	For channels 1 to 20	b	BEN/GHA/TGO
B NO711	For channels 1 to 20	b	BEN
B SE911	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	b	CPV
B SU111	For channels 1 to 20	b	BFA/CTI/GHA/GUI/LBR/MTN/SHN/TRC
B SU211	For channels 1 to 20	b	ALG/BFA/CTI/GHA/GUI/LBR/MLI/MRC/MTN/SHN/TRC
BERBER02	1, 5, 17 5, 9, 13	a a	CNR/E ISL
BOL00001	3, 7, 11, 15, 19	b	ALG/AOE/ASC/E/GMB/GNB/GUI/LBR/MLI/MRC/MTN/POR/SEN/SRL/TRC
CAN01101	All channels For channels 20 to 32	c d	URS URS
CAN01201	All channels	c	URS
CAN01203	All channels	c	URS
CAN01303	All channels	c	URS
CAN01403	All channels	c	URS
CAN01404	For channels 1 to 20	b	ISL/POR
CAN01405	For channels 1 to 20	b	F/G/IRL/ISL
CAN01504	For channels 1 to 20	b	AOE/AZR/E/ISL/MRC/MTN/POR

TABLE 3 *(cont.)*

Beam name	Channels	Limit Crit. Ref Table 2	Countries or geographical areas affected
CAN01505	For channels 1 to 20	b	ALG/E/F/G/IRL/ISL/MRC/POR
CAN01605	For channels 1 to 20	b	E/F/G/IRL/ISL/MRC/POR
CAN01606	For channels 1 to 20	b	BEL/F/G/HOL/IRL/ISL/LUX/NOR
CLMAND01	21, 23, 25, 27, 29, 31	c	URS
CLM00001	1, 3, 5, 7, 9, 11, 13, 15, 17, 19 21, 23, 25, 27, 29, 31	b c	AZR/CPV URS
CRBEC001	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	b	ASC/AZR/GMB/GNB/GUI/ISL/MTN/SEN/SRL
FLKANT01	1, 5, 9, 13	b	NOR
GRLDNK01	3, 7, 11, 15, 19	b	D/DDR/DNK/G/HOL/ISL/NOR/POL/S/TCH
GUFMGG02	4, 8, 12, 16, 20	b	NOR
HWA00002	For channels 1 to 20 All channels	b c	CHN/KRE MNG/URS
HWA00003	For channels 1 to 20 All channels	b c	CHN MNG/URS
MEX02NTE	All channels	c	URS
MEX01SUR	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	b	KIR
MEX02SUR	All channels	c	URS
PRU00004	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	b	ALG/AOE/ASC/BFA/CTI/E/G/GMB/GUI/ISL/LBR/MLI/MRC/MTN/POR/SEN/SHN/SRL/TRC

TABLE 3 *(cont.)*

Beam name	Channels	Limit Crit. Ref. Table 2	Countries or geographical areas affected
SPMFRAN3	1, 5, 9, 13, 17	b	D/DDR/DNK/ISL/ NOR/S
USAEH001	For channels 1 to 20	b	ALG/AUT/BEL/CVA/D/ DDR/DNK/E/F/G/HOL/ I/ISL/LBY/LIE/LUX/ MCO/MLT/NGR/NIG/ NOR/OCE/SMR/SUI/ TCH/TUN/YUG
USAEH002	For channels 1 to 20 All channels	b c	AZR/CPV/HWL URS
USAEH003	For channels 1 to 20 All channels	b c	MRL URS
USAEH004	For channels 1 to 20 All channels For channels 20 to 32	b c d	WAK URS URS
USAWH101	All channels	c	URS
USAWH102	All channels	c	URS
VENAND03	21, 23, 25, 27, 29, 31	c	URS
VEN11VEN	2, 4, 6, 8, 10, 12, 14, 16, 18, 20 20, 22, 24, 26, 28, 30, 32	b c	AZR/CPV URS

Country symbols

1. For the explanation of symbols designating countries or geographical areas in Region 2, see the Preface to the International Frequency List.

2. One additional symbol, CRB, has been created for the purposes of the 1983 Conference only, to designate a geographical area in the Caribbean Area. The five Caribbean beams are identified as follows:

CRBBAH01, CRBBER01, CRBBLZ01, CRBEC001 and CRBJMC01

and are intended collectively to provide coverage for the following countries or geographical areas: AIA, ATG, BAH, BER, BLZ, BRB, CYM, DMA, GRD, GUY, JMC, LCA, MSR, SCN, SUR, TCA, TRD, VCT and VRG to be so used if approved by them.

TABLE 4

TABLE SHOWING CORRESPONDENCE BETWEEN CHANNEL NUMBERS AND ASSIGNED FREQUENCIES

Channel No.	Assigned frequency (MHz)	Channel No.	Assigned frequency (MHz)
1	12224.00	17	12457.28
2	12238.58	18	12471.86
3	12253.16	19	12486.44
4	12267.74	20	12501.02
5	12282.32	21	12515.60
6	12296.90	22	12530.18
7	12311.48	23	12544.76
8	12326.06	24	12559.34
9	12340.64	25	12573.92
10	12355.22	26	12588.50
11	12369.80	27	12603.08
12	12384.38	28	12617.66
13	12398.96	29	12632.24
14	12413.54	30	12646.82
15	12428.12	31	12661.40
16	12442.70	32	12675.98

12224,00 MHz (1)

1	2	3	4		5		6	7	8	9	
ALS00002	−166.20	1	−149 66	58.37	3.76	1.24	170	1	59.7	9/GR1	10
ALS00003	−175.20	1	−150 98	58.53	3.77	1.11	167	1	60.0	9/GR2	10
ARGINSU4	−94.20	1	−52 98	−59.81	3.40	0.80	19	1	59.9	9/GR3	
ARGSUR04	−94.20	1	−65 04	−43.33	3.32	1.50	40	1	60 7	9/GR3	10
B CE311	−64.20	1	−40 60	−6.07	3.04	2.06	174	1	61 6	8 9/GR7	10
B CE312	−45 20	1	−40 27	−6.06	3.44	2 09	174	1	61.0	8 9/GR9	10
B CE411	−64 20	1	−50 97	−15.27	3.86	1 38	49	1	62 6	8 9/GR7	10
B CE412	−45 20	1	−50.71	−15.30	3.57	1 56	52	1	62 7	8 9/GR9	10
B CE511	−64 20	1	−53.10	−2.90	2.44	2.13	104	1	63 0	8 9/GR7	10
B NO611	−74 20	1	−59 60	−11.62	2.85	1 69	165	2	62.8	8 9/GR8	10
B NO711	−74 20	1	−60 70	−1 78	3.54	1.78	126	2	62 8	8 9/GR8	10
B NO811	−74.20	1	−68 76	−4.71	2.37	1 65	73	2	62 8	8 9/GR8	
B SU111	−81.20	1	−51.12	−25 63	2.76	1.05	50	1	62 8	8 9/GR6	10
B SU112	−45.20	1	−50.75	−25.62	2.47	1 48	56	1	62.2	8 9/GR9	
B SU211	−81 20	1	−44.51	−16 95	3.22	1 36	60	1	62 5	8 9/GR6	10
B SU212	−45.20	1	−44.00	−16.87	3.20	1 96	58	1	61 3	8 9/GR9	
B AHIFRB1	−87.20	1	−76.06	24.16	1.81	0 80	142	1	61.6		
BERBERMU	−96.20	1	−64.77	32.32	0 80	0.80	90	2	56.8		
B ERBER02	−31.00	1	−64 77	32.32	0 80	0.80	90	1	56 9	2	10
B OLAND01	−115 20	1	−65 04	−16 76	2 49	1.27	76	1	67.9	9/GR5	
CAN01101	−138.20	1	−125.63	57 24	3 45	1 27	157	1	59 5	9/GR10	10
CAN01201	−138.20	1	−112.04	55.95	3 35	0.97	151	1	59.6	9/GR10	10
CAN01202	−72 70	1	−107.70	55.63	2 74	1.12	32	1	59.6		
CAN01203	−129 20	1	−111.48	55 61	3.08	1.15	151	1	59.5	9/GR12	10

CAN01303	−129 20	1	−102 42	57.12	3 54	0.91	154	1	60.0	9/GR12	10
CAN01304	−91.20	1	−99 12	57.36	1 98	1 72	2	1	59 8	9/GR13	
CAN01403	−129 20	1	−89.75	52 02	4 68	0.80	148	1	61 8	9/GR12	10
CAN01404	−91.20	1	−84.82	52 42	3.10	2 05	152	1	60 4	9/GR13	10
CAN01405	−82 20	1	−84.00	52 39	2.84	2.29	172	1	60.3	9/GR14	10
CAN01504	−91.20	1	−72.66	53.77	3.57	1.67	156	1	60.2	9/GR13	10
CAN01505	−82.20	1	−71.77	53.79	3 30	1.89	162	1	60.1	9/GR14	10
CAN01605	−82.20	1	−61 50	49 55	2 65	1.40	143	1	60.3	9/GR14	10
CAN01606	−70.70	1	−61.30	49 55	2.40	1 65	148	1	60.2	10	
CHLCONT5	−106.20	1	−72.23	−35 57	2.60	0 80	55	1	59.4	9/GR17	
CHLPAC02	−106.20	1	−80 06	−30.06	1.36	0.80	69	1	59.2	9/GR17	
CLMAND01	−115.20	1	−74.72	5.93	3.85	1.63	114	1	64.9	9/GR5	
CLM00001	−103.20	1	−74.50	5.87	3.98	1.96	118	1	63.5	10	
EQACAND1	−115.20	1	−78.40	−1 61	1.37	0.95	75	1	64.0	9/GR5	
EQAGAND1	−115 20	1	−90.34	−0 62	0 90	0.81	89	1	61.3	9/GR5	
FLKANT01	−57.20	1	−44 54	−60.13	3.54	0 80	12	1	59.3	2	10
FLKFALKS	−31.00	1	−59.90	−51.64	0.80	0.80	90	1	58.1	2	
GRD00002	−42.20	1	−61.58	12.29	0.80	0.80	90	1	58.8		
HWA00002	−166.20	1	−165.79	23.42	4 20	0.80	160	1	58.8	9/GR1	10
HWA00003	−175.20	1	−166 10	23.42	4 25	0.80	159	1	58 8	9/GR2	10
MEX01NTE	−78.20	1	−105.81	26.01	2.89	2.08	155	1	60 5	1	
MEX01SUR	−69.20	1	−94 84	19.82	3.05	2.09	4	1	62.2	1	10
MEX02NTE	−136 20	1	−107 21	26 31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	−127.20	1	−96.39	19.88	3.18	1.87	157	1	62.5	1	10

12224,00 MHz (1)

1	2	3	4		5		6	7	8	9
PAQPAC01	−106.20	1	−109.18	−27.53	0.80	0.80	90	1	56.2	9/GR17
PRG00002	−99.20	1	−58.66	−23.32	1 45	1.04	76	1	60.2	
PRUAND02	−115.20	1	−74.69	−8.39	3.41	1.79	95	1	63.9	9/GR5
PTRVIR01	−101.20	1	−65.85	18.12	0.80	0.80	90	1	60.5	1 6 9/GR20
PTRVIR02	−110 20	1	−65.86	18.12	0.80	0.80	90	1	61.0	1 6 9/GR21
SPMFRAN3	−53 20	1	−67.24	47.51	3.16	0.80	7	1	60.4	2 7 10
TRD00001	−84.70	1	−61.23	10.70	0.80	0.80	90	1	59.4	
URG00001	−71.70	1	−56.22	−32.52	1.02	0.89	11	1	60.0	
USAEH001	−61.70	1	−85.19	36.21	5.63	3.33	22	1	61.8	1 5 6 10
USAEH002	−101 20	1	−89.24	36.16	5.67	3.76	170	1	61.7	1 6 9/GR20 10
USAEH003	−110.20	1	−90.14	36.11	5.55	3 55	161	1	62.0	1 6 9/GR21 10
USAEH004	−119.20	1	−91.16	36.05	5.38	3.24	152	1	62.6	1 5 6 10
USAPSA02	−166.20	1	−117.80	40.58	4.03	0.82	135	1	63.2	9/GR1
USAPSA03	−175.20	1	−118.27	40.12	3.62	0.80	136	1	65.0	9/GR2
USAWH101	−148.20	1	−109.65	38.13	5.53	1.95	142	1	62.1	10
USAWH102	−157.20	1	−111.41	38.57	5.51	1.54	138	1	63.2	10
VENAND03	−115.20	1	−67.04	6.91	2.37	1.43	111	1	67.2	9/GR5
VRG00001	−79.70	1	−64.37	18.48	0.80	0.80	90	1	58.3	4

ALS00002	–165.80	2	–149 63	58 52	3.81	1 23	171	2	59 7	9/GR1	10
ALS00003	–174 80	2	–150 95	58 54	3 77	1 11	167	2	60 0	9/GR2	10
ARGNORT4	–93 80	2	–63 96	–30 01	3.86	1 99	48	2	65.6	10	
ARGNORT5	–54 80	2	–62 85	–29 80	3.24	2.89	47	2	63.5	10	
ATNBEAM1	–52.80	2	–66 44	14.87	1.83	0 80	39	2	61 0		
B CE311	–63.80	2	–40 60	–6 07	3 04	2.06	174	2	61 6	8 9/GR7	10
B CE312	–44.80	2	–40 26	–6 06	3 44	2 09	174	2	61 0	8 9/GR9	10
B CE411	–63 80	2	–50.97	–15 26	3.86	1 38	49	2	62 6	8 9/GR7	10
B CE412	–44.80	2	–50 71	–15 30	3.57	1 56	52	2	62 7	8 9/GR9	10
B CE511	–63 80	2	–53 11	–2.98	2.42	2 15	107	2	63 1	8 9/GR7	10
B NO611	–73 80	2	–59 60	–11 62	2 86	1 69	165	1	62.8	8 9/GR8	10
B NO711	–73 80	2	–60 70	–1 78	3.54	1.78	126	1	62.8	8 9/GR8	10
B NO811	–73 80	2	–68 75	–4 71	2.37	1 65	73	1	62.8	8 9/GR8	
B SE911	–101 80	2	–45.99	–19 09	2.22	0 80	62	2	65 3	8	10
B SU111	–80.80	2	–51 10	–25 64	2 76	1 06	50	2	62.8	8 9/GR6	10
B SU112	–44 80	2	–50 76	–25 62	2 47	1 48	56	2	62.3	8 9/GR9	
B SU211	–80.80	2	–44.51	–16 94	3.22	1 37	60	2	62.5	8 9/GR6	10
B SU212	–44 80	2	–43.99	–16 97	3.27	1.92	59	2	61.3	8 9/GR9	
CAN01101	–137 80	2	–125 60	57 24	3.45	1 27	157	2	59.5	9/GR10	10
CAN01201	–137 80	2	–111 92	55 89	3 33	0.98	151	2	59 6	9/GR10	10
CAN01202	–72 30	2	–107 64	55 62	2 75	1.11	32	2	59.6		
CAN01203	–128.80	2	–111 43	55.56	3 07	1.15	151	2	59 5	9/GR12	10
CAN01303	–128 80	2	–102 39	57 12	3.54	0 92	154	2	60.0	9/GR12	10
CAN01304	–90 80	2	–99.00	57 33	1.96	1.73	1	2	59.8	9/GR13	

12238,58 MHz (2)

1	2	3	4		5		6	7	8	9	
CAN01403	−128.80	2	−89.70	52.02	4.67	0.80	148	2	61.8	9/GR12	10
CAN01404	−90.80	2	−84.78	52.41	3.09	2.06	153	2	60.4	9/GR13	10
CAN01405	−81.80	2	−84.02	52.34	2.82	2.30	172	2	60.3	9/GR14	10
CAN01504	−90.80	2	−72.68	53.78	3.57	1.67	157	2	60.2	9/GR13	10
CAN01505	−81.80	2	−71.76	53.76	3.30	1.89	162	2	60.1	9/GR14	10
CAN01605	−81.80	2	−61.54	49.50	2.66	1.39	144	2	60.3	9/GR14	10
CAN01606	−70.30	2	−61.32	49.51	2.41	1.65	148	2	60.2	10	
CHLCONT4	−105.80	2	−69.59	−23.20	2.21	0.80	68	2	59.1	9/GR16	
CHLCONT6	−105.80	2	−73.52	−55.52	3.65	1.31	39	2	59.6	9/GR16	
CRBBAH01	−92.30	2	−76.09	24.13	1.83	0.80	141	1	61.7	9/GR18	
CRBBER01	−92.30	2	−64.76	32.13	0.80	0.80	90	1	56.7	9/GR18	
CRBBLZ01	−92.30	2	−88.61	17.26	0.80	0 80	90	1	58.6	9/GR18	
CRBEC001	−92.30	2	−60.07	8.26	4.20	0.86	115	1	64.2	9/GR18	10
CRBJMC01	−92 30	2	−79.45	17.97	0.99	0.80	151	1	61.1	9/GR18	
CTR00201	−130.80	2	−84.33	9.67	0.82	0.80	119	2	65 6		
EQAC0001	−94.80	2	−78.31	−1.52	1.48	1.15	65	1	63.0	9/GR19	
EQAG0001	−94.80	2	−90.36	−0.57	0.94	0.89	99	1	61.0	9/GR19	
GUY00302	−33.80	2	−59.07	4.77	1.43	0.85	91	2	63.5		
HNDIFRB2	−107.30	2	−86.23	15.16	1.14	0.85	8	1	63.4		
HTI00002	−83.30	2	−73.28	18.96	0.82	0.80	11	2	60.9		
HWA00002	−165 80	2	−165.79	23.32	4.20	0.80	160	2	58.8	9/GR1	10
HWA00003	−174.80	2	−166.10	23.42	4.25	0.80	159	2	58.8	9/GR2	10
MEX01NTE	−77.80	2	−105.80	25.99	2.88	2.07	155	2	60.5	1	
MEX02NTE	−135 80	2	−107.36	26.32	3.80	1.57	149	2	61.2	1	10

MEX02SUR	−126.80	2	−96.39	19.88	3 19	1 87	158	2	62.5	1	10
PRU00004	−85.80	2	−74.19	−8 39	3.74	2.45	112	2	62.8	10	
PTRVIR01	−100.80	2	−65.85	18 12	0.80	0.80	90	2	60.6	1 6 9/GR20	
PTRVIR02	−109.80	2	−65.85	18.12	0.80	0.80	90	2	61.1	1 6 9/GR21	
TCA00001	−115.80	2	−71.79	21.53	0.80	0.80	90	2	60.4		
USAEH001	−61.30	2	−85.16	36 21	5.63	3.32	22	2	61.8	1 5 6	10
USAEH002	−100.80	2	−89.28	36.16	5.65	3.78	170	2	61.7	1 6 9/GR20	10
USAEH003	−109.80	2	−90 12	36.11	5.55	3.56	161	2	62.1	1 6 9/GR21	10
USAEH004	−118.80	2	−91.16	36.05	5.38	3.24	153	2	62.6	1 5 6	10
USAPSA02	−165.80	2	−117.79	40.58	4.04	0 82	135	2	63.2	9/GR1	
USAPSA03	−174.80	2	−118.20	40.15	3.63	0.80	136	2	64.9	9/GR2	
USAWH101	−147.80	2	−109.70	38.13	5 52	1 96	142	2	62.1	10	
USAWH102	−156 80	2	−111.40	38.57	5.51	1.55	138	2	63.2	10	
VCT00001	−79.30	2	−61 18	13.23	0.80	0.80	90	2	58.4		
VEN11VEN	−103.80	2	−66 79	6.90	2.50	1.77	122	2	65.1	10	

12253,16 MHz (3)

1	2	3	4		5		6	7	8	9	
ALS00002	– 166 20	3	– 149 66	58.37	3.76	1 24	170	1	59.8	9/GR1	10
ALS00003	– 175 20	3	– 150 98	58 53	3.77	1 11	167	1	60.0	9/GR2	10
ARGINSU4	– 94.20	3	– 52 98	– 59 81	3 40	0.80	19	1	59.9	9/GR3	
ARGINSU5	– 55 20	3	– 44.17	– 59.91	3.77	0 80	13	1	59.3	9/GR4	10
ARGSUR04	– 94.20	3	– 65.04	– 43 33	3.32	1.50	40	1	60.7	9/GR3	10
ARGSUR05	– 55.20	3	– 63 68	– 43.01	2 54	2.38	152	1	60.1	9/GR4	10
ATGSJN01	– 79 70	3	– 61 79	17.07	0.80	0.80	90	1	58.4		
B CE311	– 64.20	3	– 40.60	– 6 07	3.04	2.06	174	1	61.6	8 9/GR7	10
B CE312	– 45 20	3	– 40 27	– 6.06	3.44	2.09	174	1	61 0	8 9/GR9	10
B CE411	– 64.20	3	– 50.97	– 15.27	3 86	1 38	49	1	62.6	8 9/GR7	10
B CE412	– 45 20	3	– 50.71	– 15 30	3.57	1 56	52	1	62 7	8 9/GR9	10
B CE511	– 64 20	3	– 53.10	– 2 90	2 44	2.13	104	1	63.1	8 9/GR7	10
B NO611	– 74 20	3	– 59.60	– 11.62	2 85	1 69	165	2	62.9	8 9/GR8	10
B NO711	– 74 20	3	– 60 70	– 1.78	3.54	1.78	126	2	62 8	8 9/GR8	10
B NO811	– 74 20	3	– 68.76	– 4.71	2 37	1 65	73	2	62.8	8 9/GR8	
B SU111	– 81 20	3	– 51.12	– 25.63	2.76	1.05	50	1	62 9	8 9/GR6	10
B SU112	– 45 20	3	– 50 75	– 25 62	2.47	1 48	56	1	62.3	8 9/GR9	
B SU211	– 81.20	3	– 44 51	– 16.95	3.22	1.36	60	1	62.5	8 9/GR6	10
B SU212	– 45 20	3	– 44.00	– 16 87	3.20	1 96	58	1	61 3	8 9/GR9	
BERBERMU	– 96.20	3	– 64.77	32.32	0 80	0 80	90	2	56.8		
B OLAND01	– 115 20	3	– 65 04	– 16.76	2 49	1.27	76	1	67 9	9/GR5	
B OL00001	– 87 20	3	– 64.61	– 16 71	2 52	2 19	85	1	63.8	10	
B RB00001	– 92 70	3	– 59.85	12 93	0.80	0.80	90	2	59 1		
CAN01101	– 138.20	3	– 125.63	57.24	3.45	1.27	157	1	59.5	9/GR10	10

CAN01201	−138.20	3	−112.04	55.95	3 35	0.97	151	1	59.6	9/GR10	10
CAN01202	−72.70	3	−107.70	55.63	2.74	1 12	32	1	59.6		
CAN01203	−129.20	3	−111 48	55.61	3.08	1 15	151	1	59 5	9/GR12	10
CAN01303	−129.20	3	−102 42	57.12	3.54	0 91	154	1	60.1	9/GR12	10
CAN01304	−91.20	3	−99.12	57.36	1.98	1.72	2	1	59.8	9/GR13	
CAN01403	−129.20	3	−89.75	52.02	4.68	0.80	148	1	61.8	9/GR12	10
CAN01404	−91.20	3	−84 82	52.42	3.10	2.05	152	1	60.4	9/GR13	10
CAN01405	−82.20	3	−84.00	52.39	2 84	2.29	172	1	60.3	9/GR14	10
CAN01504	−91.20	3	−72.66	53 77	3.57	1.67	156	1	60.2	9/GR13	10
CAN01505	−82.20	3	−71.77	53.79	3.30	1.89	162	1	60 1	9/GR14	10
CAN01605	−82.20	3	−61.50	49 55	2 65	1.40	143	1	60.3	9/GR14	10
CAN01606	−70.70	3	−61.30	49 55	2.40	1.65	148	1	60 2	10	
CHLCONT5	−106.20	3	−72 23	−35 57	2 60	0 80	55	1	59.4	9/GR17	
CHLPAC02	−106.20	3	−80 06	−30.06	1.36	0.80	69	1	59.2	9/GR17	
CLMAND01	−115 20	3	−74.72	5.93	3.85	1 63	114	1	65.0	9/GR5	
CLM00001	−103.20	3	−74.50	5.87	3.98	1.96	118	1	63.6	10	
CUB00001	−89.20	3	−79.81	21.62	2.24	0.80	168	1	61.1		
EQACAND1	−115.20	3	−78.40	−1.61	1.37	0.95	75	1	64.1	9/GR5	
EQAGAND1	−115.20	3	−90.34	−0.62	0.90	0.81	89	1	61.3	9/GR5	
GRD00002	−42.20	3	−61.58	12.29	0.80	0 80	90	1	58.8		
GRD00059	−57.20	3	−61 58	12.29	0.80	0.80	90	1	58.5		
GRLDNK01	−53.20	3	−44 89	66.56	2.70	0.82	173	1	60.0	2	10
HWA00002	−166.20	3	−165.79	23.42	4.20	0.80	160	1	58.8	9/GR1	10
HWA00003	−175.20	3	−166 10	23.42	4.25	0.80	159	1	58.8	9/GR2	10

12253,16 MHz (3)

1	2	3	4		5		6	7	8	9	
MEX01NTE	−78 20	3	−105.81	26.01	2.89	2.08	155	1	60.5	1	
MEX01SUR	−69 20	3	−94.84	19.82	3.05	2.09	4	1	62.3	1	10
MEX02NTE	−136.20	3	−107.21	26.31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	−127.20	3	−96.39	19.88	3.18	1.87	157	1	62.6	1	10
PAQPAC01	−106.20	3	−109.18	−27.53	0.80	0.80	90	1	56.2	9/GR17	
PRG00002	−99.20	3	−58.66	−23.32	1.45	1.04	76	1	60.2		
PRUAND02	−115.20	3	−74.69	−8.39	3 41	1.79	95	1	64 0	9/GR5	
PTRVIR01	−101.20	3	−65.85	18.12	0.80	0.80	90	1	60.6	1 6 9/GR20	
PTRVIR02	−110 20	3	−65.86	18 12	0.80	0.80	90	1	61.0	1 6 9/GR21	
SURINAM2	−84 70	3	−55.69	4.35	1.00	0.80	86	1	63 2		
URG00001	−71.70	3	−56.22	−32.52	1.02	0.89	11	1	60.0		
USAEH001	−61.70	3	−85.19	36.21	5.63	3.33	22	1	61.8	1 5 6	10
USAEH002	−101 20	3	−89.24	36 16	5.67	3 76	170	1	61.7	1 6 9/GR20	10
USAEH003	−110.20	3	−90.14	36.11	5.55	3 55	161	1	62.1	1 6 9/GR21	10
USAEH004	−119.20	3	−91.16	36.05	5.38	3.24	152	1	62.6	1 5 6	10
USAPSA02	−166 20	3	−117.80	40 58	4.03	0.82	135	1	63 3	9/GR1	
USAPSA03	−175 20	3	−118.27	40.12	3.62	0.80	136	1	65.0	9/GR2	
USAWH101	−148.20	3	−109.65	38.13	5.53	1.95	142	1	62.1	10	
USAWH102	−157 20	3	−111.41	38.57	5.51	1.54	138	1	63.2	10	
VENAND03	−115.20	3	−67.04	6.91	2 37	1 43	111	1	67.3	9/GR5	

ALS00002	−165.80	4	−149.63	58.52	3.81	1 23	171	2	59.8	9/GR1	10
ALS00003	−174.80	4	−150.95	58.54	3.77	1 11	167	2	60.0	9/GR2	10
ARGNORT4	−93.80	4	−63.96	−30.01	3.86	1.99	48	2	65 7	10	
ARGNORT5	−54.80	4	−62 85	−29.80	3.24	2.89	47	2	63.5	10	
B CE311	−63.80	4	−40.60	−6 07	3.04	2 06	174	2	61.6	8 9/GR7	10
B CE312	−44.80	4	−40 26	−6.06	3 44	2 09	174	2	61.0	8 9/GR9	10
B CE411	−63.80	4	−50.97	−15 26	3.86	1.38	49	2	62.6	8 9/GR7	10
B CE412	−44.80	4	−50.71	−15.30	3.57	1.56	52	2	62.8	8 9/GR9	10
B CE511	−63.80	4	−53.11	−2.98	2.42	2.15	107	2	63.1	8 9/GR7	10
B NO611	−73.80	4	−59 60	−11.62	2 86	1.69	165	1	62.9	8 9/GR8	10
B NO711	−73.80	4	−60.70	−1 78	3.54	1.78	126	1	62 8	8 9/GR8	10
B NO811	−73.80	4	−68.75	−4.71	2.37	1.65	73	1	62.8	8 9/GR8	
B SE911	−101.80	4	−45 99	−19.09	2 22	0.80	62	2	65 3	8	10
B SU111	−80 80	4	−51.10	−25 64	2.76	1.06	50	2	62 9	8 9/GR6	10
B SU112	−44.80	4	−50.76	−25.62	2.47	1.48	56	2	62.3	8 9/GR9	
B SU211	−80.80	4	−44.51	−16.94	3.22	1.37	60	2	62.5	8 9/GR6	10
B SU212	−44.80	4	−43.99	−16.97	3.27	1 92	59	2	61.3	8 9/GR9	
CAN01101	−137 80	4	−125.60	57.24	3.45	1.27	157	2	59.5	9/GR10	10
CAN01201	−137.80	4	−111 92	55.89	3.33	0.98	151	2	59.6	9/GR10	10
CAN01202	−72 30	4	−107.64	55.62	2.75	1.11	32	2	59.6		
CAN01203	−128.80	4	−111.43	55.56	3.07	1 15	151	2	59.5	9/GR12	10
CAN01303	−128.80	4	−102.39	57.12	3.54	0.92	154	2	60.1	9/GR12	10
CAN01304	−90.80	4	−99.00	57.33	1.96	1 73	1	2	59.8	9/GR13	
CAN01403	−128 80	4	−89.70	52.02	4.67	0.80	148	2	61.8	9/GR12	10

12267,74 MHz (4)

1	2	3	4		5		6	7	8	9	
CAN01404	−90.80	4	−84.78	52.41	3 09	2.06	153	2	60.4	9/GR13	10
CAN01405	−81.80	4	−84 02	52.34	2.82	2.30	172	2	60.3	9/GR14	10
CAN01504	−90 80	4	−72.68	53.78	3 57	1.67	157	2	60.2	9/GR13	10
CAN01505	−81.80	4	−71.76	53.76	3 30	1.89	162	2	60 2	9/GR14	10
CAN01605	−81.80	4	−61.54	49 50	2.66	1.39	144	2	60.3	9/GR14	10
CAN01606	−70 30	4	−61 32	49 51	2.41	1.65	148	2	60.2	10	
CHLCONT4	−105 80	4	−69.59	−23 20	2.21	0 80	68	2	59.1	9/GR16	
CHLCONT6	−105.80	4	−73.52	−55 52	3 65	1.31	39	2	59.6	9/GR16	
CRBBAH01	−92.30	4	−76 09	24.13	1 83	0 80	141	1	61.7	9/GR18	
CRBBER01	−92.30	4	−64 76	32 13	0.80	0 80	90	1	56.8	9/GR18	
CRBBLZ01	−92 30	4	−88 61	17.26	0.80	0.80	90	1	58 7	9/GR18	
CRBEC001	−92 30	4	−60.07	8.26	4.20	0.86	115	1	64.3	9/GR18	10
CRBJMC01	−92 30	4	−79.45	17.97	0.99	0.80	151	1	61 1	9/GR18	
CYM00001	−115.80	4	−80.58	19.57	0.80	0.80	90	2	59.6		
DOMIFRB2	−83 30	4	−70.51	18.79	0.98	0.80	167	2	61.1		
EQAC0001	−94.80	4	−78 31	−1.52	1 48	1 15	65	1	63.0	9/GR19	
EQAG0001	−94 80	4	−90.36	−0.57	0.94	0 89	99	1	61 0	9/GR19	
GUFMGG02	−52 80	4	−56.42	8 47	4.16	0.81	123	2	62 7	2 7	10
HWA00002	−165 80	4	−165.79	23 32	4.20	0.80	160	2	58 8	9/GR1	10
HWA00003	−174 80	4	−166 10	23 42	4 25	0.80	159	2	58.8	9/GR2	10
JMC00005	−33.80	4	−77.27	18.12	0 80	0.80	90	2	60.6		
LCAIFRB1	−79.30	4	−61.15	13.90	0 80	0.80	90	2	58.4		
MEX01NTE	−77.80	4	−105.80	25.99	2.88	2 07	155	2	60.5	1	
MEX02NTE	−135.80	4	−107.36	26.32	3.80	1.57	149	2	61.2	1	10

MEX02SUR	–126.80	4	–96.39	19.88	3.19	1.87	158	2	62 5	1	10
PRU00004	–85 80	4	–74 19	–8.39	3 74	2 45	112	2	62.9	10	
PTRVIR01	–100 80	4	–65 85	18 12	0 80	0.80	90	2	60 6	1 6 9/GR20	
PTRVIR02	–109 80	4	–65 85	18 12	0 80	0 80	90	2	61 1	1 6 9/GR21	
SLVIFRB2	–107.30	4	–88 91	13 59	0 80	0.80	90	1	61 7		
USAEH001	–61.30	4	–85.16	36.21	5.63	3 32	22	2	61.9	1 5 6	10
USAEH002	–100.80	4	–89 28	36 16	5 65	3 78	170	2	61.7	1 6 9/GR20	10
USAEH003	–109 80	4	–90 12	36 11	5 55	3.56	161	2	62 1	1 6 9/GR21	10
USAEH004	–118.80	4	–91 16	36 05	5.38	3.24	153	2	62.6	1 5 6	10
USAPSA02	–165.80	4	–117 79	40.58	4 04	0.82	135	2	63 3	9/GR1	
USAPSA03	–174 80	4	–118.20	40.15	3.63	0 80	136	2	65 0	9/GR2	
USAWH101	–147 80	4	–109 70	38 13	5.52	1 96	142	2	62 1	10	
USAWH102	–156.80	4	–111 40	38.57	5 51	1.55	138	2	63.2	10	
VEN11VEN	–103 80	4	–66 79	6 90	2 50	1 77	122	2	65 2	10	

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1	2	3	4		5		6	7	8	9	
ALS00002	−166 20	5	−149.66	58.37	3.76	1.24	170	1	59.7	9/GR1	10
ALS00003	−175 20	5	−150.98	58.53	3.77	1.11	167	1	60.0	9/GR2	10
ARGINSU4	−94.20	5	−52.98	−59.81	3 40	0 80	19	1	59.9	9/GR3	
ARGSUR04	−94.20	5	−65.04	−43 33	3 32	1.50	40	1	60.7	9/GR3	10
B CE311	−64 20	5	−40.60	−6 07	3.04	2 06	174	1	61.6	8 9/GR7	10
B CE312	−45.20	5	−40.27	−6.06	3 44	2 09	174	1	61.0	8 9/GR9	10
B CE411	−64 20	5	−50.97	−15.27	3.86	1.38	49	1	62.6	8 9/GR7	10
B CE412	−45.20	5	−50.71	−15.30	3.57	1.56	52	1	62 7	8 9/GR9	10
B CE511	−64.20	5	−53.10	−2.90	2.44	2.13	104	1	63.0	8 9/GR7	10
B NO611	−74.20	5	−59 60	−11.62	2.85	1.69	165	2	62 8	8 9/GR8	10
B NO711	−74.20	5	−60.70	−1.78	3.54	1.78	126	2	62.8	8 9/GR8	10
B NO811	−74.20	5	−68.76	−4 71	2.37	1 65	73	2	62.8	8 9/GR8	
B SU111	−81.20	5	−51.12	−25.63	2.76	1.05	50	1	62.8	8 9/GR6	10
B SU112	−45.20	5	−50.75	−25.62	2.47	1 48	56	1	62.2	8 9/GR9	
B SU211	−81 20	5	−44.51	−16.95	3.22	1.36	60	1	62.5	8 9/GR6	10
B SU212	−45.20	5	−44.00	−16 87	3 20	1.96	58	1	61.3	8 9/GR9	
B AHIFRB1	−87 20	5	−76.06	24.16	1.81	0.80	142	1	61.6		
BERBERMU	−96.20	5	−64.77	32.32	0.80	0.80	90	2	56.8		
B ERBER02	−31.00	5	−64.77	32.32	0.80	0.80	90	1	56 9	2	10
B OLAND01	−115.20	5	−65 04	−16.76	2.49	1.27	76	1	67.9	9/GR5	
CAN01101	−138.20	5	−125 63	57.24	3.45	1.27	157	1	59.5	9/GR10	10
CAN01201	−138.20	5	−112 04	55.95	3.35	0.97	151	1	59.6	9/GR10	10
CAN01202	−72.70	5	−107 70	55.63	2 74	1.12	32	1	59.6		
CAN01203	−129.20	5	−111.48	55.61	3 08	1.15	151	1	59.5	9/GR12	10

CAN01303	−129.20	5	−102.42	57.12	3.54	0.91	154	1	60 0	9/GR12	10
CAN01304	−91.20	5	−99.12	57.36	1.98	1.72	2	1	59 8	9/GR13	
CAN01403	−129.20	5	−89.75	52 02	4 68	0.80	148	1	61.8	9/GR12	10
CAN01404	−91.20	5	−84.82	52.42	3.10	2.05	152	1	60.4	9/GR13	10
CAN01405	−82.20	5	−84.00	52 39	2.84	2 29	172	1	60.3	9/GR14	10
CAN01504	−91.20	5	−72.66	53.77	3 57	1 67	156	1	60.2	9/GR13	10
CAN01505	−82 20	5	−71.77	53.79	3.30	1.89	162	1	60.1	9/GR14	10
CAN01605	−82.20	5	−61.50	49.55	2.65	1.40	143	1	60 3	9/GR14	10
CAN01606	−70.70	5	−61.30	49.55	2.40	1.65	148	1	60.2	10	
CHLCONT5	−106.20	5	−72.23	−35.57	2 60	0 80	55	1	59.4	9/GR17	
CHLPAC02	−106.20	5	−80.06	−30 06	1.36	0.80	69	1	59.2	9/GR17	
CLMAND01	−115.20	5	−74.72	5.93	3 85	1 63	114	1	64 9	9/GR5	
CLM00001	−103.20	5	−74.50	5.87	3.98	1.96	118	1	63.5	10	
EQACAND1	−115.20	5	−78.40	−1.61	1.37	0.95	75	1	64.0	9/GR5	
EQAGAND1	−115 20	5	−90.34	−0.62	0.90	0 81	89	1	61 3	9/GR5	
FLKANT01	−57 20	5	−44.54	−60.13	3.54	0 80	12	1	59.3	2	10
FLKFALKS	−31.00	5	−59 90	−51 64	0.80	0 80	90	1	58.1	2	
GRD00002	−42.20	5	−61.58	12.29	0.80	0.80	90	1	58.8		
HWA00002	−166.20	5	−165.79	23 42	4.20	0.80	160	1	58 8	9/GR1	10
HWA00003	−175.20	5	−166.10	23.42	4.25	0.80	159	1	58.8	9/GR2	10
MEX01NTE	−78.20	5	−105 81	26.01	2 89	2.08	155	1	60 5	1	
MEX01SUR	−69.20	5	−94 84	19.82	3 05	2.09	4	1	62.2	1	10
MEX02NTE	−136.20	5	−107.21	26.31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	−127.20	5	−96.39	19.88	3.18	1.87	157	1	62.5	1	10

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1	2	3	4		5		6	7	8	9	
PAQPAC01	–106 20	5	–109 18	–27.53	0 80	0.80	90	1	56 2	9/GR17	
PRG00002	–99 20	5	–58.66	–23.32	1 45	1.04	76	1	60 2		
PRUAND02	–115 20	5	–74.69	–8.39	3.41	1 79	95	1	63 9	9/GR5	
PTRVIR01	–101 20	5	–65.85	18 12	0.80	0.80	90	1	60 5	1 6 9/GR20	
PTRVIR02	–110 20	5	–65.86	18 12	0.80	0 80	90	1	61.0	1 6 9/GR21	
SPMFRAN3	–53 20	5	–67 24	47 51	3.16	0 80	7	1	60 4	2 7	10
TRD00001	–84 70	5	–61.23	10.70	0.80	0 80	90	1	59.4		
URG00001	–71 70	5	–56.22	–32.52	1.02	0.89	11	1	60.0		
USAEH001	–61 70	5	–85.19	36 21	5 63	3.33	22	1	61.8	1 5 6	10
USAEH002	–101 20	5	–89 24	36 16	5.67	3.76	170	1	61 7	1 6 9/GR20	10
USAEH003	–110 20	5	–90.14	36.11	5.55	3 55	161	1	62 0	1 6 9/GR21	10
USAEH004	–119 20	5	–91 16	36.05	5 38	3 24	152	1	62 6	1 5 6	10
USAPSA02	–166 20	5	–117 80	40 58	4 03	0 82	135	1	63.2	9/GR1	
USAPSA03	–175 20	5	–118 27	40 12	3.62	0.80	136	1	65 0	9/GR2	
USAWH101	–148 20	5	–109 65	38 13	5.53	1.95	142	1	62.1	10	
USAWH102	–157 20	5	–111 41	38 57	5.51	1 54	138	1	63 2	10	
VENAND03	–115 20	5	–67.04	6.91	2.37	1 43	111	1	67 2	9/GR5	
VRG00001	–79 70	5	–64.37	18 48	0 80	0 80	90	1	58.3	4	

ALS00002	−165.80	6	−149.63	58 52	3.81	1.23	171	2	59.7	9/GR1	10
ALS00003	−174.80	6	−150.95	58 54	3.77	1.11	167	2	60 0	9/GR2	10
ARGNORT4	−93.80	6	−63.96	−30 01	3.86	1.99	48	2	65 6	10	
ARGNORT5	−54.80	6	−62.85	−29.80	3.24	2 89	47	2	63.5	10	
ATNBEAM1	−52.80	6	−66.44	14.87	1.83	0 80	39	2	61.0		
B CE311	−63.80	6	−40.60	−6.07	3.04	2.06	174	2	61.6	8 9/GR7	10
B CE312	−44.80	6	−40 26	−6.06	3 44	2.09	174	2	61.0	8 9/GR9	10
B CE411	−63.80	6	−50 97	−15 26	3.86	1.38	49	2	62.6	8 9/GR7	10
B CE412	−44.80	6	−50 71	−15.30	3.57	1.56	52	2	62 7	8 9/GR9	10
B CE511	−63.80	6	−53.11	−2.98	2.42	2 15	107	2	63.1	8 9/GR7	10
B NO611	−73 80	6	−59.60	−11.62	2.86	1.69	165	1	62 8	8 9/GR8	10
B NO711	−73.80	6	−60 70	−1.78	3 54	1 78	126	1	62.8	8 9/GR8	10
B NO811	−73 80	6	−68.75	−4.71	2.37	1.65	73	1	62.8	8 9/GR8	
B SE911	−101 80	6	−45.99	−19.09	2 22	0 80	62	2	65.3	8	10
B SU111	−80.80	6	−51.10	−25 64	2 76	1 06	50	2	62.8	8 9/GR6	10
B SU112	−44.80	6	−50.76	−25.62	2.47	1 48	56	2	62 3	8 9/GR9	
B SU211	−80.80	6	−44.51	−16 94	3.22	1.37	60	2	62 5	8 9/GR6	10
B SU212	−44.80	6	−43.99	−16.97	3.27	1.92	59	2	61.3	8 9/GR9	
CAN01101	−137.80	6	−125 60	57.24	3 45	1 27	157	2	59.5	9/GR10	10
CAN01201	−137.80	6	−111.92	55.89	3.33	0.98	151	2	59.6	9/GR10	10
CAN01202	−72.30	6	−107.64	55.62	2.75	1.11	32	2	59.6		
CAN01203	−128.80	6	−111 43	55.56	3 07	1.15	151	2	59 5	9/GR12	10
CAN01303	−128.80	6	−102.39	57 12	3.54	0.92	154	2	60 0	9/GR12	10
CAN01304	−90.80	6	−99.00	57.33	1.96	1.73	1	2	59.8	9/GR13	

1	2	3	4		5		6	7	8	9	
CAN01403	–128 80	6	–89.70	52.02	4.67	0 80	148	2	61.8	9/GR12	10
CAN01404	–90.80	6	–84.78	52.41	3 09	2 06	153	2	60.4	9/GR13	10
CAN01405	–81 80	6	–84 02	52.34	2.82	2.30	172	2	60.3	9/GR14	10
CAN01504	–90.80	6	–72.68	53.78	3 57	1.67	157	2	60 2	9/GR13	10
CAN01505	–81 80	6	–71.76	53.76	3.30	1.89	162	2	60 1	9/GR14	10
CAN01605	–81.80	6	–61.54	49 50	2.66	1 39	144	2	60.3	9/GR14	10
CAN01606	–70.30	6	–61.32	49.51	2.41	1 65	148	2	60 2	10	
CHLCONT4	–105 80	6	–69.59	–23.20	2.21	0 80	68	2	59.1	9/GR16	
CHLCONT6	–105.80	6	–73.52	–55.52	3 65	1 31	39	2	59 6	9/GR16	
CRBBAH01	–92.30	6	–76.09	24.13	1 83	0.80	141	1	61.7	9/GR18	
CRBBER01	–92.30	6	–64.76	32.13	0 80	0.80	90	1	56 7	9/GR18	
CRBBLZ01	–92.30	6	–88.61	17.26	0.80	0.80	90	1	58.6	9/GR18	
CRBEC001	–92 30	6	–60.07	8.26	4.20	0 86	115	1	64.2	9/GR18	10
CRBJMC01	–92 30	6	–79.45	17.97	0.99	0 80	151	1	61.1	9/GR18	
CTR00201	–130.80	6	–84.33	9.67	0.82	0 80	119	2	65 6		
EQAC0001	–94 80	6	–78 31	–1.52	1 48	1.15	65	1	63.0	9/GR19	
EQAG0001	–94.80	6	–90.36	–0 57	0.94	0.89	99	1	61 0	9/GR19	
GUY00302	–33 80	6	–59 07	4.77	1 43	0 85	91	2	63.5		
HNDIFRB2	–107.30	6	–86.23	15.16	1 14	0 85	8	1	63.4		
HTI00002	–83.30	6	–73.28	18.96	0.82	0 80	11	2	60 9		
HWA00002	–165 80	6	–165.79	23.32	4.20	0.80	160	2	58 8	9/GR1	10
HWA00003	–174.80	6	–166.10	23 42	4.25	0.80	159	2	58.8	9/GR2	10
MEX01NTE	–77.80	6	–105.80	25.99	2 88	2 07	155	2	60.5	1	
MEX02NTE	–135.80	6	–107 36	26.32	3.80	1 57	149	2	61.2	1	10

MEX02SUR	−126 80	6	−96 39	19.88	3 19	1 87	158	2	62 5	1	10
PRU00004	−85.80	6	−74.19	−8.39	3 74	2 45	112	2	62 8	10	
PTRVIR01	−100.80	6	−65 85	18.12	0.80	0 80	90	2	60.6	1 6 9/GR20	
PTRVIR02	−109.80	6	−65 85	18.12	0.80	0 80	90	2	61 1	1 6 9/GR21	
TCA00001	−115 80	6	−71 79	21 53	0 80	0 80	90	2	60 4		
USAEH001	−61.30	6	−85 16	36 21	5.63	3.32	22	2	61 8	1 5 6	10
USAEH002	−100.80	6	−89 28	36 16	5 65	3.78	170	2	61 7	1 6 9/GR20	10
USAEH003	−109 80	6	−90 12	36.11	5 55	3 56	161	2	62 1	1 6 9/GR21	10
USAEH004	−118.80	6	−91 16	36.05	5 38	3.24	153	2	62.6	1 5 6	10
USAPSA02	−165 80	6	−117.79	40.58	4.04	0.82	135	2	63.2	9/GR1	
USAPSA03	−174.80	6	−118.20	40 15	3.63	0.80	136	2	64 9	9/GR2	
USAWH101	−147.80	6	−109.70	38 13	5.52	1.96	142	2	62.1	10	
USAWH102	−156.80	6	−111 40	38.57	5.51	1.55	138	2	63.2	10	
VCT00001	−79.30	6	−61 18	13 23	0 80	0.80	90	2	58.4		
VEN11VEN	−103 80	6	−66.79	6 90	2.50	1.77	122	2	65.1	10	

12311,48 MHz (7)

1	2	3	4		5		6	7	8	9	
ALS00002	−166.20	7	−149.66	58.37	3.76	1.24	170	1	59.8	9/GR1	10
ALS00003	−175.20	7	−150.98	58.53	3.77	1.11	167	1	60.0	9/GR2	10
ARGINSU4	−94.20	7	−52.98	−59.81	3.40	0.80	19	1	59.9	9/GR3	
ARGINSU5	−55.20	7	−44.17	−59.91	3.77	0.80	13	1	59.3	9/GR4	10
ARGSUR04	−94.20	7	−65.04	−43.33	3.32	1.50	40	1	60.7	9/GR3	10
ARGSUR05	−55.20	7	−63.68	−43.01	2.54	2.38	152	1	60.1	9/GR4	10
ATGSJN01	−79 70	7	−61.79	17.07	0.80	0.80	90	1	58.4		
B CE311	−64.20	7	−40.60	−6.07	3.04	2.06	174	1	61.6	8 9/GR7	10
B CE312	−45.20	7	−40.27	−6.06	3.44	2.09	174	1	61.0	8 9/GR9	10
B CE411	−64.20	7	−50.97	−15.27	3.86	1.38	49	1	62.6	8 9/GR7	10
B CE412	−45.20	7	−50.71	−15.30	3.57	1.56	52	1	62.7	8 9/GR9	10
B CE511	−64.20	7	−53.10	−2.90	2.44	2.13	104	1	63.1	8 9/GR7	10
B NO611	−74.20	7	−59 60	−11.62	2.85	1.69	165	2	62.9	8 9/GR8	10
B NO711	−74.20	7	−60.70	−1.78	3.54	1.78	126	2	62.8	8 9/GR8	10
B NO811	−74.20	7	−68.76	−4.71	2.37	1.65	73	2	62.8	8 9/GR8	
B SU111	−81.20	7	−51.12	−25.63	2.76	1.05	50	1	62.9	8 9/GR6	10
B SU112	−45.20	7	−50.75	−25 62	2.47	1.48	56	1	62.3	8 9/GR9	
B SU211	−81.20	7	−44.51	−16.95	3.22	1.36	60	1	62.5	8 9/GR6	10
B SU212	−45 20	7	−44.00	−16.87	3.20	1.96	58	1	61.3	8 9/GR9	
BERBERMU	−96 20	7	−64.77	32.32	0.80	0.80	90	2	56.8		
B OLAND01	−115.20	7	−65.04	−16.76	2.49	1.27	76	1	67.9	9/GR5	
B OL00001	−87.20	7	−64.61	−16 71	2.52	2 19	85	1	63.8	10	
B RB00001	−92 70	7	−59.85	12.93	0.80	0.80	90	2	59.1		
CAN01101	−138.20	7	−125.63	57.24	3.45	1.27	157	1	59.5	9/GR10	10

CAN01201	−138 20	7	−112 04	55 95	3 35	0 97	151	1	59 6	9/GR10	10
CAN01202	−72 70	7	−107.70	55 63	2 74	1 12	32	1	59 6		
CAN01203	−129 20	7	−111 48	55 61	3 08	1.15	151	1	59 5	9/GR12	10
CAN01303	−129 20	7	−102 42	57 12	3 54	0 91	154	1	60.1	9/GR12	10
CAN01304	−91 20	7	−99.12	57 36	1 98	1 72	2	1	59 8	9/GR13	
CAN01403	−129 20	7	−89 75	52 02	4 68	0 80	148	1	61 8	9/GR12	10
CAN01404	−91 20	7	−84 82	52 42	3 10	2 05	152	1	60 4	9/GR13	10
CAN01405	−82.20	7	−84 00	52 39	2 84	2 29	172	1	60.3	9/GR14	10
CAN01504	−91 20	7	−72.66	53 77	3 57	1 67	156	1	60 2	9/GR13	10
CAN01505	−82.20	7	−71 77	53 79	3.30	1 89	162	1	60 1	9/GR14	10
CAN01605	−82 20	7	−61 50	49 55	2 65	1 40	143	1	60 3	9/GR14	10
CAN01606	−70 70	7	−61 30	49 55	2 40	1 65	148	1	60 2	10	
CHLCONT5	−106.20	7	−72 23	−35.57	2 60	0 80	55	1	59.4	9/GR17	
CHLPAC02	−106 20	7	−80.06	−30 06	1 36	0.80	69	1	59 2	9/GR17	
CLMAND01	−115 20	7	−74.72	5 93	3.85	1 63	114	1	65 0	9/GR5	
CLM00001	−103 20	7	−74 50	5 87	3 98	1 96	118	1	63 6	10	
CUB00001	−89 20	7	−79 81	21 62	2 24	0.80	168	1	61.1		
EQACAND1	−115 20	7	−78 40	−1 61	1 37	0.95	75	1	64 1	9/GR5	
EQAGAND1	−115.20	7	−90 34	−0 62	0 90	0 81	89	1	61 3	9/GR5	
GRD00002	−42.20	7	−61 58	12 29	0.80	0 80	90	1	58 8		
GRD00059	−57 20	7	−61.58	12 29	0 80	0 80	90	1	58 5		
GRLDNK01	−53 20	7	−44 89	66.56	2 70	0.82	173	1	60.0	2	10
HWA00002	−166 20	7	−165.79	23 42	4.20	0 80	160	1	58.8	9/GR1	10
HWA00003	−175 20	7	−166 10	23 42	4.25	0 80	159	1	58.8	9/GR2	10

12311,48 MHz (7)

1	2	3	4		5		6	7	8	9	
MEX01NTE	−78.20	7	−105.81	26.01	2.89	2.08	155	1	60.5	1	
MEX01SUR	−69.20	7	−94.84	19.82	3.05	2.09	4	1	62.3	1	10
MEX02NTE	−136.20	7	−107.21	26.31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	−127.20	7	−96.39	19.88	3.18	1.87	157	1	62.6	1	10
PAQPAC01	−106.20	7	−109.18	−27.53	0.80	0.80	90	1	56.2	9/GR17	
PRG00002	−99.20	7	−58.66	−23 32	1.45	1.04	76	1	60.2		
PRUAND02	−115.20	7	−74.69	−8.39	3.41	1.79	95	1	64.0	9/GR5	
PTRVIR01	−101.20	7	−65.85	18.12	0.80	0.80	90	1	60.6	1 6 9/GR20	
PTRVIR02	−110.20	7	−65.86	18.12	0.80	0.80	90	1	61.0	1 6 9/GR21	
SURINAM2	−84.70	7	−55.69	4.35	1.00	0.80	86	1	63.2		
URG00001	−71 70	7	−56.22	−32.52	1.02	0 89	11	1	60.0		
USAEH001	−61.70	7	−85.19	36.21	5.63	3.33	22	1	61 8	1 5 6	10
USAEH002	−101.20	7	−89.24	36.16	5.67	3.76	170	1	61 7	1 6 9/GR20	10
USAEH003	−110.20	7	−90.14	36.11	5.55	3.55	161	1	62.1	1 6 9/GR21	10
USAEH004	−119.20	7	−91.16	36 05	5.38	3.24	152	1	62.6	1 5 6	10
USAPSA02	−166.20	7	−117 80	40.58	4.03	0.82	135	1	63.3	9/GR1	
USAPSA03	−175 20	7	−118 27	40.12	3.62	0 80	136	1	65.0	9/GR2	
USAWH101	−148.20	7	−109 65	38.13	5.53	1.95	142	1	62 1	10	
USAWH102	−157.20	7	−111.41	38 57	5.51	1.54	138	1	63.2	10	
VENAND03	−115.20	7	−67.04	6.91	2.37	1.43	111	1	67.3	9/GR5	

ALS00002	−165.80	8	−149.63	58 52	3.81	1.23	171	2	59 8	9/GR1	10
ALS00003	−174.80	8	−150.95	58 54	3 77	1.11	167	2	60 0	9/GR2	10
ARGNORT4	−93.80	8	−63 96	−30.01	3.86	1.99	48	2	65 7	10	
ARGNORT5	−54.80	8	−62 85	−29 80	3.24	2 89	47	2	63.5	10	
B CE311	−63 80	8	−40.60	−6 07	3.04	2.06	174	2	61.6	8 9/GR7	10
B CE312	−44 80	8	−40.26	−6.06	3.44	2.09	174	2	61.0	8 9/GR9	10
B CE411	−63.80	8	−50 97	−15.26	3.86	1 38	49	2	62.6	8 9/GR7	10
B CE412	−44.80	8	−50 71	−15.30	3 57	1.56	52	2	62.8	8 9/GR9	10
B CE511	−63 80	8	−53.11	−2 98	2.42	2.15	107	2	63.1	8 9/GR7	10
B NO611	−73 80	8	−59.60	−11.62	2.86	1 69	165	1	62.9	8 9/GR8	10
B NO711	−73 80	8	−60 70	−1.78	3.54	1.78	126	1	62.8	8 9/GR8	10
B NO811	−73.80	8	−68 75	−4 71	2 37	1.65	73	1	62.8	8 9/GR8	
B SE911	−101 80	8	−45 99	−19.09	2 22	0.80	62	2	65.3	8	10
B SU111	−80.80	8	−51.10	−25.64	2 76	1.06	50	2	62.9	8 9/GR6	10
B SU112	−44.80	8	−50 76	−25.62	2.47	1.48	56	2	62.3	8 9/GR9	
B SU211	−80.80	8	−44.51	−16.94	3.22	1.37	60	2	62.5	8 9/GR6	10
B SU212	−44.80	8	−43.99	−16.97	3 27	1.92	59	2	61 3	8 9/GR9	
CAN01101	−137.80	8	−125.60	57.24	3.45	1.27	157	2	59.5	9/GR10	10
CAN01201	−137 80	8	−111.92	55 89	3.33	0.98	151	2	59.6	9/GR10	10
CAN01202	−72 30	8	−107.64	55 62	2.75	1.11	32	2	59.6		
CAN01203	−128.80	8	−111 43	55.56	3.07	1.15	151	2	59.5	9/GR12	10
CAN01303	−128.80	8	−102.39	57.12	3.54	0.92	154	2	60.1	9/GR12	10
CAN01304	−90.80	8	−99.00	57.33	1.96	1.73	1	2	59.8	9/GR13	
CAN01403	−128.80	8	−89 70	52.02	4.67	0.80	148	2	61.8	9/GR12	10

12326,06 MHz (8)

1	2	3	4		5		6	7	8	9	
CAN01404	– 90 80	8	– 84 78	52 41	3 09	2.06	153	2	60 4	9/GR13	10
CAN01405	– 81 80	8	– 84.02	52.34	2 82	2 30	172	2	60 3	9/GR14	10
CAN01504	– 90.80	8	– 72.68	53 78	3 57	1 67	157	2	60.2	9/GR13	10
CAN01505	– 81 80	8	– 71.76	53 76	3.30	1 89	162	2	60.2	9/GR14	10
CAN01605	– 81.80	8	– 61 54	49.50	2 66	1 39	144	2	60.3	9/GR14	10
CAN01606	– 70.30	8	– 61.32	49.51	2.41	1.65	148	2	60.2	10	
CHLCONT4	– 105 80	8	– 69.59	– 23 20	2.21	0.80	68	2	59.1	9/GR16	
CHLCONT6	– 105 80	8	– 73.52	– 55.52	3 65	1 31	39	2	59.6	9/GR16	
CRBBAH01	– 92.30	8	– 76.09	24.13	1 83	0.80	141	1	61 7	9/GR18	
CRBBER01	– 92.30	8	– 64 76	32.13	0.80	0.80	90	1	56 8	9/GR18	
CRBBLZ01	– 92.30	8	– 88 61	17.26	0 80	0.80	90	1	58.7	9/GR18	
CRBEC001	– 92.30	8	– 60 07	8 26	4 20	0.86	115	1	64 3	9/GR18	10
CRBJMC01	– 92 30	8	– 79 45	17.97	0.99	0 80	151	1	61 1	9/GR18	
CYM00001	– 115 80	8	– 80 58	19 57	0 80	0 80	90	2	59 6		
DOMIFRB2	– 83 30	8	– 70 51	18 79	0.98	0 80	167	2	61 1		
EQAC0001	– 94.80	8	– 78 31	– 1 52	1 48	1 15	65	1	63 0	9/GR19	
EQAG0001	– 94 80	8	– 90 36	– 0 57	0.94	0 89	99	1	61 0	9/GR19	
GUFMGG02	– 52 80	8	– 56 42	8.47	4 16	0.81	123	2	62.7	2 7	10
HWA00002	– 165.80	8	– 165 79	23 32	4 20	0.80	160	2	58 8	9/GR1	10
HWA00003	– 174 80	8	– 166 10	23 42	4.25	0 80	159	2	58 8	9/GR2	10
JMC00005	– 33 80	8	– 77 27	18 12	0 80	0.80	90	2	60.6		
LCAIFRB1	– 79.30	8	– 61 15	13.90	0.80	0 80	90	2	58 4		
MEX01NTE	– 77 80	8	– 105 80	25.99	2 88	2.07	155	2	60 5	1	
MEX02NTE	– 135 80	8	– 107.36	26 32	3 80	1.57	149	2	61 2	1	10

MEX02SUR	–126.80	8	–96 39	19.88	3.19	1 87	158	2	62.5	1	10
PRU00004	–85.80	8	–74 19	–8.39	3 74	2.45	112	2	62.9	10	
PTRVIR01	–100.80	8	–65.85	18.12	0 80	0 80	90	2	60.6	1 6 9/GR20	
PTRVIR02	–109.80	8	–65.85	18.12	0 80	0 80	90	2	61.1	1 6 9/GR21	
SLVIFRB2	–107.30	8	–88 91	13 59	0 80	0.80	90	1	61 7		
USAEH001	–61.30	8	–85 16	36 21	5.63	3 32	22	2	61.9	1 5 6	10
USAEH002	–100 80	8	–89.28	36.16	5 65	3 78	170	2	61 7	1 6 9/GR20	10
USAEH003	–109.80	8	–90.12	36 11	5 55	3.56	161	2	62.1	1 6 9/GR21	10
USAEH004	–118.80	8	–91.16	36 05	5.38	3.24	153	2	62.6	1 5 6	10
USAPSA02	–165.80	8	–117.79	40 58	4.04	0 82	135	2	63.3	9/GR1	
USAPSA03	–174.80	8	–118.20	40.15	3 63	0 80	136	2	65.0	9/GR2	
USAWH101	–147 80	8	–109.70	38.13	5 52	1.96	142	2	62.1	10	
USAWH102	–156.80	8	–111.40	38.57	5 51	1 55	138	2	63.2	10	
VEN11VEN	–103.80	8	–66.79	6 90	2.50	1 77	122	2	65.2	10	

1	2	3	4		5		6	7	8	9	
ALS00002	−166 20	9	−149.66	58.37	3.76	1.24	170	1	59 7	9/GR1	10
ALS00003	−175.20	9	−150 98	58 53	3.77	1 11	167	1	60 0	9/GR2	10
ARGINSU4	−94.20	9	−52 98	−59.81	3.40	0.80	19	1	59.9	9/GR3	
ARGSUR04	−94.20	9	−65 04	−43.33	3 32	1.50	40	1	60.7	9/GR3	10
B CE311	−64.20	9	−40.60	−6.07	3.04	2.06	174	1	61.6	8 9/GR7	10
B CE312	−45.20	9	−40.27	−6.06	3 44	2 09	174	1	61.0	8 9/GR9	10
B CE411	−64 20	9	−50 97	−15.27	3.86	1 38	49	1	62.6	8 9/GR7	10
B CE412	−45 20	9	−50.71	−15.30	3.57	1.56	52	1	62.7	8 9/GR9	10
B CE511	−64.20	9	−53 10	−2.90	2.44	2.13	104	1	63.0	8 9/GR7	10
B NO611	−74 20	9	−59.60	−11.62	2.85	1.69	165	2	62.8	8 9/GR8	10
B NO711	−74 20	9	−60.70	−1.78	3.54	1.78	126	2	62.8	8 9/GR8	10
B NO811	−74.20	9	−68 76	−4 71	2.37	1.65	73	2	62.8	8 9/GR8	
B SU111	−81 20	9	−51.12	−25.63	2 76	1 05	50	1	62.8	8 9/GR6	10
B SU112	−45 20	9	−50.75	−25 62	2 47	1 48	56	1	62.2	8 9/GR9	
B SU211	−81.20	9	−44.51	−16.95	3.22	1.36	60	1	62 5	8 9/GR6	10
B SU212	−45.20	9	−44 00	−16.87	3.20	1.96	58	1	61 3	8 9/GR9	
B AHIFRB1	−87 20	9	−76.06	24 16	1 81	0.80	142	1	61.6		
BERBERMU	−96.20	9	−64.77	32.32	0.80	0.80	90	2	56.8		
B ERBER02	−31 00	9	−64 77	32.32	0.80	0.80	90	1	56.9	2	10
B OLAND01	−115.20	9	−65 04	−16 76	2.49	1 27	76	1	67 9	9/GR5	
CAN01101	−138.20	9	−125.63	57 24	3 45	1.27	157	1	59.5	9/GR10	10
CAN01201	−138.20	9	−112.04	55.95	3.35	0.97	151	1	59.6	9/GR10	10
CAN01202	−72.70	9	−107.70	55.63	2.74	1 12	32	1	59 6		
CAN01203	−129.20	9	−111 48	55 61	3 08	1 15	151	1	59 5	9/GR12	10

CAN01303	– 129 20	9	– 102 42	57.12	3.54	0 91	154	1	60.0	9/GR12	10
CAN01304	– 91.20	9	– 99.12	57.36	1.98	1.72	2	1	59 8	9/GR13	
CAN01403	– 129.20	9	– 89 75	52.02	4.68	0 80	148	1	61.8	9/GR12	10
CAN01404	– 91.20	9	– 84 82	52.42	3.10	2.05	152	1	60 4	9/GR13	10
CAN01405	– 82.20	9	– 84 00	52 39	2.84	2 29	172	1	60.3	9/GR14	10
CAN01504	– 91 20	9	– 72.66	53.77	3 57	1.67	156	1	60 2	9/GR13	10
CAN01505	– 82.20	9	– 71 77	53 79	3.30	1 89	162	1	60 1	9/GR14	10
CAN01605	– 82.20	9	– 61.50	49 55	2 65	1.40	143	1	60 3	9/GR14	10
CAN01606	– 70 70	9	– 61.30	49 55	2.40	1 65	148	1	60.2	10	
CHLCONT5	– 106.20	9	– 72.23	– 35 57	2.60	0.80	55	1	59 4	9/GR17	
CHLPAC02	– 106.20	9	– 80.06	– 30 06	1 36	0.80	69	1	59 2	9/GR17	
CLMAND01	– 115 20	9	– 74 72	5 93	3.85	1 63	114	1	64.9	9/GR5	
CLM00001	– 103.20	9	– 74 50	5.87	3.98	1 96	118	1	63.5	10	
EQACAND1	– 115.20	9	– 78 40	– 1 61	1.37	0.95	75	1	64 0	9/GR5	
EQAGAND1	– 115.20	9	– 90 34	– 0 62	0.90	0.81	89	1	61 3	9/GR5	
FLKANT01	– 57.20	9	– 44.54	– 60 13	3 54	0.80	12	1	59.3	2	10
FLKFALKS	– 31.00	9	– 59 90	– 51.64	0 80	0.80	90	1	58.1	2	
GRD00002	– 42.20	9	– 61.58	12 29	0.80	0.80	90	1	58.8		
HWA00002	– 166 20	9	– 165.79	23 42	4.20	0 80	160	1	58.8	9/GR1	10
HWA00003	– 175.20	9	– 166 10	23.42	4.25	0.80	159	1	58 8	9/GR2	10
MEX01NTE	– 78.20	9	– 105 81	26.01	2.89	2.08	155	1	60 5	1	
MEX01SUR	– 69.20	9	– 94 84	19.82	3.05	2.09	4	1	62.2	1	10
MEX02NTE	– 136.20	9	– 107.21	26.31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	– 127.20	9	– 96 39	19.88	3.18	1.87	157	1	62 5	1	10

12340,64 MHz (9)

1	2	3	4		5		6	7	8	9	
PAQPAC01	−106 20	9	−109 18	−27.53	0 80	0.80	90	1	56 2	9/GR17	
PRG00002	−99 20	9	−58.66	−23 32	1 45	1 04	76	1	60 2		
PRUAND02	−115 20	9	−74 69	−8 39	3.41	1 79	95	1	63 9	9/GR5	
PTRVIR01	−101 20	9	−65 85	18 12	0.80	0 80	90	1	60 5	1 6 9/GR20	
PTRVIR02	−110 20	9	−65 86	18 12	0.80	0 80	90	1	61 0	1 6 9/GR21	
SPMFRAN3	−53.20	9	−67.24	47.51	3 16	0 80	7	1	60 4	2 7	10
TRD00001	−84.70	9	−61.23	10 70	0.80	0 80	90	1	59 4		
URG00001	−71 70	9	−56.22	−32 52	1 02	0 89	11	1	60 0		
USAEH001	−61 70	9	−85.19	36 21	5.63	3 33	22	1	61 8	1 5 6	10
USAEH002	−101 20	9	−89 24	36 16	5.67	3.76	170	1	61 7	1 6 9/GR20	10
USAEH003	−110.20	9	−90 14	36 11	5.55	3 55	161	1	62 0	1 6 9/GR21	10
USAEH004	−119 20	9	−91 16	36 05	5.38	3 24	152	1	62.6	1 5 6	10
USAPSA02	−166.20	9	−117.80	40 58	4.03	0 82	135	1	63 2	9/GR1	
USAPSA03	−175 20	9	−118.27	40 12	3.62	0 80	136	1	65.0	9/GR2	
USAWH101	−148 20	9	−109.65	38 13	5.53	1.95	142	1	62.1	10	
USAWH102	−157.20	9	−111.41	38 57	5.51	1 54	138	1	63.2	10	
VENAND03	−115.20	9	−67.04	6 91	2.37	1.43	111	1	67.2	9/GR5	
VRG00001	−79.70	9	−64.37	18.48	0.80	0 80	90	1	58.3	4	

ALS00002	– 165 80	10	– 149 63	58 52	3 81	1 23	171	2	59 7	9/GR1	10
ALS00003	– 174 80	10	– 150 95	58 54	3 77	1 11	167	2	60 0	9/GR2	10
ARGNORT4	– 93.80	10	– 63 96	– 30 01	3 86	1.99	48	2	65 6	10	
ARGNORT5	– 54.80	10	– 62 85	– 29 80	3 24	2 89	47	2	63 5	10	
ATNBEAM1	– 52 80	10	– 66 44	14.87	1 83	0.80	39	2	61 0		
B CE311	– 63.80	10	– 40.60	– 6 07	3 04	2 06	174	2	61 6	8 9/GR7	10
B CE312	– 44.80	10	– 40 26	– 6 06	3.44	2.09	174	2	61 0	8 9/GR9	10
B CE411	– 63 80	10	– 50 97	– 15 26	3 86	1 38	49	2	62 6	8 9/GR7	10
B CE412	– 44.80	10	– 50 71	– 15 30	3.57	1 56	52	2	62 7	8 9/GR9	10
B CE511	– 63 80	10	– 53 11	– 2 98	2 42	2 15	107	2	63 1	8 9/GR7	10
B NO611	– 73.80	10	– 59 60	– 11 62	2.86	1.69	165	1	62.8	8 9/GR8	10
B NO711	– 73 80	10	– 60 70	– 1 78	3 54	1 78	126	1	62 8	8 9/GR8	10
B NO811	– 73 80	10	– 68 75	– 4.71	2 37	1.65	73	1	62 8	8 9/GR8	
B SE911	– 101 80	10	– 45 99	– 19.09	2.22	0.80	62	2	65 3	8	10
B SU111	– 80.80	10	– 51 10	– 25 64	2 76	1 06	50	2	62.8	8 9/GR6	10
B SU112	– 44.80	10	– 50.76	– 25.62	2.47	1.48	56	2	62 3	8 9/GR9	
B SU211	– 80.80	10	– 44 51	– 16 94	3.22	1 37	60	2	62 5	8 9/GR6	10
B SU212	– 44 80	10	– 43.99	– 16.97	3 27	1 92	59	2	61 3	8 9/GR9	
CAN01101	– 137.80	10	– 125 60	57 24	3 45	1.27	157	2	59 5	9/GR10	10
CAN01201	– 137.80	10	– 111.92	55 89	3.33	0 98	151	2	59.6	9/GR10	10
CAN01202	– 72 30	10	– 107.64	55 62	2 75	1 11	32	2	59.6		
CAN01203	– 128.80	10	– 111.43	55.56	3 07	1.15	151	2	59 5	9/GR12	10
CAN01303	– 128.80	10	– 102 39	57 12	3.54	0.92	154	2	60.0	9/GR12	10
CAN01304	– 90.80	10	– 99.00	57 33	1.96	1.73	1	2	59 8	9/GR13	

12355,22 MHz (10)

1	2	3	4		5		6	7	8	9	
CAN01403	–128.80	10	–89.70	52.02	4.67	0.80	148	2	61 8	9/GR12	10
CAN01404	–90.80	10	–84.78	52.41	3.09	2.06	153	2	60.4	9/GR13	10
CAN01405	–81 80	10	–84.02	52.34	2.82	2.30	172	2	60.3	9/GR14	10
CAN01504	–90 80	10	–72.68	53.78	3.57	1.67	157	2	60.2	9/GR13	10
CAN01505	–81 80	10	–71.76	53.76	3.30	1.89	162	2	60.1	9/GR14	10
CAN01605	–81 80	10	–61.54	49.50	2.66	1.39	144	2	60.3	9/GR14	10
CAN01606	–70 30	10	–61.32	49.51	2.41	1.65	148	2	60.2	10	
CHLCONT4	–105.80	10	–69.59	–23.20	2.21	0.80	68	2	59.1	9/GR16	
CHLCONT6	–105 80	10	–73.52	–55.52	3.65	1.31	39	2	59.6	9/GR16	
CRBBAH01	–92.30	10	–76.09	24.13	1.83	0.80	141	1	61.7	9/GR18	
CRBBER01	–92 30	10	–64 76	32.13	0.80	0.80	90	1	56.7	9/GR18	
CRBBLZ01	–92.30	10	–88 61	17.26	0.80	0.80	90	1	58.6	9/GR18	
CRBEC001	–92.30	10	–60.07	8.26	4.20	0.86	115	1	64.2	9/GR18	10
CRBJMC01	–92.30	10	–79.45	17 97	0 99	0.80	151	1	61 1	9/GR18	
CTR00201	–130 80	10	–84 33	9.67	0.82	0.80	119	2	65.6		
EQAC0001	–94 80	10	–78.31	–1 52	1.48	1.15	65	1	63 0	9/GR19	
EQAG0001	–94.80	10	–90.36	–0 57	0.94	0.89	99	1	61.0	9/GR19	
GUY00302	–33.80	10	–59.07	4.77	1.43	0.85	91	2	63.5		
HNDIFRB2	–107.30	10	–86.23	15.16	1 14	0 85	8	1	63.4		
HTI00002	–83 30	10	–73.28	18.96	0.82	0.80	11	2	60.9		
HWA00002	–165.80	10	–165 79	23 32	4 20	0.80	160	2	58.8	9/GR1	10
HWA00003	–174.80	10	–166 10	23.42	4 25	0.80	159	2	58.8	9/GR2	10
MEX01NTE	–77.80	10	–105 80	25 99	2.88	2.07	155	2	60.5	1	
MEX02NTE	–135 80	10	–107.36	26.32	3.80	1 57	149	2	61.2	1	10

MEX02SUR	−126.80	10	−96.39	19 88	3.19	1 87	158	2	62.5	1	10
PRU00004	−85.80	10	−74.19	−8.39	3.74	2 45	112	2	62.8	10	
PTRVIR01	−100.80	10	−65.85	18.12	0 80	0.80	90	2	60.6	1 6 9/GR20	
PTRVIR02	−109.80	10	−65.85	18.12	0.80	0.80	90	2	61.1	1 6 9/GR21	
TCA00001	−115.80	10	−71.79	21.53	0.80	0.80	90	2	60.4		
USAEH001	−61.30	10	−85 16	36.21	5 63	3 32	22	2	61.8	1 5 6	10
USAEH002	−100.80	10	−89.28	36.16	5.65	3.78	170	2	61 7	1 6 9/GR20	10
USAEH003	−109.80	10	−90.12	36.11	5 55	3.56	161	2	62 1	1 6 9/GR21	10
USAEH004	−118.80	10	−91.16	36 05	5.38	3.24	153	2	62.6	1 5 6	10
USAPSA02	−165 80	10	−117.79	40.58	4.04	0 82	135	2	63 2	9/GR1	
USAPSA03	−174.80	10	−118.20	40 15	3.63	0.80	136	2	64.9	9/GR2	
USAWH101	−147.80	10	−109.70	38.13	5.52	1.96	142	2	62 1	10	
USAWH102	−156 80	10	−111.40	38.57	5.51	1 55	138	2	63.2	10	
VCT00001	−79 30	10	−61.18	13.23	0 80	0.80	90	2	58.4		
VEN11VEN	−103.80	10	−66 79	6 90	2.50	1.77	122	2	65.1	10	

1	2	3	4		5		6	7	8	9	
ALS00002	– 166 20	11	– 149.66	58 37	3 76	1.24	170	1	59.8	9/GR1	10
ALS00003	– 175.20	11	– 150.98	58.53	3 77	1.11	167	1	60 0	9/GR2	10
ARGINSU4	– 94 20	11	– 52.98	– 59 81	3 40	0 80	19	1	59 9	9/GR3	
ARGINSU5	– 55.20	11	– 44 17	– 59 91	3.77	0 80	13	1	59 3	9/GR4	10
ARGSUR04	– 94 20	11	– 65 04	– 43 33	3 32	1.50	40	1	60 7	9/GR3	10
ARGSUR05	– 55.20	11	– 63 68	– 43.01	2 54	2 38	152	1	60 1	9/GR4	10
ATGSJN01	– 79 70	11	– 61 79	17 07	0.80	0 80	90	1	58 4		
B CE311	– 64.20	11	– 40 60	– 6 07	3.04	2.06	174	1	61 6	8 9/GR7	10
B CE312	– 45 20	11	– 40 27	– 6.06	3 44	2.09	174	1	61.0	8 9/GR9	10
B CE411	– 64.20	11	– 50.97	– 15 27	3.86	1 38	49	1	62 6	8 9/GR7	10
B CE412	– 45 20	11	– 50.71	– 15 30	3.57	1.56	52	1	62.7	8 9/GR9	10
B CE511	– 64.20	11	– 53.10	– 2 90	2.44	2 13	104	1	63.1	8 9/GR7	10
B NO611	– 74 20	11	– 59.60	– 11 62	2.85	1.69	165	2	62 9	8 9/GR8	10
B NO711	– 74.20	11	– 60.70	– 1 78	3 54	1 78	126	2	62 8	8 9/GR8	10
B NO811	– 74.20	11	– 68.76	– 4 71	2.37	1 65	73	2	62.8	8 9/GR8	
B SU111	– 81.20	11	– 51 12	– 25 63	2 76	1 05	50	1	62 9	8 9/GR6	10
B SU112	– 45.20	11	– 50 75	– 25 62	2 47	1 48	56	1	62.3	8 9/GR9	
B SU211	– 81 20	11	– 44 51	– 16 95	3 22	1 36	60	1	62.5	8 9/GR6	10
B SU212	– 45 20	11	– 44 00	– 16 87	3 20	1 96	58	1	61 3	8 9/GR9	
BERBERMU	– 96 20	11	– 64 77	32.32	0 80	0 80	90	2	56 8		
B OLAND01	– 115 20	11	– 65 04	– 16.76	2.49	1 27	76	1	67 9	9/GR5	
B OL00001	– 87 20	11	– 64 61	– 16.71	2.52	2 19	85	1	63 8	10	
B RB00001	– 92 70	11	– 59 85	12.93	0.80	0 80	90	2	59 1		
CAN01101	– 138 20	11	– 125 63	57.24	3.45	1 27	157	1	59 5	9/GR10	10

CAN01201	−138.20	11	−112.04	55.95	3.35	0.97	151	1	59 6	9/GR10	10
CAN01202	−72.70	11	−107.70	55.63	2 74	1.12	32	1	59.6		
CAN01203	−129.20	11	−111.48	55.61	3.08	1.15	151	1	59.5	9/GR12	10
CAN01303	−129.20	11	−102 42	57.12	3.54	0.91	154	1	60 1	9/GR12	10
CAN01304	−91.20	11	−99.12	57 36	1.98	1.72	2	1	59 8	9/GR13	
CAN01403	−129.20	11	−89.75	52.02	4.68	0 80	148	1	61.8	9/GR12	10
CAN01404	−91.20	11	−84.82	52 42	3.10	2.05	152	1	60.4	9/GR13	10
CAN01405	−82 20	11	−84 00	52.39	2 84	2 29	172	1	60.3	9/GR14	10
CAN01504	−91.20	11	−72 66	53.77	3 57	1.67	156	1	60.2	9/GR13	10
CAN01505	−82.20	11	−71.77	53 79	3.30	1.89	162	1	60 1	9/GR14	10
CAN01605	−82.20	11	−61.50	49 55	2 65	1.40	143	1	60.3	9/GR14	10
CAN01606	−70 70	11	−61.30	49.55	2.40	1.65	148	1	60.2	10	
CHLCONT5	−106.20	11	−72 23	−35 57	2.60	0.80	55	1	59 4	9/GR17	
CHLPAC02	−106.20	11	−80 06	−30.06	1.36	0.80	69	1	59.2	9/GR17	
CLMAND01	−115 20	11	−74.72	5.93	3.85	1 63	114	1	65 0	9/GR5	
CLM00001	−103.20	11	−74.50	5.87	3.98	1.96	118	1	63 6	10	
CUB00001	−89.20	11	−79.81	21.62	2 24	0.80	168	1	61 1		
EQACAND1	−115.20	11	−78.40	−1.61	1.37	0.95	75	1	64.1	9/GR5	
EQAGAND1	−115.20	11	−90.34	−0.62	0.90	0 81	89	1	61 3	9/GR5	
GRD00002	−42.20	11	−61.58	12.29	0.80	0.80	90	1	58.8		
GRD00059	−57.20	11	−61.58	12.29	0.80	0.80	90	1	58 5		
GRLDNK01	−53.20	11	−44.89	66.56	2.70	0.82	173	1	60 0	2	10
GUY00201	−84 70	11	−59 19	4.78	1.44	0 85	95	1	63 5		
HWA00002	−166.20	11	−165.79	23.42	4.20	0.80	160	1	58.8	9/GR1	10

12369,80 MHz (11)

1	2	3	4		5		6	7	8	9	
HWA00003	–175.20	11	–166.10	23.42	4.25	0.80	159	1	58.8	9/GR2	10
MEX01NTE	–78 20	11	–105 81	26.01	2 89	2.08	155	1	60.5	1	
MEX01SUR	–69.20	11	–94.84	19 82	3 05	2.09	4	1	62.3	1	10
MEX02NTE	–136.20	11	–107.21	26.31	3.84	1 55	148	1	61 2	1	10
MEX02SUR	–127 20	11	–96.39	19.88	3.18	1 87	157	1	62 6	1	10
PAQPAC01	–106 20	11	–109.18	–27.53	0.80	0 80	90	1	56.2	9/GR17	
PRG00002	–99 20	11	–58.66	–23.32	1.45	1.04	76	1	60.2		
PRUAND02	–115 20	11	–74.69	–8.39	3.41	1 79	95	1	64.0	9/GR5	
PTRVIR01	–101 20	11	–65.85	18.12	0.80	0.80	90	1	60 6	1 6 9/GR20	
PTRVIR02	–110 20	11	–65 86	18.12	0.80	0.80	90	1	61.0	1 6 9/GR21	
URG00001	–71.70	11	–56.22	–32 52	1.02	0 89	11	1	60 0		
USAEH001	–61 70	11	–85 19	36.21	5.63	3.33	22	1	61 8	1 5 6	10
USAEH002	–101.20	11	–89.24	36.16	5.67	3.76	170	1	61 7	1 6 9/GR20	10
USAEH003	–110 20	11	–90.14	36.11	5.55	3 55	161	1	62.1	1 6 9/GR21	10
USAEH004	–119 20	11	–91.16	36.05	5.38	3.24	152	1	62 6	1 5 6	10
USAPSA02	–166.20	11	–117.80	40.58	4.03	0 82	135	1	63.3	9/GR1	
USAPSA03	–175 20	11	–118.27	40.12	3 62	0 80	136	1	65.0	9/GR2	
USAWH101	–148.20	11	–109.65	38.13	5.53	1 95	142	1	62.1	10	
USAWH102	–157.20	11	–111.41	38.57	5 51	1 54	138	1	63.2	10	
VENAND03	–115.20	11	–67.04	6 91	2.37	1 43	111	1	67.3	9/GR5	

ALS00002	– 165 80	12	– 149 63	58 52	3 81	1 23	171	2	59 8	9/GR1	10
ALS00003	– 174 80	12	– 150 95	58 54	3 77	1 11	167	2	60 0	9/GR2	10
ARGNORT4	– 93 80	12	– 63 96	– 30 01	3 86	1 99	48	2	65 7	10	
ARGNORT5	– 54 80	12	– 62.85	– 29 80	3 24	2 89	47	2	63 5	10	
B CE311	– 63 80	12	– 40 60	– 6 07	3 04	2.06	174	2	61 6	8 9/GR7	10
B CE312	– 44 80	12	– 40 26	– 6 06	3 44	2 09	174	2	61.0	8 9/GR9	10
B CE411	– 63 80	12	– 50 97	– 15 26	3.86	1 38	49	2	62 6	8 9/GR7	10
B CE412	– 44 80	12	– 50 71	– 15 30	3 57	1.56	52	2	62 8	8 9/GR9	10
B CE511	– 63 80	12	– 53 11	– 2.98	2 42	2 15	107	2	63.1	8 9/GR7	10
B NO611	– 73 80	12	– 59 60	– 11 62	2 86	1 69	165	1	62 9	8 9/GR8	10
B NO711	– 73.80	12	– 60 70	– 1 78	3 54	1 78	126	1	62 8	8 9/GR8	10
B NO811	– 73 80	12	– 68 75	– 4 71	2 37	1 65	73	1	62 8	8 9/GR8	
B SE911	– 101 80	12	– 45 99	– 19 09	2 22	0 80	62	2	65 3	8	10
B SU111	– 80 80	12	– 51 10	– 25 64	2 76	1 06	50	2	62 9	8 9/GR6	10
B SU112	– 44 80	12	– 50 76	– 25 62	2 47	1 48	56	2	62 3	8 9/GR9	
B SU211	– 80 80	12	– 44 51	– 16 94	3 22	1 37	60	2	62 5	8 9/GR6	10
B SU212	– 44.80	12	– 43 99	– 16 97	3 27	1.92	59	2	61 3	8 9/GR9	
CAN01101	– 137 80	12	– 125 60	57 24	3 45	1 27	157	2	59 5	9/GR10	10
CAN01201	– 137 80	12	– 111 92	55 89	3 33	0 98	151	2	59 6	9/GR10	10
CAN01202	– 72.30	12	– 107 64	55 62	2.75	1 11	32	2	59 6		
CAN01203	– 128 80	12	– 111 43	55 56	3 07	1.15	151	2	59 5	9/GR12	10
CAN01303	– 128 80	12	– 102 39	57 12	3 54	0 92	154	2	60 1	9/GR12	10
CAN01304	– 90.80	12	– 99 00	57 33	1 96	1 73	1	2	59.8	9/GR13	
CAN01403	– 128 80	12	– 89 70	52 02	4 67	0 80	148	2	61 8	9/GR12	10

12384,38 MHz (12)

1	2	3	4		5		6	7	8	9	
CAN01404	–90.80	12	–84.78	52.41	3.09	2.06	153	2	60.4	9/GR13	10
CAN01405	–81.80	12	–84.02	52.34	2.82	2.30	172	2	60.3	9/GR14	10
CAN01504	–90.80	12	–72.68	53.78	3.57	1 67	157	2	60.2	9/GR13	10
CAN01505	–81.80	12	–71.76	53.76	3.30	1.89	162	2	60.2	9/GR14	10
CAN01605	–81 80	12	–61.54	49.50	2.66	1.39	144	2	60.3	9/GR14	10
CAN01606	–70.30	12	–61.32	49.51	2.41	1.65	148	2	60.2	10	
CHLCONT4	–105.80	12	–69.59	–23.20	2.21	0.80	68	2	59 1	9/GR16	
CHLCONT6	–105.80	12	–73.52	–55.52	3.65	1.31	39	2	59.6	9/GR16	
CRBBAH01	–92.30	12	–76.09	24.13	1.83	0.80	141	1	61.7	9/GR18	
CRBBER01	–92.30	12	–64.76	32.13	0.80	0.80	90	1	56 8	9/GR18	
CRBBLZ01	–92.30	12	–88.61	17.26	0 80	0.80	90	1	58.7	9/GR18	
CRBEC001	–92.30	12	–60.07	8.26	4.20	0.86	115	1	64.3	9/GR18	10
CRBJMC01	–92 30	12	–79.45	17.97	0.99	0.80	151	1	61.1	9/GR18	
CYM00001	–115.80	12	–80.58	19.57	0.80	0.80	90	2	59.6		
DOMIFRB2	–83 30	12	–70.51	18.79	0.98	0.80	167	2	61 1		
EQAC0001	–94 80	12	–78.31	–1.52	1.48	1.15	65	1	63.0	9/GR19	
EQAG0001	–94.80	12	–90.36	–0.57	0.94	0.89	99	1	61.0	9/GR19	
GUFMGG02	–52.80	12	–56.42	8.47	4.16	0.81	123	2	62.7	2 7	10
HWA00002	–165 80	12	–165.79	23.32	4.20	0.80	160	2	58.8	9/GR1	10
HWA00003	–174 80	12	–166.10	23.42	4.25	0.80	159	2	58.8	9/GR2	10
JMC00005	–33 80	12	–77.27	18.12	0.80	0.80	90	2	60 6		
LCAIFRB1	–79.30	12	–61.15	13.90	0.80	0.80	90	2	58.4		
MEX01NTE	–77.80	12	–105.80	25.99	2.88	2.07	155	2	60 5	1	
MEX02NTE	–135 80	12	–107.36	26.32	3.80	1.57	149	2	61.2	1	10

MEX02SUR	−126 80	12	−96.39	19.88	3.19	1.87	158	2	62.5	1	10
PRU00004	−85 80	12	−74.19	−8 39	3 74	2 45	112	2	62 9	10	
PTRVIR01	−100 80	12	−65 85	18 12	0 80	0 80	90	2	60 6	1 6 9/GR20	
PTRVIR02	−109 80	12	−65 85	18 12	0.80	0 80	90	2	61 1	1 6 9/GR21	
SLVIFRB2	−107.30	12	−88 91	13 59	0.80	0 80	90	1	61.7		
USAEH001	−61 30	12	−85 16	36 21	5 63	3.32	22	2	61 9	1 5 6	10
USAEH002	−100.80	12	−89.28	36 16	5.65	3 78	170	2	61 7	1 6 9/GR20	10
USAEH003	−109 80	12	−90 12	36 11	5 55	3.56	161	2	62.1	1 6 9/GR21	10
USAEH004	−118 80	12	−91 16	36 05	5.38	3.24	153	2	62 6	1 5 6	10
USAPSA02	−165 80	12	−117 79	40 58	4 04	0 82	135	2	63.3	9/GR1	
USAPSA03	−174 80	12	−118 20	40 15	3 63	0.80	136	2	65.0	9/GR2	
USAWH101	−147 80	12	−109 70	38 13	5 52	1 96	142	2	62.1	10	
USAWH102	−156 80	12	−111 40	38 57	5.51	1.55	138	2	63 2	10	
VEN11VEN	−103 80	12	−66 79	6 90	2 50	1 77	122	2	65 2	10	

1	2	3	4		5		6	7	8	9	
ALS00002	−166 20	13	−149.66	58.37	3.76	1.24	170	1	59.7	9/GR1	10
ALS00003	−175.20	13	−150 98	58.53	3.77	1 11	167	1	60.0	9/GR2	10
ARGINSU4	−94.20	13	−52.98	−59.81	3.40	0.80	19	1	59.9	9/GR3	
ARGSUR04	−94 20	13	−65.04	−43.33	3.32	1 50	40	1	60.7	9/GR3	10
B CE311	−64.20	13	−40.60	−6.07	3.04	2.06	174	1	61.6	8 9/GR7	10
B CE312	−45.20	13	−40 27	−6.06	3.44	2.09	174	1	61.0	8 9/GR9	10
B CE411	−64.20	13	−50.97	−15.27	3.86	1 38	49	1	62.6	8 9/GR7	10
B CE412	−45.20	13	−50 71	−15.30	3.57	1.56	52	1	62.7	8 9/GR9	10
B CE511	−64 20	13	−53.10	−2.90	2 44	2.13	104	1	63.0	8 9/GR7	10
B NO611	−74 20	13	−59.60	−11.62	2.85	1.69	165	2	62 8	8 9/GR8	10
B NO711	−74 20	13	−60.70	−1.78	3.54	1.78	126	2	62.8	8 9/GR8	10
B NO811	−74.20	13	−68.76	−4.71	2.37	1.65	73	2	62.8	8 9/GR8	
B SU111	−81.20	13	−51 12	−25.63	2.76	1.05	50	1	62.8	8 9/GR6	10
B SU112	−45.20	13	−50 75	−25.62	2.47	1 48	56	1	62 2	8 9/GR9	
B SU211	−81.20	13	−44 51	−16.95	3.22	1.36	60	1	62 5	8 9/GR6	10
B SU212	−45 20	13	−44 00	−16.87	3.20	1.96	58	1	61 3	8 9/GR9	
B AHIFRB1	−87 20	13	−76 06	24.16	1.81	0.80	142	1	61.6		
BERBERMU	−96.20	13	−64.77	32.32	0.80	0.80	90	2	56.8		
B ERBER02	−31 00	13	−64.77	32.32	0.80	0.80	90	1	56.9	2	10
B OLAND01	−115.20	13	−65.04	−16.76	2.49	1.27	76	1	67.9	9/GR5	
CAN01101	−138 20	13	−125.63	57.24	3.45	1.27	157	1	59.5	9/GR10	10
CAN01201	−138.20	13	−112.04	55.95	3.35	0.97	151	1	59.6	9/GR10	10
CAN01202	−72 70	13	−107.70	55.63	2.74	1.12	32	1	59.6		
CAN01203	−129 20	13	−111.48	55.61	3.08	1.15	151	1	59.5	9/GR12	10

CAN01303	−129.20	13	−102 42	57.12	3 54	0 91	154	1	60 0	9/GR12	10
CAN01304	−91 20	13	−99 12	57.36	1.98	1 72	2	1	59 8	9/GR13	
CAN01403	−129 20	13	−89.75	52.02	4.68	0.80	148	1	61 8	9/GR12	10
CAN01404	−91 20	13	−84 82	52.42	3 10	2 05	152	1	60.4	9/GR13	10
CAN01405	−82 20	13	−84 00	52.39	2 84	2 29	172	1	60.3	9/GR14	10
CAN01504	−91.20	13	−72.66	53.77	3 57	1.67	156	1	60 2	9/GR13	10
CAN01505	−82 20	13	−71.77	53 79	3 30	1.89	162	1	60 1	9/GR14	10
CAN01605	−82 20	13	−61.50	49 55	2.65	1 40	143	1	60 3	9/GR14	10
CAN01606	−70 70	13	−61 30	49.55	2.40	1 65	148	1	60 2	10	
CHLCONT5	−106.20	13	−72 23	−35.57	2 60	0.80	55	1	59.4	9/GR17	
CHLPAC02	−106.20	13	−80 06	−30 06	1 36	0.80	69	1	59 2	9/GR17	
CLMAND01	−115.20	13	−74 72	5 93	3 85	1.63	114	1	64.9	9/GR5	
CLM00001	−103 20	13	−74.50	5 87	3 98	1.96	118	1	63.5	10	
EQACAND1	−115 20	13	−78.40	−1.61	1 37	0 95	75	1	64 0	9/GR5	
EQAGAND1	−115.20	13	−90 34	−0 62	0.90	0.81	89	1	61 3	9/GR5	
FLKANT01	−57 20	13	−44.54	−60 13	3.54	0.80	12	1	59 3	2	10
FLKFALKS	−31.00	13	−59 90	−51 64	0 80	0 80	90	1	58.1	2	
GRD00002	−42 20	13	−61 58	12 29	0 80	0.80	90	1	58.8		
HWA00002	−166 20	13	−165.79	23 42	4 20	0.80	160	1	58 8	9/GR1	10
HWA00003	−175.20	13	−166 10	23 42	4.25	0.80	159	1	58.8	9/GR2	10
MEX01NTE	−78 20	13	−105 81	26 01	2.89	2.08	155	1	60 5	1	
MEX01SUR	−69 20	13	−94.84	19 82	3 05	2 09	4	1	62.2	1	10
MEX02NTE	−136 20	13	−107.21	26.31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	−127.20	13	−96.39	19.88	3 18	1 87	157	1	62 5	1	10

12398,96 MHz (13)

1	2	3	4		5		6	7	8	9	
PAQPAC01	−106 20	13	−109 18	−27.53	0.80	0.80	90	1	56.2	9/GR17	
PRG00002	−99 20	13	−58.66	−23.32	1.45	1.04	76	1	60.2		
PRUAND02	−115 20	13	−74.69	−8.39	3 41	1.79	95	1	63 9	9/GR5	
PTRVIR01	−101.20	13	−65 85	18.12	0 80	0 80	90	1	60.5	1 6 9/GR20	
PTRVIR02	−110 20	13	−65 86	18 12	0.80	0 80	90	1	61.0	1 6 9/GR21	
SPMFRAN3	−53 20	13	−67.24	47.51	3.16	0.80	7	1	60.4	2 7	10
TRD00001	−84 70	13	−61 23	10.70	0.80	0.80	90	1	59.4		
URG00001	−71.70	13	−56 22	−32 52	1.02	0.89	11	1	60 0		
USAEH001	−61 70	13	−85 19	36 21	5 63	3 33	22	1	61 8	1 5 6	10
USAEH002	−101.20	13	−89 24	36.16	5 67	3 76	170	1	61.7	1 6 9/GR20	10
USAEH003	−110 20	13	−90 14	36.11	5 55	3 55	161	1	62 0	1 6 9/GR21	10
USAEH004	−119 20	13	−91 16	36 05	5 38	3 24	152	1	62 6	1 5 6	10
USAPSA02	−166.20	13	−117.80	40.58	4.03	0.82	135	1	63.2	9/GR1	
USAPSA03	−175 20	13	−118.27	40 12	3 62	0 80	136	1	65.0	9/GR2	
USAWH101	−148 20	13	−109.65	38.13	5.53	1 95	142	1	62 1	10	
USAWH102	−157.20	13	−111.41	38.57	5.51	1 54	138	1	63 2	10	
VENAND03	−115 20	13	−67 04	6 91	2.37	1.43	111	1	67.2	9/GR5	
VRG00001	−79 70	13	−64.37	18.48	0 80	0 80	90	1	58.3	4	

ALS00002	– 165 80	14	– 149.63	58.52	3.81	1.23	171	2	59.7	9/GR1	10
ALS00003	– 174.80	14	– 150 95	58.54	3.77	1.11	167	2	60.0	9/GR2	10
ARGNORT4	– 93.80	14	– 63 96	– 30 01	3 86	1.99	48	2	65.6	10	
ARGNORT5	– 54.80	14	– 62.85	– 29.80	3.24	2 89	47	2	63 5	10	
ATNBEAM1	– 52.80	14	– 66.44	14 87	1.83	0 80	39	2	61 0		
B CE311	– 63 80	14	– 40 60	– 6.07	3 04	2 06	174	2	61.6	8 9/GR7	10
B CE312	– 44.80	14	– 40 26	– 6 06	3 44	2.09	174	2	61.0	8 9/GR9	10
B CE411	– 63.80	14	– 50 97	– 15 26	3 86	1 38	49	2	62.6	8 9/GR7	10
B CE412	– 44 80	14	– 50 71	– 15 30	3.57	1.56	52	2	62.7	8 9/GR9	10
B CE511	– 63 80	14	– 53 11	– 2 98	2 42	2.15	107	2	63.1	8 9/GR7	10
B NO611	– 73 80	14	– 59 60	– 11.62	2 86	1 69	165	1	62.8	8 9/GR8	10
B NO711	– 73.80	14	– 60 70	– 1 78	3.54	1 78	126	1	62 8	8 9/GR8	10
B NO811	– 73.80	14	– 68 75	– 4 71	2 37	1 65	73	1	62.8	8 9/GR8	
B SE911	– 101.80	14	– 45 99	– 19 09	2 22	0 80	62	2	65.3	8	10
B SU111	– 80 80	14	– 51.10	– 25 64	2.76	1.06	50	2	62.8	8 9/GR6	10
B SU112	– 44 80	14	– 50.76	– 25 62	2 47	1 48	56	2	62.3	8 9/GR9	
B SU211	– 80.80	14	– 44 51	– 16.94	3.22	1.37	60	2	62.5	8 9/GR6	10
B SU212	– 44.80	14	– 43 99	– 16 97	3.27	1.92	59	2	61 3	8 9/GR9	
CAN01101	– 137.80	14	– 125.60	57 24	3 45	1.27	157	2	59.5	9/GR10	10
CAN01201	– 137.80	14	– 111.92	55.89	3 33	0.98	151	2	59 6	9/GR10	10
CAN01202	– 72 30	14	– 107 64	55.62	2.75	1.11	32	2	59.6		
CAN01203	– 128 80	14	– 111 43	55 56	3.07	1.15	151	2	59.5	9/GR12	10
CAN01303	– 128.80	14	– 102.39	57.12	3.54	0.92	154	2	60.0	9/GR12	10
CAN01304	– 90.80	14	– 99.00	57.33	1.96	1.73	1	2	59.8	9/GR13	

12413,54 MHz (14)

1	2	3	4		5		6	7	8	9	
CAN01403	–128 80	14	–89 70	52 02	4.67	0.80	148	2	61 8	9/GR12	10
CAN01404	–90 80	14	–84.78	52 41	3 09	2 06	153	2	60.4	9/GR13	10
CAN01405	–81 80	14	–84 02	52 34	2 82	2 30	172	2	60.3	9/GR14	10
CAN01504	–90 80	14	–72.68	53.78	3.57	1 67	157	2	60 2	9/GR13	10
CAN01505	–81 80	14	–71 76	53.76	3.30	1.89	162	2	60.1	9/GR14	10
CAN01605	–81 80	14	–61 54	49 50	2.66	1.39	144	2	60.3	9/GR14	10
CAN01606	–70 30	14	–61 32	49.51	2.41	1 65	148	2	60.2	10	
CHLCONT4	–105 80	14	–69 59	–23 20	2 21	0.80	68	2	59 1	9/GR16	
CHLCONT6	–105 80	14	–73 52	–55 52	3 65	1 31	39	2	59 6	9/GR16	
CRBBAH01	–92 30	14	–76 09	24 13	1 83	0 80	141	1	61 7	9/GR18	
CRBBER01	–92 30	14	–64.76	32 13	0 80	0 80	90	1	56 7	9/GR18	
CRBBLZ01	–92 30	14	–88 61	17 26	0 80	0 80	90	1	58 6	9/GR18	
CRBEC001	–92 30	14	–60 07	8 26	4.20	0 86	115	1	64 2	9/GR18	10
CRBJMC01	–92 30	14	–79 45	17 97	0.99	0 80	151	1	61.1	9/GR18	
CTR00201	–130 80	14	–84 33	9 67	0 82	0 80	119	2	65.6		
EQAC0001	–94 80	14	–78 31	–1 52	1.48	1 15	65	1	63 0	9/GR19	
EQAG0001	–94 80	14	–90.36	–0.57	0 94	0 89	99	1	61 0	9/GR19	
GUY00302	–33 80	14	–59 07	4 77	1 43	0 85	91	2	63 5		
HNDIFRB2	–107 30	14	–86.23	15 16	1 14	0 85	8	1	63 4		
HTI00002	–83 30	14	–73 28	18 96	0 82	0 80	11	2	60 9		
HWA00002	–165 80	14	–165.79	23.32	4 20	0 80	160	2	58 8	9/GR1	10
HWA00003	–174 80	14	–166.10	23.42	4.25	0 80	159	2	58 8	9/GR2	10
MEX01NTE	–77 80	14	–105 80	25 99	2.88	2 07	155	2	60 5	1	
MEX02NTE	–135 80	14	–107 36	26 32	3 80	1 57	149	2	61 2	1	10

MEX02SUR	−126 80	14	−96.39	19.88	3 19	1 87	158	2	62 5	1	10
PRU00004	−85.80	14	−74 19	−8 39	3 74	2 45	112	2	62 8	10	
PTRVIR01	−100.80	14	−65.85	18.12	0 80	0 80	90	2	60 6	1 6 9/GR20	
PTRVIR02	−109 80	14	−65 85	18 12	0 80	0 80	90	2	61 1	1 6 9/GR21	
TCA00001	−115.80	14	−71.79	21 53	0 80	0 80	90	2	60.4		
USAEH001	−61 30	14	−85 16	36 21	5 63	3 32	22	2	61 8	1 5 6	10
USAEH002	−100.80	14	−89.28	36 16	5 65	3 78	170	2	61.7	1 6 9/GR20	10
USAEH003	−109 80	14	−90 12	36.11	5 55	3 56	161	2	62 1	1 6 9/GR21	10
USAEH004	−118.80	14	−91 16	36 05	5 38	3 24	153	2	62 6	1 5 6	10
USAPSA02	−165 80	14	−117 79	40 58	4.04	0.82	135	2	63 2	9/GR1	
USAPSA03	−174.80	14	−118.20	40 15	3 63	0 80	136	2	64 9	9/GR2	
USAWH101	−147.80	14	−109 70	38 13	5 52	1.96	142	2	62 1	10	
USAWH102	−156.80	14	−111 40	38 57	5.51	1 55	138	2	63 2	10	
VCT00001	−79 30	14	−61 18	13 23	0 80	0.80	90	2	58 4		
VEN11VEN	−103 80	14	−66 79	6 90	2.50	1 77	122	2	65 1	10	

1	2	3	4		5		6	7	8	9	
ALS00002	–166 20	15	–149.66	58.37	3.76	1 24	170	1	59.8	9/GR1	10
ALS00003	–175 20	15	–150.98	58 53	3.77	1 11	167	1	60.0	9/GR2	10
ARGINSU4	–94.20	15	–52.98	–59 81	3 40	0 80	19	1	59.9	9/GR3	
ARGINSU5	–55 20	15	–44.17	–59 91	3.77	0.80	13	1	59.3	9/GR4	10
ARGSUR04	–94.20	15	–65.04	–43 33	3.32	1.50	40	1	60.7	9/GR3	10
ARGSUR05	–55 20	15	–63.68	–43 01	2.54	2.38	152	1	60.1	9/GR4	10
ATGSJN01	–79 70	15	–61.79	17 07	0.80	0.80	90	1	58.4		
B CE311	–64 20	15	–40.60	–6 07	3.04	2.06	174	1	61.6	8 9/GR7	10
B CE312	–45.20	15	–40.27	–6 06	3.44	2.09	174	1	61.0	8 9/GR9	10
B CE411	–64 20	15	–50 97	–15 27	3.86	1.38	49	1	62.6	8 9/GR7	10
B CE412	–45.20	15	–50 71	–15.30	3.57	1 56	52	1	62.7	8 9/GR9	10
B CE511	–64 20	15	–53 10	–2.90	2 44	2 13	104	1	63.1	8 9/GR7	10
B NO611	–74 20	15	–59 60	–11.62	2.85	1 69	165	2	62.9	8 9/GR8	10
B NO711	–74 20	15	–60 70	–1.78	3 54	1.78	126	2	62.8	8 9/GR8	10
B NO811	–74 20	15	–68 76	–4 71	2.37	1 65	73	2	62.8	8 9/GR8	
B SU111	–81 20	15	–51 12	–25.63	2 76	1.05	50	1	62.9	8 9/GR6	10
B SU112	–45 20	15	–50.75	–25 62	2.47	1.48	56	1	62.3	8 9/GR9	
B SU211	–81.20	15	–44.51	–16.95	3 22	1.36	60	1	62.5	8 9/GR6	10
B SU212	–45 20	15	–44.00	–16.87	3.20	1.96	58	1	61 3	8 9/GR9	
BERBERMU	–96 20	15	–64.77	32 32	0.80	0.80	90	2	56.8		
B OLAND01	–115 20	15	–65 04	–16.76	2 49	1 27	76	1	67.9	9/GR5	
B OL00001	–87 20	15	–64.61	–16 71	2.52	2 19	85	1	63.8	10	
B RB00001	–92 70	15	–59 85	12.93	0.80	0.80	90	2	59.1		
CAN01101	–138 20	15	–125.63	57.24	3.45	1 27	157	1	59.5	9/GR10	10

CAN01201	−138.20	15	−112.04	55 95	3.35	0 97	151	1	59 6	9/GR10	10
CAN01202	−72 70	15	−107 70	55 63	2 74	1.12	32	1	59 6		
CAN01203	−129.20	15	−111 48	55.61	3.08	1 15	151	1	59.5	9/GR12	10
CAN01303	−129 20	15	−102.42	57.12	3.54	0.91	154	1	60 1	9/GR12	10
CAN01304	−91.20	15	−99 12	57 36	1.98	1.72	2	1	59 8	9/GR13	
CAN01403	−129 20	15	−89.75	52.02	4 68	0 80	148	1	61.8	9/GR12	10
CAN01404	−91.20	15	−84 82	52.42	3.10	2.05	152	1	60 4	9/GR13	10
CAN01405	−82 20	15	−84 00	52 39	2 84	2 29	172	1	60.3	9/GR14	10
CAN01504	−91 20	15	−72 66	53 77	3.57	1.67	156	1	60 2	9/GR13	10
CAN01505	−82.20	15	−71.77	53.79	3 30	1 89	162	1	60 1	9/GR14	10
CAN01605	−82 20	15	−61.50	49 55	2.65	1 40	143	1	60 3	9/GR14	10
CAN01606	−70 70	15	−61.30	49 55	2 40	1 65	148	1	60 2	10	
CHLCONT5	−106.20	15	−72 23	−35.57	2 60	0 80	55	1	59 4	9/GR17	
CHLPAC02	−106.20	15	−80 06	−30.06	1 36	0 80	69	1	59 2	9/GR17	
CLMAND01	−115.20	15	−74.72	5 93	3.85	1 63	114	1	65.0	9/GR5	
CLM00001	−103.20	15	−74 50	5 87	3 98	1.96	118	1	63 6	10	
CUB00001	−89.20	15	−79 81	21 62	2 24	0 80	168	1	61.1		
EQACAND1	−115.20	15	−78 40	−1 61	1 37	0.95	75	1	64 1	9/GR5	
EQAGAND1	−115 20	15	−90.34	−0 62	0.90	0 81	89	1	61 3	9/GR5	
GRD00002	−42.20	15	−61 58	12 29	0 80	0.80	90	1	58 8		
GRD00059	−57.20	15	−61 58	12 29	0 80	0 80	90	1	58 5		
GRLDNK01	−53 20	15	−44 89	66 56	2 70	0.82	173	1	60 0	2	10
GUY00201	−84.70	15	−59 19	4 78	1.44	0.85	95	1	63 5		
HWA00002	−166 20	15	−165.79	23 42	4.20	0.80	160	1	58 8	9/GR1	10

12428,12 MHz (15)

1	2	3	4		5		6	7	8	9	
HWA00003	–175.20	15	–166.10	23 42	4 25	0.80	159	1	58.8	9/GR2	10
MEX01NTE	–78 20	15	–105.81	26.01	2 89	2 08	155	1	60.5	1	
MEX01SUR	–69.20	15	–94.84	19 82	3 05	2 09	4	1	62 3	1	10
MEX02NTE	–136.20	15	–107 21	26 31	3.84	1.55	148	1	61.2	1	10
MEX02SUR	–127.20	15	–96 39	19 88	3 18	1 87	157	1	62 6	1	10
PAQPAC01	–106 20	15	–109 18	–27 53	0.80	0.80	90	1	56.2	9/GR17	
PRG00002	–99 20	15	–58.66	–23.32	1.45	1 04	76	1	60.2		
PRUAND02	–115 20	15	–74.69	–8 39	3.41	1.79	95	1	64.0	9/GR5	
PTRVIR01	–101 20	15	–65 85	18.12	0.80	0 80	90	1	60 6	1 6 9/GR20	
PTRVIR02	–110 20	15	–65 86	18 12	0 80	0.80	90	1	61 0	1 6 9/GR21	
URG00001	–71 70	15	–56 22	–32.52	1 02	0 89	11	1	60 0		
USAEH001	–61.70	15	–85 19	36.21	5.63	3 33	22	1	61.8	1 5 6	10
USAEH002	–101.20	15	–89.24	36.16	5.67	3 76	170	1	61.7	1 6 9/GR20	10
USAEH003	–110.20	15	–90 14	36 11	5.55	3 55	161	1	62 1	1 6 9/GR21	10
USAEH004	–119.20	15	–91.16	36 05	5.38	3.24	152	1	62.6	1 5 6	10
USAPSA02	–166.20	15	–117.80	40 58	4.03	0 82	135	1	63 3	9/GR1	
USAPSA03	–175.20	15	–118.27	40 12	3.62	0 80	136	1	65 0	9/GR2	
USAWH101	–148 20	15	–109.65	38.13	5.53	1 95	142	1	62 1	10	
USAWH102	–157.20	15	–111.41	38 57	5.51	1.54	138	1	63 2	10	
VENAND03	–115.20	15	–67.04	6 91	2 37	1 43	111	1	67.3	9/GR5	

ALS00002	–165 80	16	–149 63	58 52	3.81	1.23	171	2	59.8	9/GR1	10
ALS00003	–174.80	16	–150.95	58.54	3.77	1.11	167	2	60.0	9/GR2	10
ARGNORT4	–93.80	16	–63 96	–30.01	3.86	1.99	48	2	65.7	10	
ARGNORT5	–54.80	16	–62 85	–29.80	3 24	2.89	47	2	63 5	10	
B CE311	–63 80	16	–40 60	–6 07	3 04	2.06	174	2	61.6	8 9/GR7	10
B CE312	–44.80	16	–40 26	–6.06	3 44	2 09	174	2	61 0	8 9/GR9	10
B CE411	–63 80	16	–50 97	–15.26	3 86	1 38	49	2	62 6	8 9/GR7	10
B CE412	–44 80	16	–50 71	–15 30	3.57	1.56	52	2	62 8	8 9/GR9	10
B CE511	–63.80	16	–53.11	–2 98	2.42	2.15	107	2	63 1	8 9/GR7	10
B NO611	–73.80	16	–59.60	–11.62	2 86	1 69	165	1	62 9	8 9/GR8	10
B NO711	–73 80	16	–60.70	–1 78	3 54	1 78	126	1	62 8	8 9/GR8	10
B NO811	–73 80	16	–68 75	–4 71	2 37	1 65	73	1	62 8	8 9/GR8	
B SE911	–101.80	16	–45 99	–19 09	2 22	0 80	62	2	65.3	8	10
B SU111	–80.80	16	–51 10	–25 64	2.76	1 06	50	2	62.9	8 9/GR6	10
B SU112	–44 80	16	–50.76	–25 62	2.47	1.48	56	2	62 3	8 9/GR9	
B SU211	–80 80	16	–44.51	–16 94	3.22	1 37	60	2	62.5	8 9/GR6	10
B SU212	–44 80	16	–43 99	–16 97	3 27	1 92	59	2	61 3	8 9/GR9	
CAN01101	–137 80	16	–125.60	57 24	3 45	1.27	157	2	59.5	9/GR10	10
CAN01201	–137.80	16	–111 92	55.89	3.33	0.98	151	2	59 6	9/GR10	10
CAN01202	–72.30	16	–107 64	55.62	2.75	1 11	32	2	59 6		
CAN01203	–128.80	16	–111 43	55.56	3.07	1.15	151	2	59 5	9/GR12	10
CAN01303	–128.80	16	–102 39	57.12	3 54	0 92	154	2	60.1	9/GR12	10
CAN01304	–90.80	16	–99 00	57.33	1.96	1 73	1	2	59.8	9/GR13	
CAN01403	–128.80	16	–89.70	52.02	4.67	0 80	148	2	61.8	9/GR12	10

1	2	3	4		5		6	7	8	9	
CAN01404	– 90 80	16	– 84.78	52 41	3 09	2 06	153	2	60 4	9/GR13	10
CAN01405	– 81 80	16	– 84 02	52 34	2 82	2.30	172	2	60 3	9/GR14	10
CAN01504	– 90 80	16	– 72 68	53 78	3 57	1.67	157	2	60.2	9/GR13	10
CAN01505	– 81.80	16	– 71 76	53 76	3.30	1 89	162	2	60.2	9/GR14	10
CAN01605	– 81 80	16	– 61.54	49 50	2.66	1 39	144	2	60 3	9/GR14	10
CAN01606	– 70 30	16	– 61 32	49.51	2.41	1 65	148	2	60 2	10	
CHLCONT4	– 105 80	16	– 69.59	– 23.20	2.21	0 80	68	2	59 1	9/GR16	
CHLCONT6	– 105.80	16	– 73.52	– 55 52	3.65	1.31	39	2	59.6	9/GR16	
CRBBAH01	– 92.30	16	– 76.09	24 13	1.83	0 80	141	1	61 7	9/GR18	
CRBBER01	– 92 30	16	– 64.76	32 13	0 80	0 80	90	1	56.8	9/GR18	
CRBBLZ01	– 92.30	16	– 88 61	17.26	0.80	0 80	90	1	58.7	9/GR18	
CRBEC001	– 92 30	16	– 60 07	8 26	4.20	0 86	115	1	64 3	9/GR18	10
CRBJMC01	– 92 30	16	– 79 45	17.97	0.99	0.80	151	1	61 1	9/GR18	
CYM00001	– 115 80	16	– 80 58	19 57	0 80	0 80	90	2	59 6		
DOMIFRB2	– 83 30	16	– 70.51	18 79	0 98	0 80	167	2	61 1		
EQAC0001	– 94 80	16	– 78 31	– 1 52	1 48	1 15	65	1	63.0	9/GR19	
EQAG0001	– 94 80	16	– 90 36	– 0 57	0.94	0 89	99	1	61.0	9/GR19	
GUFMGG02	– 52 80	16	– 56 42	8.47	4.16	0 81	123	2	62 7	2 7	10
HWA00002	– 165 80	16	– 165.79	23.32	4 20	0.80	160	2	58 8	9/GR1	10
HWA00003	– 174 80	16	– 166.10	23 42	4 25	0 80	159	2	58 8	9/GR2	10
JMC00005	– 33 80	16	– 77 27	18 12	0 80	0 80	90	2	60.6		
LCAIFRB1	– 79 30	16	– 61 15	13 90	0 80	0 80	90	2	58 4		
MEX01NTE	– 77.80	16	– 105.80	25 99	2.88	2 07	155	2	60 5	1	
MEX02NTE	– 135 80	16	– 107 36	26 32	3 80	1.57	149	2	61 2	1	10

MEX02SUR	–126.80	16	–96.39	19 88	3 19	1 87	158	2	62.5	1	10
PRU00004	–85.80	16	–74.19	–8 39	3.74	2 45	112	2	62.9	10	
PTRVIR01	–100.80	16	–65 85	18.12	0 80	0.80	90	2	60.6	1 6 9/GR20	
PTRVIR02	–109.80	16	–65.85	18.12	0.80	0.80	90	2	61 1	1 6 9/GR21	
SLVIFRB2	–107.30	16	–88 91	13 59	0.80	0 80	90	1	61 7		
USAEH001	–61 30	16	–85.16	36.21	5.63	3 32	22	2	61 9	1 5 6	10
USAEH002	–100.80	16	–89.28	36 16	5 65	3 78	170	2	61.7	1 6 9/GR20	10
USAEH003	–109 80	16	–90 12	36 11	5.55	3.56	161	2	62.1	1 6 9/GR21	10
USAEH004	–118.80	16	–91 16	36 05	5.38	3.24	153	2	62 6	1 5 6	10
USAPSA02	–165 80	16	–117.79	40 58	4 04	0.82	135	2	63 3	9/GR1	
USAPSA03	–174.80	16	–118 20	40.15	3.63	0 80	136	2	65.0	9/GR2	
USAWH101	–147.80	16	–109.70	38 13	5.52	1.96	142	2	62 1	10	
USAWH102	–156.80	16	–111 40	38.57	5.51	1 55	138	2	63.2	10	
VEN11VEN	–103.80	16	–66.79	6.90	2.50	1 77	122	2	65 2	10	

12457,28 MHz (17)

1	2	3	4		5		6	7	8	9	
ALS00002	– 166 20	17	– 149 66	58.37	3 76	1 24	170	1	59 9	9/GR1	10
ALS00003	– 175 20	17	– 150.98	58.53	3 77	1 11	167	1	60.2	9/GR2	10
ARGINSU4	– 94.20	17	– 52.98	– 59.81	3.40	0 80	19	1	60 1	9/GR3	
ARGINSU5	– 55 20	17	– 44.17	– 59.91	3 77	0 80	13	1	59 5	9/GR4	10
ARGSUR04	– 94 20	17	– 65 04	– 43.33	3.32	1 50	40	1	60.9	9/GR3	10
ARGSUR05	– 55 20	17	– 63 68	– 43 01	2 54	2 38	152	1	60 2	9/GR4	10
B CE311	– 64 20	17	– 40 60	– 6 07	3 04	2 06	174	1	61.9	8 9/GR7	10
B CE312	– 45 20	17	– 40.27	– 6.06	3 44	2.09	174	1	61.2	8 9/GR9	10
B CE411	– 64 20	17	– 50.97	– 15.27	3.86	1.38	49	1	62.9	8 9/GR7	10
B CE412	– 45 20	17	– 50 71	– 15.30	3 57	1 56	52	1	63 0	8 9/GR9	10
B CE511	– 64 20	17	– 53 10	– 2.90	2 44	2 13	104	1	63 4	8 9/GR7	10
B NO611	– 74 20	17	– 59 60	– 11 62	2 85	1 69	165	2	63 1	8 9/GR8	10
B NO711	– 74 20	17	– 60 70	– 1.78	3 54	1.78	126	2	63 1	8 9/GR8	10
B NO811	– 74 20	17	– 68 76	– 4.71	2 37	1 65	73	2	63 1	8 9/GR8	
B SU111	– 81 20	17	– 51.12	– 25 63	2 76	1.05	50	1	63.2	8 9/GR6	10
B SU112	– 45 20	17	– 50.75	– 25 62	2 47	1 48	56	1	62 5	8 9/GR9	
B SU211	– 81 20	17	– 44.51	– 16 95	3.22	1 36	60	1	62 8	8 9/GR6	10
B SU212	– 45.20	17	– 44.00	– 16 87	3 20	1 96	58	1	61 6	8 9/GR9	
BERBERMU	– 96 20	17	– 64 77	32 32	0 80	0 80	90	2	57 0		
B ERBER02	– 31 00	17	– 64 77	32.32	0 80	0 80	90	1	57.1	2	10
B OLAND01	– 115 20	17	– 65 04	– 16.76	2 49	1 27	76	1	68.0	9/GR5	
CAN01101	– 138 20	17	– 125 63	57 24	3 45	1 27	157	1	59 7	9/GR10	10
CAN01201	– 138 20	17	– 112.04	55 95	3.35	0 97	151	1	59.8	9/GR10	10
CAN01202	– 72 70	17	– 107 70	55 63	2 74	1.12	32	1	59 8		

CAN01203	−129 20	17	−111 48	55 61	3 08	1 15	151	1	59 7	9/GR12	10
CAN01303	−129 20	17	−102 42	57 12	3 54	0 91	154	1	60 2	9/GR12	10
CAN01304	−91 20	17	−99.12	57 36	1 98	1.72	2	1	60.0	9/GR13	
CAN01403	−129 20	17	−89 75	52 02	4 68	0 80	148	1	62 1	9/GR12	10
CAN01404	−91 20	17	−84 82	52 42	3 10	2 05	152	1	60 6	9/GR13	10
CAN01405	−82 20	17	−84 00	52 39	2 84	2 29	172	1	60 5	9/GR14	10
CAN01504	−91 20	17	−72 66	53 77	3 57	1 67	156	1	60 4	9/GR13	10
CAN01505	−82 20	17	−71 77	53 79	3 30	1 89	162	1	60.3	9/GR14	10
CAN01605	−82 20	17	−61 50	49 55	2 65	1.40	143	1	60.5	9/GR14	10
CAN01606	−70 70	17	−61 30	49.55	2 40	1 65	148	1	60 4	10	
CHLCONT5	−106 20	17	−72 23	−35 57	2 60	0.80	55	1	59 6	9/GR17	
CHLPAC02	−106 20	17	−80.06	−30 06	1 36	0 80	69	1	59 4	9/GR17	
CLMAND01	−115 20	17	−74 72	5 93	3 85	1 63	114	1	65 3	9/GR5	
CLM00001	−103 20	17	−74 50	5 87	3 98	1 96	118	1	63 9	10	
EQACAND1	−115.20	17	−78.40	−1 61	1 37	0 95	75	1	64.4	9/GR5	
EQAGAND1	−115 20	17	−90.34	−0.62	0 90	0 81	89	1	61 5	9/GR5	
FLKFALKS	−31 00	17	−59.90	−51 64	0.80	0.80	90	1	58 2	2	
HWA00002	−166 20	17	−165 79	23 42	4 20	0.80	160	1	59.0	9/GR1	10
HWA00003	−175.20	17	−166.10	23 42	4 25	0.80	159	1	58 9	9/GR2	10
JMC00002	−92 70	17	−77 30	18.12	0 80	0 80	90	2	60.1		
MEX01NTE	−78 20	17	−105 81	26 01	2 89	2.08	155	1	60.7	1	
MEX01SUR	−69.20	17	−94 84	19.82	3 05	2.09	4	1	62 5	1	10
MEX02NTE	−136.20	17	−107 21	26.31	3.84	1.55	148	1	61.4	1	10
MEX02SUR	−127 20	17	−96.39	19.88	3 18	1 87	157	1	62 8	1	10

12457,28 MHz (17)

1	2	3	4		5		6	7	8	9	
PAQPAC01	−106 20	17	−109.18	−27.53	0.80	0.80	90	1	56.4	9/GR17	
PRG00002	−99.20	17	−58.66	−23.32	1.45	1.04	76	1	60.4		
PRUAND02	−115.20	17	−74.69	−8.39	3.41	1.79	95	1	64.3	9/GR5	
PTRVIR01	−101.20	17	−65.85	18.12	0.80	0.80	90	1	60.8	1 6 9/GR20	
PTRVIR02	−110.20	17	−65.86	18.12	0.80	0.80	90	1	61.3	1 6 9/GR21	
SCN00001	−79 70	17	−62.46	17.44	0.80	0.80	90	1	58.6		
SPMFRAN3	−53.20	17	−67.24	47.51	3.16	0.80	7	1	60.6	2 7	10
SURINAM2	−84 70	17	−55.69	4.35	1.00	0.80	86	1	63.5		
URG00001	−71 70	17	−56.22	−32 52	1.02	0.89	11	1	60.2		
USAEH001	−61.70	17	−85.19	36 21	5.63	3.33	22	1	62 1	1 5 6	10
USAEH002	−101.20	17	−89.24	36.16	5.67	3.76	170	1	62.0	1 6 9/GR20	10
USAEH003	−110.20	17	−90.14	36.11	5 55	3 55	161	1	62.3	1 6 9/GR21	10
USAEH004	−119 20	17	−91.16	36.05	5.38	3.24	152	1	62.9	1 5 6	10
USAPSA02	−166 20	17	−117.80	40.58	4.03	0.82	135	1	63.5	9/GR1	
USAPSA03	−175 20	17	−118.27	40 12	3.62	0.80	136	1	65 3	9/GR2	
USAWH101	−148 20	17	−109 65	38.13	5.53	1 95	142	1	62.3	10	
USAWH102	−157.20	17	−111.41	38.57	5.51	1 54	138	1	63.5	10	
VENAND03	−115.20	17	−67.04	6.91	2.37	1 43	111	1	67.6	9/GR5	

ALS00002	–165.80	18	–149 63	58 52	3.81	1 23	171	2	59.9	9/GR1	10
ALS00003	–174 80	18	–150 95	58 54	3 77	1 11	167	2	60 2	9/GR2	10
ARGNORT4	–93 80	18	–63 96	–30 01	3 86	1 99	48	2	66 0	10	
ARGNORT5	–54 80	18	–62 85	–29 80	3 24	2 89	47	2	63.8	10	
ATNBEAM1	–52 80	18	–66 44	14 87	1 83	0 80	39	2	61 3		
B CE311	–63 80	18	–40 60	–6 07	3 04	2.06	174	2	61 9	8 9/GR7	10
B CE312	–44 80	18	–40 26	–6.06	3 44	2 09	174	2	61 2	8 9/GR9	10
B CE411	–63 80	18	–50 97	–15 26	3 86	1 38	49	2	62 9	8 9/GR7	10
B CE412	–44 80	18	–50 71	–15 30	3 57	1 56	52	2	63 0	8 9/GR9	10
B CE511	–63 80	18	–53 11	–2 98	2.42	2 15	107	2	63 4	8 9/GR7	10
B NO611	–73 80	18	–59 60	–11 62	2 86	1 69	165	1	63 1	8 9/GR8	10
B NO711	–73 80	18	–60 70	–1 78	3 54	1 78	126	1	63 1	8 9/GR8	10
B NO811	–73 80	18	–68.75	–4.71	2.37	1 65	73	1	63 1	8 9/GR8	
B SE911	–101 80	18	–45 99	–19.09	2.22	0.80	62	2	65 7	8	10
B SU111	–80 80	18	–51 10	–25 64	2.76	1 06	50	2	63 1	8 9/GR6	10
B SU112	–44 80	18	–50 76	–25 62	2.47	1 48	56	2	62.6	8 9/GR9	
B SU211	–80 80	18	–44 51	–16.94	3 22	1 37	60	2	62 8	8 9/GR6	10
B SU212	–44 80	18	–43 99	–16 97	3.27	1.92	59	2	61 6	8 9/GR9	
B LZ00001	–115 80	18	–88 68	17 27	0 80	0.80	90	2	59.2		
CAN01101	–137 80	18	–125 60	57.24	3.45	1 27	157	2	59.7	9/GR10	10
CAN01201	–137 80	18	–111 92	55 89	3 33	0.98	151	2	59 8	9/GR10	10
CAN01202	–72 30	18	–107 64	55.62	2 75	1.11	32	2	59 8		
CAN01203	–128.80	18	–111 43	55.56	3.07	1.15	151	2	59.7	9/GR12	10
CAN01303	–128 80	18	–102.39	57.12	3.54	0 92	154	2	60.3	9/GR12	10

12471,86 MHz (18)

1	2	3	4		5		6	7	8	9	
CAN01304	−90.80	18	−99.00	57.33	1.96	1.73	1	2	60.0	9/GR13	
CAN01403	−128.80	18	−89.70	52.02	4.67	0.80	148	2	62.1	9/GR12	10
CAN01404	−90 80	18	−84.78	52.41	3.09	2.06	153	2	60.6	9/GR13	10
CAN01405	−81.80	18	−84.02	52.34	2.82	2.30	172	2	60.5	9/GR14	10
CAN01504	−90.80	18	−72.68	53.78	3.57	1.67	157	2	60.4	9/GR13	10
CAN01505	−81.80	18	−71.76	53.76	3.30	1.89	162	2	60.3	9/GR14	10
CAN01605	−81.80	18	−61.54	49.50	2.66	1.39	144	2	60.5	9/GR14	10
CAN01606	−70.30	18	−61.32	49.51	2.41	1.65	148	2	60.4	10	
CHLCONT4	−105.80	18	−69.59	−23.20	2.21	0.80	68	2	59.3	9/GR16	
CHLCONT6	−105.80	18	−73.52	−55.52	3.65	1 31	39	2	59.7	9/GR16	
CRBBAH01	−92.30	18	−76.09	24.13	1.83	0.80	141	1	61.9	9/GR18	
CRBBER01	−92.30	18	−64.76	32.13	0.80	0.80	90	1	56.9	9/GR18	
CRBBLZ01	−92.30	18	−88.61	17.26	0.80	0.80	90	1	58.9	9/GR18	
CRBEC001	−92.30	18	−60.07	8 26	4.20	0.86	115	1	64.6	9/GR18	10
CRBJMC01	−92.30	18	−79.45	17.97	0.99	0.80	151	1	61.3	9/GR18	
CTR00201	−130.80	18	−84.33	9.67	0.82	0.80	119	2	66.0		
DMAIFRB1	−79.30	18	−61.30	15.35	0.80	0 80	90	2	58.7		
EQAC0001	−94.80	18	−78.31	−1.52	1.48	1.15	65	1	63.3	9/GR19	
EQAG0001	−94.80	18	−90.36	−0.57	0.94	0.89	99	1	61.2	9/GR19	
HWA00002	−165.80	18	−165.79	23.32	4.20	0 80	160	2	59.0	9/GR1	10
HWA00003	−174 80	18	−166.10	23.42	4.25	0.80	159	2	59.0	9/GR2	10
MEX01NTE	−77.80	18	−105.80	25.99	2.88	2.07	155	2	60.7	1	
MEX02NTE	−135.80	18	−107.36	26.32	3.80	1.57	149	2	61.4	1	10
MEX02SUR	−126.80	18	−96.39	19.88	3.19	1.87	158	2	62.8	1	10

NCG00003	−107.30	18	−84 99	12 90	1.05	1.01	176	1	63.6		
PRU00004	−85 80	18	−74 19	−8 39	3.74	2.45	112	2	63.1	10	
PTRVIR01	−100.80	18	−65.85	18.12	0.80	0.80	90	2	60.8	1 6 9/GR20	
PTRVIR02	−109 80	18	−65.85	18.12	0.80	0.80	90	2	61.4	1 6 9/GR21	
USAEH001	−61 30	18	−85 16	36.21	5 63	3 32	22	2	62.1	1 5 6	10
USAEH002	−100.80	18	−89.28	36.16	5 65	3.78	170	2	62.0	1 6 9/GR20	10
USAEH003	−109.80	18	−90.12	36 11	5.55	3.56	161	2	62.3	1 6 9/GR21	10
USAEH004	−118.80	18	−91 16	36.05	5.38	3 24	153	2	62.9	1 5 6	10
USAPSA02	−165.80	18	−117 79	40.58	4.04	0.82	135	2	63.5	9/GR1	
USAPSA03	−174.80	18	−118.20	40 15	3.63	0.80	136	2	65.3	9/GR2	
USAWH101	−147.80	18	−109.70	38.13	5.52	1.96	142	2	62.3	10	
USAWH102	−156.80	18	−111.40	38.57	5 51	1 55	138	2	63.5	10	
VEN11VEN	−103.80	18	−66.79	6.90	2 50	1 77	122	2	65.5	10	

1	2	3	4		5		6	7	8	9	
ALS00002	–166 20	19	–149.66	58.37	3 76	1.24	170	1	60.0	9/GR1	10
ALS00003	–175 20	19	–150 98	58.53	3 77	1.11	167	1	60 2	9/GR2	10
ARGINSU4	–94.20	19	–52 98	–59 81	3.40	0 80	19	1	60.1	9/GR3	
ARGINSU5	–55 20	19	–44 17	–59 91	3.77	0.80	13	1	59.5	9/GR4	10
ARGSUR04	–94 20	19	–65 04	–43.33	3.32	1.50	40	1	60.9	9/GR3	10
ARGSUR05	–55 20	19	–63 68	–43.01	2.54	2 38	152	1	60 3	9/GR4	10
B CE311	–64 20	19	–40.60	–6.07	3 04	2.06	174	1	61.9	8 9/GR7	10
B CE312	–45 20	19	–40.27	–6.06	3.44	2 09	174	1	61 3	8 9/GR9	10
B CE411	–64 20	19	–50.97	–15.27	3 86	1 38	49	1	62.9	8 9/GR7	10
B CE412	–45 20	19	–50 71	–15 30	3.57	1.56	52	1	63.1	8 9/GR9	10
B CE511	–64 20	19	–53.10	–2.90	2 44	2.13	104	1	63 4	8 9/GR7	10
B NO611	–74 20	19	–59 60	–11.62	2 85	1.69	165	2	63.2	8 9/GR8	10
B NO711	–74 20	19	–60 70	–1 78	3.54	1 78	126	2	63 2	8 9/GR8	10
B NO811	–74 20	19	–68 76	–4 71	2 37	1.65	73	2	63 1	8 9/GR8	
B SU111	–81 20	19	–51 12	–25.63	2.76	1 05	50	1	63 2	8 9/GR6	10
B SU112	–45 20	19	–50 75	–25 62	2.47	1 48	56	1	62.6	8 9/GR9	
B SU211	–81 20	19	–44 51	–16.95	3 22	1 36	60	1	62 8	8 9/GR6	10
B SU212	–45 20	19	–44.00	–16.87	3.20	1 96	58	1	61.6	8 9/GR9	
BERBERMU	–96 20	19	–64 77	32 32	0 80	0 80	90	2	57 0		
B OLAND01	–115 20	19	–65 04	–16 76	2.49	1.27	76	1	68.1	9/GR5	
B OL00001	–87 20	19	–64 61	–16 71	2 52	2.19	85	1	64 2	10	
B RB00001	–92.70	19	–59 85	12 93	0 80	0.80	90	2	59.4		
CAN01101	–138 20	19	–125.63	57 24	3.45	1 27	157	1	59 7	9/GR10	10
CAN01201	–138 20	19	–112 04	55 95	3 35	0 97	151	1	59 8	9/GR10	10

CAN01202	−72.70	19	−107 70	55.63	2.74	1 12	32	1	59.8		
CAN01203	−129.20	19	−111 48	55.61	3.08	1 15	151	1	59 7	9/GR12	10
CAN01303	−129 20	19	−102.42	57 12	3 54	0.91	154	1	60.3	9/GR12	10
CAN01304	−91 20	19	−99 12	57 36	1.98	1.72	2	1	60.1	9/GR13	
CAN01403	−129 20	19	−89 75	52.02	4 68	0.80	148	1	62 1	9/GR12	10
CAN01404	−91 20	19	−84.82	52.42	3.10	2.05	152	1	60.6	9/GR13	10
CAN01405	−82.20	19	−84 00	52 39	2.84	2 29	172	1	60.5	9/GR14	10
CAN01504	−91.20	19	−72 66	53 77	3 57	1 67	156	1	60.4	9/GR13	10
CAN01505	−82 20	19	−71 77	53.79	3 30	1.89	162	1	60 4	9/GR14	10
CAN01605	−82 20	19	−61.50	49 55	2.65	1.40	143	1	60.5	9/GR14	10
CAN01606	−70.70	19	−61 30	49 55	2.40	1.65	148	1	60.5	10	
CHLCONT5	−106 20	19	−72 23	−35 57	2.60	0.80	55	1	59.6	9/GR17	
CHLPAC02	−106.20	19	−80.06	−30.06	1 36	0 80	69	1	59 4	9/GR17	
CLMAND01	−115.20	19	−74.72	5 93	3 85	1 63	114	1	65.4	9/GR5	
CLM00001	−103.20	19	−74 50	5 87	3.98	1.96	118	1	63.9	10	
CUB00001	−89.20	19	−79.81	21 62	2.24	0.80	168	1	61.3		
EQACAND1	−115 20	19	−78.40	−1 61	1 37	0 95	75	1	64 4	9/GR5	
EQAGAND1	−115.20	19	−90.34	−0.62	0.90	0 81	89	1	61.6	9/GR5	
GRD00059	−57 20	19	−61 58	12 29	0.80	0.80	90	1	58.7		
GRLDNK01	−53 20	19	−44.89	66 56	2 70	0.82	173	1	60.2	2	10
GUY00201	−84 70	19	−59 19	4.78	1 44	0.85	95	1	63.8		
HWA00002	−166 20	19	−165 79	23.42	4.20	0 80	160	1	59.0	9/GR1	10
HWA00003	−175.20	19	−166 10	23.42	4.25	0.80	159	1	59 0	9/GR2	10
MEX01NTE	−78.20	19	−105 81	26.01	2.89	2.08	155	1	60 8	1	

12486,44 MHz (19)

1	2	3	4		5		6	7	8	9	
MEX01SUR	−69 20	19	−94 84	19 82	3.05	2.09	4	1	62.5	1	10
MEX02NTE	−136 20	19	−107 21	26.31	3.84	1 55	148	1	61.5	1	10
MEX02SUR	−127 20	19	−96 39	19.88	3 18	1.87	157	1	62 8	1	10
MSR00001	−79 70	19	−61.73	16 75	0 80	0.80	90	1	58.9	4	
PAQPAC01	−106 20	19	−109 18	−27.53	0 80	0.80	90	1	56 4	9/GR17	
PRG00002	−99.20	19	−58.66	−23 32	1.45	1 04	76	1	60.5		
PRUAND02	−115 20	19	−74.69	−8.39	3 41	1 79	95	1	64 3	9/GR5	
PTRVIR01	−101 20	19	−65 85	18 12	0.80	0.80	90	1	60.8	1 6 9/GR20	
PTRVIR02	−110 20	19	−65 86	18.12	0 80	0 80	90	1	61 3	1 6 9/GR21	
URG00001	−71 70	19	−56 22	−32 52	1 02	0 89	11	1	60 2		
USAEH001	−61 70	19	−85 19	36 21	5.63	3.33	22	1	62 1	1 5 6	10
USAEH002	−101 20	19	−89 24	36.16	5 67	3 76	170	1	62 0	1 6 9/GR20	10
USAEH003	−110 20	19	−90 14	36.11	5 55	3.55	161	1	62.4	1 6 9/GR21	10
USAEH004	−119 20	19	−91 16	36.05	5.38	3 24	152	1	62 9	1 5 6	10
USAPSA02	−166 20	19	−117.80	40.58	4 03	0 82	135	1	63.6	9/GR1	
USAPSA03	−175.20	19	−118.27	40.12	3.62	0.80	136	1	65.4	9/GR2	
USAWH101	−148 20	19	−109 65	38 13	5.53	1 95	142	1	62 4	10	
USAWH102	−157 20	19	−111 41	38 57	5 51	1.54	138	1	63 5	10	
VENAND03	−115 20	19	−67 04	6 91	2.37	1 43	111	1	67 7	9/GR5	

ALS00002	– 165 80	20	– 149 63	58.52	3 81	1.23	171	2	59 9	9/GR1	10	
ALS00003	– 174.80	20	– 150.95	58.54	3.77	1 11	167	2	60 2	9/GR2	10	
ARGNORT4	– 93.80	20	– 63.96	– 30 01	3 86	1.99	48	2	66 1	10		
ARGNORT5	– 54 80	20	– 62.85	– 29.80	3.24	2 89	47	2	63 9	10		
B CE311	– 63.80	20	– 40.60	– 6.07	3 04	2 06	174	2	61.9	8 9/GR7	10	
B CE312	– 44 80	20	– 40 26	– 6 06	3 44	2 09	174	2	61 3	8 9/GR9	10	11
B CE411	– 63 80	20	– 50.97	– 15.26	3.86	1.38	49	2	62.9	8 9/GR7	10	
B CE412	– 44.80	20	– 50 71	– 15.30	3 57	1 56	52	2	63 1	8 9/GR9	10	12
B CE511	– 63 80	20	– 53.11	– 2 98	2 42	2 15	107	2	63 4	8 9/GR7	10	
B NO611	– 73.80	20	– 59 60	– 11 62	2.86	1.69	165	1	63.2	8 9/GR8	10	
B NO711	– 73.80	20	– 60 70	– 1.78	3.54	1 78	126	1	63 2	8 9/GR8	10	
B NO811	– 73.80	20	– 68 75	– 4.71	2.37	1.65	73	1	63 2	8 9/GR8		
B SE911	– 101.80	20	– 45.99	– 19.09	2 22	0.80	62	2	65.7	8	10	
B SU111	– 80 80	20	– 51 10	– 25 64	2.76	1.06	50	2	63.2	8 9/GR6	10	
B SU112	– 44.80	20	– 50 76	– 25 62	2 47	1 48	56	2	62 6	8 9/GR9	11	
B SU211	– 80 80	20	– 44.51	– 16 94	3 22	1 37	60	2	62 8	8 9/GR6	10	
B SU212	– 44 80	20	– 43.99	– 16 97	3.27	1.92	59	2	61 6	8 9/GR9	12	
CAN01101	– 137.80	20	– 125.60	57 24	3.45	1 27	157	2	59 7	9/GR10	10	
CAN01201	– 137.80	20	– 111 92	55 89	3.33	0.98	151	2	59 8	9/GR10	10	
CAN01202	– 72.30	20	– 107 64	55 62	2.75	1 11	32	2	59.8			
CAN01203	– 128.80	20	– 111.43	55 56	3 07	1 15	151	2	59 7	9/GR12	10	
CAN01303	– 128.80	20	– 102.39	57 12	3 54	0 92	154	2	60.3	9/GR12	10	
CAN01304	– 90 80	20	– 99.00	57 33	1 96	1.73	1	2	60.0	9/GR13		
CAN01403	– 128.80	20	– 89.70	52.02	4.67	0.80	148	2	62.1	9/GR12	10	

12501,02 MHz (20)

1	2	3	4		5		6	7	8	9	
CAN01404	−90 80	20	−84.78	52.41	3 09	2 06	153	2	60 6	9/GR13	10
CAN01405	−81 80	20	−84.02	52.34	2 82	2.30	172	2	60 5	9/GR14	10
CAN01504	−90 80	20	−72 68	53.78	3.57	1.67	157	2	60.4	9/GR13	10
CAN01505	−81 80	20	−71 76	53.76	3 30	1 89	162	2	60 4	9/GR14	10
CAN01605	−81 80	20	−61.54	49 50	2 66	1 39	144	2	60 5	9/GR14	10
CAN01606	−70 30	20	−61 32	49.51	2.41	1.65	148	2	60.5	10	
CHLCONT4	−105 80	20	−69 59	−23.20	2.21	0.80	68	2	59.3	9/GR16	
CHLCONT6	−105 80	20	−73.52	−55.52	3.65	1.31	39	2	59.8	9/GR16	
CRBBAH01	−92.30	20	−76 09	24 13	1.83	0 80	141	1	62.0	9/GR18	
CRBBER01	−92 30	20	−64 76	32 13	0.80	0.80	90	1	57 0	9/GR18	
CRBBLZ01	−92 30	20	−88 61	17.26	0.80	0.80	90	1	58.9	9/GR18	
CRBEC001	−92 30	20	−60 07	8 26	4.20	0.86	115	1	64.6	9/GR18	10
CRBJMC01	−92 30	20	−79 45	17 97	0.99	0 80	151	1	61.4	9/GR18	
EQAC0001	−94 80	20	−78 31	−1.52	1.48	1 15	65	1	63.3	9/GR19	
EQAG0001	−94 80	20	−90 36	−0.57	0 94	0 89	99	1	61 3	9/GR19	
GRD00003	−79 30	20	−61 62	12 34	0 80	0.80	90	2	58 9		
GTMIFRB2	−107 30	20	−90 50	15.64	1.03	0.80	84	1	61 4		
GUFMGG02	−52 80	20	−56 42	8.47	4 16	0.81	123	2	63.0	2 7	10
HWA00002	−165 80	20	−165 79	23.32	4 20	0.80	160	2	59 0	9/GR1	10
HWA00003	−174 80	20	−166 10	23.42	4 25	0.80	159	2	59.0	9/GR2	10
MEX01NTE	−77 80	20	−105 80	25.99	2.88	2.07	155	2	60 8	1	
MEX02NTE	−135 80	20	−107.36	26 32	3 80	1.57	149	2	61 5	1	10
MEX02SUR	−126 80	20	−96.39	19.88	3.19	1 87	158	2	62 8	1	10
PNRIFRB2	−121 00	20	−80 15	8 46	1.01	0 80	170	1	65 1		

PRU00004	– 85 80	20	– 74 19	– 8.39	3 74	2 45	112	2	63 2	10	
PTRVIR01	– 100 80	20	– 65 85	18 12	0 80	0.80	90	2	60 9	1 6 9/GR20	
PTRVIR02	– 109 80	20	– 65 85	18 12	0 80	0 80	90	2	61.4	1 6 9/GR21	
USAEH001	– 61.30	20	– 85 16	36 21	5.63	3 32	22	2	62.1	1 5 6	10
USAEH002	– 100.80	20	– 89.28	36 16	5 65	3 78	170	2	62 0	1 6 9/GR20	10
USAEH003	– 109 80	20	– 90 12	36 11	5.55	3 56	161	2	62 4	1 6 9/GR21	10
USAEH004	– 118 80	20	– 91 16	36 05	5 38	3 24	153	2	62 9	1 5 6	10
USAPSA02	– 165.80	20	– 117.79	40 58	4 04	0.82	135	2	63 6	9/GR1	
USAPSA03	– 174 80	20	– 118 20	40 15	3.63	0 80	136	2	65 3	9/GR2	
USAWH101	– 147.80	20	– 109 70	38 13	5 52	1.96	142	2	62 4	10	
USAWH102	– 156 80	20	– 111 40	38.57	5 51	1 55	138	2	63.5	10	
VEN02VEN	– 103 80	20	– 63 50	15 50	0 80	0 80	90	2	60 1	9/GR22	
VEN11VEN	– 103.80	20	– 66 79	6 90	2 50	1 77	122	2	65.6	9/GR22	10

12515,60 MHz (21)

1	2	3	4		5		6	7	8	9		
ALS00002	−166 20	21	−149.66	58.37	3 76	1 24	170	1	59.9	9/GR1	10	
ALS00003	−175 20	21	−150 98	58 53	3 77	1 11	167	1	60 2	9/GR2	10	
ARGINSU4	−94 20	21	−52.98	−59.81	3 40	0 80	19	1	60 1	9/GR3		
ARGINSU5	−55 20	21	−44.17	−59.91	3.77	0.80	13	1	59 5	9/GR4		
ARGSUR04	−94 20	21	−65 04	−43.33	3.32	1.50	40	1	60.9	9/GR3		
ARGSUR05	−55.20	21	−63 68	−43 01	2.54	2.38	152	1	60.2	9/GR4		
B CE311	−64 20	21	−40.60	−6 07	3.04	2.06	174	1	61.9	8 9/GR7		
B CE312	−45 20	21	−40.27	−6 06	3.44	2.09	174	1	61.2	8 9/GR9	10	11
B CE411	−64 20	21	−50.97	−15.27	3.86	1 38	49	1	62.9	8 9/GR7		
B CE412	−45 20	21	−50 71	−15 30	3 57	1 56	52	1	63 0	8 9/GR9	10	12
B CE511	−64 20	21	−53 10	−2 90	2 44	2.13	104	1	63 4	8 9/GR7		
B NO611	−74.20	21	−59 60	−11.62	2 85	1.69	165	2	63 1	8 9/GR8		
B NO711	−74 20	21	−60 70	−1.78	3 54	1.78	126	2	63.1	8 9/GR8		
B NO811	−74 20	21	−68 76	−4.71	2.37	1.65	73	2	63 1	8 9/GR8		
B SU111	−81 20	21	−51 12	−25.63	2.76	1.05	50	1	63.2	8 9/GR6		
B SU112	−45 20	21	−50 75	−25.62	2.47	1.48	56	1	62.5	8 9/GR9	11	
B SU211	−81 20	21	−44.51	−16 95	3.22	1.36	60	1	62.8	8 9/GR6		
B SU212	−45.20	21	−44 00	−16 87	3.20	1.96	58	1	61.6	8 9/GR9	12	
BERBERMU	−96.20	21	−64 77	32.32	0.80	0 80	90	2	57.0			
B OLAND01	−115 20	21	−65 04	−16 76	2 49	1 27	76	1	68.0	9/GR5		
CAN01101	−138 20	21	−125 63	57.24	3.45	1.27	157	1	59.7	9/GR10	10	
CAN01201	−138.20	21	−112.04	55.95	3.35	0 97	151	1	59.8	9/GR10	10	
CAN01202	−72.70	21	−107 70	55.63	2.74	1 12	32	1	59 8			
CAN01203	−129.20	21	−111.48	55.61	3 08	1.15	151	1	59.7	9/GR12	10	

CAN01303	−129 20	21	−102.42	57.12	3 54	0.91	154	1	60.2	9/GR12	10
CAN01304	−91 20	21	−99 12	57.36	1 98	1.72	2	1	60 0	9/GR13	
CAN01403	−129 20	21	−89.75	52.02	4 68	0.80	148	1	62.1	9/GR12	10
CAN01404	−91.20	21	−84.82	52.42	3 10	2 05	152	1	60 6	9/GR13	
CAN01405	−82.20	21	−84.00	52.39	2.84	2 29	172	1	60 5	9/GR14	
CAN01504	−91.20	21	−72.66	53.77	3.57	1 67	156	1	60.4	9/GR13	
CAN01505	−82.20	21	−71.77	53 79	3 30	1.89	162	1	60.3	9/GR14	
CAN01605	−82.20	21	−61.50	49 55	2.65	1 40	143	1	60 5	9/GR14	
CAN01606	−70.70	21	−61.30	49 55	2.40	1 65	148	1	60 4		
CHLCONT5	−106 20	21	−72.23	−35.57	2.60	0.80	55	1	59.6	9/GR17	
CHLPAC02	−106.20	21	−80.06	−30.06	1.36	0 80	69	1	59 4	9/GR17	
CLMAND01	−115.20	21	−74.72	5.93	3 85	1 63	114	1	65 3	9/GR5	10
CLM00001	−103.20	21	−74 50	5 87	3.98	1 96	118	1	63.9	10	
EQACAND1	−115 20	21	−78 40	−1 61	1 37	0 95	75	1	64 4	9/GR5	
EQAGAND1	−115 20	21	−90.34	−0.62	0.90	0.81	89	1	61.5	9/GR5	
HWA00002	−166.20	21	−165 79	23 42	4 20	0.80	160	1	59 0	9/GR1	10
HWA00003	−175.20	21	−166.10	23.42	4.25	0.80	159	1	58 9	9/GR2	10
JMC00002	−92.70	21	−77.30	18.12	0.80	0.80	90	2	60 1		
MEX01NTE	−78 20	21	−105 81	26 01	2.89	2 08	155	1	60 7	1	
MEX01SUR	−69.20	21	−94.84	19 82	3.05	2.09	4	1	62.5	1	
MEX02NTE	−136 20	21	−107.21	26 31	3.84	1.55	148	1	61.4	1	10
MEX02SUR	−127.20	21	−96.39	19.88	3.18	1 87	157	1	62.8	1	10
PAQPAC01	−106.20	21	−109.18	−27 53	0.80	0.80	90	1	56.4	9/GR17	
PRG00002	−99.20	21	−58 66	−23.32	1.45	1 04	76	1	60 4		

12515,60 MHz (21)

1	2	3	4		5		6	7	8	9	
PRUAND02	−115 20	21	−74 69	−8 39	3 41	1 79	95	1	64.3	9/GR5	
PTRVIR01	−101 20	21	−65 85	18.12	0 80	0 80	90	1	60.8	1 6 9/GR20	
PTRVIR02	−110 20	21	−65.86	18 12	0 80	0 80	90	1	61 3	1 6 9/GR21	
SCN00001	−79 70	21	−62 46	17.44	0 80	0 80	90	1	58 6		
SPMFRAN3	−53 20	21	−67.24	47 51	3 16	0 80	7	1	60 6	2 7	
SURINAM2	−84 70	21	−55.69	4 35	1 00	0 80	86	1	63 5		
URG00001	−71 70	21	−56 22	−32 52	1 02	0 89	11	1	60.2		
USAEH001	−61 70	21	−85 19	36 21	5 63	3.33	22	1	62 1	1 5 6	
USAEH002	−101 20	21	−89 24	36 16	5.67	3 76	170	1	62 0	1 6 9/GR20	10
USAEH003	−110 20	21	−90 14	36 11	5 55	3 55	161	1	62 3	1 6 9/GR21	10
USAEH004	−119 20	21	−91 16	36.05	5 38	3 24	152	1	62 9	1 5 6	10
USAPSA02	−166 20	21	−117 80	40.58	4 03	0 82	135	1	63 5	9/GR1	
USAPSA03	−175 20	21	−118 27	40 12	3.62	0.80	136	1	65 3	9/GR2	
USAWH101	−148 20	21	−109 65	38 13	5 53	1.95	142	1	62 3	10	
USAWH102	−157 20	21	−111 41	38 57	5 51	1.54	138	1	63 5	10	
VENAND03	−115 20	21	−67 04	6 91	2 37	1 43	111	1	67 6	9/GR5	10

ALS00002	−165.80	22	−149 63	58.52	3 81	1.23	171	2	59.9	9/GR1	10	
ALS00003	−174.80	22	−150 95	58.54	3.77	1.11	167	2	60.2	9/GR2	10	
ARGNORT4	−93.80	22	−63.96	−30 01	3.86	1.99	48	2	66.0			
ARGNORT5	−54 80	22	−62 85	−29.80	3 24	2 89	47	2	63.8			
ATNBEAM1	−52.80	22	−66.44	14.87	1 83	0.80	39	2	61 3			
B CE311	−63.80	22	−40 60	−6 07	3 04	2.06	174	2	61.9	8 9/GR7		
B CE312	−44.80	22	−40.26	−6.06	3 44	2.09	174	2	61.2	8 9/GR9	10	11
B CE411	−63.80	22	−50 97	−15.26	3.86	1 38	49	2	62 9	8 9/GR7		
B CE412	−44.80	22	−50.71	−15.30	3.57	1.56	52	2	63.0	8 9/GR9	10	12
B CE511	−63.80	22	−53 11	−2 98	2 42	2.15	107	2	63 4	8 9/GR7		
B NO611	−73 80	22	−59 60	−11 62	2.86	1 69	165	1	63 1	8 9/GR8		
B NO711	−73.80	22	−60 70	−1.78	3 54	1.78	126	1	63 1	8 9/GR8		
B NO811	−73 80	22	−68 75	−4.71	2.37	1.65	73	1	63 1	8 9/GR8		
B SE911	−101.80	22	−45.99	−19 09	2 22	0 80	62	2	65.7	8		
B SU111	−80.80	22	−51.10	−25 64	2.76	1.06	50	2	63.1	8 9/GR6		
B SU112	−44 80	22	−50 76	−25.62	2 47	1.48	56	2	62 6	8 9/GR9	11	
B SU211	−80.80	22	−44.51	−16.94	3 22	1.37	60	2	62.8	8 9/GR6		
B SU212	−44 80	22	−43 99	−16 97	3 27	1.92	59	2	61 6	8 9/GR9	12	
B LZ00001	−115 80	22	−88.68	17 27	0.80	0 80	90	2	59.2			
CAN01101	−137.80	22	−125.60	57.24	3 45	1.27	157	2	59 7	9/GR10	10	
CAN01201	−137.80	22	−111 92	55 89	3 33	0.98	151	2	59 8	9/GR10	10	
CAN01202	−72.30	22	−107.64	55 62	2.75	1 11	32	2	59.8			
CAN01203	−128.80	22	−111.43	55.56	3.07	1.15	151	2	59 7	9/GR12	10	
CAN01303	−128.80	22	−102.39	57 12	3.54	0.92	154	2	60 3	9/GR12	10	

1	2	3	4		5		6	7	8	9	
CAN01304	−90.80	22	−99.00	57 33	1 96	1 73	1	2	60 0	9/GR13	
CAN01403	−128 80	22	−89.70	52 02	4 67	0.80	148	2	62 1	9/GR12	10
CAN01404	−90 80	22	−84.78	52 41	3 09	2 06	153	2	60 6	9/GR13	
CAN01405	−81 80	22	−84 02	52 34	2 82	2 30	172	2	60 5	9/GR14	
CAN01504	−90 80	22	−72 68	53.78	3 57	1 67	157	2	60.4	9/GR13	
CAN01505	−81 80	22	−71 76	53.76	3.30	1 89	162	2	60 3	9/GR14	
CAN01605	−81 80	22	−61.54	49.50	2.66	1 39	144	2	60.5	9/GR14	
CAN01606	−70 30	22	−61.32	49 51	2.41	1 65	148	2	60.4		
CHLCONT4	−105 80	22	−69 59	−23.20	2 21	0 80	68	2	59 3	9/GR16	
CHLCONT6	−105.80	22	−73.52	−55 52	3 65	1.31	39	2	59 7	9/GR16	
CRBBAH01	−92.30	22	−76.09	24 13	1 83	0.80	141	1	61.9	9/GR18	
CRBBER01	−92 30	22	−64 76	32 13	0 80	0.80	90	1	56.9	9/GR18	
CRBBLZ01	−92 30	22	−88 61	17 26	0.80	0 80	90	1	58 9	9/GR18	
CRBEC001	−92 30	22	−60 07	8 26	4 20	0.86	115	1	64 6	9/GR18	
CRBJMC01	−92 30	22	−79 45	17 97	0 99	0 80	151	1	61 3	9/GR18	
CTR00201	−130 80	22	−84.33	9 67	0 82	0 80	119	2	66 0		
DMAIFRB1	−79 30	22	−61 30	15.35	0.80	0 80	90	2	58.7		
EQAC0001	−94.80	22	−78 31	−1.52	1 48	1 15	65	1	63 3	9/GR19	
EQAG0001	−94 80	22	−90 36	−0 57	0 94	0 89	99	1	61.2	9/GR19	
HWA00002	−165 80	22	−165 79	23.32	4 20	0.80	160	2	59 0	9/GR1	10
HWA00003	−174 80	22	−166.10	23.42	4 25	0.80	159	2	59 0	9/GR2	10
MEX01NTE	−77 80	22	−105 80	25 99	2 88	2.07	155	2	60 7	1	
MEX02NTE	−135.80	22	−107.36	26.32	3 80	1 57	149	2	61 4	1	10
MEX02SUR	−126 80	22	−96.39	19 88	3 19	1 87	158	2	62 8	1	10

NCG00003	−107 30	22	−84 99	12 90	1 05	1 01	176	1	63 6	
PRU00004	−85 80	22	−74 19	−8 39	3 74	2 45	112	2	63 1	
PTRVIR01	−100 80	22	−65 85	18.12	0 80	0 80	90	2	60 8	1 6 9/GR20
PTRVIR02	−109 80	22	−65 85	18 12	0 80	0 80	90	2	61 4	1 6 9/GR21
USAEH001	−61 30	22	−85 16	36 21	5 63	3 32	22	2	62 1	1 5 6
USAEH002	−100 80	22	−89 28	36 16	5 65	3 78	170	2	62 0	1 6 9/GR20 10
USAEH003	−109 80	22	−90 12	36 11	5 55	3 56	161	2	62.3	1 6 9/GR21 10
USAEH004	−118 80	22	−91 16	36 05	5 38	3 24	153	2	62 9	1 5 6 10
USAPSA02	−165 80	22	−117 79	40 58	4 04	0 82	135	2	63 5	9/GR1
USAPSA03	−174 80	22	−118.20	40 15	3 63	0 80	136	2	65.3	9/GR2
USAWH101	−147 80	22	−109 70	38.13	5 52	1 96	142	2	62.3	10
USAWH102	−156 80	22	−111 40	38 57	5 51	1.55	138	2	63 5	10
VEN11VEN	−103 80	22	−66 79	6 90	2 50	1 77	122	2	65 5	10

12544,76 MHz (23)

1	2	3	4		5		6	7	8	9		
ALS00002	−166.20	23	−149.66	58.37	3.76	1.24	170	1	60.0	9/GR1	10	
ALS00003	−175.20	23	−150.98	58.53	3.77	1.11	167	1	60.2	9/GR2	10	
ARGINSU4	−94.20	23	−52.98	−59.81	3.40	0.80	19	1	60.1	9/GR3		
ARGINSU5	−55.20	23	−44.17	−59.91	3.77	0.80	13	1	59.5	9/GR4		
ARGSUR04	−94.20	23	−65.04	−43.33	3.32	1.50	40	1	60.9	9/GR3		
ARGSUR05	−55 20	23	−63.68	−43.01	2.54	2.38	152	1	60.3	9/GR4		
B CE311	−64.20	23	−40.60	−6.07	3.04	2.06	174	1	61.9	8 9/GR7		
B CE312	−45.20	23	−40.27	−6.06	3.44	2.09	174	1	61.3	8 9/GR9	10	11
B CE411	−64.20	23	−50.97	−15.27	3.86	1.38	49	1	62.9	8 9/GR7		
B CE412	−45.20	23	−50.71	−15.30	3.57	1.56	52	1	63.1	8 9/GR9	10	12
B CE511	−64.20	23	−53.10	−2.90	2.44	2.13	104	1	63.4	8 9/GR7		
B NO611	−74.20	23	−59.60	−11.62	2.85	1.69	165	2	63.2	8 9/GR8		
B NO711	−74.20	23	−60.70	−1.78	3.54	1.78	126	2	63.2	8 9/GR8		
B NO811	−74.20	23	−68.76	−4.71	2.37	1.65	73	2	63.1	8 9/GR8		
B SU111	−81.20	23	−51.12	−25.63	2.76	1.05	50	1	63.2	8 9/GR6		
B SU112	−45 20	23	−50.75	−25.62	2.47	1.48	56	1	62 6	8 9/GR9	11	
B SU211	−81 20	23	−44.51	−16.95	3.22	1.36	60	1	62 8	8 9/GR6		
B SU212	−45 20	23	−44.00	−16 87	3.20	1.96	58	1	61 6	8 9/GR9	12	
BERBERMU	−96.20	23	−64.77	32.32	0.80	0.80	90	2	57.0			
B OLAND01	−115.20	23	−65.04	−16.76	2.49	1.27	76	1	68.1	9/GR5		
B OL00001	−87.20	23	−64.61	−16.71	2.52	2.19	85	1	64.2			
B RB00001	−92 70	23	−59.85	12 93	0.80	0.80	90	2	59.4			
CAN01101	−138.20	23	−125.63	57.24	3.45	1.27	157	1	59.7	9/GR10	10	
CAN01201	−138.20	23	−112.04	55.95	3.35	0.97	151	1	59.8	9/GR10	10	

CAN01202	– 72 70	23	– 107.70	55 63	2 74	1 12	32	1	59.8		
CAN01203	– 129 20	23	– 111 48	55 61	3 08	1 15	151	1	59 7	9/GR12	10
CAN01303	– 129 20	23	– 102 42	57 12	3 54	0 91	154	1	60.3	9/GR12	10
CAN01304	– 91 20	23	– 99 12	57 36	1 98	1 72	2	1	60 1	9/GR13	
CAN01403	– 129 20	23	– 89 75	52 02	4 68	0 80	148	1	62.1	9/GR12	10
CAN01404	– 91 20	23	– 84 82	52 42	3 10	2 05	152	1	60 6	9/GR13	
CAN01405	– 82 20	23	– 84 00	52 39	2 84	2 29	172	1	60.5	9/GR14	
CAN01504	– 91.20	23	– 72 66	53 77	3 57	1.67	156	1	60 4	9/GR13	
CAN01505	– 82 20	23	– 71 77	53 79	3.30	1 89	162	1	60 4	9/GR14	
CAN01605	– 82 20	23	– 61.50	49 55	2 65	1 40	143	1	60 5	9/GR14	
CAN01606	– 70 70	23	– 61 30	49 55	2.40	1 65	148	1	60 5		
CHLCONT5	– 106 20	23	– 72 23	– 35 57	2 60	0.80	55	1	59 6	9/GR17	
CHLPAC02	– 106 20	23	– 80 06	– 30 06	1 36	0 80	69	1	59.4	9/GR17	
CLMAND01	– 115 20	23	– 74 72	5 93	3 85	1 63	114	1	65 4	9/GR5	10
CLM00001	– 103 20	23	– 74 50	5.87	3 98	1.96	118	1	63.9	10	
CUB00001	– 89 20	23	– 79.81	21 62	2 24	0 80	168	1	61.3		
EQACAND1	– 115 20	23	– 78 40	– 1 61	1 37	0 95	75	1	64 4	9/GR5	
EQAGAND1	– 115.20	23	– 90 34	– 0 62	0 90	0.81	89	1	61.6	9/GR5	
GRD00059	– 57 20	23	– 61 58	12.29	0.80	0 80	90	1	58 7		
GRLDNK01	– 53 20	23	– 44 89	66.56	2 70	0 82	173	1	60 2	2	
GUY00201	– 84 70	23	– 59 19	4 78	1 44	0 85	95	1	63 8		
HWA00002	– 166 20	23	– 165 79	23 42	4.20	0 80	160	1	59.0	9/GR1	10
HWA00003	– 175.20	23	– 166 10	23.42	4.25	0 80	159	1	59 0	9/GR2	10
MEX01NTE	– 78.20	23	– 105.81	26.01	2 89	2 08	155	1	60.8	1	

12544,76 MHz (23)

1	2	3	4		5		6	7	8	9	
MEX01SUR	–69.20	23	–94.84	19.82	3.05	2.09	4	1	62.5	1	
MEX02NTE	–136.20	23	–107.21	26 31	3.84	1.55	148	1	61 5	1	10
MEX02SUR	–127.20	23	–96.39	19 88	3.18	1.87	157	1	62 8	1	10
MSR00001	–79.70	23	–61.73	16.75	0.80	0.80	90	1	58.9	4	
PAQPAC01	–106.20	23	–109.18	–27.53	0.80	0.80	90	1	56.4	9/GR17	
PRG00002	–99.20	23	–58.66	–23.32	1.45	1.04	76	1	60.5		
PRUAND02	–115.20	23	–74.69	–8.39	3.41	1.79	95	1	64.3	9/GR5	
PTRVIR01	–101.20	23	–65.85	18.12	0.80	0.80	90	1	60 8	1 6 9/GR20	
PTRVIR02	–110.20	23	–65.86	18 12	0.80	0.80	90	1	61.3	1 6 9/GR21	
URG00001	–71 70	23	–56.22	–32.52	1 02	0.89	11	1	60.2		
USAEH001	–61 70	23	–85.19	36.21	5 63	3 33	22	1	62 1	1 5 6	
USAEH002	–101.20	23	–89.24	36.16	5.67	3.76	170	1	62 0	1 6 9/GR20	10
USAEH003	–110.20	23	–90.14	36.11	5.55	3.55	161	1	62.4	1 6 9/GR21	10
USAEH004	–119.20	23	–91.16	36.05	5.38	3.24	152	1	62.9	1 5 6	10
USAPSA02	–166.20	23	–117.80	40.58	4 03	0.82	135	1	63 6	9/GR1	
USAPSA03	–175.20	23	–118.27	40.12	3.62	0.80	136	1	65 4	9/GR2	
USAWH101	–148.20	23	–109.65	38.13	5.53	1.95	142	1	62.4	10	
USAWH102	–157.20	23	–111.41	38.57	5.51	1.54	138	1	63.5	10	
VENAND03	–115 20	23	–67 04	6.91	2.37	1.43	111	1	67.7	9/GR5	10

ALS00002	−165 80	24	−149 63	58 52	3 81	1 23	171	2	59 9	9/GR1	10	
ALS00003	−174 80	24	−150 95	58 54	3 77	1 11	167	2	60.2	9/GR2	10	
ARGNORT4	−93 80	24	−63 96	−30.01	3.86	1 99	48	2	66.1			
ARGNORT5	−54 80	24	−62.85	−29 80	3.24	2 89	47	2	63 9			
B CE311	−63 80	24	−40 60	−6 07	3 04	2 06	174	2	61 9	8 9/GR7		
B CE312	−44 80	24	−40 26	−6 06	3 44	2 09	174	2	61 3	8 9/GR9	10	11
B CE411	−63 80	24	−50.97	−15 26	3 86	1 38	49	2	62 9	8 9/GR7		
B CE412	−44 80	24	−50 71	−15 30	3 57	1 56	52	2	63 1	8 9/GR9	10	12
B CE511	−63 80	24	−53.11	−2 98	2 42	2.15	107	2	63 4	8 9/GR7		
B NO611	−73 80	24	−59.60	−11 62	2 86	1.69	165	1	63 2	8 9/GR8		
B NO711	−73.80	24	−60 70	−1 78	3 54	1.78	126	1	63 2	8 9/GR8		
B NO811	−73.80	24	−68 75	−4 71	2 37	1 65	73	1	63 2	8 9/GR8		
B SE911	−101 80	24	−45 99	−19 09	2 22	0.80	62	2	65 7	8		
B SU111	−80.80	24	−51.10	−25 64	2 76	1.06	50	2	63.2	8 9/GR6		
B SU112	−44 80	24	−50 76	−25 62	2 47	1.48	56	2	62 6	8 9/GR9	11	
B SU211	−80 80	24	−44 51	−16.94	3 22	1 37	60	2	62 8	8 9/GR6		
B SU212	−44 80	24	−43.99	−16.97	3 27	1 92	59	2	61.6	8 9/GR9	12	
CAN01101	−137 80	24	−125 60	57 24	3.45	1 27	157	2	59.7	9/GR10	10	
CAN01201	−137.80	24	−111 92	55 89	3 33	0 98	151	2	59 8	9/GR10	10	
CAN01202	−72 30	24	−107 64	55 62	2.75	1.11	32	2	59 8			
CAN01203	−128 80	24	−111 43	55 56	3 07	1 15	151	2	59.7	9/GR12	10	
CAN01303	−128.80	24	−102 39	57.12	3.54	0 92	154	2	60.3	9/GR12	10	
CAN01304	−90 80	24	−99 00	57.33	1 96	1.73	1	2	60 0	9/GR13		
CAN01403	−128 80	24	−89 70	52.02	4 67	0 80	148	2	62 1	9/GR12	10	

12559,34 MHz (24)

1	2	3	4		5		6	7	8	9	
CAN01404	-90 80	24	-84.78	52.41	3.09	2 06	153	2	60.6	9/GR13	
CAN01405	-81.80	24	-84.02	52.34	2.82	2 30	172	2	60 5	9/GR14	
CAN01504	-90 80	24	-72.68	53.78	3 57	1.67	157	2	60 4	9/GR13	
CAN01505	-81 80	24	-71.76	53 76	3 30	1.89	162	2	60 4	9/GR14	
CAN01605	-81.80	24	-61 54	49 50	2 66	1 39	144	2	60 5	9/GR14	
CAN01606	-70.30	24	-61 32	49 51	2 41	1 65	148	2	60 5		
CHLCONT4	-105 80	24	-69.59	-23 20	2 21	0 80	68	2	59 3	9/GR16	
CHLCONT6	-105.80	24	-73 52	-55.52	3 65	1.31	39	2	59 8	9/GR16	
CRBBAH01	-92.30	24	-76 09	24.13	1 83	0 80	141	1	62 0	9/GR18	
CRBBER01	-92 30	24	-64 76	32 13	0.80	0 80	90	1	57.0	9/GR18	
CRBBLZ01	-92 30	24	-88 61	17.26	0 80	0 80	90	1	58 9	9/GR18	
CRBEC001	-92 30	24	-60.07	8 26	4 20	0.86	115	1	64 6	9/GR18	
CRBJMC01	-92.30	24	-79 45	17.97	0 99	0.80	151	1	61 4	9/GR18	
EQAC0001	-94 80	24	-78 31	-1 52	1.48	1 15	65	1	63 3	9/GR19	
EQAG0001	-94.80	24	-90.36	-0 57	0 94	0 89	99	1	61 3	9/GR19	
GRD00003	-79 30	24	-61.62	12.34	0 80	0 80	90	2	58 9		
GTMIFRB2	-107.30	24	-90 50	15 64	1 03	0 80	84	1	61 4		
GUFMGG02	-52 80	24	-56 42	8 47	4 16	0.81	123	2	63 0	2 7	
HWA00002	-165 80	24	-165 79	23 32	4 20	0 80	160	2	59 0	9/GR1	10
HWA00003	-174.80	24	-166 10	23 42	4 25	0 80	159	2	59 0	9/GR2	10
MEX01NTE	-77 80	24	-105 80	25.99	2.88	2.07	155	2	60 8	1	
MEX02NTE	-135 80	24	-107.36	26 32	3 80	1 57	149	2	61.5	1	10
MEX02SUR	-126 80	24	-96.39	19 88	3 19	1 87	158	2	62 8	1	10
PNRIFRB2	-121.00	24	-80 15	8 46	1 01	0 80	170	1	65 1		

PRU00004	−85.80	24	−74 19	−8.39	3.74	2.45	112	2	63 2		
PTRVIR01	−100.80	24	−65.85	18.12	0 80	0.80	90	2	60 9	1 6 9/GR20	
PTRVIR02	−109.80	24	−65.85	18.12	0 80	0.80	90	2	61.4	1 6 9/GR21	
USAEH001	−61.30	24	−85 16	36 21	5 63	3 32	22	2	62.1	1 5 6	
USAEH002	−100 80	24	−89.28	36 16	5 65	3 78	170	2	62.0	1 6 9/GR20	10
USAEH003	−109 80	24	−90 12	36.11	5 55	3 56	161	2	62 4	1 6 9/GR21	10
USAEH004	−118 80	24	−91 16	36.05	5.38	3.24	153	2	62.9	1 5 6	10
USAPSA02	−165 80	24	−117 79	40.58	4.04	0.82	135	2	63.6	9/GR1	
USAPSA03	−174 80	24	−118 20	40.15	3 63	0 80	136	2	65 3	9/GR2	
USAWH101	−147.80	24	−109.70	38.13	5 52	1.96	142	2	62.4	10	
USAWH102	−156 80	24	−111 40	38 57	5 51	1.55	138	2	63.5	10	
VEN02VEN	−103 80	24	−63.50	15 50	0 80	0.80	90	2	60.1	9/GR22	
VEN11VEN	−103 80	24	−66 79	6 90	2 50	1 77	122	2	65 6	9/GR22	10

12573,92 MHz (25)

1	2	3	4		5		6	7	8	9		
ALS00002	– 166 20	25	– 149 66	58.37	3.76	1.24	170	1	59.9	9/GR1	10	
ALS00003	– 175 20	25	– 150 98	58.53	3.77	1 11	167	1	60 2	9/GR2	10	
ARGINSU4	– 94 20	25	– 52 98	– 59 81	3 40	0.80	19	1	60.1	9/GR3		
ARGINSU5	– 55 20	25	– 44 17	– 59 91	3 77	0 80	13	1	59 5	9/GR4		
ARGSUR04	– 94 20	25	– 65.04	– 43.33	3 32	1 50	40	1	60.9	9/GR3		
ARGSUR05	– 55 20	25	– 63 68	– 43 01	2 54	2 38	152	1	60.2	9/GR4		
B CE311	– 64 20	25	– 40 60	– 6 07	3 04	2 06	174	1	61 9	8 9/GR7		
B CE312	– 45 20	25	– 40 27	– 6 06	3 44	2 09	174	1	61 2	8 9/GR9	10	11
B CE411	– 64 20	25	– 50 97	– 15 27	3 86	1 38	49	1	62 9	8 9/GR7		
B CE412	– 45 20	25	– 50 71	– 15 30	3 57	1 56	52	1	63 0	8 9/GR9	10	12
B CE511	– 64 20	25	– 53 10	– 2 90	2 44	2.13	104	1	63 4	8 9/GR7		
B NO611	– 74 20	25	– 59 60	– 11 62	2 85	1 69	165	2	63 1	8 9/GR8		
B NO711	– 74 20	25	– 60 70	– 1 78	3 54	1 78	126	2	63 1	8 9/GR8		
B NO811	– 74 20	25	– 68 76	– 4 71	2 37	1 65	73	2	63.1	8 9/GR8		
B SU111	– 81 20	25	– 51.12	– 25 63	2 76	1 05	50	1	63 2	8 9/GR6		
B SU112	– 45 20	25	– 50 75	– 25 62	2 47	1 48	56	1	62.5	8 9/GR9	11	
B SU211	– 81 20	25	– 44 51	– 16 95	3 22	1 36	60	1	62 8	8 9/GR6		
B SU212	– 45 20	25	– 44 00	– 16 87	3 20	1 96	58	1	61 6	8 9/GR9	12	
BERBERMU	– 96 20	25	– 64 77	32 32	0 80	0 80	90	2	57.0			
B OLAND01	– 115 20	25	– 65 04	– 16 76	2 49	1 27	76	1	68 0	9/GR5		
CAN01101	– 138 20	25	– 125 63	57 24	3.45	1 27	157	1	59.7	9/GR10	10	
CAN01201	– 138 20	25	– 112 04	55 95	3 35	0 97	151	1	59 8	9/GR10	10	
CAN01202	– 72.70	25	– 107 70	55 63	2 74	1 12	32	1	59 8			
CAN01203	– 129 20	25	– 111.48	55 61	3 08	1 15	151	1	59 7	9/GR12	10	

CAN01303	−129.20	25	−102 42	57 12	3 54	0 91	154	1	60 2	9/GR12	10
CAN01304	−91 20	25	−99 12	57 36	1 98	1 72	2	1	60 0	9/GR13	
CAN01403	−129 20	25	−89 75	52 02	4 68	0 80	148	1	62 1	9/GR12	10
CAN01404	−91 20	25	−84 82	52 42	3 10	2 05	152	1	60 6	9/GR13	
CAN01405	−82 20	25	−84 00	52.39	2 84	2 29	172	1	60 5	9/GR14	
CAN01504	−91 20	25	−72 66	53 77	3.57	1 67	156	1	60 4	9/GR13	
CAN01505	−82 20	25	−71 77	53.79	3 30	1 89	162	1	60 3	9/GR14	
CAN01605	−82 20	25	−61 50	49 55	2 65	1 40	143	1	60 5	9/GR14	
CAN01606	−70 70	25	−61 30	49 55	2 40	1 65	148	1	60.4		
CHLCONT5	−106.20	25	−72 23	−35 57	2 60	0 80	55	1	59 6	9/GR17	
CHLPAC02	−106 20	25	−80 06	−30 06	1 36	0 80	69	1	59 4	9/GR17	
CLMAND01	−115 20	25	−74 72	5 93	3 85	1.63	114	1	65 3	9/GR5	10
CLM00001	−103 20	25	−74 50	5 87	3 98	1.96	118	1	63 9	10	
EQACAND1	−115 20	25	−78 40	−1 61	1 37	0 95	75	1	64 4	9/GR5	
EQAGAND1	−115.20	25	−90 34	−0 62	0 90	0 81	89	1	61 5	9/GR5	
HWA00002	−166 20	25	−165 79	23 42	4 20	0 80	160	1	59 0	9/GR1	10
HWA00003	−175.20	25	−166 10	23 42	4 25	0 80	159	1	58 9	9/GR2	10
JMC00002	−92 70	25	−77 30	18 12	0 80	0 80	90	2	60 1		
MEX01NTE	−78 20	25	−105 81	26 01	2 89	2 08	155	1	60 7	1	
MEX01SUR	−69 20	25	−94 84	19 82	3 05	2 09	4	1	62 5	1	
MEX02NTE	−136.20	25	−107 21	26 31	3 84	1 55	148	1	61.4	1	10
MEX02SUR	−127.20	25	−96 39	19 88	3 18	1 87	157	1	62 8	1	10
PAQPAC01	−106.20	25	−109 18	−27 53	0.80	0 80	90	1	56 4	9/GR17	
PRG00002	−99 20	25	−58 66	−23 32	1.45	1 04	76	1	60 4		

12573,92 MHz (25)

1	2	3	4		5		6	7	8	9	
PRUAND02	−115 20	25	−74 69	−8 39	3.41	1.79	95	1	64 3	9/GR5	
PTRVIR01	−101 20	25	−65.85	18 12	0.80	0 80	90	1	60 8	1 6 9/GR20	
PTRVIR02	−110 20	25	−65.86	18 12	0.80	0 80	90	1	61 3	1 6 9/GR21	
SCN00001	−79 70	25	−62 46	17 44	0.80	0 80	90	1	58 6		
SPMFRAN3	−53 20	25	−67.24	47 51	3.16	0 80	7	1	60 6	2 7	
SURINAM2	−84 70	25	−55 69	4 35	1 00	0 80	86	1	63 5		
URG00001	−71 70	25	−56.22	−32 52	1 02	0.89	11	1	60 2		
USAEH001	−61 70	25	−85 19	36 21	5 63	3 33	22	1	62 1	1 5 6	
USAEH002	−101 20	25	−89 24	36.16	5.67	3 76	170	1	62 0	1 6 9/GR20	10
USAEH003	−110 20	25	−90 14	36 11	5 55	3.55	161	1	62 3	1 6 9/GR21	10
USAEH004	−119 20	25	−91.16	36 05	5 38	3 24	152	1	62 9	1 5 6	10
USAPSA02	−166 20	25	−117.80	40.58	4 03	0.82	135	1	63 5	9/GR1	
USAPSA03	−175.20	25	−118 27	40 12	3.62	0.80	136	1	65.3	9/GR2	
USAWH101	−148 20	25	−109 65	38 13	5.53	1.95	142	1	62.3	10	
USAWH102	−157 20	25	−111.41	38 57	5 51	1.54	138	1	63.5	10	
VENAND03	−115 20	25	−67.04	6.91	2.37	1.43	111	1	67.6	9/GR5	10

ALS00002	–165 80	26	–149 63	58 52	3 81	1 23	171	2	59 9	9/GR1	10	
ALS00003	–174 80	26	–150.95	58.54	3 77	1 11	167	2	60 2	9/GR2	10	
ARGNORT4	–93.80	26	–63 96	–30 01	3 86	1 99	48	2	66 0			
ARGNORT5	–54 80	26	–62 85	–29 80	3 24	2 89	47	2	63 8			
ATNBEAM1	–52 80	26	–66 44	14 87	1 83	0 80	39	2	61 3			
B CE311	–63 80	26	–40 60	–6 07	3.04	2 06	174	2	61 9	8 9/GR7		
B CE312	–44 80	26	–40 26	–6 06	3 44	2 09	174	2	61 2	8 9/GR9	10	11
B CE411	–63.80	26	–50.97	–15.26	3 86	1 38	49	2	62 9	8 9/GR7		
B CE412	–44 80	26	–50 71	–15 30	3 57	1 56	52	2	63 0	8 9/GR9	10	12
B CE511	–63 80	26	–53 11	–2 98	2.42	2 15	107	2	63 4	8 9/GR7		
B NO611	–73 80	26	–59.60	–11 62	2 86	1 69	165	1	63 1	8 9/GR8		
B NO711	–73 80	26	–60 70	–1 78	3 54	1 78	126	1	63 1	8 9/GR8		
B NO811	–73.80	26	–68 75	–4 71	2 37	1 65	73	1	63 1	8 9/GR8		
B SE911	–101 80	26	–45.99	–19 09	2 22	0.80	62	2	65 7	8		
B SU111	–80 80	26	–51 10	–25 64	2 76	1 06	50	2	63 1	8 9/GR6		
B SU112	–44 80	26	–50 76	–25.62	2 47	1 48	56	2	62 6	8 9/GR9	11	
B SU211	–80 80	26	–44.51	–16 94	3 22	1 37	60	2	62 8	8 9/GR6		
B SU212	–44 80	26	–43.99	–16 97	3 27	1 92	59	2	61 6	8 9/GR9	12	
B LZ00001	–115 80	26	–88 68	17 27	0 80	0 80	90	2	59.2			
CAN01101	–137 80	26	–125 60	57 24	3 45	1.27	157	2	59.7	9/GR10	10	
CAN01201	–137 80	26	–111 92	55 89	3 33	0 98	151	2	59.8	9/GR10	10	
CAN01202	–72.30	26	–107.64	55 62	2 75	1 11	32	2	59 8			
CAN01203	–128.80	26	–111 43	55.56	3 07	1.15	151	2	59 7	9/GR12	10	
CAN01303	–128 80	26	–102 39	57 12	3.54	0 92	154	2	60 3	9/GR12	10	

12588,50 MHz (26)

1	2	3	4		5		6	7	8	9	
CAN01304	– 90 80	26	– 99.00	57 33	1 96	1 73	1	2	60 0	9/GR13	
CAN01403	– 128 80	26	– 89.70	52 02	4.67	0 80	148	2	62.1	9/GR12	10
CAN01404	– 90 80	26	– 84 78	52 41	3 09	2 06	153	2	60 6	9/GR13	
CAN01405	– 81 80	26	– 84.02	52 34	2 82	2 30	172	2	60 5	9/GR14	
CAN01504	– 90 80	26	– 72.68	53 78	3 57	1.67	157	2	60 4	9/GR13	
CAN01505	– 81 80	26	– 71.76	53 76	3 30	1 89	162	2	60.3	9/GR14	
CAN01605	– 81 80	26	– 61 54	49 50	2.66	1 39	144	2	60 5	9/GR14	
CAN01606	– 70 30	26	– 61 32	49 51	2 41	1.65	148	2	60 4		
CHLCONT4	– 105 80	26	– 69 59	– 23 20	2 21	0 80	68	2	59.3	9/GR16	
CHLCONT6	– 105 80	26	– 73 52	– 55 52	3 65	1 31	39	2	59 7	9/GR16	
CRBBAH01	– 92 30	26	– 76 09	24 13	1 83	0 80	141	1	61 9	9/GR18	
CRBBER01	– 92 30	26	– 64 76	32 13	0 80	0.80	90	1	56.9	9/GR18	
CRBBLZ01	– 92 30	26	– 88 61	17 26	0 80	0 80	90	1	58 9	9/GR18	
CRBEC001	– 92 30	26	– 60 07	8 26	4 20	0 86	115	1	64 6	9/GR18	
CRBJMC01	– 92 30	26	– 79.45	17 97	0 99	0 80	151	1	61 3	9/GR18	
CTR00201	– 130 80	26	– 84 33	9 67	0 82	0 80	119	2	66 0		
DMAIFRB1	– 79 30	26	– 61 30	15 35	0 80	0 80	90	2	58 7		
EQAC0001	– 94 80	26	– 78 31	– 1 52	1 48	1 15	65	1	63 3	9/GR19	
EQAG0001	– 94 80	26	– 90 36	– 0.57	0 94	0 89	99	1	61 2	9/GR19	
HWA00002	– 165 80	26	– 165 79	23.32	4 20	0 80	160	2	59 0	9/GR1	10
HWA00003	– 174 80	26	– 166 10	23 42	4 25	0 80	159	2	59 0	9/GR2	10
MEX01NTE	– 77 80	26	– 105 80	25 99	2 88	2.07	155	2	60.7	1	
MEX02NTE	– 135 80	26	– 107.36	26 32	3 80	1 57	149	2	61.4	1	10
MEX02SUR	– 126 80	26	– 96 39	19 88	3 19	1.87	158	2	62 8	1	10

NCG00003	−107.30	26	−84.99	12.90	1.05	1.01	176	1	63 6	
PRU00004	−85.80	26	−74.19	−8.39	3 74	2 45	112	2	63 1	
PTRVIR01	−100.80	26	−65.85	18 12	0.80	0 80	90	2	60 8	1 6 9/GR20
PTRVIR02	−109.80	26	−65 85	18.12	0 80	0 80	90	2	61.4	1 6 9/GR21
USAEH001	−61.30	26	−85.16	36.21	5.63	3 32	22	2	62.1	1 5 6
USAEH002	−100 80	26	−89.28	36.16	5 65	3 78	170	2	62 0	1 6 9/GR20 10
USAEH003	−109.80	26	−90.12	36.11	5 55	3.56	161	2	62 3	1 6 9/GR21 10
USAEH004	−118 80	26	−91.16	36.05	5 38	3.24	153	2	62 9	1 5 6 10
USAPSA02	−165.80	26	−117 79	40.58	4.04	0.82	135	2	63 5	9/GR1
USAPSA03	−174.80	26	−118.20	40 15	3 63	0 80	136	2	65.3	9/GR2
USAWH101	−147 80	26	−109.70	38 13	5 52	1 96	142	2	62 3	10
USAWH102	−156.80	26	−111.40	38.57	5 51	1.55	138	2	63 5	10
VEN11VEN	−103 80	26	−66.79	6.90	2.50	1 77	122	2	65 5	10

12603,08 MHz (27)

1	2	3	4		5		6	7	8	9		
ALS00002	–166 20	27	–149.66	58.37	3 76	1 24	170	1	60 0	9/GR1	10	
ALS00003	–175 20	27	–150.98	58.53	3 77	1.11	167	1	60.2	9/GR2	10	
ARGINSU4	–94 20	27	–52.98	–59.81	3 40	0.80	19	1	60.1	9/GR3		
ARGINSU5	–55 20	27	–44.17	–59 91	3 77	0 80	13	1	59 5	9/GR4		
ARGSUR04	–94 20	27	–65.04	–43 33	3.32	1 50	40	1	60 9	9/GR3		
ARGSUR05	–55.20	27	–63.68	–43 01	2 54	2.38	152	1	60 3	9/GR4		
B CE311	–64 20	27	–40 60	–6 07	3 04	2.06	174	1	61 9	8 9/GR7		
B CE312	–45 20	27	–40 27	–6.06	3 44	2 09	174	1	61.3	8 9/GR9	10	11
B CE411	–64 20	27	–50 97	–15.27	3 86	1 38	49	1	62 9	8 9/GR7		
B CE412	–45 20	27	–50.71	–15 30	3 57	1 56	52	1	63 1	8 9/GR9	10	12
B CE511	–64 20	27	–53.10	–2 90	2.44	2.13	104	1	63 4	8 9/GR7		
B NO611	–74 20	27	–59 60	–11.62	2 85	1 69	165	2	63.2	8 9/GR8		
B NO711	–74 20	27	–60.70	–1 78	3 54	1 78	126	2	63 2	8 9/GR8		
B NO811	–74 20	27	–68 76	–4 71	2 37	1 65	73	2	63 1	8 9/GR8		
B SU111	–81 20	27	–51.12	–25 63	2.76	1.05	50	1	63.2	8 9/GR6		
B SU112	–45 20	27	–50 75	–25 62	2 47	1.48	56	1	62 6	8 9/GR9	11	
B SU211	–81 20	27	–44 51	–16 95	3.22	1 36	60	1	62.8	8 9/GR6		
B SU212	–45 20	27	–44.00	–16.87	3.20	1 96	58	1	61 6	8 9/GR9	12	
BERBERMU	–96 20	27	–64 77	32.32	0 80	0 80	90	2	57 0			
B OLAND01	–115 20	27	–65.04	–16 76	2.49	1 27	76	1	68 1	9/GR5		
B OL00001	–87 20	27	–64 61	–16 71	2.52	2.19	85	1	64 2			
B RB00001	–92 70	27	–59 85	12.93	0.80	0.80	90	2	59 4			
CAN01101	–138 20	27	–125 63	57 24	3 45	1.27	157	1	59 7	9/GR10	10	
CAN01201	–138 20	27	–112 04	55 95	3 35	0 97	151	1	59 8	9/GR10	10	

CAN01202	–72.70	27	–107 70	55.63	2 74	1.12	32	1	59.8		
CAN01203	–129.20	27	–111 48	55 61	3 08	1.15	151	1	59.7	9/GR12	10
CAN01303	–129 20	27	–102.42	57.12	3 54	0.91	154	1	60.3	9/GR12	10
CAN01304	–91.20	27	–99.12	57.36	1.98	1 72	2	1	60.1	9/GR13	
CAN01403	–129.20	27	–89 75	52 02	4 68	0 80	148	1	62 1	9/GR12	10
CAN01404	–91.20	27	–84.82	52 42	3.10	2.05	152	1	60 6	9/GR13	
CAN01405	–82.20	27	–84.00	52 39	2.84	2.29	172	1	60 5	9/GR14	
CAN01504	–91 20	27	–72.66	53.77	3.57	1.67	156	1	60 4	9/GR13	
CAN01505	–82 20	27	–71 77	53 79	3.30	1.89	162	1	60.4	9/GR14	
CAN01605	–82 20	27	–61 50	49.55	2 65	1.40	143	1	60.5	9/GR14	
CAN01606	–70.70	27	–61 30	49 55	2 40	1 65	148	1	60.5		
CHLCONT5	–106.20	27	–72.23	–35.57	2.60	0.80	55	1	59.6	9/GR17	
CHLPAC02	–106 20	27	–80 06	–30.06	1.36	0 80	69	1	59.4	9/GR17	
CLMAND01	–115.20	27	–74.72	5 93	3.85	1.63	114	1	65.4	9/GR5	10
CLM00001	–103.20	27	–74 50	5 87	3.98	1.96	118	1	63 9	10	
CUB00001	–89.20	27	–79.81	21 62	2.24	0.80	168	1	61.3		
EQACAND1	–115.20	27	–78 40	–1 61	1.37	0.95	75	1	64 4	9/GR5	
EQAGAND1	–115.20	27	–90.34	–0 62	0 90	0.81	89	1	61 6	9/GR5	
GRD00059	–57.20	27	–61 58	12.29	0 80	0 80	90	1	58 7		
GRLDNK01	–53.20	27	–44.89	66.56	2.70	0.82	173	1	60 2	2	
GUY00201	–84.70	27	–59.19	4.78	1.44	0.85	95	1	63 8		
HWA00002	–166.20	27	–165.79	23.42	4.20	0.80	160	1	59.0	9/GR1	10
HWA00003	–175.20	27	–166.10	23.42	4.25	0.80	159	1	59.0	9/GR2	10
MEX01NTE	–78.20	27	–105 81	26 01	2.89	2.08	155	1	60.8	1	

12603,08 MHz (27)

1	2	3	4		5		6	7	8	9	
MEX01SUR	−69 20	27	−94.84	19.82	3.05	2 09	4	1	62 5	1	
MEX02NTE	−136 20	27	−107.21	26.31	3 84	1 55	148	1	61 5	1	10
MEX02SUR	−127.20	27	−96.39	19.88	3 18	1 87	157	1	62.8	1	10
MSR00001	−79.70	27	−61 73	16 75	0 80	0 80	90	1	58 9	4	
PAQPAC01	−106 20	27	−109 18	−27 53	0.80	0 80	90	1	56 4	9/GR17	
PRG00002	−99.20	27	−58 66	−23.32	1 45	1.04	76	1	60 5		
PRUAND02	−115 20	27	−74 69	−8 39	3 41	1 79	95	1	64.3	9/GR5	
PTRVIR01	−101 20	27	−65 85	18.12	0 80	0 80	90	1	60 8	1 6 9/GR20	
PTRVIR02	−110 20	27	−65 86	18.12	0 80	0 80	90	1	61 3	1 6 9/GR21	
URG00001	−71 70	27	−56.22	−32 52	1 02	0 89	11	1	60 2		
USAEH001	−61 70	27	−85 19	36 21	5 63	3 33	22	1	62 1	1 5 6	
USAEH002	−101 20	27	−89 24	36 16	5 67	3 76	170	1	62 0	1 6 9/GR20	10
USAEH003	−110 20	27	−90 14	36.11	5 55	3 55	161	1	62.4	1 6 9/GR21	10
USAEH004	−119 20	27	−91 16	36 05	5 38	3 24	152	1	62 9	1 5 6	10
USAPSA02	−166 20	27	−117 80	40 58	4.03	0 82	135	1	63 6	9/GR1	
USAPSA03	−175 20	27	−118 27	40 12	3 62	0 80	136	1	65 4	9/GR2	
USAWH101	−148 20	27	−109 65	38.13	5 53	1.95	142	1	62 4	10	
USAWH102	−157.20	27	−111 41	38.57	5 51	1.54	138	1	63 5	10	
VENAND03	−115 20	27	−67.04	6 91	2 37	1.43	111	1	67 7	9/GR5	10

ALS00002	−165 80	28	−149 63	58 52	3.81	1 23	171	2	59 9	9/GR1	10		
ALS00003	−174.80	28	−150 95	58 54	3.77	1 11	167	2	60 2	9/GR2	10		
ARGNORT4	−93 80	28	−63 96	−30 01	3 86	1 99	48	2	66 1				
ARGNORT5	−54 80	28	−62 85	−29 80	3 24	2 89	47	2	63 9				
B CE311	−63.80	28	−40 60	−6 07	3 04	2 06	174	2	61 9	8	9/GR7		
B CE312	−44 80	28	−40 26	−6 06	3 44	2 09	174	2	61 3	8	9/GR9	10	11
B CE411	−63 80	28	−50 97	−15 26	3 86	1 38	49	2	62.9	8	9/GR7		
B CE412	−44 80	28	−50 71	−15 30	3 57	1 56	52	2	63 1	8	9/GR9	10	12
B CE511	−63 80	28	−53 11	−2 98	2 42	2 15	107	2	63 4	8	9/GR7		
B NO611	−73 80	28	−59.60	−11 62	2 86	1 69	165	1	63.2	8	9/GR8		
B NO711	−73 80	28	−60 70	−1 78	3 54	1 78	126	1	63 2	8	9/GR8		
B NO811	−73 80	28	−68 75	−4.71	2 37	1 65	73	1	63 2	8	9/GR8		
B SE911	−101.80	28	−45.99	−19 09	2 22	0 80	62	2	65 7	8			
B SU111	−80 80	28	−51 10	−25 64	2 76	1 06	50	2	63 2	8	9/GR6		
B SU112	−44 80	28	−50 76	−25 62	2 47	1 48	56	2	62 6	8	9/GR9	11	
B SU211	−80 80	28	−44 51	−16 94	3.22	1 37	60	2	62.8	8	9/GR6		
B SU212	−44 80	28	−43 99	−16 97	3 27	1 92	59	2	61 6	8	9/GR9	12	
CAN01101	−137 80	28	−125.60	57.24	3.45	1.27	157	2	59.7	9/GR10	10		
CAN01201	−137 80	28	−111 92	55 89	3 33	0 98	151	2	59.8	9/GR10	10		
CAN01202	−72 30	28	−107 64	55 62	2 75	1 11	32	2	59 8				
CAN01203	−128 80	28	−111 43	55.56	3 07	1 15	151	2	59 7	9/GR12	10		
CAN01303	−128 80	28	−102 39	57 12	3 54	0 92	154	2	60 3	9/GR12	10		
CAN01304	−90 80	28	−99 00	57.33	1 96	1 73	1	2	60.0	9/GR13			
CAN01403	−128 80	28	−89.70	52.02	4 67	0 80	148	2	62 1	9/GR12	10		

12617,66 MHz (28)

1	2	3	4		5		6	7	8	9	
CAN01404	−90.80	28	−84.78	52.41	3.09	2.06	153	2	60.6	9/GR13	
CAN01405	−81.80	28	−84.02	52.34	2.82	2.30	172	2	60.5	9/GR14	
CAN01504	−90.80	28	−72.68	53.78	3.57	1.67	157	2	60.4	9/GR13	
CAN01505	−81.80	28	−71.76	53.76	3.30	1.89	162	2	60.4	9/GR14	
CAN01605	−81.80	28	−61.54	49.50	2.66	1.39	144	2	60.5	9/GR14	
CAN01606	−70.30	28	−61.32	49.51	2.41	1.65	148	2	60.5		
CHLCONT4	−105.80	28	−69.59	−23.20	2.21	0 80	68	2	59.3	9/GR16	
CHLCONT6	−105.80	28	−73.52	−55.52	3.65	1 31	39	2	59.8	9/GR16	
CRBBAH01	−92.30	28	−76.09	24.13	1.83	0.80	141	1	62.0	9/GR18	
CRBBER01	−92.30	28	−64.76	32.13	0.80	0 80	90	1	57.0	9/GR18	
CRBBLZ01	−92.30	28	−88.61	17.26	0.80	0.80	90	1	58.9	9/GR18	
CRBEC001	−92.30	28	−60.07	8.26	4.20	0.86	115	1	64.6	9/GR18	
CRBJMC01	−92.30	28	−79.45	17.97	0.99	0.80	151	1	61.4	9/GR18	
EQAC0001	−94.80	28	−78.31	−1.52	1.48	1.15	65	1	63.3	9/GR19	
EQAG0001	−94.80	28	−90.36	−0.57	0.94	0.89	99	1	61.3	9/GR19	
GRD00003	−79.30	28	−61.62	12.34	0.80	0.80	90	2	58.9		
GTMIFRB2	−107.30	28	−90.50	15.64	1.03	0.80	84	1	61.4		
GUFMGG02	−52 80	28	−56.42	8.47	4.16	0.81	123	2	63.0	2 7	
HWA00002	−165.80	28	−165.79	23.32	4.20	0.80	160	2	59.0	9/GR1	10
HWA00003	−174.80	28	−166.10	23.42	4.25	0.80	159	2	59.0	9/GR2	10
MEX01NTE	−77.80	28	−105.80	25.99	2.88	2.07	155	2	60.8	1	
MEX02NTE	−135.80	28	−107.36	26.32	3.80	1.57	149	2	61.5	1	10
MEX02SUR	−126.80	28	−96.39	19.88	3.19	1.87	158	2	62.8	1	10
PNRIFRB2	−121 00	28	−80.15	8 46	1.01	0.80	170	1	65.1		

PRU00004	–85.80	28	–74 19	–8 39	3 74	2.45	112	2	63 2		
PTRVIR01	–100.80	28	–65 85	18.12	0.80	0 80	90	2	60 9	1 6 9/GR20	
PTRVIR02	–109.80	28	–65 85	18 12	0 80	0.80	90	2	61 4	1 6 9/GR21	
USAEH001	–61 30	28	–85 16	36 21	5 63	3.32	22	2	62 1	1 5 6	
USAEH002	–100 80	28	–89 28	36 16	5 65	3.78	170	2	62 0	1 6 9/GR20	10
USAEH003	–109 80	28	–90.12	36 11	5 55	3 56	161	2	62 4	1 6 9/GR21	10
USAEH004	–118 80	28	–91 16	36 05	5.38	3 24	153	2	62 9	1 5 6	10
USAPSA02	–165 80	28	–117 79	40 58	4.04	0 82	135	2	63 6	9/GR1	
USAPSA03	–174 80	28	–118 20	40 15	3.63	0 80	136	2	65.3	9/GR2	
USAWH101	–147.80	28	–109.70	38 13	5.52	1 96	142	2	62 4	10	
USAWH102	–156 80	28	–111 40	38.57	5.51	1 55	138	2	63 5	10	
VEN02VEN	–103 80	28	–63 50	15 50	0.80	0 80	90	2	60 1	9/GR22	
VEN11VEN	–103 80	28	–66.79	6 90	2.50	1.77	122	2	65 6	9/GR22	10

1	2	3	4		5		6	7	8	9		
ALS00002	−166.20	29	−149.66	58.37	3.76	1.24	170	1	59.9	9/GR1	10	
ALS00003	−175.20	29	−150.98	58 53	3.77	1.11	167	1	60.2	9/GR2	10	
ARGINSU4	−94.20	29	−52.98	−59.81	3.40	0.80	19	1	60.1	9/GR3		
ARGINSU5	−55 20	29	−44.17	−59.91	3.77	0.80	13	1	59.5	9/GR4		
ARGSUR04	−94.20	29	−65.04	−43.33	3.32	1.50	40	1	60 9	9/GR3		
ARGSUR05	−55.20	29	−63.68	−43.01	2.54	2 38	152	1	60.2	9/GR4		
B CE311	−64 20	29	−40.60	−6.07	3.04	2.06	174	1	61.9	8 9/GR7		
B CE312	−45.20	29	−40.27	−6.06	3 44	2.09	174	1	61.2	8 9/GR9	10	11
B CE411	−64.20	29	−50.97	−15.27	3 86	1.38	49	1	62.9	8 9/GR7		
B CE412	−45 20	29	−50 71	−15.30	3.57	1.56	52	1	63.0	8 9/GR9	10	12
B CE511	−64.20	29	−53.10	−2.90	2.44	2.13	104	1	63.4	8 9/GR7		
B NO611	−74.20	29	−59 60	−11.62	2.85	1.69	165	2	63 1	8 9/GR8		
B NO711	−74.20	29	−60.70	−1.78	3.54	1.78	126	2	63.1	8 9/GR8		
B NO811	−74.20	29	−68.76	−4 71	2.37	1.65	73	2	63.1	8 9/GR8		
B SU111	−81 20	29	−51 12	−25.63	2.76	1.05	50	1	63.2	8 9/GR6		
B SU112	−45.20	29	−50.75	−25.62	2.47	1.48	56	1	62.5	8 9/GR9	11	
B SU211	−81.20	29	−44.51	−16.95	3.22	1.36	60	1	62.8	8 9/GR6		
B SU212	−45.20	29	−44.00	−16.87	3 20	1 96	58	1	61.6	8 9/GR9	12	
BERBERMU	−96 20	29	−64.77	32.32	0 80	0 80	90	2	57 0			
B OLAND01	−115.20	29	−65.04	−16.76	2 49	1.27	76	1	68.0	9/GR5		
CAN01101	−138.20	29	−125.63	57.24	3.45	1.27	157	1	59.7	9/GR10	10	
CAN01201	−138.20	29	−112.04	55.95	3.35	0.97	151	1	59 8	9/GR10	10	
CAN01202	−72.70	29	−107 70	55.63	2.74	1.12	32	1	59.8			
CAN01203	−129.20	29	−111.48	55.61	3.08	1.15	151	1	59 7	9/GR12	10	

CAN01303	−129 20	29	−102.42	57 12	3.54	0 91	154	1	60.2	9/GR12	10
CAN01304	−91.20	29	−99.12	57.36	1 98	1 72	2	1	60.0	9/GR13	
CAN01403	−129 20	29	−89 75	52.02	4.68	0.80	148	1	62.1	9/GR12	10
CAN01404	−91.20	29	−84.82	52.42	3.10	2.05	152	1	60.6	9/GR13	
CAN01405	−82.20	29	−84.00	52.39	2.84	2.29	172	1	60.5	9/GR14	
CAN01504	−91 20	29	−72.66	53 77	3 57	1.67	156	1	60 4	9/GR13	
CAN01505	−82.20	29	−71.77	53.79	3.30	1.89	162	1	60 3	9/GR14	
CAN01605	−82 20	29	−61 50	49.55	2.65	1.40	143	1	60.5	9/GR14	
CAN01606	−70.70	29	−61 30	49.55	2.40	1.65	148	1	60.4		
CHLCONT5	−106.20	29	−72.23	−35.57	2.60	0.80	55	1	59 6	9/GR17	
CHLPAC02	−106 20	29	−80 06	−30 06	1 36	0.80	69	1	59.4	9/GR17	
CLMAND01	−115.20	29	−74.72	5.93	3.85	1.63	114	1	65.3	9/GR5	10
CLM00001	−103.20	29	−74.50	5.87	3 98	1.96	118	1	63 9	10	
EQACAND1	−115 20	29	−78 40	−1 61	1 37	0.95	75	1	64 4	9/GR5	
EQAGAND1	−115.20	29	−90.34	−0.62	0.90	0.81	89	1	61.5	9/GR5	
HWA00002	−166 20	29	−165.79	23 42	4 20	0.80	160	1	59.0	9/GR1	10
HWA00003	−175 20	29	−166 10	23 42	4.25	0 80	159	1	58.9	9/GR2	10
JMC00002	−92.70	29	−77.30	18 12	0.80	0.80	90	2	60.1		
MEX01NTE	−78 20	29	−105.81	26 01	2.89	2.08	155	1	60 7	1	
MEX01SUR	−69.20	29	−94 84	19 82	3.05	2.09	4	1	62.5	1	
MEX02NTE	−136 20	29	−107.21	26.31	3.84	1.55	148	1	61.4	1	10
MEX02SUR	−127 20	29	−96 39	19.88	3 18	1 87	157	1	62 8	1	10
PAQPAC01	−106.20	29	−109.18	−27.53	0.80	0.80	90	1	56.4	9/GR17	
PRG00002	−99 20	29	−58.66	−23.32	1.45	1.04	76	1	60 4		

12632,24 MHz (29)

1	2	3	4		5		6	7	8	9	
PRUAND02	−115 20	29	−74 69	−8.39	3 41	1.79	95	1	64 3	9/GR5	
PTRVIR01	−101.20	29	−65 85	18.12	0 80	0.80	90	1	60 8	1 6 9/GR20	
PTRVIR02	−110.20	29	−65 86	18.12	0 80	0.80	90	1	61 3	1 6 9/GR21	
SCN00001	−79 70	29	−62 46	17.44	0 80	0.80	90	1	58.6		
SPMFRAN3	−53 20	29	−67 24	47.51	3 16	0.80	7	1	60.6	2 7	
SURINAM2	−84 70	29	−55 69	4.35	1.00	0.80	86	1	63.5		
URG00001	−71 70	29	−56 22	−32.52	1.02	0 89	11	1	60.2		
USAEH001	−61 70	29	−85 19	36.21	5 63	3 33	22	1	62 1	1 5 6	
USAEH002	−101 20	29	−89 24	36 16	5 67	3 76	170	1	62.0	1 6 9/GR20	10
USAEH003	−110 20	29	−90 14	36.11	5 55	3 55	161	1	62.3	1 6 9/GR21	10
USAEH004	−119 20	29	−91 16	36.05	5 38	3.24	152	1	62.9	1 5 6	10
USAPSA02	−166 20	29	−117 80	40 58	4 03	0.82	135	1	63.5	9/GR1	
USAPSA03	−175 20	29	−118.27	40.12	3 62	0.80	136	1	65.3	9/GR2	
USAWH101	−148 20	29	−109 65	38 13	5.53	1.95	142	1	62 3	10	
USAWH102	−157 20	29	−111.41	38 57	5 51	1 54	138	1	63.5	10	
VENAND03	−115 20	29	−67 04	6 91	2.37	1.43	111	1	67 6	9/GR5	10

ALS00002	– 165.80	30	– 149.63	58 52	3.81	1 23	171	2	59.9	9/GR1	10	
ALS00003	– 174.80	30	– 150.95	58.54	3.77	1.11	167	2	60.2	9/GR2	10	
ARGNORT4	– 93 80	30	– 63.96	– 30.01	3.86	1.99	48	2	66.0			
ARGNORT5	– 54.80	30	– 62 85	– 29 80	3.24	2.89	47	2	63.8			
ATNBEAM1	– 52.80	30	– 66.44	14.87	1.83	0.80	39	2	61.3			
B CE311	– 63.80	30	– 40.60	– 6.07	3.04	2.06	174	2	61.9	8 9/GR7		
B CE312	– 44.80	30	– 40.26	– 6.06	3 44	2.09	174	2	61.2	8 9/GR9	10	11
B CE411	– 63.80	30	– 50.97	– 15.26	3 86	1.38	49	2	62.9	8 9/GR7		
B CE412	– 44.80	30	– 50.71	– 15.30	3 57	1.56	52	2	63.0	8 9/GR9	10	12
B CE511	– 63.80	30	– 53.11	– 2.98	2.42	2.15	107	2	63.4	8 9/GR7		
B NO611	– 73.80	30	– 59.60	– 11.62	2.86	1.69	165	1	63 1	8 9/GR8		
B NO711	– 73.80	30	– 60.70	– 1.78	3.54	1.78	126	1	63.1	8 9/GR8		
B NO811	– 73.80	30	– 68.75	– 4.71	2.37	1 65	73	1	63 1	8 9/GR8		
B SE911	– 101.80	30	– 45.99	– 19.09	2.22	0 80	62	2	65 7	8		
B SU111	– 80.80	30	– 51.10	– 25.64	2.76	1.06	50	2	63.1	8 9/GR6		
B SU112	– 44.80	30	– 50.76	– 25.62	2.47	1.48	56	2	62.6	8 9/GR9	11	
B SU211	– 80.80	30	– 44.51	– 16.94	3.22	1.37	60	2	62.8	8 9/GR6		
B SU212	– 44.80	30	– 43.99	– 16.97	3.27	1.92	59	2	61.6	8 9/GR9	12	
B LZ00001	– 115.80	30	– 88.68	17.27	0.80	0.80	90	2	59.2			
CAN01101	– 137.80	30	– 125.60	57.24	3.45	1.27	157	2	59.7	9/GR10	10	
CAN01201	– 137.80	30	– 111.92	55.89	3.33	0.98	151	2	59.8	9/GR10	10	
CAN01202	– 72.30	30	– 107 64	55.62	2.75	1.11	32	2	59.8			
CAN01203	– 128.80	30	– 111.43	55.56	3 07	1.15	151	2	59.7	9/GR12	10	
CAN01303	– 128.80	30	– 102.39	57.12	3.54	0.92	154	2	60.3	9/GR12	10	

1	2	3	4		5		6	7	8	9	
CAN01304	– 90 80	30	– 99.00	57.33	1 96	1 73	1	2	60 0	9/GR13	
CAN01403	– 128 80	30	– 89.70	52.02	4 67	0.80	148	2	62 1	9/GR12	10
CAN01404	– 90.80	30	– 84 78	52 41	3.09	2 06	153	2	60 6	9/GR13	
CAN01405	– 81 80	30	– 84 02	52 34	2 82	2 30	172	2	60.5	9/GR14	
CAN01504	– 90 80	30	– 72.68	53 78	3.57	1 67	157	2	60.4	9/GR13	
CAN01505	– 81 80	30	– 71 76	53.76	3.30	1 89	162	2	60 3	9/GR14	
CAN01605	– 81.80	30	– 61 54	49 50	2 66	1.39	144	2	60.5	9/GR14	
CAN01606	– 70 30	30	– 61 32	49.51	2 41	1 65	148	2	60.4		
CHLCONT4	– 105.80	30	– 69 59	– 23.20	2 21	0 80	68	2	59.3	9/GR16	
CHLCONT6	– 105 80	30	– 73.52	– 55 52	3 65	1.31	39	2	59 7	9/GR16	
CRBBAH01	– 92 30	30	– 76 09	24.13	1 83	0 80	141	1	61.9	9/GR18	
CRBBER01	– 92 30	30	– 64.76	32 13	0 80	0 80	90	1	56 9	9/GR18	
CRBBLZ01	– 92 30	30	– 88.61	17 26	0 80	0 80	90	1	58 9	9/GR18	
CRBEC001	– 92 30	30	– 60 07	8.26	4 20	0 86	115	1	64 6	9/GR18	
CRBJMC01	– 92 30	30	– 79 45	17 97	0.99	0.80	151	1	61 3	9/GR18	
CTR00201	– 130 80	30	– 84.33	9 67	0 82	0 80	119	2	66.0		
DMAIFRB1	– 79.30	30	– 61.30	15 35	0 80	0 80	90	2	58 7		
EQAC0001	– 94 80	30	– 78 31	– 1.52	1 48	1 15	65	1	63.3	9/GR19	
EQAG0001	– 94 80	30	– 90 36	– 0 57	0 94	0.89	99	1	61 2	9/GR19	
HWA00002	– 165 80	30	– 165.79	23.32	4.20	0 80	160	2	59 0	9/GR1	10
HWA00003	– 174 80	30	– 166 10	23 42	4 25	0.80	159	2	59 0	9/GR2	10
MEX01NTE	– 77.80	30	– 105 80	25 99	2 88	2.07	155	2	60 7	1	
MEX02NTE	– 135 80	30	– 107.36	26.32	3.80	1 57	149	2	61 4	1	10
MEX02SUR	– 126.80	30	– 96.39	19 88	3 19	1.87	158	2	62 8	1	10

NCG00003	–107.30	30	–84 99	12 90	1.05	1 01	176	1	63 6	
PRU00004	–85.80	30	–74.19	–8 39	3.74	2 45	112	2	63 1	
PTRVIR01	–100.80	30	–65.85	18.12	0.80	0 80	90	2	60 8	1 6 9/GR20
PTRVIR02	–109.80	30	–65.85	18 12	0.80	0.80	90	2	61 4	1 6 9/GR21
USAEH001	–61.30	30	–85.16	36 21	5.63	3.32	22	2	62.1	1 5 6
USAEH002	–100.80	30	–89.28	36.16	5 65	3.78	170	2	62.0	1 6 9/GR20 10
USAEH003	–109.80	30	–90.12	36 11	5.55	3.56	161	2	62.3	1 6 9/GR21 10
USAEH004	–118 80	30	–91 16	36.05	5 38	3.24	153	2	62.9	1 5 6 10
USAPSA02	–165 80	30	–117.79	40.58	4 04	0.82	135	2	63 5	9/GR1
USAPSA03	–174.80	30	–118 20	40 15	3.63	0.80	136	2	65 3	9/GR2
USAWH101	–147.80	30	–109.70	38.13	5.52	1 96	142	2	62 3	10
USAWH102	–156.80	30	–111 40	38 57	5.51	1.55	138	2	63 5	10
VEN11VEN	–103.80	30	–66.79	6.90	2 50	1.77	122	2	65.5	10

12661,40 MHz (31)

1	2	3	4	5	6	7	8	9
ALS00002	−166.20	31	−149.66 58 37	3.76 1.24	170	1	60 0	9/GR1 10
ALS00003	−175.20	31	−150.98 58.53	3.77 1.11	167	1	60.2	9/GR2 10
ARGINSU4	−94 20	31	−52.98 −59.81	3.40 0.80	19	1	60.1	9/GR3
ARGINSU5	−55.20	31	−44.17 −59.91	3.77 0.80	13	1	59.5	9/GR4
ARGSUR04	−94.20	31	−65.04 −43.33	3.32 1.50	40	1	60.9	9/GR3
ARGSUR05	−55.20	31	−63.68 −43.01	2 54 2.38	152	1	60.3	9/GR4
B CE311	−64 20	31	−40.60 −6.07	3 04 2.06	174	1	61.9	8 9/GR7
B CE312	−45.20	31	−40.27 −6.06	3.44 2.09	174	1	61 3	8 9/GR9 10 11
B CE411	−64 20	31	−50.97 −15.27	3.86 1 38	49	1	62.9	8 9/GR7
B CE412	−45 20	31	−50.71 −15.30	3.57 1.56	52	1	63.1	8 9/GR9 10 12
B CE511	−64 20	31	−53 10 −2.90	2.44 2.13	104	1	63.4	8 9/GR7
B NO611	−74 20	31	−59.60 −11.62	2.85 1.69	165	2	63.2	8 9/GR8
B NO711	−74 20	31	−60 70 −1.78	3.54 1.78	126	2	63.2	8 9/GR8
B NO811	−74.20	31	−68.76 −4.71	2.37 1.65	73	2	63.1	8 9/GR8
B SU111	−81.20	31	−51 12 −25 63	2.76 1.05	50	1	63.2	8 9/GR6
B SU112	−45.20	31	−50.75 −25.62	2.47 1.48	56	1	62.6	8 9/GR9 11
B SU211	−81 20	31	−44.51 −16.95	3 22 1.36	60	1	62 8	8 9/GR6
B SU212	−45.20	31	−44.00 −16.87	3.20 1.96	58	1	61 6	8 9/GR9 12
BERBERMU	−96 20	31	−64.77 32.32	0.80 0.80	90	2	57 0	
B OLAND01	−115.20	31	−65.04 −16.76	2 49 1 27	76	1	68.1	9/GR5
B OL00001	−87 20	31	−64.61 −16.71	2 52 2 19	85	1	64.2	
B RB00001	−92.70	31	−59 85 12.93	0.80 0.80	90	2	59.4	
CAN01101	−138.20	31	−125.63 57.24	3.45 1.27	157	1	59 7	9/GR10 10
CAN01201	−138 20	31	−112.04 55.95	3.35 0.97	151	1	59 8	9/GR10 10

CAN01202	−72 70	31	−107 70	55 63	2.74	1 12	32	1	59.8		
CAN01203	−129.20	31	−111 48	55.61	3.08	1 15	151	1	59 7	9/GR12	10
CAN01303	−129.20	31	−102 42	57.12	3.54	0.91	154	1	60 3	9/GR12	10
CAN01304	−91 20	31	−99 12	57.36	1.98	1 72	2	1	60 1	9/GR13	
CAN01403	−129.20	31	−89 75	52.02	4 68	0.80	148	1	62 1	9/GR12	10
CAN01404	−91 20	31	−84 82	52.42	3 10	2 05	152	1	60.6	9/GR13	
CAN01405	−82 20	31	−84 00	52 39	2 84	2 29	172	1	60 5	9/GR14	
CAN01504	−91.20	31	−72 66	53 77	3 57	1 67	156	1	60.4	9/GR13	
CAN01505	−82.20	31	−71 77	53.79	3.30	1 89	162	1	60.4	9/GR14	
CAN01605	−82.20	31	−61 50	49.55	2.65	1 40	143	1	60.5	9/GR14	
CAN01606	−70.70	31	−61 30	49.55	2 40	1 65	148	1	60.5		
CHLCONT5	−106.20	31	−72 23	−35 57	2 60	0 80	55	1	59 6	9/GR17	
CHLPAC02	−106.20	31	−80 06	−30.06	1 36	0.80	69	1	59 4	9/GR17	
CLMAND01	−115 20	31	−74.72	5.93	3 85	1 63	114	1	65 4	9/GR5	10
CLM00001	−103 20	31	−74 50	5 87	3 98	1.96	118	1	63.9	10	
CUB00001	−89.20	31	−79 81	21 62	2 24	0 80	168	1	61.3		
EQACAND1	−115.20	31	−78 40	−1.61	1.37	0 95	75	1	64.4	9/GR5	
EQAGAND1	−115.20	31	−90 34	−0.62	0.90	0.81	89	1	61 6	9/GR5	
GRD00059	−57.20	31	−61 58	12.29	0 80	0.80	90	1	58.7		
GRLDNK01	−53 20	31	−44 89	66 56	2.70	0.82	173	1	60 2	2	
GUY00201	−84 70	31	−59.19	4 78	1.44	0 85	95	1	63 8		
HWA00002	−166 20	31	−165.79	23 42	4.20	0.80	160	1	59.0	9/GR1	10
HWA00003	−175 20	31	−166.10	23 42	4.25	0.80	159	1	59.0	9/GR2	10
MEX01NTE	−78.20	31	−105 81	26.01	2.89	2.08	155	1	60 8	1	

12661,40 MHz (31)

1	2	3	4		5		6	7	8	9	
MEX01SUR	−69.20	31	−94 84	19 82	3 05	2.09	4	1	62 5	1	
MEX02NTE	−136 20	31	−107.21	26 31	3.84	1.55	148	1	61.5	1	10
MEX02SUR	−127 20	31	−96.39	19 88	3.18	1.87	157	1	62.8	1	10
MSR00001	−79.70	31	−61.73	16 75	0.80	0 80	90	1	58.9	4	
PAQPAC01	−106 20	31	−109 18	−27.53	0.80	0.80	90	1	56 4	9/GR17	
PRG00002	−99.20	31	−58.66	−23.32	1 45	1 04	76	1	60 5		
PRUAND02	−115 20	31	−74 69	−8.39	3.41	1.79	95	1	64.3	9/GR5	
PTRVIR01	−101.20	31	−65.85	18 12	0.80	0.80	90	1	60 8	1 6 9/GR20	
PTRVIR02	−110 20	31	−65 86	18.12	0 80	0 80	90	1	61 3	1 6 9/GR21	
URG00001	−71 70	31	−56.22	−32.52	1 02	0.89	11	1	60 2		
USAEH001	−61 70	31	−85.19	36 21	5.63	3 33	22	1	62 1	1 5 6	
USAEH002	−101 20	31	−89.24	36.16	5 67	3 76	170	1	62 0	1 6 9/GR20	10
USAEH003	−110.20	31	−90.14	36.11	5.55	3.55	161	1	62.4	1 6 9/GR21	10
USAEH004	−119 20	31	−91.16	36.05	5.38	3 24	152	1	62 9	1 5 6	10
USAPSA02	−166 20	31	−117.80	40.58	4.03	0 82	135	1	63 6	9/GR1	
USAPSA03	−175.20	31	−118 27	40.12	3.62	0.80	136	1	65.4	9/GR2	
USAWH101	−148 20	31	−109.65	38 13	5.53	1.95	142	1	62 4	10	
USAWH102	−157.20	31	−111.41	38.57	5.51	1.54	138	1	63.5	10	
VENAND03	−115 20	31	−67 04	6 91	2.37	1.43	111	1	67.7	9/GR5	10

ALS00002	– 165.80	32	– 149.63	58 52	3.81	1.23	171	2	59 9	9/GR1	10	
ALS00003	– 174.80	32	– 150.95	58 54	3 77	1.11	167	2	60.2	9/GR2	10	
ARGNORT4	– 93.80	32	– 63 96	– 30 01	3.86	1 99	48	2	66 1			
ARGNORT5	– 54.80	32	– 62.85	– 29 80	3 24	2 89	47	2	63 9			
B CE311	– 63.80	32	– 40 60	– 6.07	3.04	2.06	174	2	61.9	8 9/GR7		
B CE312	– 44 80	32	– 40 26	– 6 06	3.44	2 09	174	2	61 3	8 9/GR9	10	11
B CE411	– 63.80	32	– 50.97	– 15 26	3.86	1 38	49	2	62 9	8 9/GR7		
B CE412	– 44.80	32	– 50.71	– 15 30	3.57	1 56	52	2	63.1	8 9/GR9	10	12
B CE511	– 63.80	32	– 53 11	– 2.98	2 42	2.15	107	2	63.4	8 9/GR7		
B NO611	– 73 80	32	– 59 60	– 11.62	2.86	1 69	165	1	63 2	8 9/GR8		
B NO711	– 73.80	32	– 60.70	– 1.78	3 54	1.78	126	1	63 2	8 9/GR8		
B NO811	– 73.80	32	– 68.75	– 4.71	2 37	1 65	73	1	63 2	8 9/GR8		
B SE911	– 101.80	32	– 45 99	– 19.09	2 22	0.80	62	2	65.7	8		
B SU111	– 80 80	32	– 51 10	– 25.64	2.76	1.06	50	2	63.2	8 9/GR6		
B SU112	– 44.80	32	– 50 76	– 25.62	2.47	1 48	56	2	62 6	8 9/GR9	11	
B SU211	– 80 80	32	– 44 51	– 16.94	3.22	1.37	60	2	62 8	8 9/GR6		
B SU212	– 44.80	32	– 43.99	– 16.97	3.27	1 92	59	2	61.6	8 9/GR9	12	
CAN01101	– 137.80	32	– 125 60	57.24	3.45	1.27	157	2	59 7	9/GR10	10	
CAN01201	– 137 80	32	– 111.92	55.89	3.33	0.98	151	2	59 8	9/GR10	10	
CAN01202	– 72.30	32	– 107.64	55.62	2 75	1.11	32	2	59.8			
CAN01203	– 128.80	32	– 111 43	55.56	3.07	1 15	151	2	59.7	9/GR12	10	
CAN01303	– 128 80	32	– 102.39	57 12	3.54	0.92	154	2	60 3	9/GR12	10	
CAN01304	– 90.80	32	– 99.00	57.33	1 96	1.73	1	2	60 0	9/GR13		
CAN01403	– 128 80	32	– 89.70	52.02	4 67	0.80	148	2	62.1	9/GR12	10	

1	2	3	4		5		6	7	8	9	
CAN01404	– 90.80	32	– 84.78	52 41	3 09	2 06	153	2	60.6	9/GR13	
CAN01405	– 81.80	32	– 84.02	52.34	2.82	2.30	172	2	60.5	9/GR14	
CAN01504	– 90 80	32	– 72.68	53.78	3 57	1.67	157	2	60.4	9/GR13	
CAN01505	– 81.80	32	– 71.76	53.76	3.30	1.89	162	2	60.4	9/GR14	
CAN01605	– 81.80	32	– 61.54	49.50	2.66	1.39	144	2	60.5	9/GR14	
CAN01606	– 70 30	32	– 61 32	49.51	2.41	1.65	148	2	60.5		
CHLCONT4	– 105 80	32	– 69.59	– 23.20	2 21	0 80	68	2	59 3	9/GR16	
CHLCONT6	– 105 80	32	– 73.52	– 55 52	3.65	1.31	39	2	59 8	9/GR16	
CRBBAH01	– 92.30	32	– 76.09	24 13	1 83	0 80	141	1	62 0	9/GR18	
CRBBER01	– 92 30	32	– 64.76	32 13	0 80	0 80	90	1	57 0	9/GR18	
CRBBLZ01	– 92.30	32	– 88 61	17 26	0.80	0 80	90	1	58 9	9/GR18	
CRBEC001	– 92 30	32	– 60.07	8.26	4 20	0.86	115	1	64 6	9/GR18	
CRBJMC01	– 92 30	32	– 79 45	17 97	0.99	0 80	151	1	61 4	9/GR18	
EQAC0001	– 94 80	32	– 78.31	– 1.52	1.48	1 15	65	1	63 3	9/GR19	
EQAG0001	– 94 80	32	– 90.36	– 0 57	0.94	0.89	99	1	61.3	9/GR19	
GRD00003	– 79.30	32	– 61.62	12.34	0 80	0 80	90	2	58.9		
GTMIFRB2	– 107 30	32	– 90.50	15.64	1 03	0 80	84	1	61 4		
GUFMGG02	– 52.80	32	– 56 42	8 47	4 16	0 81	123	2	63 0	2 7	
HWA00002	– 165 80	32	– 165.79	23.32	4 20	0 80	160	2	59 0	9/GR1	10
HWA00003	– 174 80	32	– 166 10	23.42	4 25	0 80	159	2	59 0	9/GR2	10
MEX01NTE	– 77 80	32	– 105 80	25.99	2 88	2.07	155	2	60 8	1	
MEX02NTE	– 135 80	32	– 107 36	26.32	3.80	1.57	149	2	61 5	1	10
MEX02SUR	– 126.80	32	– 96.39	19.88	3.19	1.87	158	2	62 8	1	10
PNRIFRB2	– 121 00	32	– 80 15	8 46	1.01	0.80	170	1	65 1		

PRU00004	−85.80	32	−74.19	−8.39	3.74	2.45	112	2	63.2	
PTRVIR01	−100.80	32	−65.85	18.12	0.80	0.80	90	2	60.9	1 6 9/GR20
PTRVIR02	−109.80	32	−65.85	18 12	0.80	0.80	90	2	61.4	1 6 9/GR21
USAEH001	−61.30	32	−85.16	36.21	5.63	3.32	22	2	62 1	1 5 6
USAEH002	−100.80	32	−89.28	36.16	5.65	3.78	170	2	62.0	1 6 9/GR20 10
USAEH003	−109 80	32	−90.12	36.11	5.55	3.56	161	2	62.4	1 6 9/GR21 10
USAEH004	−118.80	32	−91.16	36.05	5.38	3.24	153	2	62.9	1 5 6 10
USAPSA02	−165 80	32	−117 79	40.58	4 04	0.82	135	2	63 6	9/GR1
USAPSA03	−174.80	32	−118 20	40.15	3 63	0.80	136	2	65 3	9/GR2
USAWH101	−147 80	32	−109.70	38.13	5 52	1.96	142	2	62 4	10
USAWH102	−156 80	32	−111 40	38.57	5 51	1.55	138	2	63 5	10
VEN02VEN	−103 80	32	−63.50	15 50	0.80	0.80	90	2	60 1	9/GR22
VEN11VEN	−103 80	32	−66 79	6.90	2.50	1 77	122	2	65 6	9/GR22 10

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ARTICLE 11

The Plan for the Broadcasting-Satellite Service in the Frequency Bands 11.7 - 12.2 GHz in Region 3 and 11.7 - 12.5 GHz in Region 1

11.1 COLUMN HEADINGS OF THE PLAN

Col. 1. *Country symbol and IFRB Serial Number* (Column 1 contains the symbol designating the country or the geographical area taken from Table No. 1 of the Preface to the International Frequency List).

Col. 2. *Nominal orbital position*, in degrees.

Col. 3. *Channel number* (see table showing channel numbers and corresponding assigned frequencies).

Col. 4. *Boresight* geographical coordinates, in degrees and tenths of a degree.

Col. 5. *Antenna beamwidth.* This column contains two figures corresponding to the major axis and the minor axis respectively of the elliptical cross-section half-power beam, in degrees and tenths of a degree.

Col. 6. *Orientation of the ellipse* determined as follows: in a plane normal to the beam axis, the direction of a major axis of the ellipse is specified as the angle measured anti-clockwise from a line parallel to the equatorial plane to the major axis of the ellipse to the nearest degree.

Col. 7. *Polarization* (1 = direct, 2 = indirect) [1].

Col. 8. *E.i.r.p.* in the direction of maximum radiation in dBW.

Col. 9. *Remarks.*

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[1] See Annex 5, paragraph 3.2.3.

11.2 NOTES RELATING TO THE PLAN

1. The ΔG of this assignment is . . . dB.

2. To be dedicated to the Islamic programme envisaged in the Conference [1] documents.

3. This assignment results from a common requirement of the Administrations of Denmark and Iceland. The service area includes the Faeroe Islands and Iceland. The assignment may, after consultations between the two Administrations, be used by either of them.

4. IFB – IFRB. This assignment has been included in the Plan by the Conference.

5. Assignment intended to ensure coverage of Algeria, Libya, Morocco, Mauritania and Tunisia, with the agreement of the countries concerned. If required, this assignment may be used with the characteristics of the beam TUN 150.

6. Assignments appearing in the Plan for Somalia should be coordinated with each country concerned and in particular with Ethiopia.

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[1] The World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977

11.3 TABLE SHOWING CORRESPONDENCE BETWEEN CHANNEL NUMBERS AND ASSIGNED FREQUENCIES

Channel No.	Assigned frequency (MHz)	Channel No.	Assigned frequency (MHz)
1	11 727.48	21	12 111.08
2	11 746.66	22	12 130.26
3	11 765.84	23	12 149.44
4	11 785.02	24	12 168.62
5	11 804.20	25	12 187.80
6	11 823.38	26	12 206.98
7	11 842.56	27	12 226.16
8	11 861.74	28	12 245.34
9	11 880.92	29	12 264.52
10	11 900.10	30	12 283.70
11	11 919.28	31	12 302.88
12	11 938.46	32	12 322.06
13	11 957.64	33	12 341.24
14	11 976.82	34	12 360.42
15	11 996.00	35	12 379.60
16	12 015.18	36	12 398.78
17	12 034.36	37	12 417.96
18	12 053.54	38	12 437.14
19	12 072.72	39	12 456.32
20	12 091.90	40	12 475.50

1		2	3	4		5		6	7	8	9
AFG	246A	50 0	1	64 5	33.1	1.44	1.40	21	1	63 4	
AUS	005A	98.0	1	133 5	−18.8	2.70	1.40	76	2	64.3	
CAR	338A	122.0	1	149.5	8.0	5.36	0.77	178	1	62 5	
CHN	155A	62.0	1	88.3	31.5	3.38	1.45	162	2	62.9	
CHN	162A	92.0	1	115 9	21.0	2.74	2.42	23	2	63 9	
CHN	163A	80.0	1	116.0	39.2	1.20	0.80	132	1	64 4	
CME	300A	−13 0	1	12.7	6.2	2.54	1 68	87	1	63 4	
F	093A	−19 0	1	2.6	45.9	2.50	0 98	160	1	63 8	
FJI	193A	152 0	1	179.4	−17.9	1 04	0 98	67	1	63 7	
GUI	192A	−37.0	1	−11 0	10.2	1 58	1 04	147	2	63 4	
IND	039A	56.0	1	72 7	11.2	1 26	0.60	107	1	63 1	
IND	044A	68.0	1	79.5	22 3	2.19	1 42	146	1	63 3	
INS	035A	104.0	1	124.3	−3.2	3.34	1.94	82	1	63 2	
J	111A	110 0	1	134.5	31.5	3 52	3.30	68	1	63 2	
LBY	280A	−25.0	1	21.4	26.0	2.50	1.04	119	2	63 5	
MDG	236A	29.0	1	46.6	−18 8	2 72	1.14	65	2	63 3	
NZL	055A	158.0	1	172.3	−39 7	2 88	1.56	47	1	63 3	
PLM	337A	170.0	1	−161.4	7 0	0.60	0 60	0	1	62.4	
POL	132A	−1.0	1	19 3	51.8	1.46	0.64	162	2	64 1	
QAT	247A	17.0	1	51.1	25.3	0.60	0.60	0	1	61 8	1/1 6
SMA	335A	170.0	1	−170 1	−14 2	0.60	0.60	0	2	61 1	1/0 9
SMR	311A	−37.0	1	12.6	43 7	0.60	0.60	0	1	62 4	1/0 8
SWZ	313A	−1.0	1	31.5	−26.5	0.62	0.60	66	1	62 8	1/1 7
THA	142A	74.0	1	100.7	13.2	2.82	1.54	106	2	63 6	
TUR	145A	5 0	1	34.4	38 9	2.68	1.04	168	1	63.7	
URS	064A	23.0	1	45.6	40 8	2 16	0.60	163	2	63.9	
URS	067A	44.0	1	62.4	58 5	3 20	1.52	169	1	66 3	
WAK	334A	140.0	1	166.5	19 2	0 60	0.60	0	1	63.6	
YMS	267A	11.0	1	48.8	15 2	1 76	1.54	176	2	62.8	

ALG	251A	–25 0	2	4 2	33 2	2 45	1 25	172	1	63 4
ARS	275A	17 0	2	48 3	24 6	3 84	1 20	138	2	62 7
AUS	006A	98 0	2	135 4	–30 3	2 00	1 40	44	1	63 2
AUS	008A	128 0	2	145 9	–21 5	2 90	2 00	120	2	63 7
BOT	297A	–1 0	2	23 3	–22 2	2 13	1 50	36	2	63 7
CHN	154A	62 0	2	83 9	40 5	2 75	2 05	177	1	63 2
CHN	161A	92 0	2	118 1	31 1	2 49	1 69	117	1	64 4
CKH	052A	158 0	2	–161 0	–19 8	1 02	0 64	132	2	64 6
CLN	219A	50 0	2	80 6	7 7	1 18	0 60	106	1	63 6
D	087A	–19 0	2	9 6	49 9	1 62	0 72	147	2	65 5
FNL	103A	5 0	2	22 5	64 5	1 38	0 76	171	2	67 7
GNP	304A	–31 0	2	–15 0	12 0	0 90	0 60	172	2	63 1
GUM	331A	122 0	2	144 5	13 1	0 60	0 60	0	2	63 3
IND	037A	68 0	2	93 0	25 5	1 46	1 13	40	2	63 9
IND	045A	56 0	2	76 2	19 5	1 58	1 58	21	2	63 5
INS	028A	80 0	2	101 5	0 0	3 00	1 20	133	2	63 3
IRL	211A	–31 0	2	–8 2	53 2	0 84	0 60	162	1	64 2
KOR	112A	110 0	2	127 5	36 0	1 24	1 02	168	2	63 6
LAO	284A	74 0	2	103 7	18 1	2 16	0 78	133	1	63 8
MAU	242A	29 0	2	59 8	–18 9	1 62	1 24	55	1	64 0
MLA	228A	86 0	2	114 1	3 9	2 34	1 12	45	1	63 6
MLI	327A	–37 0	2	–2 0	19 0	2 66	1 26	127	1	63 2
MRL	333A	146 0	2	166 7	7 9	1 50	1 50	177	1	63 3
NCL	100A	140 0	2	166 0	–21 0	1 14	0 72	146	1	63 7
PAK	127A	38 0	2	69 6	29 5	2 30	2 16	14	1	63 9
PNG	131A	110 0	2	147 7	–6 3	2 50	2 18	169	1	64 4
ROU	136A	–1 0	2	25 0	45 7	1 38	0 66	155	1	63 8
TCD	143A	–13 0	2	18 1	15 5	3 40	1 72	107	2	64 0
TGO	226A	–25 0	2	0 8	8 6	1 52	0 60	105	2	63 4
WAL	102A	140 0	2	–176.8	–14 0	0 74	0 60	29	1	64 4
YEM	266A	11 0	2	44 3	15 1	1 14	0 70	109	1	62 6
ZAI	323A	–19 0	2	21 3	–6 8	2 80	1.52	149	1	64 6

1		2	3	4		5		6	7	8	9
AFG	245A	50 0	3	70.2	35.5	1.32	1.13	53	1	62.8	
AUS	004A	98.0	3	121.8	−24.9	3.60	1.90	54	2	63.0	
AUS	009A	128.0	3	147.2	−32.0	2.10	1.40	15	1	64.1	
AZR	134A	−31 0	3	−23.4	36.1	2.56	0.70	158	2	63.0	
BEN	233A	−19 0	3	2.2	9.5	1.44	0.68	97	2	63.3	
CHN	157A	62.0	3	102.3	27 8	2.56	1.58	127	2	65.1	
CHN	160A	92 0	3	122.8	45.3	2.50	1.45	150	2	65.1	
COM	207A	29 0	3	44 1	−12.1	0.76	0.60	149	2	63.1	
GAB	260A	−13 0	3	11 8	−0.6	1.43	1.12	64	1	63.3	
GMB	302A	−37 0	3	−15.1	13.4	0.79	0 60	4	2	63.3	
GRC	105A	5 0	3	24.7	38.2	1 78	0.98	156	1	63.3	
IND	043A	56.0	3	77.8	11 1	1.36	1.28	172	1	63.3	
IND	047A	68 0	3	93.3	11.1	1.92	0.60	96	1	63.4	
INS	036A	104 0	3	135 2	−3.8	2 46	2.00	147	1	63.8	
IRN	109A	34 0	3	54 2	32 4	3 82	1.82	149	2	62.8	
J	111B	110 0	3	134.5	31.5	3.52	3 30	68	1	64.2	
LBN	279A	11 0	3	35.8	33.9	0.60	0.60	0	2	61.6	1/1.8
LBR	244A	−31 0	3	−9 3	6.6	1.22	0.70	133	1	63.2	
LBY	321A	−25 0	3	13.1	27.2	2.36	1 12	129	2	63.0	
LIE	253A	−37 0	3	9.5	47.1	0.60	0.60	0	1	62.4	1/0.7
LUX	114A	−19 0	3	6.0	49.8	0.60	0.60	0	1	62.9	1/2.0
MRA	332A	122 0	3	145 9	16.9	1.20	0.60	76	1	63.5	
NHB	128A	140 0	3	168 0	−16.4	1.52	0.68	87	2	62.8	
NRU	309A	134 0	3	167.0	−0.5	0.60	0.60	0	2	62.5	
POR	133A	−31 0	3	−8.0	39.6	0.92	0 60	112	2	63.4	
SMO	057A	158 0	3	−172.3	−13 7	0.60	0 60	0	1	63 6	
SNG	151A	74 0	3	103.8	1.3	0 60	0.60	0	2	63.5	
SOM	312A	23 0	3	45.0	6.4	3.26	1.54	71	1	62 3	
TCH	144A	−1 0	3	17.3	49 3	1.47	0 60	170	2	63.8	
UGA	051A	11 0	3	32.3	1.2	1.46	1 12	60	1	63.2	
URS	061A	23 0	3	24 7	56.6	0.88	0.64	12	2	65.0	
URS	073A	44 0	3	54 3	63.5	1.58	0.66	3	1	66.9	
VTN	325A	86 0	3	105 3	16.1	3.03	1.40	116	2	63.4	
ZMB	314A	−1.0	3	27 5	−13.1	2.38	1.48	39	1	63.7	

ALG	252A	– 25 0	4	1 6	25 5	3 64	2 16	152	1	62 8	
AND	341A	– 37 0	4	1 6	42 5	0 60	0 60	0	2	61 5	1/0 5
ARS	003A	17 0	4	41 1	23 8	3 52	1 68	134	2	62 7	
AUS	007A	128 0	4	145 0	– 38 1	1 83	1 39	134	2	63 3	
AUT	016A	– 19 0	4	12 2	47 5	1.14	0 63	166	2	64 1	
BUL	020A	– 1 0	4	25 0	43 0	1 04	0 60	165	1	63 6	
CHN	156A	62 0	4	97 8	36 3	2 56	1 58	157	1	63 5	
CHN	161B	92 0	4	118 1	31 1	2 49	1 69	117	1	64 4	
CKN	053A	158 0	4	– 163 0	– 11 2	1 76	0 72	30	2	64 3	
CPV	301A	– 31 0	4	– 24 0	16 0	0 86	0 70	144	2	62 2	
EGY	026A	– 7 0	4	29 7	26 8	2 33	1 72	136	2	63 1	
G	027A	– 31 0	4	– 3.5	53 8	1 84	0 72	142	1	65 0	
IND	040A	56 0	4	73 0	25 0	1 82	1 48	58	2	63 6	
IND	048A	68 0	4	86 2	25 0	1 56	0 90	120	2	63 7	
INS	028B	80 0	4	101 5	0 0	3 00	1 20	133	2	63 3	
KOR	112B	110 0	4	127 5	36 0	1 24	1 02	168	2	63.6	
LAO	284B	74 0	4	103 7	18 1	2 16	0 78	133	1	63 8	
MAU	243A	29 0	4	56 8	– 13 9	1 56	1 38	65	1	63 7	
MLA	228B	86 0	4	114 1	3.9	2 34	1 12	45	1	63 6	
MLI	328A	– 37 0	4	– 7 6	13 2	1 74	1 24	171	1	63 7	
MLT	147A	– 13 0	4	14 3	35 9	0 60	0 60	0	1	61 0	1/0 7
MOZ	307A	– 1 0	4	34 0	– 18.0	3 57	1 38	55	2	64 2	
OCE	101A	– 160 0	4	– 145 0	– 16 3	4 34	3 54	4	2	63 5	
PAK	283A	38 0	4	74 7	33 9	1 34	1 13	160	1	64 3	
PNG	271A	128 0	4	148 0	– 6 7	2 80	2.05	155	1	63 4	
RRW	310A	11 0	4	30.0	– 2 1	0 66	0 60	42	2	64 8	
S	138A	5 0	4	16 2	61 0	1 04	0 98	14	2	67 1	
STP	241A	– 13 0	4	7 0	0 8	0 60	0 60	0	2	61 4	1/1 3
TON	215A	170 0	4	– 174 7	– 18 0	1 41	0 68	85	1	63.3	
URS	060A	23 0	4	41 5	57 4	3 08	1 56	153	1	66 7	
ZAI	322A	– 19 0	4	22 4	0 0	2 16	1 88	48	1	64 7	

1		2	3	4		5		6	7	8	9
AFG	246B	50.0	5	64.5	33.1	1.44	1.40	21	1	63.4	
AUS	005B	98.0	5	133.5	−18.8	2.70	1.40	76	2	64.3	
CAR	338B	122.0	5	149.5	8.0	5.36	0.77	178	1	62.5	
CHN	155B	62.0	5	88.3	31.5	3.38	1.45	162	2	62.9	
CHN	162B	92.0	5	115.9	21.0	2.74	2.42	23	2	64.0	
CHN	164A	80.0	5	112.2	37.4	1.06	0.76	111	1	64.2	
CME	300B	−13.0	5	12.7	6.2	2.54	1.68	87	1	63.5	
F	093B	−19.0	5	2.6	45.9	2.50	0.98	160	1	63.8	
FJI	193B	152.0	5	179.4	−17.9	1.04	0.98	67	1	63.7	
GUI	192B	−37.0	5	−11.0	10.2	1.58	1.04	147	2	63.5	
IND	039B	56.0	5	72.7	11.2	1.26	0.60	107	1	63.1	
IND	044B	68.0	5	79.5	22.3	2.19	1.42	146	1	63.4	
INS	035B	104.0	5	124.3	−3.2	3.34	1.94	82	1	63.2	
J	111C	110.0	5	134.5	31.5	3.52	3.30	68	1	64.2	
LBY	280B	−25.0	5	21.4	26.0	2.50	1.04	119	2	63.5	
MDG	236B	29.0	5	46.6	−18.8	2.72	1.14	65	2	63.4	
NZL	055B	158.0	5	172.3	−39.7	2.88	1.56	47	1	63.4	
PLM	337B	170.0	5	−161.4	7.0	0.60	0.60	0	1	62.4	
POL	132B	−1.0	5	19.3	51.8	1.46	0.64	162	2	64.2	
QAT	247B	17.0	5	51.1	25.3	0.60	0.60	0	1	61.8	1/1.6
SMA	335B	170.0	5	−170.1	−14.2	0.60	0.60	0	2	61.2	1/0.9
SMR	311B	−37.0	5	12.6	43.7	0.60	0.60	0	1	62.5	1/0.8
SWZ	313B	−1.0	5	31.5	−26.5	0.62	0.60	66	1	62.8	1/1.7
THA	142B	74.0	5	100.7	13.2	2.82	1.54	106	2	63.7	
TUR	145B	5.0	5	34.4	38.9	2.68	1.04	168	1	63.8	
URS	064B	23.0	5	45.6	40.8	2.16	0.60	163	2	63.9	
URS	067B	44.0	5	62.4	58.5	3.20	1.52	169	1	66.4	
WAK	334B	140.0	5	166.5	19.2	0.60	0.60	0	1	63.6	
YMS	267B	11.0	5	48.8	15.2	1.76	1.54	176	2	62.9	

ALG	251B	−25.0	6	4.2	33.2	2.45	1.25	172	1	63.4	
ARS	275B	17.0	6	48.3	24.6	3.84	1.20	138	2	62.8	
AUS	006B	98.0	6	135.4	−30.3	2.00	1.40	44	1	63.3	
AUS	008B	128.0	6	145.9	−21.5	2.90	2.00	120	2	63.7	
BOT	297B	−1.0	6	23.3	−22.2	2.13	1.50	36	2	63.8	
CHN	154B	62.0	6	83.9	40.5	2.75	2.05	177	1	63.3	
CHN	161C	92.0	6	118.1	31.1	2.49	1.69	117	1	64.5	
CKH	052B	158.0	6	−161.0	−19.8	1.02	0.64	132	2	64.6	
CLN	219B	50.0	6	80.6	7.7	1.18	0.60	106	1	63.6	
D	087B	−19.0	6	9.6	49.9	1.62	0.72	147	2	65.6	
FNL	103B	5.0	6	22.5	64.5	1.38	0.76	171	2	67.8	
GNP	304B	−31.0	6	−15.0	12.0	0.90	0.60	172	2	63.2	
GUM	331B	122.0	6	144.5	13.1	0.60	0.60	0	2	63.4	
IND	037B	68.0	6	93.0	25.5	1.46	1.13	40	2	64.0	
IND	045B	56.0	6	76.2	19.5	1.58	1.58	21	2	63.6	
INS	028C	80.0	6	101.5	0.0	3.00	1.20	133	2	63.3	
IRL	211B	−31.0	6	−8.2	53.2	0.84	0.60	162	1	64.3	
KOR	112C	110.0	6	127.5	36.0	1.24	1.02	168	2	63.6	
LAO	284C	74.0	6	103.7	18.1	2.16	0.78	133	1	63.8	
MAU	242B	29.0	6	59.8	−18.9	1.62	1.24	55	1	64.0	
MLA	228C	86.0	6	114.1	3.9	2.34	1.12	45	1	63.6	
MLI	327B	−37.0	6	−2.0	19.0	2.66	1.26	127	1	63.2	
MRL	333B	146.0	6	166.7	7.9	1.50	1.50	177	1	63.3	
NCL	100B	140.0	6	166.0	−21.0	1.14	0.72	146	1	63.8	
PAK	127B	38.0	6	69.6	29.5	2.30	2.16	14	1	64.0	
PNG	131B	110.0	6	147.7	−6.3	2.50	2.18	169	1	64.4	
ROU	136B	−1.0	6	25.0	45.7	1.38	0.66	155	1	63.9	
TCD	143B	−13.0	6	18.1	15.5	3.40	1.72	107	2	64.0	
TGO	226B	−25.0	6	0.8	8.6	1.52	0.60	105	2	63.4	
WAL	102B	140.0	6	−176.8	−14.0	0.74	0.60	29	1	64.4	
YEM	266B	11.0	6	44.3	15.1	1.14	0.70	109	1	62.7	
ZAI	323B	−19.0	6	21.3	−6.8	2.80	1.52	149	1	64.7	

1		2	3	4		5		6	7	8	9
AFG	245B	50 0	7	70.2	35.5	1.32	1.13	53	1	62.9	
AUS	004B	98.0	7	121.8	−24.9	3.60	1.90	54	2	63.1	
AUS	009B	128 0	7	147.2	−32.0	2 10	1.40	15	1	64.1	
AZR	134B	−31 0	7	−23.4	36.1	2.56	0.70	158	2	63.1	
BEN	233B	−19.0	7	2.2	9.5	1.44	0.68	97	2	63.3	
CHN	157B	62 0	7	102.3	27.8	2.56	1.58	127	2	65.1	
CHN	160B	92 0	7	122.8	45.3	2.50	1.45	150	2	65.1	
COM	207B	29.0	7	44 1	−12.1	0.76	0.60	149	2	63.1	
GAB	260B	−13.0	7	11.8	−0.6	1.43	1.12	64	1	63.4	
GMB	302B	−37 0	7	−15.1	13.4	0.79	0.60	4	2	63.4	
GRC	105B	5.0	7	24.7	38.2	1 78	0.98	156	1	63.4	
IND	043B	56.0	7	77.8	11.1	1.36	1.28	172	1	63.4	
IND	047B	68 0	7	93.3	11.1	1.92	0.60	96	1	63.5	
INS	036B	104.0	7	135.2	−3.8	2.46	2.00	147	1	63.8	
IRN	109B	34.0	7	54.2	32.4	3.82	1.82	149	2	62.8	
J	111D	110 0	7	134.5	31.5	3.52	3.30	68	1	64 2	
LBN	279B	11 0	7	35.8	33.9	0.60	0.60	0	2	61.7	1/1.8
LBR	244B	−31.0	7	−9.3	6.6	1.22	0.70	133	1	63.3	
LBY	321B	−25.0	7	13.1	27.2	2.36	1.12	129	2	63.1	
LIE	253B	−37.0	7	9.5	47.1	0 60	0.60	0	1	62.5	1/0.7
LUX	114B	−19.0	7	6.0	49.8	0.60	0.60	0	1	63.0	1/2.0
MRA	332B	122.0	7	145.9	16.9	1.20	0.60	76	1	63.5	
NHB	128B	140.0	7	168.0	−16.4	1.52	0.68	87	2	62.9	
NRU	309B	134 0	7	167.0	−0.5	0.60	0.60	0	2	62.6	
POR	133B	−31.0	7	−8.0	39.6	0.92	0.60	112	2	63.4	
SMO	057B	158.0	7	−172.3	−13.7	0.60	0.60	0	1	63.7	
SNG	151B	74 0	7	103.8	1.3	0.60	0.60	0	2	63.6	
SOM	312B	23.0	7	45.0	6.4	3.26	1.54	71	1	62.4	
TCH	144B	−1 0	7	17.3	49.3	1.47	0.60	170	2	63.9	
UGA	051B	11.0	7	32.3	1.2	1.46	1.12	60	1	63.3	
URS	061B	23 0	7	24.7	56.6	0.88	0.64	12	2	65.1	
URS	072A	44 0	7	70.1	61.5	2.38	0.66	173	1	67.1	
VTN	325B	86.0	7	105.3	16.1	3.03	1.40	116	2	63.5	
ZMB	314B	−1.0	7	27.5	−13.1	2.38	1.48	39	1	63.8	

ALG	252B	–25.0	8	1.6	25.5	3.64	2.16	152	1	62.8	
AND	341B	–37.0	8	1 6	42.5	0.60	0.60	0	2	61.5	1/0 5
ARS	003B	17.0	8	41.1	23 8	3.52	1.68	134	2	62.8	
AUS	007B	128.0	8	145.0	–38.1	1.83	1.39	134	2	63.4	
AUT	016B	–19.0	8	12.2	47 5	1.14	0.63	166	2	64 2	
BUL	020B	–1.0	8	25 0	43.0	1.04	0 60	165	1	63.7	
CHN	156B	62.0	8	97.8	36.3	2.56	1.58	157	1	63.5	
CHN	173A	92.0	8	115 7	27.4	1.14	0.94	99	1	64.0	
CKN	053B	158.0	8	–163.0	–11.2	1.76	0 72	30	2	64.3	
CPV	301B	–31 0	8	–24.0	16.0	0.86	0.70	144	2	62.2	
EGY	026B	–7.0	8	29.7	26 8	2 33	1.72	136	2	63.2	
G	027B	–31.0	8	–3.5	53.8	1 84	0.72	142	1	65.1	
IND	040B	56 0	8	73.0	25.0	1.82	1.48	58	2	63.7	
IND	048B	68.0	8	86.2	25.0	1.56	0.90	120	2	63.7	
INS	028D	80.0	8	101.5	0 0	3.00	1.20	133	2	63.4	
KOR	112D	110.0	8	127 5	36.0	1.24	1.02	168	2	63 7	
LAO	284D	74.0	8	103.7	18.1	2.16	0.78	133	1	63.8	
MAU	243B	29.0	8	56.8	–13.9	1.56	1.38	65	1	63.8	
MLA	228D	86.0	8	114.1	3.9	2.34	1 12	45	1	63.7	
MLI	328B	–37.0	8	–7.6	13.2	1.74	1.24	171	1	63.8	
MLT	147B	–13.0	8	14.3	35.9	0.60	0.60	0	1	61.0	1/0.7
MOZ	307B	–1.0	8	34.0	–18.0	3.57	1.38	55	2	64.2	
OCE	101B	–160.0	8	–145.0	–16.3	4.34	3.54	4	2	63 6	
PAK	283B	38.0	8	74.7	33.9	1.34	1.13	160	1	64.3	
PNG	271B	128.0	8	148.0	–6.7	2.80	2.05	155	1	63.4	
RRW	310B	11.0	8	30.0	–2.1	0.66	0.60	42	2	64.9	
S	138B	5.0	8	16.2	61 0	1.04	0.98	14	2	67.1	
STP	241B	–13.0	8	7.0	0.8	0.60	0.60	0	2	61.5	1/1.3
TON	215B	170.0	8	–174.7	–18.0	1.41	0.68	85	1	63.3	
URS	060B	23.0	8	41.5	57.4	3.08	1.56	153	1	66.8	
ZAI	322B	–19 0	8	22.4	0.0	2.16	1.88	48	1	64.8	

1		2	3	4		5		6	7	8	9
AFG	246C	50.0	9	64.5	33 1	1.44	1.40	21	1	63.4	
AUS	005C	98 0	9	133.5	−18.8	2.70	1.40	76	2	64.4	
CAR	338C	122.0	9	149.5	8.0	5.36	0.77	178	1	62.6	
CHN	155C	62 0	9	88.3	31 5	3.38	1.45	162	2	63.0	
CHN	162C	92 0	9	115.9	21.0	2.74	2.42	23	2	64.0	
CHN	165A	80.0	9	111.4	41 8	1.58	1.20	15	1	63.6	
CME	300C	−13 0	9	12.7	6.2	2.54	1.68	87	1	63.5	
F	093C	−19 0	9	2.6	45.9	2.50	0.98	160	1	63.9	
FJI	193C	152 0	9	179.4	−17 9	1.04	0 98	67	1	63.8	
GUI	192C	−37 0	9	−11 0	10 2	1 58	1 04	147	2	63.5	
IND	039C	56 0	9	72.7	11 2	1.26	0.60	107	1	63.2	
IND	044C	68 0	9	79.5	22.3	2 19	1.42	146	1	63.5	
INS	035C	104.0	9	124.3	−3.2	3.34	1 94	82	1	63.3	
J	111E	110 0	9	134.5	31 5	3.52	3.30	68	1	64 3	
LBY	280C	−25.0	9	21.4	26.0	2.50	1 04	119	2	63.6	
MDG	236C	29.0	9	46.6	−18 8	2 72	1 14	65	2	63.4	
NZL	055C	158.0	9	172.3	−39.7	2.88	1 56	47	1	63.4	
PLM	337C	170.0	9	−161.4	7 0	0 60	0 60	0	1	62.5	
POL	132C	−1 0	9	19 3	51.8	1 46	0.64	162	2	64.2	
QAT	247C	17 0	9	51 1	25.3	0 60	0 60	0	1	61.9	1/1.6
SMA	335C	170 0	9	−170 1	−14.2	0.60	0.60	0	2	61.3	1/0 9
SMR	311C	−37 0	9	12 6	43.7	0.60	0.60	0	1	62.5	1/0.8
SWZ	313C	−1 0	9	31 5	−26.5	0.62	0 60	66	1	62.9	1/1.7
THA	142C	74 0	9	100 7	13.2	2.82	1.54	106	2	63.7	
TUR	145C	5.0	9	34.4	38.9	2.68	1.04	168	1	63.8	
URS	064C	23.0	9	45.6	40.8	2.16	0 60	163	2	64.0	
URS	067C	44.0	9	62.4	58.5	3.20	1.52	169	1	66 4	
WAK	334C	140.0	9	166.5	19.2	0.60	0.60	0	1	63 7	
YMS	267C	11.0	9	48.8	15.2	1.76	1.54	176	2	62.9	

ALG	251C	−25.0	10	4.2	33.2	2.45	1 25	172	1	63 5	
ARS	275C	17.0	10	48.3	24.6	3.84	1.20	138	2	62 9	
AUS	006C	98.0	10	135.4	−30.3	2.00	1.40	44	1	63.3	
AUS	008C	128.0	10	145.9	−21 5	2.90	2.00	120	2	63.8	
BOT	297C	−1.0	10	23 3	−22.2	2.13	1.50	36	2	63.9	
CHN	154C	62.0	10	83.9	40 5	2.75	2 05	177	1	63 3	
CHN	171A	92.0	10	117.2	32 0	1 20	0.74	126	1	64 2	
CHN	187A	80.0	10	106.6	26 7	1.14	0.94	179	2	64 0	
CKH	052C	158.0	10	−161.0	−19.8	1 02	0.64	132	2	64 7	
CLN	219C	50.0	10	80.6	7.7	1 18	0.60	106	1	63.7	
D	087C	−19.0	10	9.6	49.9	1.62	0 72	147	2	65 6	
FNL	103C	5.0	10	22.5	64.5	1.38	0.76	171	2	67.9	
GNP	304C	−31.0	10	−15.0	12.0	0.90	0.60	172	2	63.2	
GUM	331C	122.0	10	144.5	13 1	0 60	0.60	0	2	63 4	
IND	037C	68.0	10	93.0	25 5	1 46	1.13	40	2	64 0	
IND	045C	56.0	10	76.2	19.5	1.58	1 58	21	2	63.6	
IRL	211C	−31.0	10	−8.2	53.2	0.84	0.60	162	1	64.4	
KOR	112E	110.0	10	127.5	36.0	1.24	1.02	168	2	63.7	
LAO	284E	74.0	10	103.7	18.1	2.16	0 78	133	1	63.9	
MAU	242C	29.0	10	59.8	−18.9	1.62	1 24	55	1	64.1	
MLI	327C	−37.0	10	−2.0	19.0	2 66	1.26	127	1	63 2	
MRL	333C	146.0	10	166.7	7 9	1.50	1.50	177	1	63.4	
NCL	100C	140.0	10	166.0	−21.0	1.14	0.72	146	1	63.8	
PAK	127C	38.0	10	69.6	29.5	2.30	2.16	14	1	64.0	
PNG	131C	110.0	10	147.7	−6.3	2.50	2.18	169	1	64 5	
ROU	136C	−1.0	10	25.0	45.7	1 38	0.66	155	1	63 9	
TCD	143C	−13.0	10	18.1	15.5	3.40	1.72	107	2	64.1	
TGO	226C	−25.0	10	0.8	8.6	1.52	0.60	105	2	63.5	
WAL	102C	140.0	10	−176.8	−14.0	0.74	0.60	29	1	64.5	
YEM	266C	11 0	10	44 3	15 1	1.14	0.70	109	1	62.7	
ZAI	323C	−19.0	10	21.3	−6.8	2.80	1.52	149	1	64.7	

1		2	3	4		5		6	7	8	9
AFG	245C	50.0	11	70.2	35.5	1.32	1.13	53	1	62.9	
AUS	004C	98 0	11	121.8	−24.9	3.60	1.90	54	2	63.1	
AUS	009C	128 0	11	147.2	−32.0	2 10	1.40	15	1	64.2	
AZR	134C	−31 0	11	−23.4	36.1	2.56	0.70	158	2	63.1	
BEN	233C	−19.0	11	2.2	9.5	1.44	0 68	97	2	63 4	
CHN	157C	62 0	11	102.3	27.8	2.56	1.58	127	2	65.2	
CHN	160C	92 0	11	122.8	45 3	2.50	1 45	150	2	65.2	
COM	207C	29 0	11	44 1	−12 1	0 76	0.60	149	2	63.2	
GAB	260C	−13.0	11	11 8	−0.6	1.43	1.12	64	1	63.4	
GMB	302C	−37 0	11	−15 1	13.4	0.79	0.60	4	2	63 4	
GRC	105C	5 0	11	24.7	38.2	1.78	0.98	156	1	63.4	
IND	043C	56 0	11	77 8	11.1	1.36	1.28	172	1	63.5	
IND	047C	68.0	11	93.3	11.1	1 92	0.60	96	1	63.5	
INS	036C	104 0	11	135 2	−3 8	2 46	2.00	147	1	63.9	
IRN	109C	34 0	11	54.2	32 4	3.82	1.82	149	2	62 9	
J	111F	110 0	11	134 5	31 5	3.52	3 30	68	1	64.3	
LBN	279C	11 0	11	35.8	33 9	0.60	0.60	0	2	61.7	1/1.8
LBR	244C	−31 0	11	−9 3	6.6	1 22	0.70	133	1	63.3	
LBY	321C	−25 0	11	13 1	27 2	2.36	1 12	129	2	63 1	
LIE	253C	−37 0	11	9.5	47.1	0.60	0 60	0	1	62.5	1/0.7
LUX	114C	−19 0	11	6 0	49 8	0.60	0.60	0	1	63.0	1/2.0
MRA	332C	122.0	11	145 9	16.9	1 20	0 60	76	1	63.6	
NHB	128C	140.0	11	168 0	−16.4	1.52	0.68	87	2	63.0	
NRU	309C	134 0	11	167 0	−0.5	0.60	0.60	0	2	62.6	
POR	133C	−31 0	11	−8.0	39 6	0.92	0 60	112	2	63 5	
SMO	057C	158 0	11	−172 3	−13.7	0.60	0 60	0	1	63 8	
SNG	151C	74 0	11	103 8	1.3	0 60	0.60	0	2	63.7	
SOM	312C	23 0	11	45 0	6.4	3 26	1 54	71	1	62.4	
TCH	144C	−1 0	11	17.3	49.3	1 47	0.60	170	2	63.9	
UGA	051C	11 0	11	32 3	1 2	1 46	1.12	60	1	63.3	
URS	061C	23 0	11	24 7	56.6	0 88	0.64	12	2	65 1	
VTN	325C	86 0	11	105.3	16 1	3.03	1 40	116	2	63.5	
ZMB	314C	−1 0	11	27.5	−13.1	2.38	1 48	39	1	63.8	

ALG	252C	−25 0	12	1 6	25 5	3 64	2 16	152	1	62 9	
AND	341C	−37 0	12	1 6	42 5	0.60	0.60	0	2	61 6	1/0.5
ARS	003C	17 0	12	41 1	23 8	3.52	1 68	134	2	62.8	
AUS	007C	128.0	12	145.0	−38 1	1.83	1 39	134	2	63.4	
AUT	016C	−19.0	12	12 2	47 5	1 14	0.63	166	2	64 2	
BRU	330A	74.0	12	114 7	4 4	0.60	0 60	0	1	62.5	1/1 3
BUL	020C	−1.0	12	25 0	43 0	1.04	0 60	165	1	63 8	
CHN	156C	62 0	12	97.8	36 3	2.56	1 58	157	1	63.6	
CHN	170A	92 0	12	119 5	33 0	1.34	0 64	155	1	64 4	
CHN	178A	80.0	12	111.5	27 4	1.22	0 86	130	2	64 4	
CKN	053C	158.0	12	−163.0	−11 2	1.76	0 72	30	2	64 4	
CPV	301C	−31.0	12	−24.0	16 0	0 86	0 70	144	2	62.3	
DNK	089A	5.0	12	12.3	57 1	1.20	0 60	177	2	64.3	
EGY	026C	−7.0	12	29.7	26 8	2.33	1.72	136	2	63.2	
G	027C	−31.0	12	−3 5	53 8	1.84	0 72	142	1	65 1	
IND	040C	56 0	12	73 0	25 0	1.82	1.48	58	2	63.8	
IND	048C	68 0	12	86 2	25 0	1.56	0.90	120	2	63 8	
KOR	112F	110.0	12	127.5	36 0	1 24	1.02	168	2	63 7	
MAU	243C	29.0	12	56.8	−13 9	1 56	1.38	65	1	63.8	
MLD	306A	44.0	12	73.1	6.0	0.96	0 60	90	1	63 7	
MLI	328C	−37.0	12	−7 6	13 2	1.74	1 24	171	1	63 8	
MLT	147C	−13 0	12	14.3	35.9	0.60	0.60	0	1	61.1	1/0.7
MOZ	307C	−1.0	12	34 0	−18 0	3.57	1.38	55	2	64.3	
OCE	101C	−160.0	12	−145.0	−16 3	4.34	3.54	4	2	63.6	
PAK	210A	38.0	12	72.1	30.8	1.16	0.72	90	1	63.5	
PNG	271C	128.0	12	148.0	−6.7	2.80	2.05	155	1	63.5	
RRW	310C	11.0	12	30 0	−2.1	0.66	0.60	42	2	64.9	
STP	241C	−13.0	12	7.0	0.8	0.60	0.60	0	2	61 5	1/1.3
TON	215C	170 0	12	−174.7	−18.0	1.41	0.68	85	1	63 4	
URS	060C	23.0	12	41.5	57 4	3.08	1.56	153	1	66.9	
URS	069A	44 0	12	70.8	38.5	1.36	0.74	161	2	64.1	
ZAI	322C	−19.0	12	22 4	0.0	2 16	1.88	48	1	64.8	

11 957,64 MHz (13)

1		2	3	4		5		6	7	8	9
AFG	246D	50.0	13	64.5	33.1	1.44	1.40	21	1	63.4	
AUS	005D	98.0	13	133.5	−18.8	2.70	1.40	76	2	64.4	
CAR	338D	122.0	13	149.5	8.0	5.36	0.77	178	1	62.6	
CHN	155D	62.0	13	88.3	31.5	3.38	1.45	162	2	63.0	
CHN	180A	92.0	13	113.7	12.9	3.76	2.18	72	2	63.6	
CME	300D	−13.0	13	12.7	6.2	2.54	1.68	87	1	63.6	
F	093D	−19.0	13	2.6	45.9	2.50	0.98	160	1	64.0	
GUI	192D	−37.0	13	−11.0	10.2	1.58	1.04	147	2	63.6	
IND	039D	56.0	13	72.7	11.2	1.26	0.60	107	1	63.3	
IND	044D	68.0	13	79.5	22.3	2.19	1.42	146	1	63.5	
INS	035D	104.0	13	124.3	−3.2	3.34	1.94	82	1	63.4	
J	111G	110.0	13	134.5	31.5	3.52	3.30	68	1	64.3	
LBY	280D	−25.0	13	21.4	26.0	2.50	1.04	119	2	63.6	
MDG	236D	29.0	13	46.6	−18.8	2.72	1.14	65	2	63.5	
NZL	055D	158.0	13	172.3	−39.7	2.88	1.56	47	1	63.5	
NZL	287A	128.0	13	173.0	−41.0	3.30	1.28	48	1	64.8	
PLM	337D	170.0	13	−161.4	7.0	0.60	0.60	0	1	62.6	
POL	132D	−1.0	13	19.3	51.8	1.46	0.64	162	2	64.3	
QAT	247D	17.0	13	51.1	25.3	0.60	0.60	0	1	62.0	1/1.6
SMA	335D	170.0	13	−170.1	−14.2	0.60	0.60	0	2	61.3	1/0.9
SMR	311D	−37.0	13	12.6	43.7	0.60	0.60	0	1	62.6	1/0.8
SWZ	313D	−1.0	13	31.5	−26.5	0.62	0.60	66	1	63.0	1/1.7
THA	142D	74.0	13	100.7	13.2	2.82	1.54	106	2	63.8	
TUR	145D	5.0	13	34.4	38.9	2.68	1.04	168	1	63.9	
URS	064D	23.0	13	45.6	40.8	2.16	0.60	163	2	64.1	
URS	067D	44.0	13	62.4	58.5	3.20	1.52	169	1	66.5	
WAK	334D	140.0	13	166.5	19.2	0.60	0.60	0	1	63.7	
YMS	267D	11.0	13	48.8	15.2	1.76	1.54	176	2	63.0	

ALG	251D	−25.0	14	4.2	33.2	2.45	1.25	172	1	63.6	
ARS	275D	17.0	14	48.3	24.6	3.84	1.20	138	2	63.0	
AUS	006D	98.0	14	135.4	−30.3	2.00	1.40	44	1	63.4	
AUS	008D	128.0	14	145.9	−21.5	2.90	2.00	120	2	63.9	
BOT	297D	−1.0	14	23.3	−22.2	2.13	1.50	36	2	63.9	
BRU	330B	74.0	14	114.7	4.4	0.60	0.60	0	1	62.6	1/1.3
CHN	154D	62.0	14	83.9	40.5	2.75	2.05	177	1	63.4	
CHN	172A	92.0	14	120.4	29.1	0 96	0.84	123	1	64.3	
CHN	181A	80.0	14	108.5	23 8	1 41	1.08	153	2	64 1	
CKH	052D	158.0	14	−161.0	−19 8	1.02	0.64	132	2	64.8	
CLN	219D	50.0	14	80.6	7 7	1 18	0 60	106	1	63 8	
D	087D	−19.0	14	9.6	49.9	1.62	0.72	147	2	65.7	
GNP	304D	−31.0	14	−15.0	12 0	0.90	0.60	172	2	63.3	
GUM	331D	122.0	14	144.5	13.1	0.60	0.60	0	2	63 5	
IND	037D	68.0	14	93.0	25.5	1.46	1.13	40	2	64.1	
IND	045D	56.0	14	76.2	19.5	1.58	1.58	21	2	63 7	
IRL	211D	−31.0	14	−8.2	53.2	0.84	0.60	162	1	64.4	
KRE	286A	110.0	14	127 0	39.1	1.30	1.10	31	2	64 0	
MAU	242D	29.0	14	59.8	−18.9	1.62	1.24	55	1	64.1	
MLI	327D	−37.0	14	−2.0	19.0	2.66	1.26	127	1	63.2	
MRL	333D	146.0	14	166.7	7.9	1.50	1.50	177	1	63.5	
NCL	100D	140.0	14	166.0	−21.0	1.14	0.72	146	1	63.9	
NOR	120A	5.0	14	13.1	64.1	1 84	0.88	10	2	65.0	
PAK	210B	38.0	14	72.1	30.8	1.16	0.72	90	1	63.6	
PNG	131D	110.0	14	147.7	−6.3	2.50	2.18	169	1	64.6	
ROU	136D	−1.0	14	25.0	45.7	1.38	0.66	155	1	64.0	
TCD	143D	−13.0	14	18.1	15.5	3.40	1.72	107	2	64.1	
TGO	226D	−25.0	14	0.8	8.6	1.52	0.60	105	2	63.5	
WAL	102D	140.0	14	−176.8	−14 0	0.74	0.60	29	1	64.6	
YEM	266D	11.0	14	44.3	15.1	1.14	0.70	109	1	62.8	
ZAI	323D	−19.0	14	21.3	−6.8	2.80	1.52	149	1	64.8	

1		2	3	4		5		6	7	8	9
AFG	245D	50.0	15	70.2	35.5	1.32	1.13	53	1	63.0	
AUS	004D	98.0	15	121.8	−24.9	3.60	1.90	54	2	63.2	
AUS	009D	128.0	15	147.2	−32.0	2.10	1.40	15	1	64.2	
AZR	134D	−31.0	15	−23.4	36 1	2.56	0.70	158	2	63.2	
BEN	233D	−19 0	15	2.2	9.5	1.44	0.68	97	2	63.4	
BGD	220A	74 0	15	90.3	23.6	1.46	0.84	135	1	63.7	
CHN	158A	80.0	15	111.8	38.0	2.60	1.74	124	1	64.9	
CHN	174A	92.0	15	118.1	25.9	1.02	0.84	82	2	64.1	
COM	207D	29.0	15	44.1	−12.1	0.76	0.60	149	2	63.3	
GAB	260D	−13.0	15	11.8	−0.6	1.43	1.12	64	1	63.5	
GMB	302D	−37 0	15	−15.1	13.4	0.79	0.60	4	2	63.5	
GRC	105D	5 0	15	24.7	38.2	1.78	0.98	156	1	63.5	
IND	043D	56 0	15	77.8	11.1	1.36	1.28	172	1	63.5	
IND	047D	68 0	15	93.3	11 1	1.92	0.60	96	1	63.6	
INS	036D	104 0	15	135.2	−3.8	2.46	2.00	147	1	63.9	
IRN	109D	34 0	15	54 2	32.4	3 82	1.82	149	2	63.0	
J	111H	110 0	15	134 5	31 5	3.52	3.30	68	1	64.4	
LBN	279D	11 0	15	35 8	33.9	0.60	0.60	0	2	61.8	1/1.8
LBR	244D	−31 0	15	−9 3	6.6	1.22	0.70	133	1	63.4	
LBY	321D	−25 0	15	13 1	27.2	2.36	1.12	129	2	63 2	
LIE	253D	−37 0	15	9 5	47.1	0.60	0.60	0	1	62 6	1/0 7
LUX	114D	−19 0	15	6.0	49 8	0.60	0 60	0	1	63.1	1/2.0
MRA	332D	122 0	15	145 9	16 9	1 20	0 60	76	1	63.6	
NHB	128D	140 0	15	168.0	−16.4	1 52	0 68	87	2	63.0	
NRU	309D	134 0	15	167 0	−0.5	0 60	0 60	0	2	62 7	
POR	133D	−31 0	15	−8.0	39.6	0 92	0 60	112	2	63.6	
SMO	057D	158 0	15	−172.3	−13.7	0 60	0 60	0	1	63 8	
SNG	151D	74 0	15	103.8	1.3	0 60	0.60	0	2	63.7	
SOM	312D	23 0	15	45.0	6.4	3 26	1.54	71	1	62.5	
TCH	144D	−1 0	15	17 3	49.3	1 47	0.60	170	2	64 0	
UGA	051D	11 0	15	32.3	1 2	1 46	1 12	60	1	63 4	
URS	061D	23 0	15	24.7	56.6	0 88	0 64	12	2	65.2	
VTN	325D	86 0	15	105.3	16 1	3 03	1 40	116	2	63.6	
ZMB	314D	−1 0	15	27 5	−13 1	2.38	1 48	39	1	63.9	

ALG	252D	−25 0	16	1.6	25.5	3 64	2.16	152	1	63.0	
AND	341D	−37.0	16	1.6	42.5	0 60	0.60	0	2	61.6	1/0 5
ARS	003D	17.0	16	41.1	23.8	3 52	1.68	134	2	62 8	
AUS	007D	128.0	16	145.0	−38.1	1 83	1 39	134	2	63 5	
AUT	016D	−19 0	16	12.2	47.5	1.14	0.63	166	2	64.3	
BUL	020D	−1.0	16	25.0	43.0	1 04	0.60	165	1	63 8	
CHN	169A	92.0	16	118.5	36.4	1 16	0.76	11	1	64.7	
CHN	186A	62.0	16	102.5	30.2	1.91	1.23	147	2	65 5	
CKN	053D	158.0	16	−163.0	−11 2	1 76	0.72	30	2	64 5	
CPV	301D	−31.0	16	−24.0	16.0	0 86	0 70	144	2	62.4	
DNK	089B	5.0	16	12.3	57 1	1 20	0.60	177	2	64 4	
EGY	026D	−7.0	16	29.7	26 8	2.33	1.72	136	2	63.3	
G	027D	−31.0	16	−3.5	53 8	1 84	0 72	142	1	65 2	
IND	040D	56.0	16	73.0	25 0	1.82	1 48	58	2	63 8	
IND	048D	68 0	16	86.2	25 0	1.56	0 90	120	2	65 5	
KRE	286B	110 0	16	127 0	39 1	1.30	1.10	31	2	64.0	
MAU	243D	29.0	16	56 8	−13.9	1 56	1.38	65	1	63 9	
MLA	227A	86.0	16	102 1	4.1	1.62	0 82	135	1	63.2	2
MLD	306B	44.0	16	73.1	6.0	0.96	0.60	90	1	63.7	
MLI	328D	−37.0	16	−7.6	13.2	1.74	1.24	171	1	63.9	
MLT	147D	−13.0	16	14.3	35.9	0.60	0.60	0	1	61.2	1/0.7
MOZ	307D	−1.0	16	34.0	−18.0	3.57	1.38	55	2	64.4	
OCE	101D	−160 0	16	−145.0	−16.3	4.34	3.54	4	2	63 7	
PHL	285A	98.0	16	121.3	11.1	3 46	1.76	99	2	63.7	
RRW	310D	11.0	16	30.0	−2.1	0 66	0.60	42	2	65.0	
STP	241D	−13 0	16	7 0	0.8	0.60	0.60	0	2	61 6	1/1.3
TON	215D	170.0	16	−174 7	−18.0	1 41	0.68	85	1	63.5	
URS	060D	23.0	16	41.5	57.4	3.08	1.56	153	1	66 9	
URS	069B	44.0	16	70 8	38.5	1.36	0.74	161	2	64.1	
ZAI	322D	−19.0	16	22.4	0.0	2.16	1.88	48	1	64.9	

1		2	3	4		5		6	7	8	9
AUS	005E	98.0	17	133.5	– 18.8	2.70	1.40	76	2	64.5	
BRM	298A	74.0	17	97.1	19.1	3.58	1.48	104	2	63.9	
CAR	338E	122 0	17	149.5	8.0	5 36	0 77	178	1	62.7	
CHN	167A	92.0	17	124.3	43.7	1.98	0 72	156	2	64.7	
CHN	182A	80 0	17	108.7	35.1	1.42	0 88	109	1	64.2	
CME	300E	– 13 0	17	12.7	6.2	2.54	1.68	87	1	63 6	
F	093E	– 19 0	17	2.6	45.9	2.50	0.98	160	1	64.0	
GUI	192E	– 37 0	17	– 11.0	10.2	1.58	1.04	147	2	63.7	
IND	038A	56.0	17	75.9	33.4	1.52	1 08	33	1	64.3	
IND	046A	68.0	17	84.7	20.5	1.60	0.86	30	1	63.6	
INS	032A	80.0	17	112.3	– 0.3	2.66	2.32	109	2	64.0	
LBY	280E	– 25 0	17	21.4	26.0	2.50	1.04	119	2	63.7	
MDG	236E	29.0	17	46.6	– 18.8	2.72	1 14	65	2	63.5	
NPL	122A	50.0	17	83.7	28.3	1.72	0 60	163	2	64 6	
NZL	287B	128.0	17	173.0	– 41.0	3.30	1 28	48	1	64 8	
PLM	337E	170.0	17	– 161 4	7.0	0 60	0.60	0	1	62.6	
POL	132E	– 1 0	17	19 3	51 8	1 46	0.64	162	2	64.3	
QAT	247E	17.0	17	51.1	25.3	0.60	0 60	0	1	62 0	1/1 6 2
SMA	335E	170.0	17	– 170.1	– 14.2	0.60	0 60	0	2	61 4	1/0.9
SMR	311E	– 37 0	17	12.6	43.7	0.60	0 60	0	1	62 7	1/0 8
SWZ	313E	– 1 0	17	31.5	– 26.5	0.62	0.60	66	1	63.0	1/1 7
TUR	145E	5.0	17	34 4	38.9	2.68	1.04	168	1	63 9	
URS	064E	23.0	17	45.6	40 8	2.16	0 60	163	2	64 1	
WAK	334E	140 0	17	166.5	19.2	0.60	0 60	0	1	63 8	
YMS	267E	11.0	17	48.8	15.2	1.76	1 54	176	2	63 0	

ALG	251E	–25.0	18	4.2	33.2	2 45	1.25	172	1	63.6	
ARS	275E	17.0	18	48 3	24 6	3.84	1.20	138	2	63 0	
AUS	006E	98.0	18	135 4	–30 3	2.00	1 40	44	1	63 4	
AUS	008E	128.0	18	145 9	–21.5	2.90	2.00	120	2	63.9	
BGD	220B	74.0	18	90 3	23 6	1 46	0 84	135	1	63.7	
BOT	297E	–1 0	18	23 3	–22.2	2.13	1.50	36	2	64.0	
CBG	299A	68.0	18	105 0	12 7	1.01	0 90	110	1	64 3	
CHN	159A	80.0	18	109.4	27 3	2.14	1.72	107	2	64 5	
CHN	185A	62.0	18	95.7	35.4	2.10	1 14	156	1	63.4	
D	087E	–19.0	18	9 6	49.9	1.62	0 72	147	2	65 7	
GNP	304E	–31 0	18	–15.0	12 0	0.90	0 60	172	2	63.3	
GUM	331E	122 0	18	144 5	13 1	0.60	0.60	0	2	63.5	
IND	041A	56 0	18	78 4	16.0	2.08	1.38	35	2	63.8	
IND	042A	68 0	18	79.3	27 7	2.14	1.16	147	2	63 8	
INS	030A	80 0	18	112.3	–8.1	3.14	1.46	169	1	64.2	
IRL	211E	–31 0	18	–8.2	53 2	0 84	0 60	162	1	64.5	
KRE	286C	110 0	18	127.0	39.1	1.30	1.10	31	2	64.0	
MAU	242E	29 0	18	59.8	–18.9	1 62	1.24	55	1	64.2	
MLA	227B	86 0	18	102 1	4 1	1.62	0.82	135	1	63 3	
MLI	327E	–37.0	18	–2 0	19.0	2.66	1.26	127	1	63.2	
MRL	333E	146.0	18	166 7	7.9	1.50	1.50	177	1	63.5	
NOR	120B	5.0	18	13 1	64.1	1.84	0.88	10	2	65.0	
PAK	281A	38 0	18	65 2	27.9	1.52	1.42	28	1	63.0	
PHL	285B	98.0	18	121 3	11.1	3.46	1.76	99	2	63.7	
ROU	136E	–1.0	18	25.0	45.7	1.38	0.66	155	1	64.0	
TCD	143E	–13 0	18	18.1	15 5	3.40	1.72	107	2	64 2	
TGO	226E	–25 0	18	0.8	8.6	1.52	0.60	105	2	63.6	
URS	070A	44.0	18	73.9	41.0	1 34	0 84	5	2	64.5	
YEM	266E	11.0	18	44.3	15.1	1.14	0.70	109	1	62 8	
ZAI	323E	–19.0	18	21.3	–6.8	2.80	1.52	149	1	64 9	

1		2	3	4		5		6	7	8	9
AUS	004E	98.0	19	121.8	−24.9	3.60	1.90	54	2	63.2	
AUS	009E	128.0	19	147.2	−32.0	2.10	1.40	15	1	64.3	
AZR	134E	−31.0	19	−23.4	36.1	2.56	0.70	158	2	63.2	
BEN	233E	−19.0	19	2.2	9.5	1.44	0.68	97	2	63.5	
BRM	298B	74.0	19	97.1	19.1	3.58	1.48	104	2	63.9	
CHN	158B	80.0	19	111.8	38.0	2.60	1.74	124	1	64.9	
CHN	179A	92.0	19	112.2	21.9	1.84	1.22	37	2	63.8	
GAB	260E	−13.0	19	11.8	−0.6	1.43	1.12	64	1	63.6	
GMB	302E	−37.0	19	−15.1	13.4	0.79	0.60	4	2	63.5	
GRC	105E	5.0	19	24.7	38.2	1.78	0.98	156	1	63.5	
IND	038B	56.0	19	75.9	33.4	1.52	1.08	33	1	64.3	
IND	046B	68.0	19	84.7	20.5	1.60	0.86	30	1	63.6	
INS	032B	80.0	19	112.3	−0.3	2.66	2.32	109	2	64.1	
INS	036E	104.0	19	135.2	−3.8	2.46	2.00	147	1	64.0	2
IRN	109E	34.0	19	54.2	32.4	3.82	1.82	149	2	63.0	
LBN	279E	11.0	19	35.8	33.9	0.60	0.60	0	2	61.8	1/1.8
LBY	321E	−25 0	19	13.1	27.2	2.36	1.12	129	2	63.3	
LIE	253E	−37.0	19	9.5	47.1	0.60	0.60	0	1	62.6	1/0.7
LUX	114E	−19 0	19	6.0	49.8	0.60	0.60	0	1	63.1	1/2.0
MRA	332E	122 0	19	145.9	16.9	1.20	0.60	76	1	63.7	
NIU	054A	158.0	19	−169.8	−19.0	0.60	0.60	0	2	64.1	
NPL	122B	50.0	19	83.7	28.3	1.72	0.60	163	2	64.6	
POR	133E	−31.0	19	−8.0	39.6	0.92	0.60	112	2	63.6	
SOM	312E	23.0	19	45.0	6.4	3.26	1.54	71	1	62.6	
TCH	144E	−1.0	19	17.3	49.3	1.47	0.60	170	2	64.0	
UGA	051E	11.0	19	32.3	1.2	1.46	1.12	60	1	63.4	
URS	061E	23.0	19	24.7	56.6	0.88	0.64	12	2	65.2	
URS	077A	110.0	19	112.7	57.3	2.67	1.75	2	1	64.1	
ZMB	314E	−1.0	19	27.5	−13.1	2.38	1.48	39	1	63.9	

ALG	252E	– 25.0	20	1.6	25.5	3.64	2.16	152	1	63.0	
AND	341E	– 37 0	20	1 6	42.5	0.60	0.60	0	2	61.7	1/0.5
ARS	003E	17 0	20	41.1	23.8	3 52	1.68	134	2	62.9	
AUS	007E	128.0	20	145.0	– 38.1	1.83	1.39	134	2	63.5	
AUT	016E	– 19.0	20	12 2	47.5	1 14	0.63	166	2	64.3	
BGD	220C	74.0	20	90 3	23.6	1 46	0 84	135	1	63.7	
BUL	020E	– 1 0	20	25.0	43.0	1.04	0.60	165	1	63 9	
CBG	299B	68.0	20	105.0	12.7	1.01	0 90	110	1	64.3	
CHN	159B	80 0	20	109.4	27.3	2.14	1 72	107	2	64.6	
CHN	184A	62.0	20	101 0	37.9	2.78	0.82	144	1	63 7	
CPV	301E	– 31.0	20	– 24.0	16.0	0.86	0.70	144	2	62.4	
DNK	089C	5 0	20	12 3	57 1	1.20	0 60	177	2	64.4	
EGY	026E	– 7 0	20	29 7	26.8	2.33	1 72	136	2	63.3	
G	027E	– 31.0	20	– 3 5	53.8	1.84	0.72	142	1	65 2	
IND	041B	56.0	20	78.4	16.0	2.08	1 38	35	2	63.8	
IND	042B	68.0	20	79.3	27 7	2 14	1.16	147	2	63.8	
INS	030B	80.0	20	112 3	– 8 1	3.14	1.46	169	1	64.2	
KRE	286D	110.0	20	127.0	39.1	1.30	1.10	31	2	64.0	
MLA	227C	86.0	20	102.1	4.1	1.62	0.82	135	1	63.3	
MLI	328E	– 37.0	20	– 7.6	13.2	1.74	1.24	171	1	63.9	
MOZ	307E	– 1.0	20	34.0	– 18.0	3.57	1.38	55	2	64 4	
PAK	282A	38.0	20	68.5	25 8	1.32	0.62	133	1	63.3	
PHL	285C	98.0	20	121.3	11 1	3.46	1.76	99	2	63.7	
RRW	310E	11.0	20	30.0	– 2.1	0.66	0 60	42	2	65.0	
STP	241E	– 13 0	20	7.0	0.8	0.60	0.60	0	2	61.7	1/1.3
TKL	058A	158.0	20	– 171.8	– 8 9	0.70	0.60	35	1	63.8	
URS	065A	23.0	20	32.4	63.1	1.18	0.60	175	1	66.6	
URS	066A	44.0	20	64.3	44.6	4.56	2.48	169	2	65.4	
URS	079A	140.0	20	138.0	53.6	3.16	2.12	62	2	67.7	
ZAI	322E	– 19.0	20	22.4	0.0	2.16	1.88	48	1	64.9	

12 111,08 MHz (21)

1		2	3	4		5		6	7	8	9
AFI	099A	23.0	21	42.5	11.6	0.60	0.60	0	1	62.5	
AUS	005F	98.0	21	133.5	–18.8	2.70	1.40	76	2	64.5	
BEL	018A	–19.0	21	4.6	50.6	0.82	0.60	167	1	64.2	
BLR	062A	23.0	21	27.8	52.6	1.08	0.72	1	2	64.8	
BRM	298C	74.0	21	97.1	19.1	3.58	1.48	104	2	63.9	
CHN	175A	92.0	21	121.4	23.8	1.14	0.82	64	2	64.3	
CHN	176A	80.0	21	113.7	33.9	1.20	0.80	141	1	64.3	
CYP	086A	5.0	21	33.3	35.1	0.60	0.60	0	1	63.6	
DDR	216A	–1.0	21	12.6	52.1	0.83	0.63	172	2	64.2	
HVO	107A	–31.0	21	–1.5	12.2	1.45	1.14	29	1	64.0	
IFB	021A	5.0	21	24.5	–28.0	3.13	1.68	27	2	64.1	4
IND	038C	56.0	21	75.9	33.4	1.52	1.08	33	1	64.4	
IND	046C	68.0	21	84.7	20.5	1.60	0.86	30	1	63.7	
INS	032C	80.0	21	112.3	–0.3	2.66	2.32	109	2	64.1	
ISL	049A	–31.0	21	–19.0	64.9	1.00	0.60	177	2	65.8	
KEN	249A	11.0	21	37.9	1.1	2.29	1.56	94	1	63.7	
MCO	116A	–37.0	21	7.4	43.7	0.60	0.60	0	1	62.4	1/0.5
MRC	209A	–25.0	21	–9.0	29.2	2.72	1.47	43	2	63.3	
NPL	122C	50.0	21	83.7	28.3	1.72	0.60	163	2	64.6	
NZL	287C	128.0	21	173.0	–41.0	3.30	1.28	48	1	64.9	
SEN	222A	–37 0	21	–14.4	13.8	1.46	1.04	139	2	63.6	
UAE	274A	17.0	21	53.6	24.2	0.98	0.80	162	1	63.2	2
YUG	148A	–7.0	21	18.4	43.7	1.68	0.66	154	1	65.2	

ALB	296A	−7.0	22	19.8	41.3	0.68	0.60	146	2	63.8	
AUS	006F	98.0	22	135.4	−30.3	2.00	1.40	44	1	63.5	
AUS	008F	128.0	22	145.9	−21.5	2.90	2.00	120	2	64.0	
BDI	270A	11.0	22	29.9	−3.1	0.71	0.60	80	2	63.4	
BGD	220D	74.0	22	90.3	23.6	1.46	0.84	135	1	63.8	
CBG	299C	68.0	22	105.0	12.7	1.01	0.90	110	1	64.3	
CHN	159C	80.0	22	109.4	27.3	2.14	1.72	107	2	64.6	
CHN	168A	92.0	22	124.8	48.1	2.68	0.92	157	2	65.4	
CHN	183A	62.0	22	104.8	39.0	1.48	0.60	142	1	63.8	
COG	235A	−13.0	22	14.6	−0.7	2.02	1.18	59	2	63.8	
CTI	237A	−31.0	22	−5.6	7.5	1.60	1.22	108	2	63.7	
ETH	092A	23.0	22	39.7	9.1	3.50	2.40	124	2	63.4	
FNL	104A	5.0	22	17.0	61.5	2.00	1.00	10	2	67.7	
HNG	106A	−1.0	22	19.5	47.2	0.92	0.60	176	1	64.0	
IFB	135A	−1.0	22	29.6	−18.8	1.46	1.36	37	2	64.2	4
IND	041C	56.0	22	78.4	16.0	2.08	1.38	35	2	63.8	
IND	042C	68.0	22	79.3	27.7	2.14	1.16	147	2	63.8	
INS	030C	80.0	22	112.3	−8.1	3.14	1.46	169	1	64.2	
KRE	286E	110.0	22	127.0	39.1	1.30	1.10	31	2	64.1	
KWT	113A	17.0	22	47.6	29.2	0.68	0.60	145	2	63.1	
MLA	227D	86.0	22	102.1	4.1	1.62	0.82	135	1	63.3	
MTN	223A	−37.0	22	−12.2	18.5	2.62	1.87	150	1	62.8	
NIG	119A	−19.0	22	7 8	9.4	2.16	2.02	45	1	63.9	
PAK	281B	38.0	22	65.2	27.9	1.52	1.42	28	1	63.1	
PHL	285D	98.0	22	121.3	11.1	3.46	1.76	99	2	63.7	
REU	097A	29.0	22	55.6	−19.2	1.56	0.78	96	1	63.9	
SDN	231A	−7.0	22	28.9	12.7	2.26	1.96	159	1	63.5	
SUI	140A	−19.0	22	8.2	46.6	0.98	0.70	171	2	64.1	
SYR	229A	11.0	22	38.3	34.9	1.04	0.90	7	1	63.2	
TUN	150A	−25.0	22	9.5	33.5	1.88	0.72	135	1	63.8	
URS	070B	44.0	22	73.9	41.0	1.34	0.84	5	2	64.6	
URS	081A	140.0	22	168.5	65.5	1.96	0.60	168	1	68.1	

1		2	3	4		5		6	7	8	9
AGL	295A	– 13.0	23	16.5	– 12.0	3.09	2.26	84	1	64.1	
ARS	340A	17.0	23	52.3	24.8	2.68	0.70	143	1	63.2	
AUS	004F	98.0	23	121.8	– 24.9	3.60	1.90	54	2	63.3	
AUS	009F	128.0	23	147.2	– 32 0	2.10	1.40	15	1	64.3	
BRM	298D	74.0	23	97.1	19.1	3.58	1.48	104	2	64.0	
CHN	158C	80.0	23	111.8	38.0	2.60	1.74	124	1	65.0	
CNR	130A	– 31.0	23	– 15.7	28.4	1 54	0.60	5	2	62.8	
CVA	085A	– 37.0	23	10.8	41.5	2.00	0.60	138	1	63 6	1/1.5
E	129A	– 31.0	23	– 3 1	39.9	2.10	1.14	154	2	63.9	
GHA	108A	– 25.0	23	– 1.2	7.9	1.48	1.06	102	1	63.6	
GNE	303A	– 19.0	23	10.3	1.5	0.68	0.60	10	2	63.8	
HOL	213A	– 19.0	23	5.4	52.0	0.76	0.60	171	1	64.4	
IND	038D	56.0	23	75.9	33.4	1.52	1.08	33	1	64.4	
IND	046D	68.0	23	84.7	20.5	1.60	0.86	30	1	63.7	
INS	032D	80 0	23	112.3	– 0.3	2 66	2.32	109	2	64 1	
ISL	050A	5.0	23	– 19 5	61.0	2.20	0.80	4	1	66.3	3
JOR	224A	11.0	23	35 8	31.4	0.84	0.78	114	2	63.1	
NIU	054B	158.0	23	– 169.8	– 19.0	0.60	0.60	0	2	64.1	
SDN	230A	– 7 0	23	29.2	7.5	2.34	1.12	148	2	64.4	
SRL	259A	– 31.0	23	– 11 8	8.6	0 78	0.68	114	1	63.4	
TGK	225A	11.0	23	34.6	– 6.2	2.41	1.72	129	1	63 7	
URS	061F	23.0	23	24.7	56.6	0.88	0.64	12	2	65 3	
URS	064F	23.0	23	45 6	40.8	2.16	0.60	163	1	64.2	
URS	077B	110.0	23	112.7	57.3	2.67	1.75	2	1	66.1	
YUG	149A	– 7.0	23	18.4	43.7	1.68	0.66	154	1	65.2	

AUS	007F	128.0	24	145.0	−38.1	1.83	1.39	134	2	63.6	
BGD	220E	74.0	24	90.3	23.6	1.46	0.84	135	1	63.8	
CAF	258A	−13.0	24	21.0	6.3	2.25	1.68	31	2	64.3	
CBG	299D	68.0	24	105.0	12.7	1.01	0.90	110	1	64.3	
CHN	166A	92.0	24	121.1	41.7	1.52	0.78	154	2	64.5	
CHN	177A	80.0	24	111.8	30.8	1.42	0.82	160	2	64.7	
CHN	188A	62.0	24	101.5	25.1	1.86	1.08	132	2	65.0	
DNK	090A	5.0	24	17.0	61.5	2.00	1.00	10	2	67.5	
I	082A	−19.0	24	12.3	41.3	2.38	0.98	137	2	64.1	
IND	041D	56.0	24	78.4	16.0	2.08	1.38	35	2	63.9	
IND	042D	68.0	24	79.3	27.7	2.14	1.16	147	2	63.9	
INS	030D	80.0	24	112.3	−8.1	3.14	1.46	169	1	64.3	
IRQ	256A	11.0	24	43.6	32.8	1.88	0.96	143	1	63.3	2
LSO	305A	5.0	24	27.8	−29.8	0.66	0.60	36	1	64.2	
MLA	227E	86.0	24	102.1	4.1	1.62	0.82	135	1	63.4	
MTN	288A	−37.0	24	−7.8	23.4	1.63	1.10	141	1	63.0	
MWI	308A	−1.0	24	34.1	−13.0	1.54	0.60	87	2	64.2	
MYT	098A	29.0	24	45.1	−12.8	0.60	0.60	0	1	63.4	
NGR	115A	−25.0	24	8.3	16.8	2.54	2.08	44	2	64.5	
OMA	123A	17.0	24	55.6	21.0	1.88	1.02	100	2	63.3	
PAK	282B	38.0	24	68.5	25.8	1.32	0.62	133	1	63.4	
PHL	285E	98.0	24	121.3	11.1	3.46	1.76	99	2	63.8	
SDN	232A	−7.0	24	30.4	19.0	2.44	1.52	176	1	63.3	
TKL	058B	158.0	24	−171.8	−8.9	0.70	0.60	35	1	63.9	
URS	066B	44.0	24	64.3	44.6	4.56	2.48	169	2	65.4	
URS	079B	140.0	24	138.0	53.6	3.16	2.12	62	2	67.8	

12 187,80 MHz (25)

1		2	3	4		5		6	7	8	9
AFI	099B	23 0	25	42 5	11 6	0 60	0 60	0	1	62 6	
BEL	018B	−19 0	25	4.6	50 6	0 82	0 60	167	1	64 1	
BLR	062B	23 0	25	27 8	52 6	1 08	0 72	1	2	64 9	
CYP	086B	5 0	25	33.3	35.1	0 60	0 60	0	1	63 6	
DDR	216B	−1 0	25	12.6	52 1	0 83	0.63	172	2	64 3	
HVO	107B	−31.0	25	−1.5	12.2	1.45	1 14	29	1	64 0	
IFB	021B	5.0	25	24 5	−28 0	3.13	1.68	27	2	64 1	4
ISL	049B	−31 0	25	−19 0	64 9	1 00	0.60	177	2	65 9	
ISR	110A	−13 0	25	34 9	31 4	0 94	0.60	117	2	63 8	
KEN	249B	11 0	25	37 9	1 1	2 29	1.56	94	1	63 8	
MCO	116B	−37 0	25	7 4	43.7	0 60	0.60	0	1	62 5	1/0 5
MNG	248A	74 0	25	102.2	46.6	3 60	1 13	169	1	64 1	
MRC	209B	−25 0	25	−9.0	29 2	2.72	1 47	43	2	63 3	
NMB	025A	−19 0	25	17.5	−21.6	2.66	1 90	48	2	64 7	
SEN	222B	−37 0	25	−14.4	13.8	1.46	1 04	139	2	63 7	
UAE	274B	17 0	25	53 6	24.2	0.98	0.80	162	1	63 2	
URS	078A	110 0	25	108.2	53.4	2.16	0.78	10	1	65 0	
YUG	148B	−7 0	25	18.4	43.7	1.68	0.66	154	1	65 3	

ALB	296B	– 7.0	26	19.8	41.3	0.68	0.60	146	2	63.8	
BDI	270B	11 0	26	29 9	– 3.1	0.71	0 60	80	2	63.4	
COG	235B	– 13.0	26	14.6	– 0 7	2.02	1.18	59	2	63.8	
CTI	237B	– 31.0	26	– 5.6	7.5	1.60	1.22	108	2	63.7	
ETH	092B	23.0	26	39.7	9.1	3.50	2.40	124	2	63 5	
FNL	104B	5.0	26	17.0	61 5	2.00	1.00	10	2	67.5	
HNG	106B	– 1.0	26	19.5	47 2	0.92	0.60	176	1	64 0	
IFB	135B	– 1.0	26	29.6	– 18 8	1.46	1.36	37	2	64.2	4
KWT	113B	17.0	26	47.6	29.2	0.68	0.60	145	2	63.1	
MTN	223B	– 37.0	26	– 12 2	18.5	2.62	1.87	150	1	62.9	
NIG	119B	– 19.0	26	7.8	9.4	2.16	2.02	45	1	63.9	
REU	097B	29.0	26	55.6	– 19.2	1.56	0.78	96	1	64.0	
SDN	231B	– 7.0	26	28.9	12.7	2.26	1.96	159	1	63.5	
SUI	140B	– 19.0	26	8.2	46.6	0.98	0.70	171	2	64.1	
SYR	229B	11.0	26	38.3	34.9	1.04	0.90	7	1	63.3	
TUN	150B	– 25.0	26	9.5	33.5	1.88	0.72	135	1	63.9	
URS	068A	44.0	26	59.0	38.8	2.24	1.00	164	2	64.0	
URS	074A	74.0	26	88.8	57.6	3.08	1.68	162	2	67.9	
URS	080A	140.0	26	155.3	55.4	2.90	2.36	35	1	67.9	

12 226,16 MHz (27)

1		2	3	4		5		6	7	8	9
AGL	295B	−13.0	27	16.5	−12.0	3.09	2.26	84	1	64.2	
BHR	255A	17.0	27	50.5	26.1	0.60	0.60	0	1	60.8	1/0.7
CNR	130B	−31.0	27	−15.7	28.4	1.54	0.60	5	2	62.8	
CVA	083A	−37.0	27	12.4	41.8	0.60	0.60	0	1	65.2	
DNK	091A	5.0	27	−19.5	61.0	2.20	0.80	4	1	66.2	3
E	129B	−31.0	27	−3.1	39.9	2.10	1.14	154	2	64.0	
GHA	108B	−25.0	27	−1.2	7.9	1.48	1.06	102	1	63.7	
GNE	303B	−19.0	27	10.3	1.5	0.68	0.60	10	2	63.8	
HOL	213B	−19.0	27	5.4	52.0	0.76	0.60	171	1	64.5	
JOR	224B	11.0	27	35.8	31.4	0.84	0.78	114	2	63.1	
SDN	230B	−7.0	27	29.2	7.5	2.34	1.12	148	2	64.5	
SRL	259B	−31.0	27	−11.8	8.6	0.78	0.68	114	1	63.5	
TGK	225B	11.0	27	34.6	−6.2	2.41	1.72	129	1	63.8	
URS	059A	23.0	27	36.0	47.0	3.70	1.43	153	2	65.2	
URS	077C	110.0	27	112.7	57.3	2.67	1.75	2	1	67.2	
YUG	149B	−7.0	27	18.4	43.7	1.68	0.66	154	1	65.3	

CAF	258B	−13.0	28	21 0	6.3	2.25	1.68	31	2	64.3	
I	082B	−19.0	28	12.3	41.3	2 38	0 98	137	2	64.2	
IRQ	256B	11 0	28	43.6	32.8	1.88	0.96	143	1	63.4	
LSO	305B	5.0	28	27 8	−29.8	0.66	0.60	36	1	64.2	
MTN	288B	−37.0	28	−7.8	23.4	1.63	1.10	141	1	63.0	
MWI	308B	−1.0	28	34 1	−13.0	1.54	0 60	87	2	64.3	
MYT	098B	29.0	28	45.1	−12.8	0.60	0.60	0	1	63.5	
NGR	115B	−25 0	28	8.3	16.8	2 54	2.08	44	2	64.5	
NOR	121A	5 0	28	17 0	61 5	2.00	1.00	10	2	66.8	
OMA	123B	17 0	28	55.6	21 0	1.88	1.02	100	2	63.3	
SDN	232B	−7.0	28	30.4	19.0	2.44	1.52	176	1	63 3	
URS	066C	44.0	28	64.3	44.6	4.56	2.48	169	2	65.5	
URS	076A	74.0	28	98.0	63.2	1.84	0.69	170	2	68.1	
URS	079C	140 0	28	138.0	53.6	3.16	2.12	62	2	67.8	

12 264,52 MHz (29)

1		2	3	4		5		6	7	8	9
AFI	099C	23 0	29	42.5	11 6	0 60	0 60	0	1	62.6	
BEL	018C	– 19.0	29	4.6	50 6	0.82	0.60	167	1	63.5	
CYP	086C	5 0	29	33.3	35.1	0 60	0 60	0	1	63.7	
DDR	216C	– 1 0	29	12 6	52.1	0.83	0.63	172	2	64.3	
HVO	107C	– 31 0	29	– 1.5	12.2	1.45	1.14	29	1	64.1	
IFB	021C	5 0	29	24.5	– 28 0	3.13	1.68	27	2	64.2	4
ISL	049C	– 31 0	29	– 19.0	64.9	1.00	0.60	177	2	65.9	
ISR	110B	– 13 0	29	34 9	31 4	0 94	0.60	117	2	63.9	
KEN	249C	11.0	29	37 9	1.1	2 29	1 56	94	1	63.8	
MCO	116C	– 37 0	29	7 4	43.7	0.60	0 60	0	1	62.5	1/0 5
MNG	248B	74 0	29	102 2	46.6	3.60	1 13	169	1	64.2	
MRC	209C	– 25 0	29	– 9 0	29.2	2.72	1.47	43	2	63.4	
NMB	025B	– 19 0	29	17 5	– 21 6	2.66	1.90	48	2	64.8	
SEN	222C	– 37.0	29	– 14.4	13.8	1 46	1.04	139	2	63 7	
UAE	274C	17 0	29	53.6	24.2	0 98	0.80	162	1	63 3	
UKR	063A	23 0	29	31.2	48 4	2.32	0 96	172	2	64.6	
YUG	148C	– 7 0	29	18.4	43.7	1.68	0.66	154	1	65 3	

ALB	296C	–7 0	30	19 8	41 3	0.68	0.60	146	2	63.9	
BDI	270C	11 0	30	29.9	–3 1	0 71	0.60	80	2	63.5	
COG	235C	–13 0	30	14 6	–0 7	2 02	1.18	59	2	63 9	
CTI	237C	–31 0	30	–5 6	7.5	1 60	1 22	108	2	63.8	
ETH	092C	23 0	30	39 7	9.1	3.50	2 40	124	2	63.6	
HNG	106C	–1 0	30	19 5	47 2	0.92	0.60	176	1	64.1	
IFB	135C	–1.0	30	29 6	–18 8	1.46	1.36	37	2	64 3	4
KWT	113C	17 0	30	47 6	29 2	0 68	0.60	145	2	63.2	
MTN	223C	–37 0	30	–12 2	18 5	2.62	1.87	150	1	62.9	
NIG	119C	–19.0	30	7 8	9.4	2 16	2.02	45	1	64.0	
REU	097C	29.0	30	55 6	–19.2	1 56	0.78	96	1	64.1	
S	139A	5 0	30	17 0	61 5	2.00	1 00	10	2	67.1	
SDN	231C	–7 0	30	28.9	12 7	2.26	1.96	159	1	63.6	
SUI	140C	–19 0	30	8 2	46 6	0 98	0.70	171	2	64 2	
SYR	229C	11 0	30	38 3	34.9	1 04	0 90	7	1	63 3	
TUN	150C	–25 0	30	9 5	33 5	1.88	0.72	135	1	63.9	
URS	068B	44 0	30	59 0	38.8	2 24	1.00	164	2	64.1	
URS	074B	74 0	30	88 8	57.6	3 08	1.68	162	2	68.0	
URS	080B	140 0	30	155 3	55 4	2 90	2.36	35	1	67.9	

12 302,88 MHz (31)

1		2	3	4		5		6	7	8	9
AGL	295C	– 13.0	31	16.5	– 12.0	3.09	2.26	84	1	64.2	
BHR	255B	17.0	31	50.5	26.1	0.60	0.60	0	1	60 9	1/0 7
CNR	130C	– 31.0	31	– 15.7	28.4	1.54	0.60	5	2	62.9	
CVA	083B	– 37.0	31	12.4	41.8	0.60	0.60	0	1	65.3	
E	129C	– 31.0	31	– 3.1	39.9	2.10	1.14	154	2	64.0	
GHA	108C	– 25.0	31	– 1.2	7.9	1.48	1.06	102	1	63.7	
GNE	303C	– 19.0	31	10.3	1.5	0.68	0.60	10	2	63.9	
HOL	213C	– 19.0	31	5.4	52.0	0.76	0.60	171	1	64.6	
ISL	050B	5.0	31	– 19.5	61.0	2.20	0.80	4	1	66.4	3
JOR	224C	11.0	31	35.8	31.4	0.84	0.78	114	2	63.2	
SDN	230C	– 7.0	31	29.2	7.5	2.34	1.12	148	2	64.5	
SRL	259C	– 31.0	31	– 11.8	8.6	0.78	0.68	114	1	63.6	
TGK	225C	11.0	31	34.6	– 6.2	2.41	1.72	129	1	63.8	
URS	059B	23.0	31	36.0	47.0	3.70	1.43	153	2	65.2	
URS	077D	110.0	31	112.7	57.3	2.67	1.75	2	1	67.2	
YUG	149C	– 7.0	31	18.4	43.7	1.68	0.66	154	1	65.4	

CAF	258C	−13.0	32	21.0	6.3	2.25	1.68	31	2	64.4	
I	082C	−19.0	32	12.3	41.3	2.38	0.98	137	2	64.2	
IRQ	256C	11.0	32	43.6	32.8	1.88	0.96	143	1	63.4	
LSO	305C	5.0	32	27.8	−29.8	0.66	0.60	36	1	64.3	
MTN	288C	−37.0	32	−7.8	23.4	1.63	1.10	141	1	63.1	
MWI	308C	−1.0	32	34.1	−13.0	1.54	0.60	87	2	64.4	
MYT	098C	29.0	32	45.1	−12.8	0.60	0.60	0	1	63.5	
NGR	115C	−25.0	32	8.3	16.8	2.54	2.08	44	2	64.6	
NOR	121B	5.0	32	17.0	61.5	2.00	1.00	10	2	66.9	
OMA	123C	17.0	32	55.6	21.0	1.88	1.02	100	2	63.4	
SDN	232C	−7.0	32	30.4	19.0	2.44	1.52	176	1	63.4	
URS	066D	44.0	32	64.3	44.6	4.56	2.48	169	2	65.5	
URS	075A	74.0	32	94.0	51.7	1.52	0.60	172	2	65.1	
URS	079D	140.0	32	138.0	53.6	3.16	2.12	62	2	67.9	

12 341,24 MHz (33)

1		2	3	4		5		6	7	8	9
AFI	099D	23.0	33	42.5	11.6	0.60	0.60	0	1	62.7	
BEL	018D	–19.0	33	4.6	50.6	0.82	0.60	167	1	63.9	
CYP	086D	5.0	33	33.3	35 1	0.60	0.60	0	1	63.7	
DDR	216D	–1.0	33	12.6	52.1	0.83	0.63	172	2	64.4	
HVO	107D	–31.0	33	–1.5	12.2	1.45	1.14	29	1	64.1	
IFB	021D	5.0	33	24.5	–28.0	3.13	1.68	27	2	64.2	4
ISL	049D	–31.0	33	–19.0	64.9	1.00	0.60	177	2	66.0	
ISR	110C	–13.0	33	34.9	31.4	0.94	0.60	117	2	63.9	
KEN	249D	11.0	33	37.9	1.1	2.29	1.56	94	1	63.9	
MCO	116D	–37.0	33	7.4	43.7	0.60	0.60	0	1	62.6	1/0.5
MNG	248C	74.0	33	102.2	46.6	3.60	1.13	169	1	64.2	
MRC	209D	–25.0	33	–9.0	29.2	2.72	1.47	43	2	63.4	
NMB	025C	–19.0	33	17.5	–21.6	2.66	1.90	48	2	64.8	
SEN	222D	–37.0	33	–14.4	13.8	1.46	1.04	139	2	63.8	
UAE	274D	17.0	33	53.6	24.2	0.98	0.80	162	1	63.3	
UKR	063B	23.0	33	31.2	48.4	2.32	0.96	172	2	64.7	
YUG	148D	–7 0	33	18.4	43.7	1.68	0.66	154	1	65.4	

ARTICLE 12

Relationship to Resolution 507

12.1 The provisions and associated Plans for the broadcasting-satellite service in Regions 1 and 3 and in Region 2, of this Appendix, shall be regarded as including a world agreement and associated Plans for Regions 1, 2 and 3 in accordance with *resolves* 1 of Resolution **507**, which requires the stations in the broadcasting-satellite service to be established and operated in accordance with such agreements and associated plans.

ARTICLE 13

Interference

13.1 The Members of the Union shall endeavour to agree on the action required to reduce harmful interference which might be caused by the application of these provisions and the associated Plans.

ARTICLE 14

Period of Validity of the Provisions and Associated Plans

14.1 For Regions 1 and 3, the provisions and associated Plan have been prepared in order to meet the requirements of the broadcasting-satellite service in the bands concerned for a period of at least fifteen years from 1 January 1979.

14.2 For Region 2, the provisions and associated Plan have been prepared in order to meet the requirements of the broadcasting-satellite service in the bands concerned for a period extending until at least 1 January 1994.

14.3 In any event, the provisions and associated Plans shall remain in force until their revision by a competent administrative radio conference convened in accordance with the relevant provisions of the Convention in force.

ANNEX 1

Limits for Determining Whether a Service of an Administration is Affected by a Proposed Modification to the Plans or When It is Necessary Under This Appendix to Seek the Agreement of Any Other Administration[1]

(See Article 4)

1. *Limits to the change in the wanted-to-interfering signal ratio with respect to frequency assignments in conformity with the Regions 1 and 3 Plan*

With respect to paragraph 4.3.1.1, an administration in Region 1 or 3 shall be considered as being affected if the effect of the proposed modification to the Regions 1 and 3 Plan would result in the wanted-to-interfering signal ratio at any point within the service area associated with any of its frequency assignments in that Plan falling below either 30 dB or the value resulting from the frequency assignments in the Plan at the date of entry into force of the Final Acts[2], whichever is the lower.

Note: In performing the calculation, the effect at the receiver input of all the co-channel and adjacent-channel signals is expressed in terms of one equivalent co-channel interfering signal. This value is usually expressed in decibels.

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[1] With respect to this Annex, except for section 2 and sub-section 8 *b)*, the limits relate to the power flux-density which would be obtained assuming free-space propagation conditions.

With respect to sub-section 8 *b)* of this Annex, the limits relate to the power flux-density which would be obtained assuming clear-sky propagation conditions using the method contained in Annex 5.

With respect to section 2 of this Annex, the limit specified relates to the overall equivalent protection margin calculated in accordance with section 2.1.4 of Annex 5.

[2] Final Acts of the 1977 Conference, which entered into force on 1 January 1979.

2. *Limits to the change in the overall equivalent protection margin with respect to frequency assignments in conformity with the Region 2 Plan*

With respect to paragraph 4.3.3.1, an administration in Region 2 shall be considered as being affected if the overall equivalent protection margin[1] corresponding to a test point of its entry in the Region 2 Plan, including the cumulative effect of any previous modification to that Plan or any previous agreement, falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below the value resulting from:

- the Region 2 Plan as established by the 1983 Conference; *or*
- a modification of the assignment in accordance with this Appendix; *or*
- a new entry in the Region 2 Plan under Article 4 of this Appendix; *or*
- any agreement reached in accordance with this Appendix.

3. *Limits to the change in the power flux-density to protect the broadcasting-satellite service in Regions 1 and 2 in the band 12.2 - 12.5 GHz and in Region 3 in the band 12.5 - 12.7 GHz*

With respect to paragraph 4.3.1.2, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

[1] For the definition of the overall equivalent protection margin, see section 1.14 of Annex 5 to this Appendix.

With respect to paragraph 4.3.3.2 or 4.3.3.6 as appropriate, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

-147 dB(W/m^2/27 MHz)	for $0° \leqslant \theta < 0.44°$;
$-138 + 25 \log \theta$ dB(W/m^2/27 MHz)	for $0.44° \leqslant \theta < 19.1°$;
-106 dB(W/m^2/27 MHz)	for $\theta \geqslant 19.1°$;

where θ is:

- the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 1 or 3 and the broadcasting-satellite space station affected in Region 2, *or*

- the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 2 and the broadcasting-satellite space station affected in Region 1 or 3.

4. *Limits to the change in the power flux-density to protect the terrestrial services of administrations in Region 2*

With respect to paragraph 4.3.1.4, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in exceeding a power flux-density, for any angle of arrival, at any point on its territories, of:

-125 dB(W/m^2/4 kHz)	when the broadcasting-satellite station uses circular polarization, *and,*
-128 dB(W/m^2/4 kHz)	when the broadcasting-satellite station uses linear polarization.

5. *Limits to the change in the power flux-density to protect the terrestrial services of administrations in Regions 1 and 3*[1]

With respect to paragraph 4.3.3.4, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in the following power flux-density limits being exceeded:

a) in the frequency band 12.2 - 12.7 GHz for all the territories of administrations in Regions 1[2] and 3 and for any arrival angle γ:

-125 dB(W/m^2/4 kHz)	for broadcasting-satellite space stations using circular polarization;
-128 dB(W/m^2/4 kHz)	for broadcasting-satellite space stations using linear polarization;

b) in the frequency band 12.2 - 12.5 GHz for territories of administrations in Region 3 and those in the western part of Region 1, west of longitude 30° E[3]:

-132 dB(W/m^2/5 MHz)	for $0° \leq \gamma < 10°$;
$-132 + 4.2\,(\gamma - 10)$ dB(W/m^2/5 MHz)	for $10° \leq \gamma < 15°$;
-111 dB(W/m^2/5 MHz)	for $15° \leq \gamma < 90°$;

[1] See section 3.18 of Annex 5

[2] In the band 12.5 - 12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **848** and **850** of the Radio Regulations.

[3] See Resolution **34**.

c) in the frequency band 12.2 – 12.7 GHz for territories of administrations in Region 1[1], east of longitude 30° E:

-134 dB(W/m^2/5 MHz)	for $\gamma = 0°$;
$-134 + 4.6975\,\gamma^2$ dB(W/m^2/5 MHz)	for $0° < \gamma \leqslant 0.8°$;
$-128.5 + 25 \log \gamma$ dB(W/m^2/5 MHz)	for $\gamma > 0.8°$;

d) in the frequency band 12.5 – 12.7 GHz for all the territories of administrations of Regions 1[1] and 3:

-148 dB(W/m^2/4 kHz)	for $\gamma = 0°$;
$-148 + 4.6975\,\gamma^2$ dB(W/m^2/4 kHz)	for $0° < \gamma \leqslant 0.8°$;
$-142.5 + 25 \log \gamma$ dB(W/m^2/4 kHz)	for $\gamma > 0.8°$,

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

6. *Limits to the change in the power flux-density of assignments in the Regions 1 and 3 Plan to protect the fixed-satellite service (space-to-Earth) in the band 11.7 - 12.2 GHz in Region 2, and of assignments in the Region 2 Plan to protect the fixed-satellite service (space-to-Earth) in the band 12.5 - 12.7 GHz in Region 1 and in the band 12.2 - 12.7 GHz in Region 3*

With respect to paragraph 4.3.1.5, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in an increase in the power flux-density on its territory of 0.25 dB or more above that resulting from the frequency assignments in the Regions 1 and 3 Plan at the time of entry into force of the Final Acts[2].

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[1] In the band 12.5 - 12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **848** and **850** of the Radio Regulations.

[2] Final Acts of the 1977 Conference, which entered into force on 1 January 1979.

With respect to paragraph 4.3.3.5, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in an increase in the power flux-density on its territory of 0.25 dB or more above that resulting from the frequency assignments in the Region 2 Plan at the time of entry into force of the Final Acts[1].

However, where an assignment in the Regions 1 and 3 Plan or its subsequent modification gives a power flux-density of less than -138 dB(W/m^2/27 MHz) anywhere in the territory of an administration of Region 2, that administration shall be considered as not being affected; where an assignment in the Region 2 Plan or its subsequent modification gives a power flux-density of less than -160 dB(W/m^2/4 kHz) anywhere in the territory of an administration of Region 1 or 3, that administration shall be considered as not being affected.

7. *Limits to the change in equivalent noise temperature to protect the fixed-satellite service (Earth-to-space) in Region 1 from modifications to the Region 2 Plan in the band 12.5 - 12.7 GHz*

With respect to paragraph 4.3.3.5, an administration of Region 1 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in:

– the $\Delta T/T$ resulting from the proposed modification is greater than the $\Delta T/T$ resulting from the assignment in the Region 2 Plan as of the date of entry into force of the Final Acts[1]; *and*

– the $\Delta T/T$ resulting from the proposed modification exceeds 4%,

using the method of Appendix **29** (Case II).

[1] Final Acts of the 1985 Conference.

8. *Limits to the change in the power flux-density to protect the terrestrial services of other administrations*

a) In Region 1 or 3:

With respect to paragraph 4.3.1.4, an administration in Region 1 or 3 shall be considered as being affected if the consequence of the proposed modification of an existing assignment in the Regions 1 and 3 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Regions 1 and 3 Plan at the time of entry into force of the Final Acts[1]. The same administration shall be considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the limits expressed in sections 5*a)* and 5*b)* of this Annex applied to the frequency range 11.7 - 12.5 GHz.

With respect to paragraph 4.3.1.4 in the case of an addition of a new assignment to the Regions 1 and 3 Plan, an administration in Region 1 or 3 is considered as being affected if the power flux-density on any part of its territory exceeds the limit expressed in sections 5*a)* and 5*b)* of this Annex applied to the frequency range 11.7 - 12.5 GHz.

b) In Region 2:

With respect to paragraph 4.3.3.4, an administration in Region 2 shall be considered as being affected if the consequence of the proposed modification to an existing assignment in the Region 2 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Region 2 Plan at the time of entry into force of the Final Acts[2]. The same administration shall be considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the following limit: -115 dB(W/m^2).

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[1] Final Acts of the 1977 Conference, which entered into force on 1 January 1979.

[2] Final Acts of the 1985 Conference.

With respect to paragraph 4.3.3.4 in the case of an addition of a new assignment to the Region 2 Plan, an administration in Region 2 is considered as being affected if the power flux-density on any part of its territory exceeds -115 dB(W/m^2).

ANNEX 2

Basic Characteristics to Be Furnished in Notices[1] Relating to Space Stations in the Broadcasting-Satellite Service[2]

1. Country and IFRB number in the case of Regions 1 and 3; country and beam identification in the case of Region 2.
2. Nominal orbital position (in degrees from the Greenwich meridian) in the case of Regions 1 and 3; orbital position (xxx.xx degrees from the Greenwich meridian) in the case of Region 2.
3. Assigned frequency or channel number.
4. Date of bringing into use.
5. Identity of the space station.
6. Service area (if necessary, the service area may be defined by a number of "test points").

[1] The Board shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Annex.

[2] In Region 2, only those notices relating to frequency assignments for space stations used for telemetry and tracking purposes associated with the Region 2 Plan shall be furnished in accordance with Appendix **3** to the Radio Regulations.

7. Geographical coordinates of the intersection of the antenna beam axis with the Earth.

8. Rain-climatic zone(s)[1].

9. Class of station.

10. Class of emission and necessary bandwidth.

11. Power supplied to the antenna (dBW) in the case of Regions 1 and 3; and, in the case of Region 2, power supplied to the antenna (dBW) and the maximum power density per Hz (dB(W/Hz)), averaged over the worst 5 MHz, 40 kHz and 4 kHz, supplied to the antenna.

12. Antenna characteristics:
   a) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);
   b) shape of the beam (elliptical, circular, or other);
   c) pointing accuracy;
   d) type of polarization;
   e) sense of polarization;
   f) for circular beams indicate the following:
      – half-power beamwidth in degrees;
      – co-polar and cross-polar radiation patterns;
   g) for elliptical beams indicate the following:
      – co-polar and cross-polar radiation patterns;
      – rotation accuracy;
      – orientation;
      – major axis (degrees) at the half-power beamwidth;
      – minor axis (degrees) at the half-power beamwidth;

[1] As defined in Annex 5 to this Appendix.

h) for beams of other than circular or elliptical shape, indicate the following:

- co-polar and cross-polar gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite on to a plane perpendicular to the line from the centre of the Earth to the satellite. The isotropic or absolute gain shall be indicated at each contour which corresponds to a decrease in gain of 2, 4, 6, 10 and 20 dB and thereafter at 10 dB intervals down to a value of 0 dB relative to an isotropic radiator;
- wherever practicable, a numerical equation or table providing the necessary information to allow the gain contours to be plotted.

In the case of Regions 1 and 3:

i) ΔG (difference between the maximum gain and the gain in the direction of the point in the service area at which the power flux-density is at a minimum).

13. Station keeping accuracy.

14. Modulation characteristics:

a) type of modulation;

b) pre-emphasis characteristics;

c) TV standard;

d) sound broadcasting characteristics;

e) frequency deviation;

f) composition of the baseband;

g) type of multiplexing of the video and sound signals;

h) energy dispersal characteristics.

15. Minimum angle of elevation in the service area in the case of Regions 1 and 3.

16. Type of reception (individual or community) in the case of Regions 1 and 3.

17. Regular hours of operation (UTC).

18. Coordination.

19. Agreements.

20. Other information.

21. Operating administration or company.

ANNEX 3

Method for Determining the Limiting Interfering Power Flux-Density at the Edge of a Broadcasting-Satellite Service Area in the Frequency Bands 11.7 - 12.2 GHz (in Region 3), 11.7 - 12.5 GHz (in Region 1) and 12.2 - 12.7 GHz (in Region 2) and for Calculating the Power Flux-Density Produced There by a Terrestrial Station

1. *General*

1.1 This Annex describes a method of calculating the interference potential from terrestrial transmitters to broadcasting-satellite receivers.

1.2 The method is in two parts:

a) the calculation of the maximum permissible interfering power flux-density at the edge of the broadcasting-satellite service area concerned;

b) the calculation of the likely power flux-density produced at any point on the edge of the service area by the terrestrial transmitter of another administration.

1.3 The interference potential of the terrestrial transmitters must be considered case by case; the power flux-density produced by each terrestrial transmitter is compared to the limiting power flux-density at any point on the edge of the service area of a broadcasting-satellite station of another administration. If, for a given transmitter, the value of the power flux-density produced is lower than the value of the limiting power flux-density at any point on the edge of the service area, the interference caused to the broadcasting-satellite service by this transmitter is considered to be lower than the permissible value and no coordination is required between administrations before the terrestrial service is brought into use. Where this is not the case, coordination and more precise calculations derived from a mutually agreed basis are necessary.

1.4 It is emphasized that, should the calculation described in this Annex indicate that the maximum permissible power flux-density is exceeded, it does not necessarily preclude the introduction of the terrestrial service since the calculations are necessarily based on worst-case assumptions for:

a) the nature of the terrain of the interference path;

b) the off-beam discrimination on the broadcasting-satellite receiving installations;

c) the necessary protection ratios for the broadcasting-satellite service;

d) the type of reception in the broadcasting-satellite service, i.e., assuming individual reception, this being more critical than community reception for the angles of elevation concerned;

e) the value of power flux-density to be protected in the broadcasting-satellite service;

f) the propagation conditions between the terrestrial station and the broadcasting-satellite service area.

2. *Limit of power flux-density*

2.1 *General*

The limiting power flux-density not to be exceeded at the edge of the service area in order to protect the broadcasting-satellite service of an administration is given by the formula:

$$F = F_0 - R + D + P \tag{1}$$

where:

F = the maximum permissible interfering power flux-density (dB(W/m^2)) within the necessary bandwidth of the broadcasting-satellite;

F_0 = the wanted power flux-density (dB(W/m^2)) at the edge of the service area;

R = the protection ratio (dB) between the wanted and interfering signals;

D = angular discrimination (dB) provided by the radiation pattern of the broadcasting-satellite receiver antenna;

P = polarization discrimination (dB) between the wanted and interfering signals.

2.2 *Wanted power flux-density (F_0)*

The value of F_0 is equal to:

a) -103 dB(W/m^2) for service areas in Regions 1 and 3, *and*

b) -107 dB(W/m^2) for 24 MHz, as well as for 27 MHz with respect to the cases mentioned in the footnote to section 3.8 of Annex 5 for service areas in Region 2.

2.3 *Protection ratio (R)*

2.3.1 The single entry protection ratio against all types of terrestrial transmissions, with the exception of amplitude-modulation multichannel television systems, is 35 dB for carrier frequency differences between the wanted and interfering signals of up to ± 10 MHz, decreasing linearly from 35 dB to 0 dB for carrier frequency differences between 10 MHz and 35 MHz, and is 0 dB for frequency differences in excess of 35 MHz (see Figure 1).

2.3.2 The carrier frequency difference should be determined by reference to the frequency assignments in the broadcasting-satellite Plan or, in the case of assignments not contained within a plan, by reference to the characteristics of the proposed or operational system. For amplitude-modulation multichannel television systems which produce high peaks of power flux-density spread over a wide range of their necessary bandwidth, the protection ratio R is 35 dB and is independent of the carrier frequency difference.

2.3.3 A signal from a terrestrial station should be considered only if its necessary bandwidth overlaps the necessary bandwidth of the broadcasting-satellite assignment.

2.4 *Angular discrimination (D)*

Regions 1 and 3:

2.4.1 Where the angle of elevation φ selected for the proposed or operational broadcasting-satellite system for the broadcasting-satellite service area concerned is equal to or greater than 19°, the value of D to be assumed in expression (1) is 33 dB. When φ is less than 19°, D should be derived from the expression (2) below.

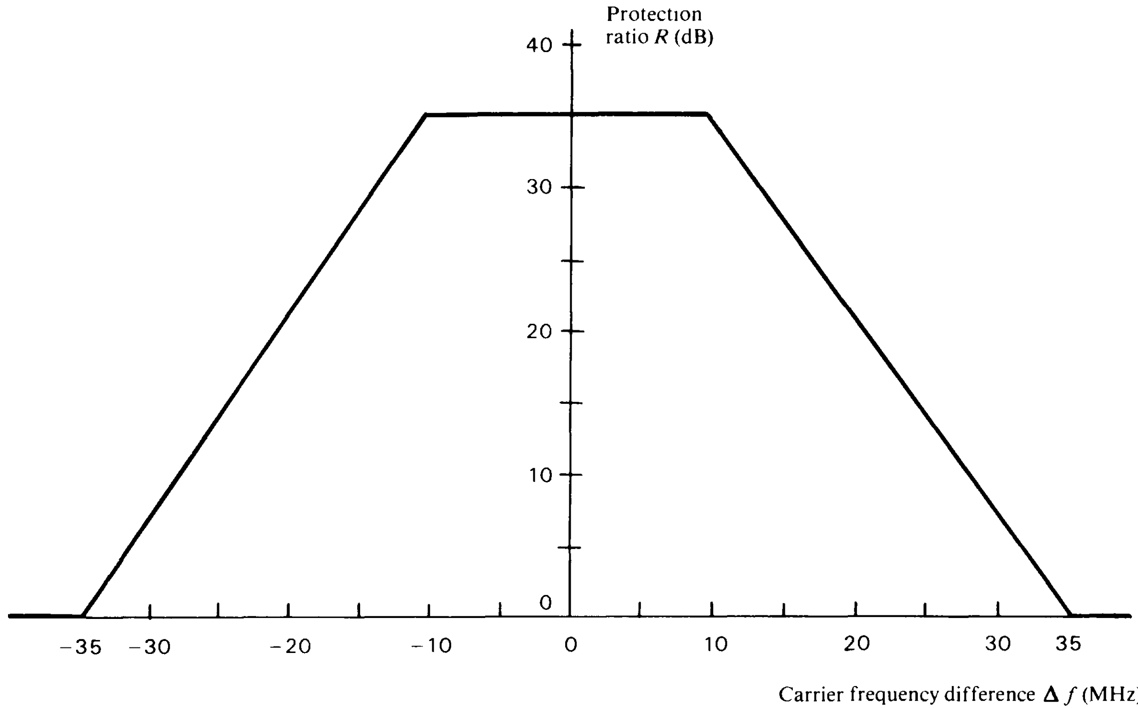


FIGURE 1

Protection ratio R (dB) for a broadcasting-satellite signal against a single entry of interference from a terrestrial service (except for AM multichannel TV system)

Note: If more than one value of φ is specified for a particular service area, the appropriate value of φ should be used for each section of the edge of the service area under consideration.

$$
\begin{aligned}
D &= 0 && \text{for } 0^\circ \leqslant \varphi \leqslant 0.5^\circ \\
D &= 3\,\varphi^2 && \text{for } 0.5^\circ < \varphi \leqslant 1.41^\circ \\
D &= 3 + 20 \log \varphi && \text{for } 1.41^\circ < \varphi \leqslant 2.52^\circ \\
D &= 1 + 25 \log \varphi && \text{for } 2.52^\circ < \varphi \leqslant 19^\circ
\end{aligned} \qquad (2)
$$

Note: For the graphical determination of D see Figure 2.

Region 2:

2.4.2 D should be derived from the expression (3) below where φ is the elevation angle for the proposed or operational broadcasting-satellite system for the broadcasting-satellite service area concerned.

Note: If more than one value of φ is specified for a particular service area, the appropriate value of φ should be used for each section of the edge of the service area under consideration.

$$
\begin{aligned}
D &= 0 && \text{for } 0^\circ \leqslant \varphi \leqslant 0.43^\circ \\
D &= 4.15\varphi^2 && \text{for } 0.43^\circ < \varphi \leqslant 1.92^\circ \\
D &= 8.24 + 25 \log \varphi && \text{for } 1.92^\circ < \varphi \leqslant 25^\circ \\
D &= 43.2 && \text{for } \varphi > 25^\circ
\end{aligned} \qquad (3)
$$

Note: For the graphical determination of D see Figure 3.

2.5 *Polarization discrimination (P)*

The value of P is equal to:

a) 3 dB when the interfering terrestrial service uses linear polarization and the broadcasting-satellite service uses circular polarization or vice versa;

b) 0 dB when the interfering terrestrial service and the broadcasting-satellite service both use circular or both use linear polarization.

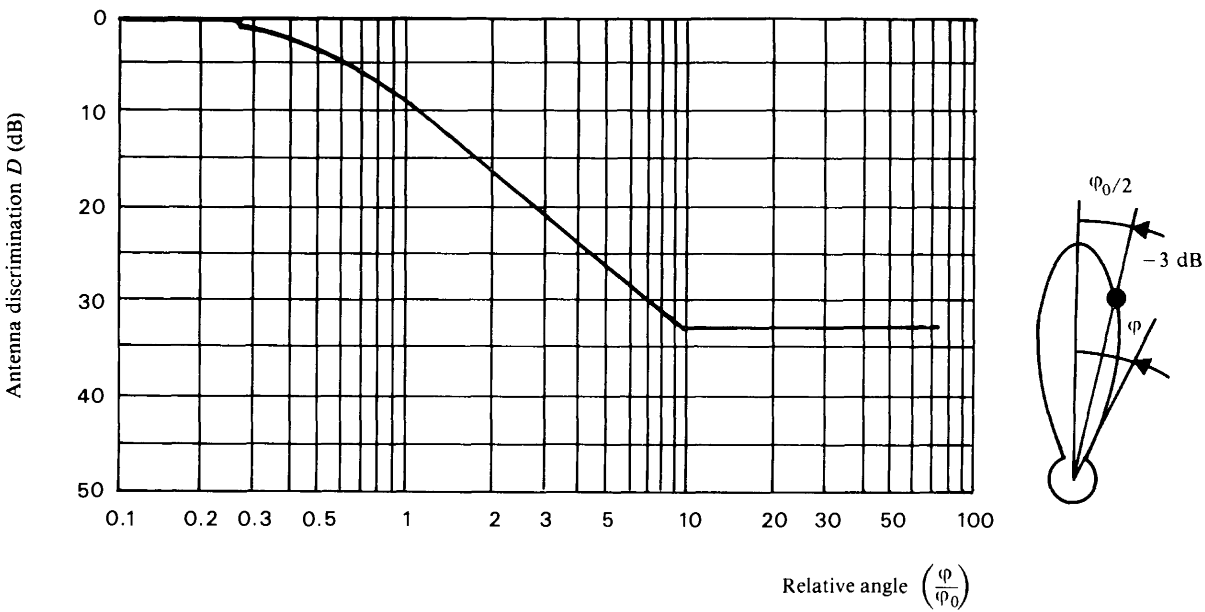


FIGURE 2

Discrimination D (dB) of broadcasting-satellite receiver antenna as a function of satellite elevation angle

For service areas in Regions 1 and 3, $\varphi_0 = 2°$.

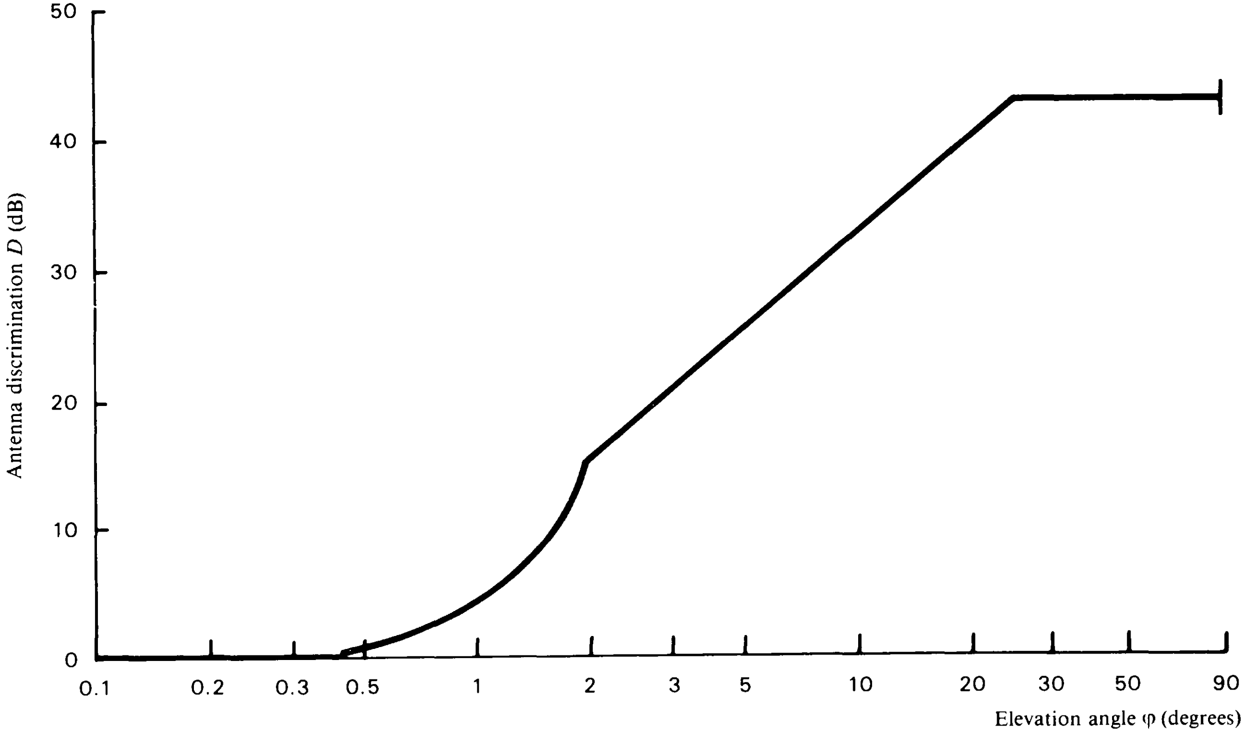


FIGURE 3

Discrimination D (dB) of broadcasting-satellite receiver antenna as a function of satellite elevation angle

3. *Power flux-density produced by a terrestrial station (F_p)*

The power flux-density F_p (dB(W/m^2)) produced at any point on the edge of the service area by the terrestrial station is determined from the following formula:

$$F_p = E - A + 43 \quad (4)$$

where:

E = the equivalent isotropically radiated power (dBW) of the terrestrial station in the direction of the point concerned on the edge of the service area;

A = the total path loss in dB.

3.1 *Evaluation of path loss A for a terrestrial station at a distance greater than 100 km from the edge of the service area of the broadcasting satellite*

For path lengths greater than 100 km, A is given by:

In the case of Regions 1 and 3:

$$A = 137.6 + 0.2324\ d_t + 0.0814\ d_m \quad (5)$$

In the case of Region 2:

$$A = 141.9 + 0.2867\ d_t + 0.1522\ d_m \quad (6)$$

where:

d_t and d_m are the overland and oversea path lengths respectively, in kilometres.

3.2 *Evaluation of path loss A for a terrestrial station at a distance equal to or less than 100 km from the edge of the service area of the broadcasting satellite*

In the case of Regions 1 and 3:

For path lengths equal to or less than 100 km, A is calculated using equations (5) and (7) and the lower value obtained is substituted in formula (4) to calculate the power flux-density produced at the point concerned on the edge of the service area:

$$A = 109.5 + 20 \log (d_t + d_m) \tag{7}$$

The variation in A for different path lengths and percentage of oversea path is shown in Figure 4.

In the case of Region 2:

For path lengths equal to or less than 100 km, A is calculated using equations (6) and (8) and the lower value obtained is substituted in formula (4) to calculate the power flux-density produced at the point concerned on the edge of the service area:

$$A = 114.4 + 20 \log (d_t + d_m) + 0.01 (d_t + d_m) \tag{8}$$

The variation in A for different path lengths and percentage of oversea path is shown in Figure 5.

3.3 *Distance beyond which the method need not be applied*

The method need not be applied and coordination is unnecessary when the distance between the terrestrial station and the service area of the broadcasting satellite is greater than:

a) 400 km in the case of all overland paths; *or*

b) 1200 km in the case of all oversea or mixed paths.

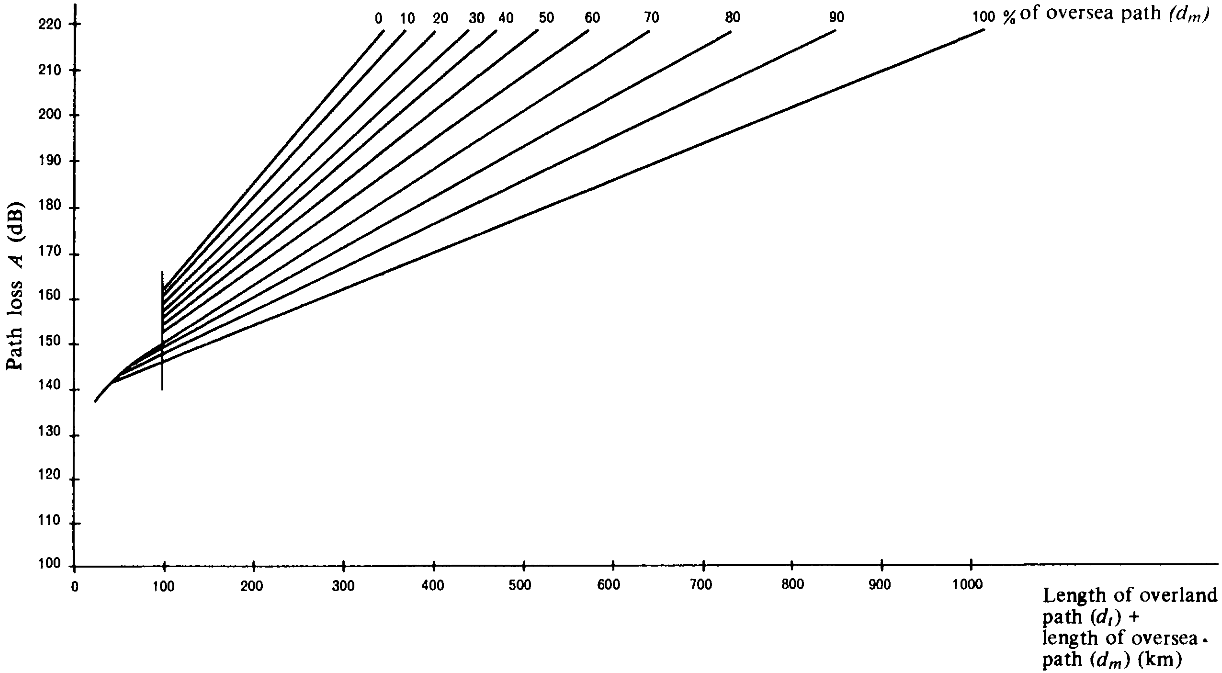


FIGURE 4

Total path loss A (dB) versus total path length $(d_l + d_m)$ (km) and percentage of oversea path (Regions 1 and 3)

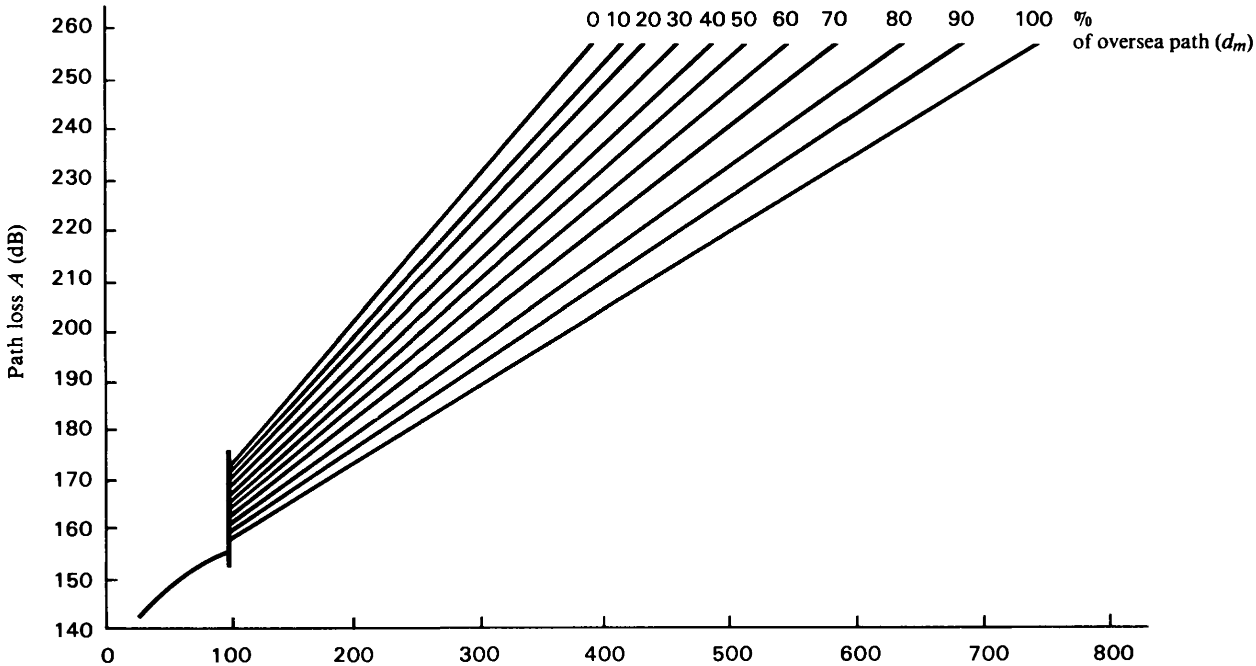


FIGURE 5

Total path A (dB) versus total path length (d_l + d_m) (km)
and percentage of oversea path
(Region 2)

ANNEX 4

Need for Coordination of a Space Station in the Fixed-Satellite Service: in Region 2 (11.7 - 12.2 GHz) with Respect to the Regions 1 and 3 Plan, in Region 1 (12.5 - 12.7 GHz) and in Region 3 (12.2 - 12.7 GHz) with Respect to the Region 2 Plan

(See Article 7)

With respect to paragraph 7.2.1 of Article 7 of this Appendix, coordination of a space station in the fixed-satellite service of Region 2 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 1 or Region 3 exceeds the value derived from the expressions given below.

With respect to paragraph 7.2.1 of Article 7 of this Appendix, coordination of a space station in the fixed-satellite service in Region 1 or 3 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 2 exceeds the value derived from the same expressions:

-147 dB(W/m^2/27 MHz) for $0° \leqslant \theta < 0.44°$

$-138 + 25 \log \theta$ dB(W/m^2/27 MHz) for $0.44° \leqslant \theta < 19.1°$

-106 dB(W/m^2/27 MHz) for $\theta \geqslant 19.1°$

where θ is:

- the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 2 and the longitude of the affected broadcasting-satellite space station in Regions 1 and 3, *or*

- the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 1 or 3 and the longitude of the affected broadcasting-satellite space station in Region 2.

ANNEX 5

Technical Data Used in Establishing the Provisions and Associated Plans and Which Should Be Used for Their Application

1. DEFINITIONS

1.1 *Service area*

The area on the surface of the Earth in which the administration responsible for the service has the right to demand that the agreed protection conditions be provided.

Note: In the definition of service area, it is made clear that within the service area the agreed protection conditions can be demanded. This is the area where there should be at least the wanted power flux-density and protection against interference based on the agreed protection ratio for the agreed percentage of time.

1.2 *Coverage area*

The area on the surface of the Earth delineated by a contour of a constant given value of power flux-density which would permit the wanted quality of reception in the absence of interference.

Note 1: In accordance with the provisions of No. **2674** of the Radio Regulations, the coverage area must be the smallest area which encompasses the service area.

Note 2: The coverage area, which will normally encompass the entire service area, will result from the intersection of the antenna beam (elliptical or circular) with the surface of the Earth, and will be defined by a given value of power flux-density. For example, in the case of a country with a service planned for individual reception, it would be the area delineated by the contour corresponding to a level of -103 dB(W/m^2) exceeded for 99% of the worst month in the case of Regions 1 and 3, and -107 dB(W/m^2) exceeded for 99% of the worst month in the case of Region 2. There will usually be an area outside the service area but within the coverage area in which the power flux-density will be at least equivalent to the minimum specified value; however, protection against interference will not be provided in this area.

1.3 *Beam area*

The area delineated by the intersection of the half-power beam of the satellite transmitting antenna with the surface of the Earth.

Note: The beam area is simply that area on the Earth's surface corresponding to the -3 dB points on the satellite antenna radiation pattern. In many cases the beam area would almost coincide with the coverage area, the discrepancy being accounted for by the permanent difference in path lengths from the satellite throughout the beam area, and also by the permanent variations, if any, in propagation factors across the area. However, for a service area where the maximum dimension as seen from the satellite position is less than 0.6° in Regions 1 and 3, and less than 0.8° in Region 2 (the agreed minimum practicable satellite antenna half-power beamwidths), there could be a significant difference between the beam area and the coverage area.

1.4 *Nominal orbital position*

The longitude of a position in the geostationary-satellite orbit associated with a frequency assignment to a space station in a space radiocommunication service. The position is given in degrees from the Greenwich meridian.

Note: Definitions in sections 1.5 to 1.14 are applicable to Region 2.

1.5 *Feeder link*

In the Region 2 broadcasting-satellite service Plan, the term "feeder link", as defined in No. **109** of the Radio Regulations, is further qualified to indicate a fixed-satellite service link in the frequency band 17.3 - 17.8 GHz from any earth station within the feeder-link service area to the associated space station in the broadcasting-satellite service.

1.6 *Feeder-link area*

The area delineated by the intersection of the half-power beam of the satellite receiving antenna with the surface of the Earth.

1.7 *Feeder-link service area*

The area on the surface of the Earth within the feeder-link beam area within which the administration responsible for the service has the right to locate transmitting earth stations for the purpose of providing feeder links to broadcasting-satellite space stations.

1.8 *Adjacent channel*

The RF channel in the broadcasting-satellite service frequency Plan, or in the associated feeder-link frequency Plan, which is situated immediately higher or lower in frequency with respect to the reference channel.

1.9 *Second adjacent channel*

The RF channel in the broadcasting-satellite service frequency Plan, or in the associated feeder-link frequency Plan, which is situated immediately beyond either of the adjacent channels, with respect to the reference channel.

1.10 *Overall carrier-to-interference ratio*

The overall carrier-to-interference ratio is the ratio of the wanted carrier power to the sum of all interfering RF powers in a given channel including both feeder links and down-links. The overall carrier-to-interference ratio due to interference from the given channel is calculated as the reciprocal of the sum of the reciprocals of the feeder link carrier-to-interference ratio and the down-link carrier-to-interference ratio referred to the satellite receiver input and earth station receiver input, respectively.[1]

1.11 *Overall co-channel protection margin*

The overall co-channel protection margin in a given channel is the difference in decibels between the overall co-channel carrier-to-interference ratio and the co-channel protection ratio.

1.12 *Overall adjacent channel protection margin*

The overall adjacent channel protection margin is the difference in decibels between the overall adjacent channel carrier-to-interference ratio and the adjacent channel protection ratio.

[1] There are a total of five overall carrier-to-interference ratios used in the analysis of the Plan for the broadcasting-satellite service in Region 2, namely, co-channel, upper and lower adjacent channels, and upper and lower second adjacent channels.

1.13 *Overall second adjacent channel protection margin*

The overall second adjacent channel protection margin is the difference in decibels between the overall second adjacent channel carrier-to-interference ratio and the second adjacent channel protection ratio.

1.14 *Overall equivalent protection margin* [1]

The overall equivalent protection margin M is given in decibels by the expression:

$$M = -10 \log \left(\sum_{i=1}^{5} 10^{(-M_i/10)} \right) \qquad \text{(dB)}$$

where:

M_1 = overall co-channel protection margin, in dB (as defined in section 1.11 of this Annex);

M_2, M_3 = overall adjacent channel protection margins for the upper and lower adjacent channels respectively, in dB (as defined in section 1.12 of this Annex);

M_4, M_5 [2] = overall second adjacent channel protection margins for the upper and lower second adjacent channels respectively, in dB (as defined in section 1.13 of this Annex).

---

[1] For Regions 1 and 3, see Section 1.11 of Annex 3 to Appendix **30A(Orb-88)** and Note 1 thereto.

[2] M_4 and M_5 are applicable only for Region 2.

The adjective "equivalent" indicates that the protection margins for all interference sources from the adjacent and second adjacent channels as well as co-channel interference sources have been included.

2. RADIO PROPAGATION FACTORS

In Regions 1 and 3:

2.1 The propagation loss on the space-to-Earth path is equal to the free space path loss plus the attenuation exceeded for 1% of the worst month, the latter being given in Figure 1 for the five rain-climatic zones shown in Figure 2.

2.2 In using the curves of Figure 1, the difference between clear weather attenuation and the attenuation exceeded for 1% of the worst month should be limited to a maximum of 2 dB by appropriate choice of angle of elevation.

2.3 In planning the broadcasting-satellite service, for emissions applying circular polarization, the level of the depolarized component relative to the level of the co-polar component should be taken as:

– 27 dB for rain-climatic zones 1 and 2;

– 30 dB for rain-climatic zones 3, 4 and 5.

In Region 2:

2.4 The propagation loss on a space-Earth path is equal to the free space path loss plus the atmospheric absorption loss plus the rain attenuation exceeded for 1% of the worst month.

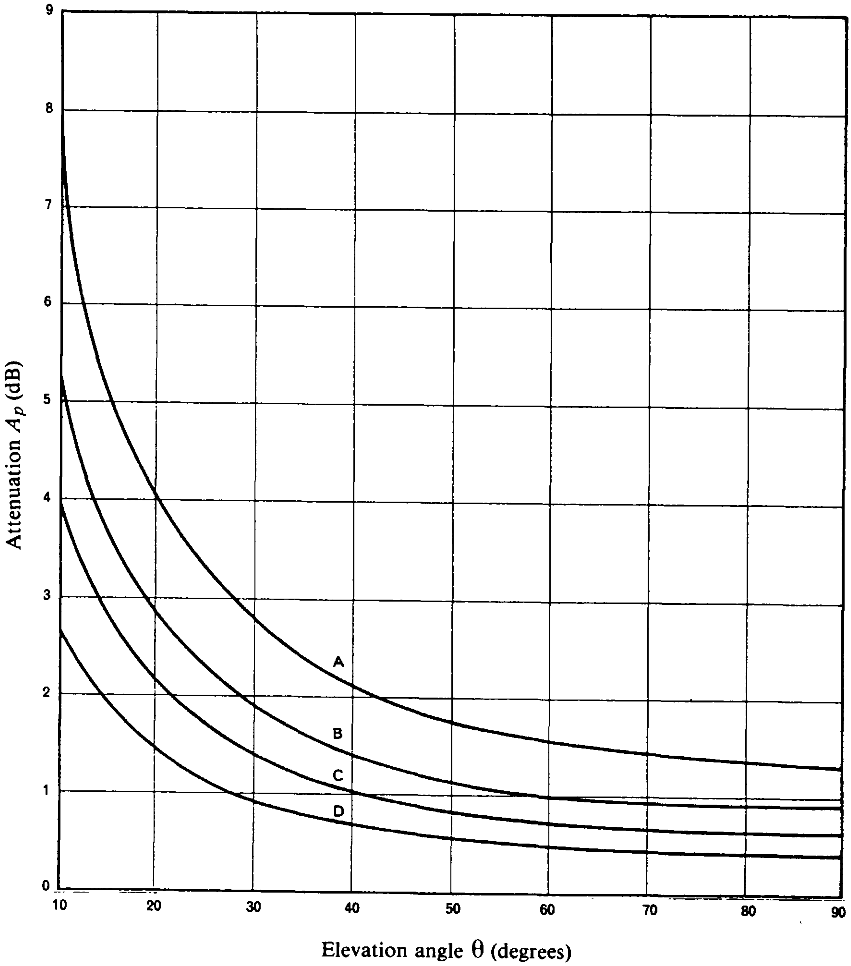


FIGURE 1

Predicted attenuation values exceeded for 1% of the worst month (0.25% of the time) at 12 GHz in the rain-climatic zones indicated in Figure 2 (for Regions 1 and 3)

A: Rain-climatic zone 1

B: Rain-climatic zone 2

C: Rain-climatic zones 3 and 4

D: Rain-climatic zone 5

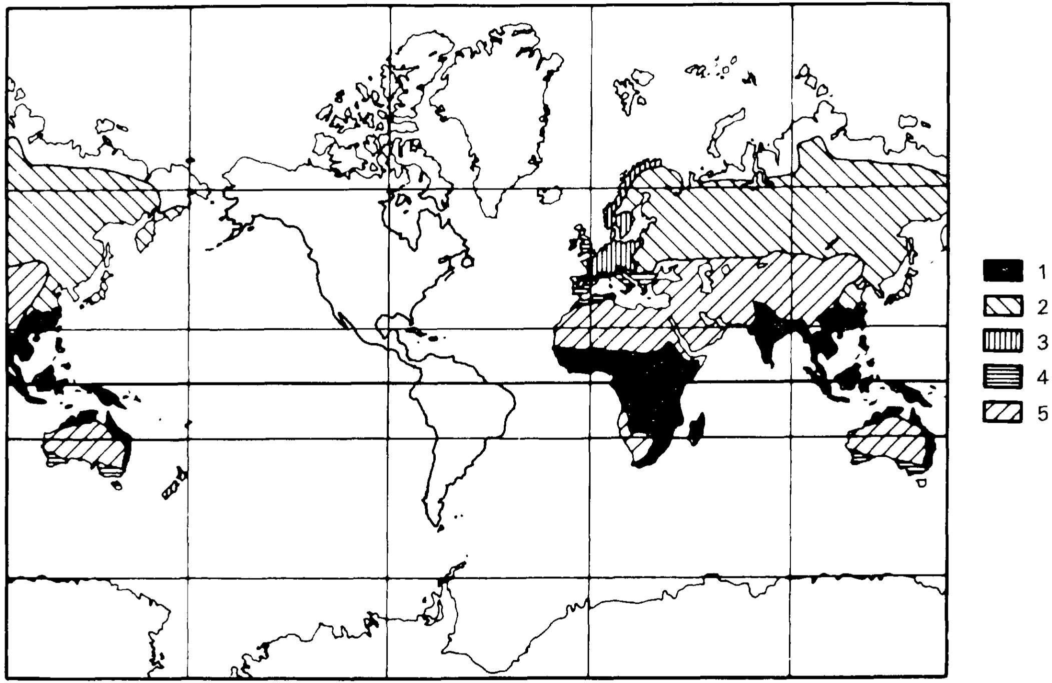


FIGURE 2

Rain-climatic zones in Regions 1 and 3

It should be noted that extensive measurements of attenuation due to rainfall have not been carried out in the tropical countries, especially in the African region.

2.4.1 *Atmospheric absorption*

The loss due to atmospheric absorption (i.e. clear sky attenuation) is given by:

$$A_a = \frac{92.20}{\cos\theta}\left[0.017 F_o + 0.002\,\rho F_w\right] \qquad \text{(dB)} \qquad \text{for} \quad \theta < 5°$$

where:

$$F_o = \left[24.88 \tan\theta + 0.339\sqrt{1416.77\tan^2\theta + 5.51}\right]^{-1}$$

$$F_w = \left[40.81 \tan\theta + 0.339\sqrt{3811.66\tan^2\theta + 5.51}\right]^{-1}$$

and:

$$A_a = \frac{0.042 + 0.003\,\rho}{\sin\theta} \qquad \text{(dB)} \qquad \text{for} \quad \theta \geqslant 5°$$

where:

θ = elevation angle (degrees),

ρ = surface water vapour concentration, g/m^3, being

ρ = 10 g/m^3 for rain-climatic zones A to K and

ρ = 20 g/m^3 for rain-climatic zones M to P (see Figure 3).

2.4.2 *Rain attenuation*

The rain attenuation A_p of circularly polarized signals exceeded for 1% of the worst month at 12.5 GHz is given by:

$$A_p = 0.21\,\gamma\,Lr \qquad \text{(dB)} \qquad (1)$$

where:

L is the slant path length through rain

$$= \frac{2(h_R - h_0)}{\left\{\sin^2\theta + 2\,\frac{(h_R - h_0)}{8500}\right\}^{1/2} + \sin\theta} \qquad \text{(km)}$$

r is the rain path length reduction factor

$$= \frac{90}{90 + 4\,L\cos\theta}$$

h_R is the rain height (km)

$$= c\left\{5.1 - 2.15\log\left(1 + 10^{(\zeta - 27)/25}\right)\right\} \qquad \text{(km)}$$

$c = 0.6$ for $|\zeta| \leqslant 20°$

$c = 0.6 + 0.02(|\zeta| - 20)$ for $20° < |\zeta| \leqslant 40°$

$c = 1.0$ for $|\zeta| > 40°$

h_0 is the height (km) above mean sea level of the earth station;

ζ is the earth station latitude (degrees);

θ is the elevation angle (degrees);

γ is the specific rain attenuation $= 0.0202\ R^{1.198}$ dB/km;

R is the rain intensity (mm/h) obtained from the Table below for the rain climatic zones identified in Figure 3.

(*Note:* The method is based on R exceeded for 0.01% of an average year.)

Rainfall intensity (R) for the rain climatic zones (exceeded for 0.01% of an average year) (see Figure 3)

Rain climatic zone	A	B	C	D	E	F	G	K	M	N	P
Rainfall intensity (mm/h)	8	12	15	19	22	28	30	42	63	95	145

Figure 4 presents plots of rain attenuation, as calculated using equation (1), of circularly polarized signals exceeded for 1% of the worst month at 12.5 GHz, as a function of earth station latitude and elevation angle for each of the rain climatic zones shown in Figure 3.

2.4.3 *Rain attenuation limit*

In the analysis of the Plan for the broadcasting-satellite service in Region 2, a maximum down-link attenuation of 9 dB was agreed in order to limit the inhomogeneity of broadcasting-satellite power flux-density and to facilitate sharing during clear-sky conditions.

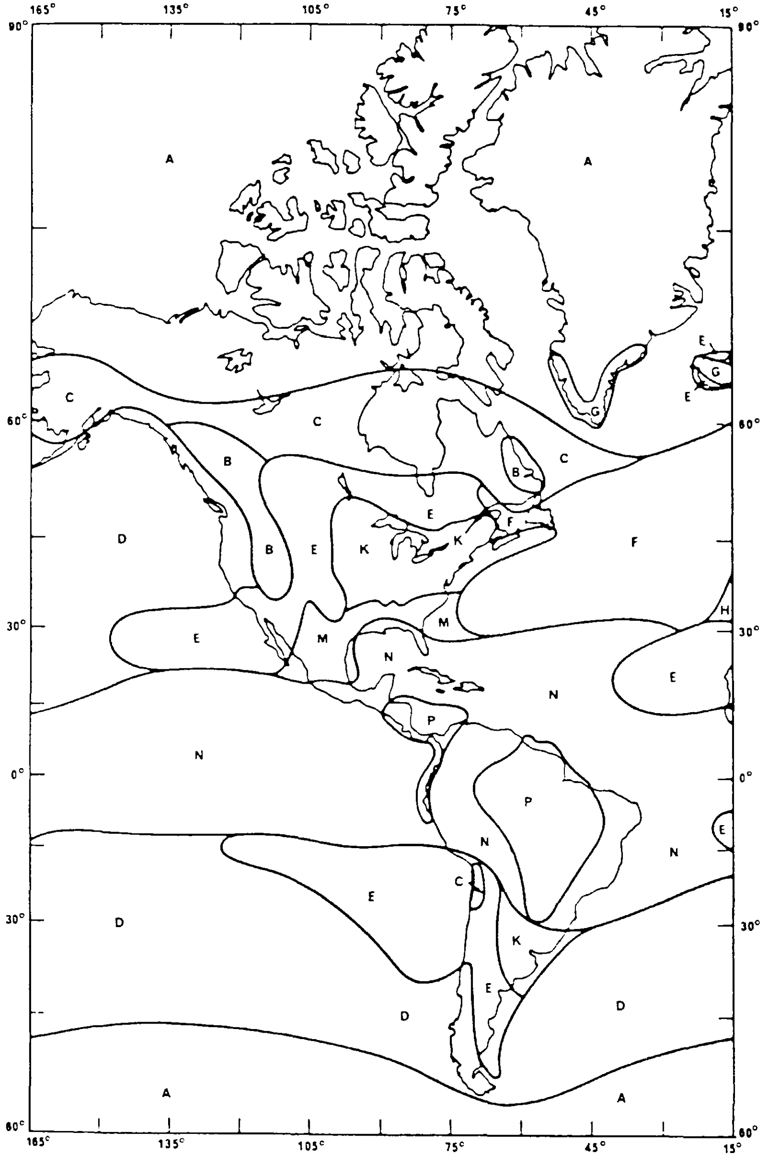


FIGURE 3

Rain-climatic zones (Region 2)

2.4.4 *Procedure for calculating the carrier-to-interference ratio at a test point*

The calculation of the down-link carrier-to-interference ratio (exceeded for 99% of the worst month) used to obtain the overall equivalent protection margin at a test point is the minimum value of the carrier-to-interference ratio obtained assuming:

i) clear-sky conditions (i.e. including atmospheric absorption); *or*

ii) rain-faded conditions corresponding to an attenuation value exceeded for 1% of the worst month.

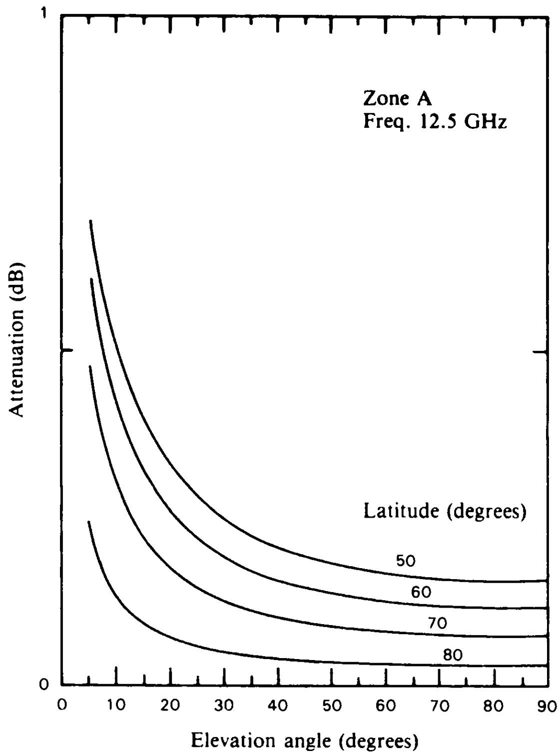
2.5 *Depolarization*

Rain and ice can cause depolarization of radio frequency signals. The level of the co-polar component relative to the depolarized component is given by the cross-polarization discrimination (XPD) ratio. For circularly polarized emissions, the XPD ratio, in dB, exceeded for 99% of the worst month is obtained from:

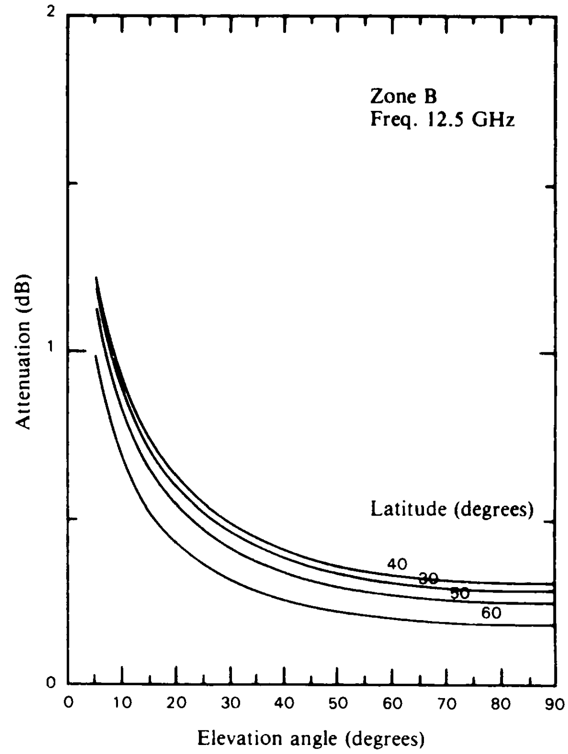
$$\mathrm{XPD} = 30 \log f - 40 \log (\cos \theta) - 20 \log A_p \qquad \text{(dB)} \qquad (2)$$

$$\text{for} \quad 5° \leqslant \theta \leqslant 60°$$

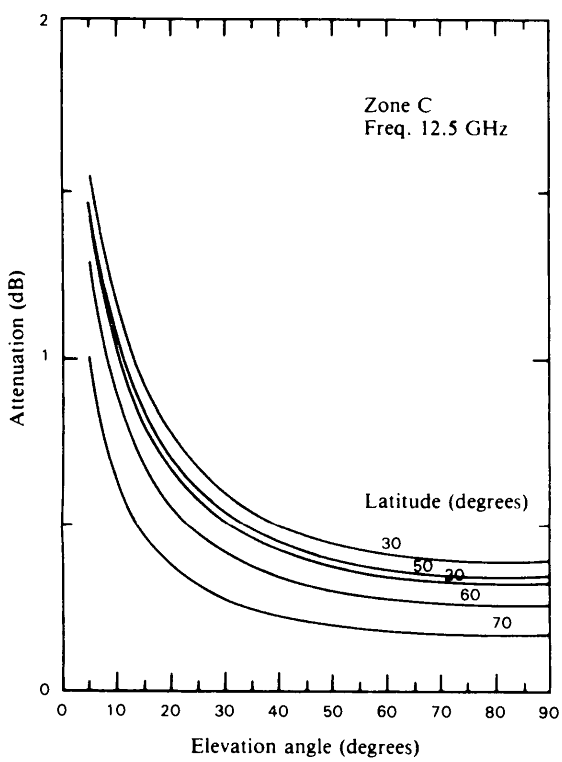
where A_p (dB) is the co-polar rain attenuation exceeded for 1% of the worst month (calculated in section 2.4), f is the frequency in GHz and θ is the elevation angle. For angles of θ greater than 60°, use $\theta = 60°$ in equation (2).



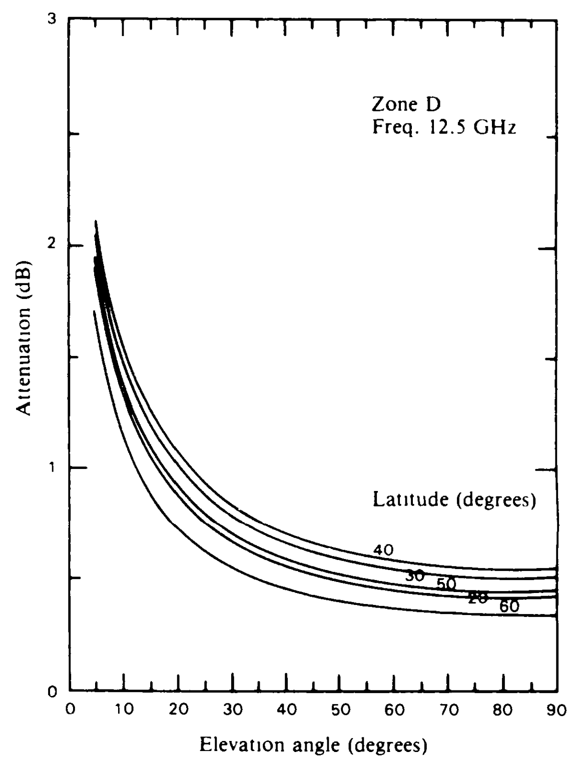
a) Rain climatic zone A



b) Rain climatic zone B



c) Rain climatic zone C



d) Rain climatic zone D

FIGURE 4

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain-climatic zones

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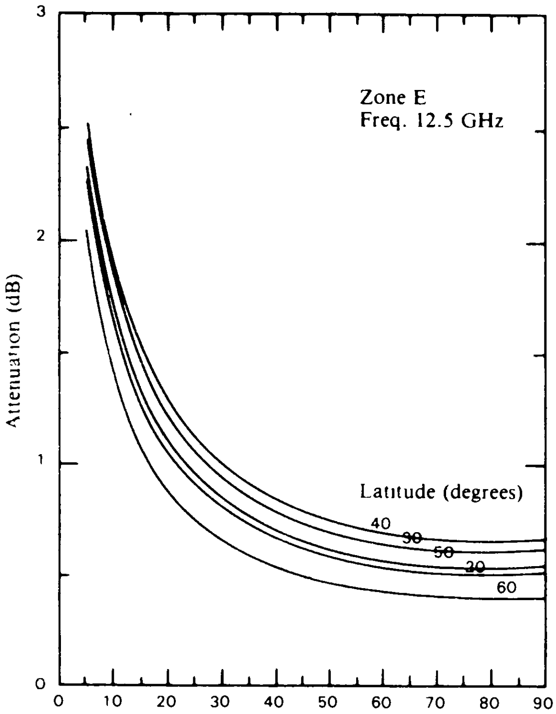
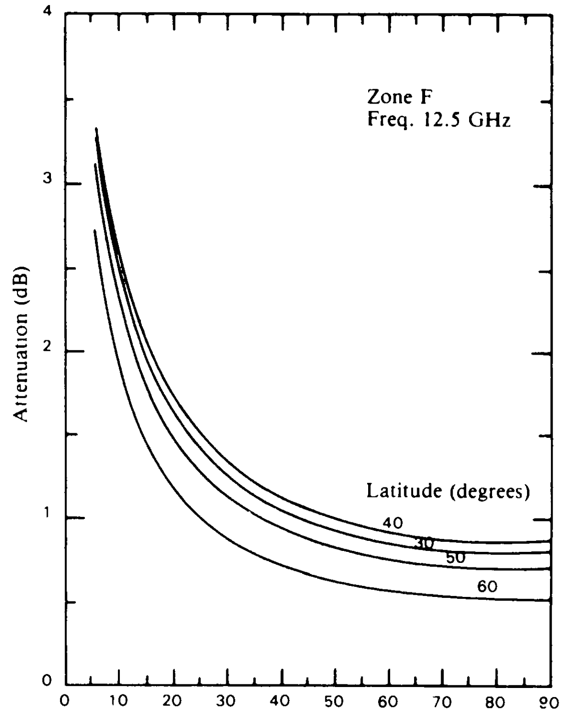
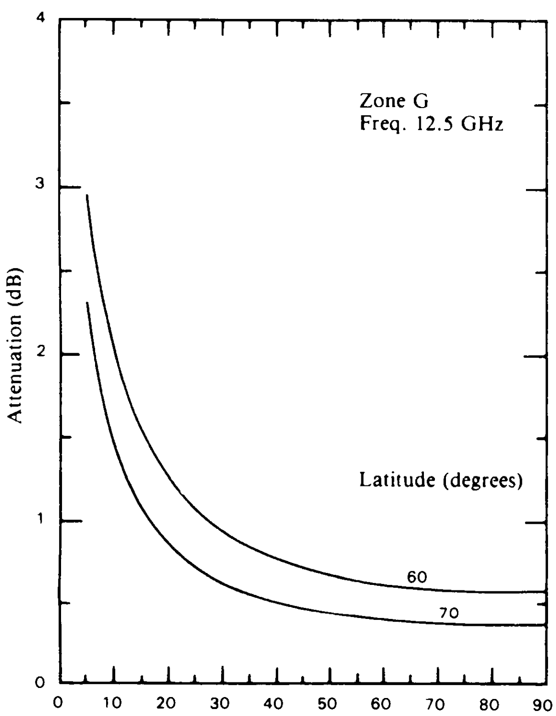


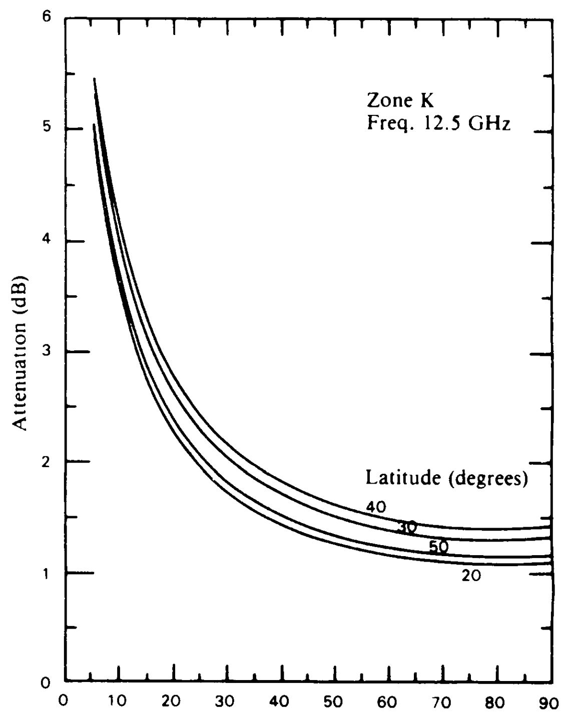
e) Rain climatic zone E



f) Rain climatic zone F



g) Rain climatic zone G



h) Rain climatic zone K

FIGURE 4 *(cont.)*

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain-climatic zones

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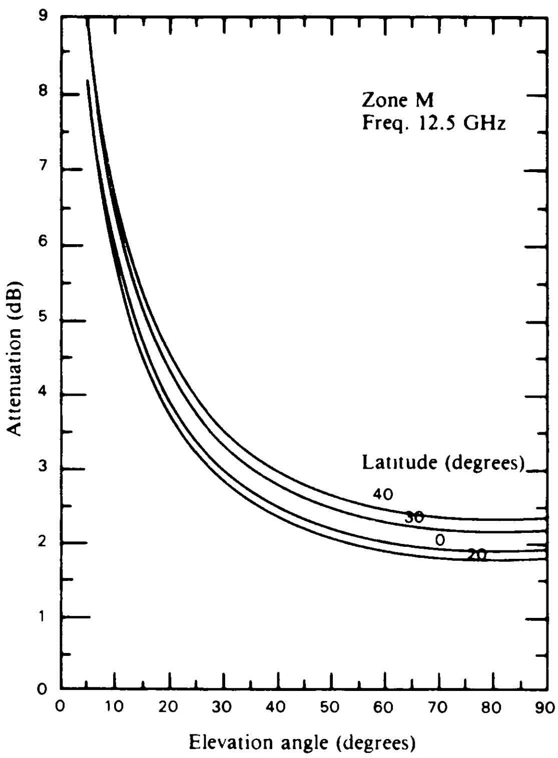
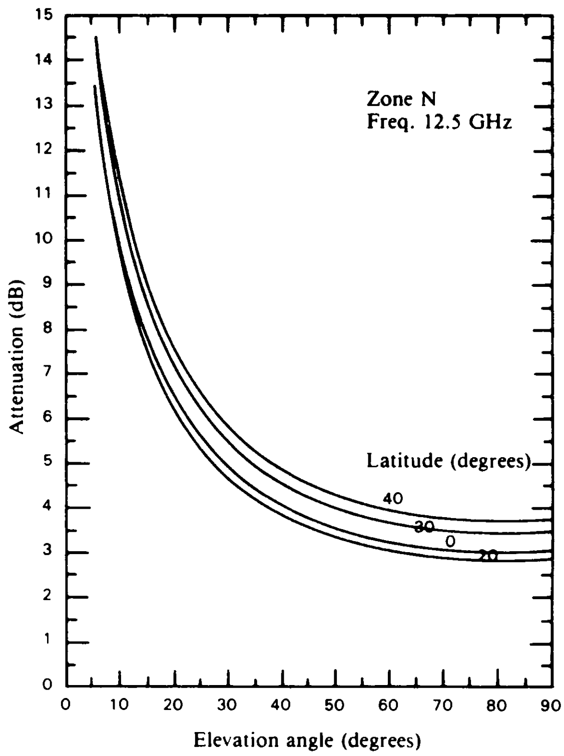
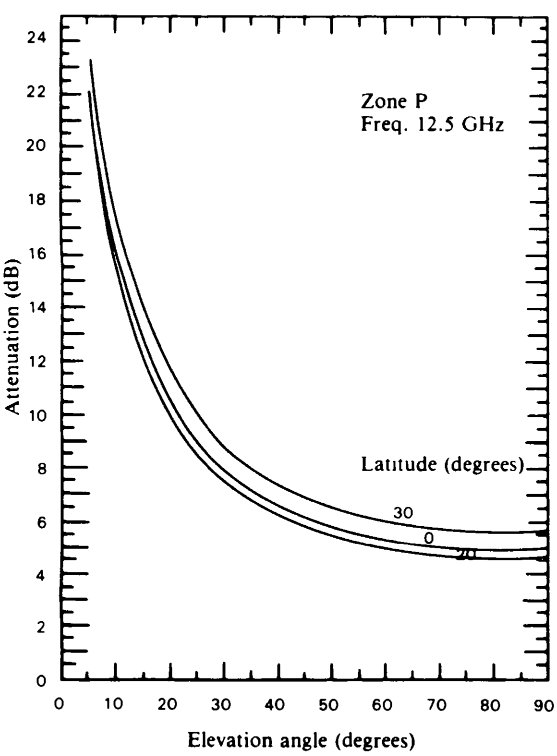


j) Rain climatic zone M



k) Rain climatic zone N



l) Rain climatic zone P

FIGURE 4 *(cont.)*

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain-climatic zones

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3. BASIC TECHNICAL CHARACTERISTICS

3.1 *Type of modulation*

3.1.1 In Regions 1 and 3, planning of the broadcasting-satellite service is based on the use of a signal consisting of a video signal with an associated carrier, frequency-modulated by a sound signal, both frequency-modulating a carrier in the 12 GHz band, with a pre-emphasis characteristic in accordance with Figure 5 (from CCIR Recommendation 405).

3.1.2 In Region 2, planning is based on the use of a frequency-modulated composite-coded colour television signal with two sound sub-carriers. However, in recognition of the need to provide for the use of new, enhanced television coding and modulation formats (e.g. time-compressed, multiplexed analogue video component signals and digitally-coded sound and data signals), values of the important technical characteristics have been chosen to take into consideration the implementation of these new formats within the provisions of the Plan.

3.1.3 Nevertheless, this does not preclude the use of other modulating signals having different characteristics (e.g. modulation with sound channels frequency-multiplexed within the bandwidth of a television channel, digital modulation of sound and television signals, or other pre-emphasis characteristics), provided that the use of such characteristics does not cause greater interference than that caused by the system considered in the appropriate Regional Plan or complies with the provisions of paragraph 3.2 of Article 3 of this Appendix.

3.2 *Polarization*

3.2.1 For the planning of the broadcasting-satellite service, circular polarization shall be used in Regions 1, 2 and 3.

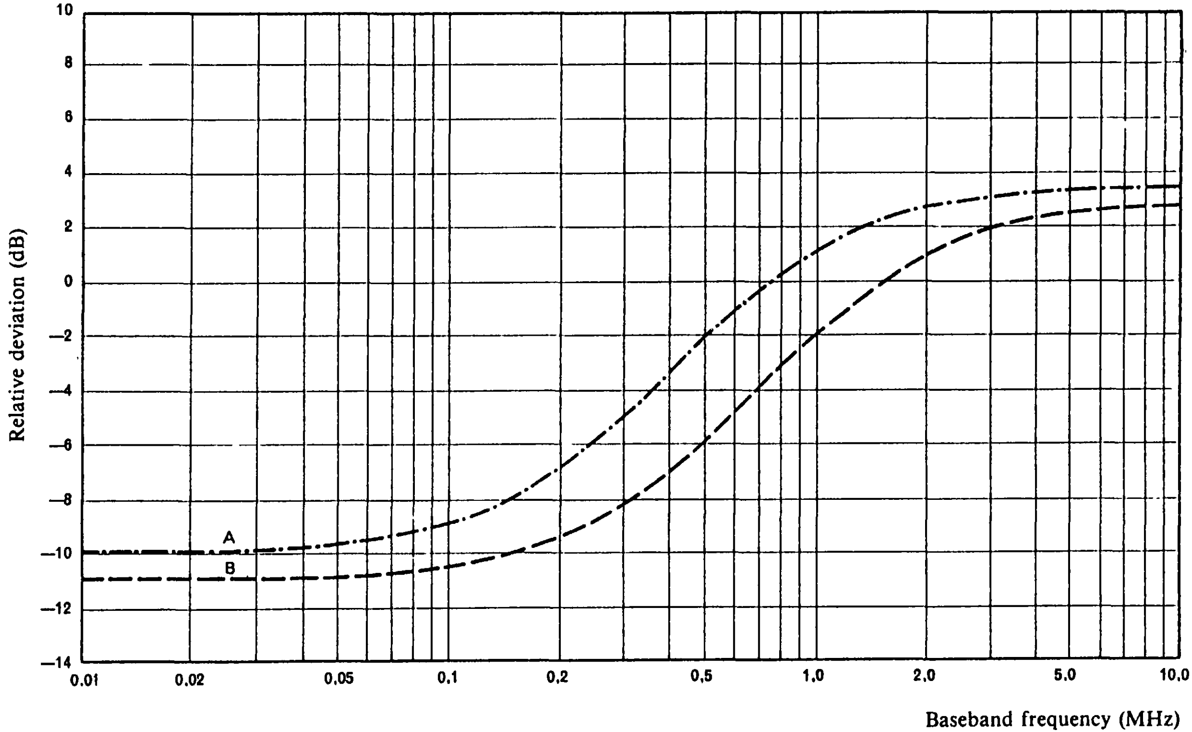

FIGURE 5

Pre-emphasis characteristic for television on 525- and 625-line systems

Curve A: 525-line system

Curve B: 625-line system

3.2.2 In Regions 1 and 3, the polarization of different beams intended to serve the same area should, if possible, be the same.

3.2.3 The terms "direct" and "indirect" used in the Plans to indicate the direction of rotation of circularly-polarized waves correspond to right-hand (clockwise) and left-hand (anti-clockwise) polarization respectively according to the following definitions:

Direct polarization (right-hand or clockwise polarization):

An elliptically or circularly-polarized electromagnetic wave, in which the electric field-intensity vector, observed in any *fixed plane*, normal to the direction of propagation, whilst looking in (i.e., not against) the direction of propagation, rotates *with time* in a *right-hand* or clockwise direction.

Note: For right-hand circularly-polarized plane waves, the ends of the electric vectors drawn from any points along a straight line normal to the plane of the wave front form, *at any instant*, a *left-hand* helix.

Indirect polarization (left-hand or anti-clockwise polarization):

An elliptically or circularly-polarized electromagnetic wave, in which the electric field-intensity vector, observed in any *fixed plane*, normal to the direction of propagation, whilst looking in (i.e., not against) the direction of propagation, rotates *with time* in a *left-hand* or anti-clockwise direction.

Note: For left-hand circularly-polarized plane waves, the ends of the electric vectors drawn from any points along a straight line normal to the plane of the wave front form, *at any instant*, a *right-hand* helix.

3.3 *Carrier-to-noise ratio*

For the purpose of planning the broadcasting-satellite service, the carrier-to-noise ratio is equal to or exceeds 14 dB for 99% of the worst month.

In Regions 1 and 3, the reduction in quality in the down-link due to thermal noise in the up-link is taken as equivalent to a degradation in the down-link carrier-to-noise ratio not exceeding 0.5 dB for 99% of the worst month. In Region 2, as a guide for planning, the reduction in quality in the down-link due to thermal noise in the feeder link is taken as equivalent to a degradation in the down-link carrier-to-noise ratio of approximately 0.5 dB not exceeded for 99% of the worst month, but the feeder-link and down-link Plans are evaluated on the basis of the overall carrier-to-noise ratio of 14 dB for the combined down-link and feeder-link contributions.

3.4 *Protection ratio between FM television signals*

For planning in Regions 1 and 3 the following protection ratios have been adopted for the purpose of calculating equivalent protection margins[1].

31 dB for co-channel signals;

15 dB for adjacent channel signals;

---

[1] The equivalent protection margin M is given in dB by the formula

$$M = -10 \log (10^{-M_1/10} + 10^{-M_2/10} + 10^{-M_3/10})$$

where M_1 is the value in dB of the protection margin for the same channel. This is defined in the following expression where the powers are evaluated at the receiver input:

$$\frac{\text{wanted power}}{\begin{array}{c}\text{sum of the co-channel}\\ \text{interfering powers}\end{array}} \text{(dB)} - \begin{array}{c}\text{co-channel protection}\\ \text{ratio (dB)}\end{array}$$

M_2 and M_3 are the values in dB of the upper and lower adjacent-channel protection margins respectively.

The definition of the adjacent-channel protection margin is similar to that for the co-channel case except that the adjacent-channel protection ratio and the sum of the interfering powers due to emissions in the adjacent channel are considered.

In Region 2, the following protection ratios have been adopted for the purpose of calculating the overall equivalent protection margin [1]:

28 dB for co-channel signals;

13.6 dB for adjacent-channel signals;

−9.9 dB for second adjacent-channel signals.

In Region 2, as a guide for planning, the reduction in the overall carrier-to-interference ratio due to co-channel interference in the feeder link is taken as equivalent to a degradation in the down-link co-channel carrier-to-interference ratio of approximately 0.5 dB not exceeded for 99% of the worst month, but the feeder-link and down-link Plans are evaluated on the basis of the overall equivalent protection margin, which includes the combined down-link and feeder-link contributions.

In Region 2, an overall equivalent protection margin of zero decibels, or greater, indicates that the individual protection ratios have been met for the co-channel, the adjacent channels and the second adjacent channels.

3.4.1 *Adjacent channel protection ratio template for Region 2* [2] *(FMTV into FMTV)*

The protection ratios for adjacent channels are derived from the template given in Figure 6. The template is symmetrical and is given in terms of absolute levels for the carrier-to-interference ratios.

The template is obtained by joining the segment for adjacent channels to the horizontal extension of the co-channel protection ratio value. The adjacent channel protection ratio cannot be adjusted relative to the co-channel value.

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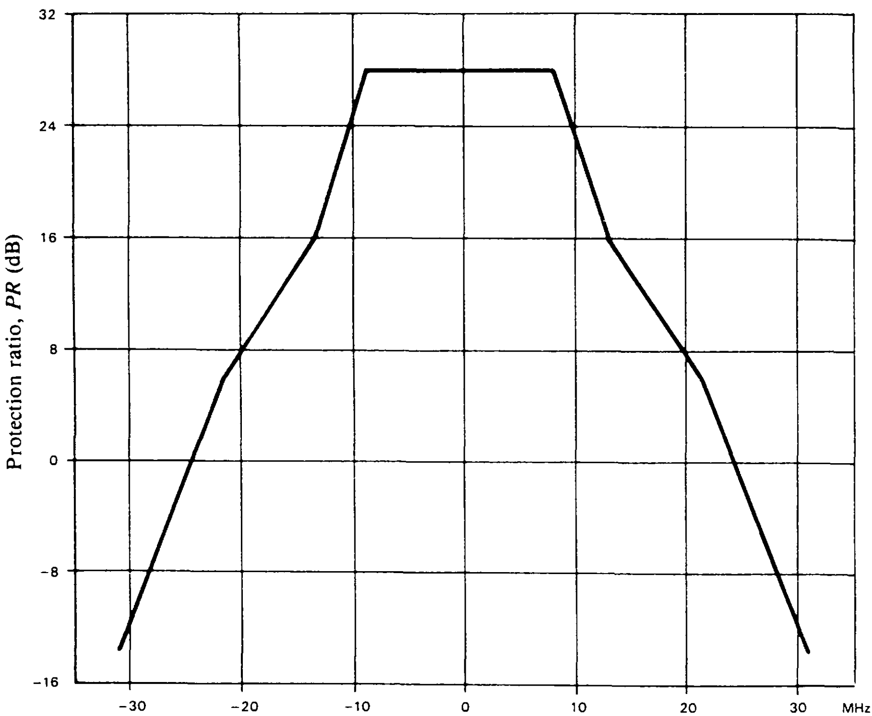
[1] The definitions in sections 1.10, 1.11, 1.12, 1.13 and 1.14 of this Annex apply to these calculations.

[2] See Annex 6 for the protection ratio template for Regions 1 and 3.



Carrier frequency offset F_0 (MHz)

$F_0 = (f_{int} - f_{wanted})$

FIGURE 6

Protection ratio template (FMTV/FMTV), for planning of broadcasting-satellite systems in Region 2

The template is given by the following expressions:

$$PR = \begin{cases} 28 \text{ dB} & \text{for } |F_0| \leqslant 8.36 \text{ MHz} \\ -2.762\ |F_0| + 51.09 \text{ dB} & \text{for } 8.36 < |F_0| \leqslant 12.87 \text{ MHz} \\ -1.154\ |F_0| + 30.4 \text{ dB} & \text{for } 12.87 < |F_0| \leqslant 21.25 \text{ MHz} \\ -2.00\ |F_0| + 48.38 \text{ dB} & \text{for } |F_0| > 21.25 \text{ MHz} \end{cases}$$

where:

PR is the protection ratio in dB and $|F_0|$ is the carrier spacing between the interfering and wanted signals in MHz.

3.5 *Channel spacing*

3.5.1 *Channel spacing in the Plans*

In Regions 1 and 3, the spacing between the assigned frequencies of two adjacent channels is 19.18 MHz.

In Region 2, the spacing between the assigned frequencies of two adjacent channels is 14.58 MHz, which corresponds to 32 channels in the 500 MHz bandwidth allocated to the broadcasting-satellite service.

The Plans give the assigned frequencies for each channel.

3.5.2 *Grouping of channels in the same beam*

Planning in Region 1 has been carried out by trying to group all the channels radiated within a single antenna beam within a frequency range of 400 MHz, in order to simplify receiver construction.

3.5.3 *Spacing between assigned channel frequencies feeding a common antenna*

For Regions 1 and 3, owing to technical difficulties in the output circuit of a satellite transmitter, spacing between the assigned frequencies of two channels feeding a common antenna must be greater than 40 MHz.

3.6 *Figure of merit (G/T) of a receiving station in the broadcasting-satellite service*

In planning the broadcasting-satellite service, the value of the figure of merit G/T used is:

for Regions 1 and 3:

6 dB(K^{-1}) for individual reception;

14 dB(K^{-1}) for community reception, *and*

for Region 2:

10 dB(K^{-1}) for individual reception.

The values are calculated from the following formula which allows for pointing error, polarization effects and equipment ageing:

$$G/T = 10 \log \left(\frac{\alpha \beta G_r}{\alpha \, T_a + (1 - \alpha) \, T_0 + (n - 1) \, T_0} \right) \qquad \text{dB}(\text{K}^{-1})$$

where:

α = the total coupling losses, expressed as a power ratio;

β = the total losses due to the pointing error, polarization effects and equipment ageing, expressed as a power ratio;

G_r = the effective gain of the receiving antenna, expressed as a power ratio and taking account of illumination method and efficiency;

T_a = the effective temperature of the antenna (K);

T_0 = the reference temperature = 290 K;

n = the overall noise factor of the receiver, expressed as a power ratio.

See also CCIR Report 473-3 (Annex 1).

3.7 *Receiving antennas*

3.7.1 *Minimum diameter of receiving antennas*

For planning the broadcasting-satellite service the minimum receiving antenna diameter must be such that the half-power beamwidth φ_0 is:

a) for individual reception: 2° in Regions 1 and 3, and 1.7° in Region 2;

b) for community reception: 1° in Regions 1 and 3.

3.7.2 *Receiving antenna reference patterns*

The co-polar and cross-polar receiving antenna reference patterns are given in Figures 7 and 8.

a) For Regions 1 and 3, the relative antenna gain (dB) is given by the curves in Figure 7 for:

- individual reception, for which use should be made of:
  - Curve A for the co-polar component;
  - Curve B for the cross-polar component;
- community reception, for which use should be made of:
  - Curve A′ up to the intersection with Curve C, then Curve C, for the co-polar component;
  - Curve B for the cross-polar component.

b) For Region 2, the relative antenna gain (dB) is given by the curves in Figure 8 for individual reception, for which use should be made of:

- Curve A for the co-polar component;
- Curve B for the cross-polar component.

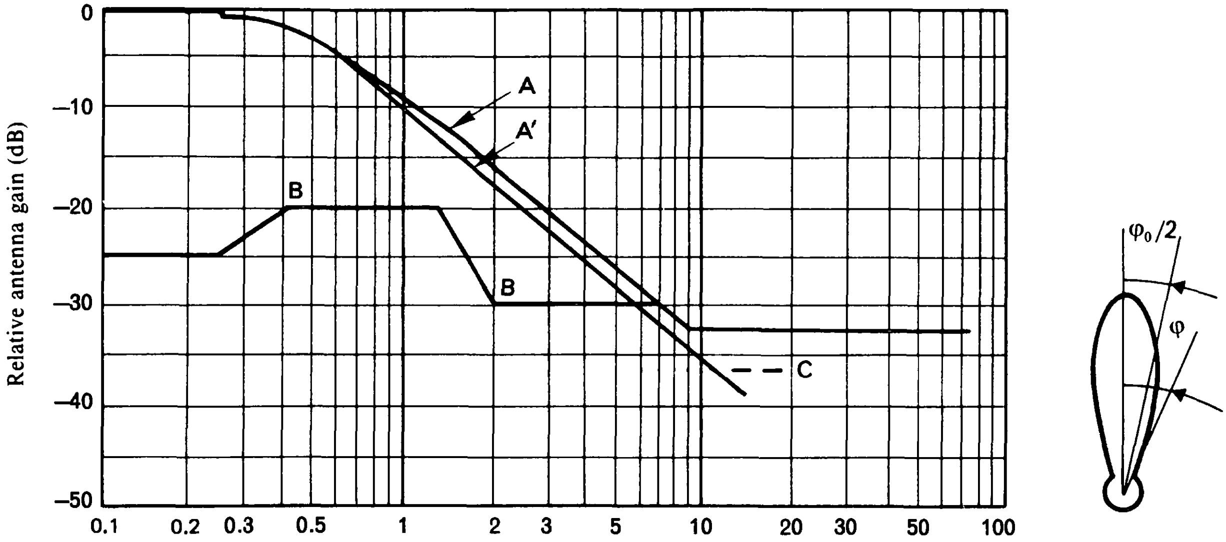


FIGURE 7

Co-polar and cross-polar receiving antenna reference patterns in Regions 1 and 3

Curve A: Co-polar component for individual reception without side-lobe suppression (dB relative to main beam gain)

0	for $0 \leqslant \varphi \leqslant 0.25\ \varphi_0$
$-12\left(\frac{\varphi}{\varphi_0}\right)^2$	for $0.25\ \varphi_0 < \varphi \leqslant 0.707\ \varphi_0$
$-\left[9.0 + 20 \log\left(\frac{\varphi}{\varphi_0}\right)\right]$	for $0.707\ \varphi_0 < \varphi \leqslant 1.26\ \varphi_0$
$-\left[8.5 + 25 \log\left(\frac{\varphi}{\varphi_0}\right)\right]$	for $1.26\ \varphi_0 < \varphi \leqslant 9.55\ \varphi_0$
-33	for $\varphi > 9.55\ \varphi_0$

Curve A': Co-polar component for community reception without side-lobe suppression (dB relative to main beam gain)

0	for $0 \leqslant \varphi \leqslant 0.25\ \varphi_0$
$-12\left(\frac{\varphi}{\varphi_0}\right)^2$	for $0.25\ \varphi_0 < \varphi \leqslant 0.86\ \varphi_0$
$-\left[10.5 + 25 \log\left(\frac{\varphi}{\varphi_0}\right)\right]$	for $\varphi > 0.86\ \varphi_0$ up to intersection with Curve C (then Curve C)

Curve B: Cross-polar component for both types of reception (dB relative to main beam gain)

-25	for $0 \leqslant \varphi \leqslant 0.25\ \varphi_0$
$-\left(30 + 40 \log\left\|\frac{\varphi}{\varphi_0} - 1\right\|\right)$	for $0.25\ \varphi_0 < \varphi \leqslant 0.44\ \varphi_0$
-20	for $0.44\ \varphi_0 < \varphi \leqslant 1.4\ \varphi_0$
$-\left(30 + 25 \log\left\|\frac{\varphi}{\varphi_0} - 1\right\|\right)$	for $1.4\ \varphi_0 < \varphi \leqslant 2\ \varphi_0$

-30 until intersection with co-polar component curve; then co-polar component curve.

Curve C: Minus the on-axis gain (Curve C in this figure illustrates the particular case of an antenna with an on-axis gain of 37 dBi).

Note: for values of φ_0 see section 3.7.1

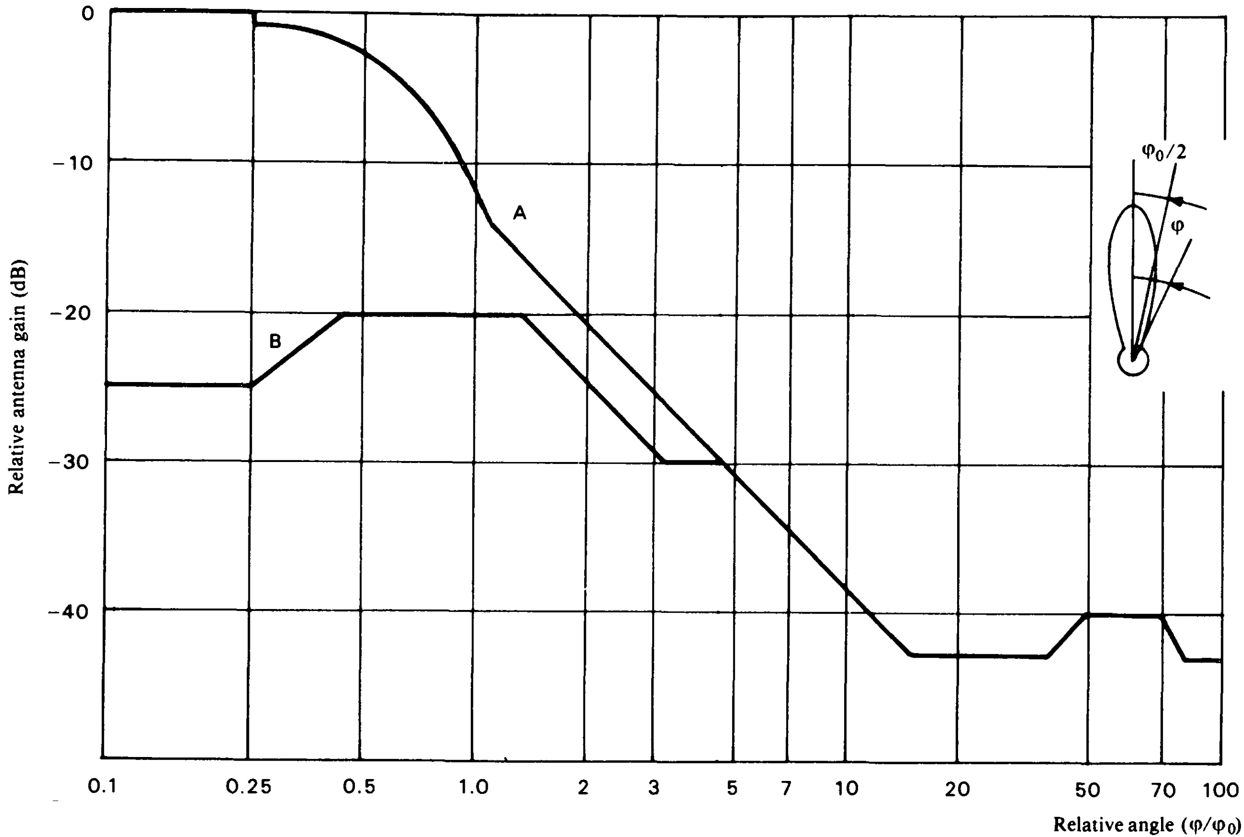


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FIGURE 8

Reference patterns for co-polar and cross-polar components for receiving earth station antennas in Region 2

Curve A: Co-polar component without side-lobe suppression (dB relative to main beam gain)

0	for $0 \leqslant \varphi \leqslant 0.25\ \varphi_0$
$-12\ (\varphi/\varphi_0)^2$	for $0.25\ \varphi_0 < \varphi \leqslant 1.13\ \varphi_0$
$-\{14 + 25 \log(\varphi/\varphi_0)\}$	for $1.13\ \varphi_0 < \varphi \leqslant 14.7\ \varphi_0$
-43.2	for $14.7\ \varphi_0 < \varphi \leqslant 35\ \varphi_0$
$-\{85.2 - 27.2 \log(\varphi/\varphi_0)\}$	for $35\ \varphi_0 < \varphi \leqslant 45.1\ \varphi_0$
-40.2	for $45.1\ \varphi_0 < \varphi \leqslant 70\ \varphi_0$
$-\{-55.2 + 51.7 \log(\varphi/\varphi_0)\}$	for $70\ \varphi_0 < \varphi \leqslant 80\ \varphi_0$
-43.2	for $80\ \varphi_0 < \varphi \leqslant 180°$

Curve B: Cross-polar component (dB relative to main beam gain)

-25	for $0 \leqslant \varphi \leqslant 0.25\ \varphi_0$
$-\left(30 + 40 \log \left\lvert \frac{\varphi}{\varphi_0} - 1 \right\rvert\right)$	for $0.25\ \varphi_0 < \varphi \leqslant 0.44\ \varphi_0$
-20	for $0.44\ \varphi_0 < \varphi \leqslant 1.28\ \varphi_0$
$-\left(17.3 + 25 \log \left\lvert \frac{\varphi}{\varphi_0} \right\rvert\right)$	for $1.28\ \varphi_0 < \varphi \leqslant 3.22\ \varphi_0$

-30 until intersection with co-polar component curve; then co-polar component curve.

Note 1: For values of φ_0 see paragraph 3.7.1.

Note 2: In the angular range between 0.1 φ_0 and 1.13 φ_0 the co-polar and cross-polar gains must not exceed the reference patterns.

Note 3: At off-axis angles larger than 1.13 φ_0 and for 90% of all sidelobe peaks in each of the reference angular windows, the gain must not exceed the reference patterns. The reference angular windows are 1.13 φ_0 to 3 φ_0, 3 φ_0 to 6 φ_0, 6 φ_0 to 10 φ_0, 10 φ_0 to 20 φ_0, 20 φ_0 to 40 φ_0, 40 φ_0 to 75 φ_0 and 75 φ_0 to 180°.

3.8 *Necessary bandwidth*

The necessary bandwidths considered are as follows for:

– 625-line systems in Regions 1 and 3: 27 MHz;

– 525-line systems in Region 3: 27 MHz.

In Region 2, the Plan is based on a channel bandwidth of 24 MHz[1], but different bandwidths may be implemented in accordance with the provisions of this Appendix.

3.9 *Guardbands*

3.9.1 A guardband is defined as the portion of the frequency spectrum between the edge of the allocated band and the edge of the necessary bandwidth of the emission in the nearest channel.

3.9.2 For the planning of the broadcasting-satellite service, the guardbands necessary to protect the services in adjacent frequency bands are shown in the table below.

Regions	Guardband at the lower edge of the band	Guardband at the upper edge of the band
1	14 MHz	11 MHz
2	12 MHz	12 MHz
3	14 MHz	11 MHz

[1] For France, Denmark and some of the United Kingdom requirements which use 625-line standards with greater video bandwidth, the channels shown in the Plan have a necessary bandwidth of 27 MHz. This is indicated by an appropriate symbol in the Plan.

For Regions 1 and 3, the guardbands assume a maximum beam centre e.i.r.p. of 67 dBW (value relating to individual reception), and a filter roll-off of 2 dB/MHz. If smaller e.i.r.p. values are assumed, the guardbands can be reduced in width by 0.5 MHz for each decibel decrease in e.i.r.p.

3.9.3 Since developments in technology or the choice of lower e.i.r.p. values than those given above are likely to permit a reduction in the necessary guardbands, it is recommended for Regions 1 and 3 that, for purposes other than planning at the 1977 Conference, the latest CCIR Recommendations concerning spurious emissions from broadcasting satellites should be followed.

3.9.4 The guardbands at both the lower and upper edges may be used for transmissions in the space operation service.

3.10 *Orbital spacing*

The Plan for Regions 1 and 3 has been based generally on nominal orbital positions spaced uniformly at intervals of 6°. The Plan for Region 2 has been based on a non-uniform spacing.

3.11 *Satellite station-keeping*

Space stations in the broadcasting-satellite service must be maintained in position with an accuracy of better than ± 0.1° in both the N-S and the E-W directions. For such space stations, the maintenance of the tolerance in the N-S direction is recommended but is not a requirement for Region 2.

3.12 *Elevation angle of receiving antennas*

The Plans have been based on the desirability of a minimum angle of elevation of 20° to minimize the required e.i.r.p. of the satellite and to reduce the effects of shadowing and the possibility of interference from terrestrial services. However, for areas situated in latitudes above about 60°, the angle of elevation is of necessity less than 20°. Attention is also drawn to section 2.2 for the Regions 1 and 3 Plan and to section 2.4.3 for the Region 2 Plan.

For mountainous areas where an elevation angle of 20° may not suffice, an angle of at least 30° has been provided, where possible, to provide an acceptable service. An angle of elevation of at least 40° has been considered for service areas subject to high precipitation (e.g., in Regions 1 and 3, rain-climatic zone 1; in Region 2, rain-climatic zones M, N and P), but exceptions were made in some cases in Region 2.

Some dry, non-mountainous areas may be given an acceptable service at angles of elevation less than 20°.

In areas with small elevation angles, the shadowing effect of tall buildings may have to be taken into account.

In choosing a satellite position designed to give the maximum angle of elevation at the ground, the influence of such a position on the eclipse period has been borne in mind.

3.13 *Transmitting antennas*

3.13.1 *Cross-section of transmitted beam*

Planning in Regions 1, 2 and 3 has been based on the use of transmitting antennas with beams of elliptical or circular cross-section.

If the cross-section of the emitted beam is elliptical, the effective beamwidth φ_0 is a function of the angle of rotation between the plane containing the satellite and the major axis of the beam cross-section and the plane in which the beamwidth is required.

The relationship between the maximum gain of an antenna and the half-power beamwidth can be derived from the expression:

$$G_m = \frac{27\,843}{ab}$$

or

$$G_m\,(\text{dB}) = 44.44 - 10 \log a - 10 \log b$$

where:

a and b are the angles (in degrees) subtended at the satellite by the major and minor axes of the elliptical cross-section of the beam.

An antenna efficiency of 55% is assumed.

3.13.2 *Minimum beamwidth of transmitting antenna*

A minimum value of 0.6° for the half-power beamwidth of a transmitting antenna has been adopted for planning for Regions 1 and 3, and 0.8° for Region 2.

3.13.3 *Transmitting antenna reference patterns*

The reference patterns for the co-polar and cross-polar components of satellite transmitting antennas used in preparing the Plans are given in Figure 9 for Regions 1 and 3, and in Figure 10 for Region 2.

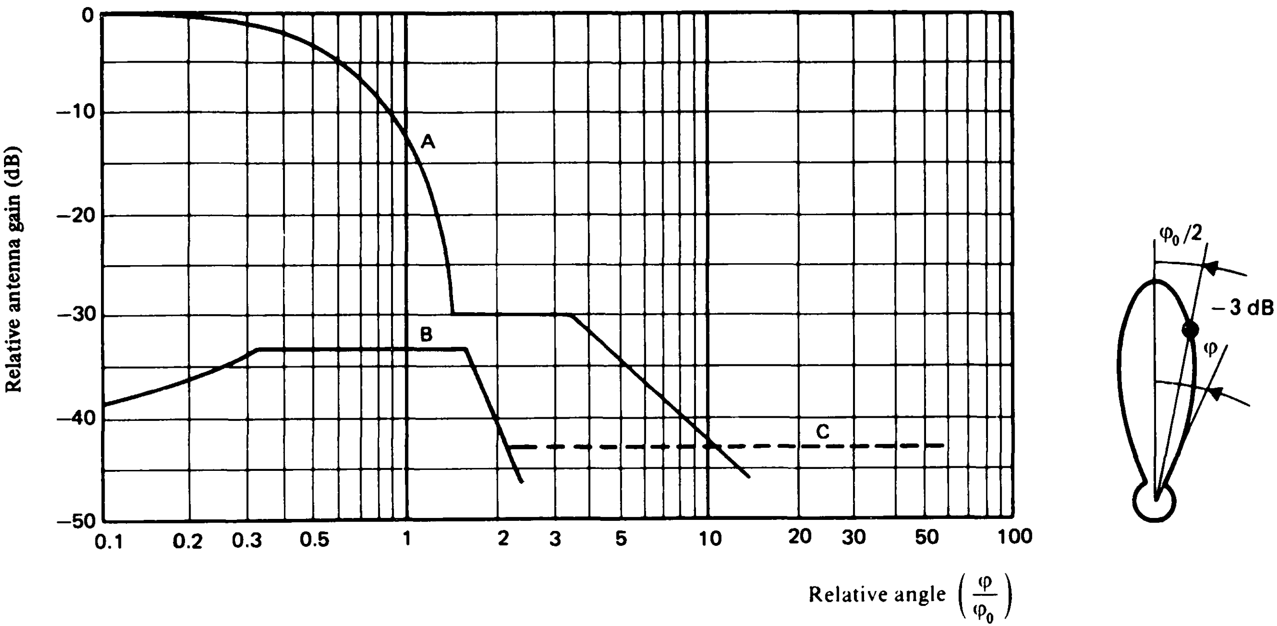

FIGURE 9

Reference patterns for co-polar and cross-polar components for satellite transmitting antennas in Regions 1 and 3

Curve A: Co-polar component (dB relative to main beam gain)

$-12\left(\frac{\varphi}{\varphi_0}\right)^2$ for $0 \leqslant \varphi \leqslant 1.58\ \varphi_0$

-30 for $1.58\ \varphi_0 < \varphi \leqslant 3.16\ \varphi_0$

$-\left[17.5 + 25 \log \left(\frac{\varphi}{\varphi_0}\right)\right]$ for $\varphi > 3.16\ \varphi_0$

after intersection with Curve C: as Curve C

Curve B: Cross-polar component (dB relative to main beam gain)

$-\left(40 + 40 \log \left|\frac{\varphi}{\varphi_0} - 1\right|\right)$ for $0 \leqslant \varphi \leqslant 0.33\ \varphi_0$

-33 for $0.33\ \varphi_0 < \varphi \leqslant 1.67\ \varphi_0$

$-\left(40 + 40 \log \left|\frac{\varphi}{\varphi_0} - 1\right|\right)$ for $\varphi > 1.67\ \varphi_0$

after intersection with Curve C: as Curve C

Curve C: Minus the on-axis gain (Curve C in this figure illustrates the particular case of an antenna with an on-axis gain of 43 dBi).

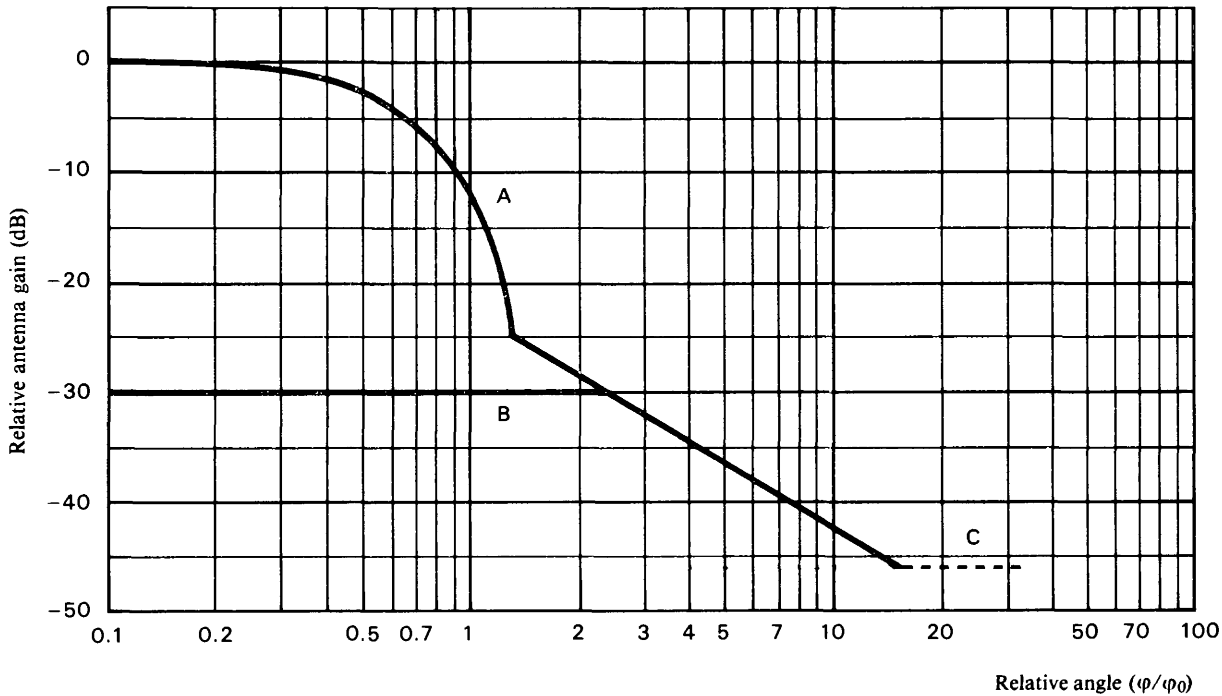

FIGURE 10

Reference patterns for co-polar and cross-polar components for satellite transmitting antennas in Region 2

Curve A: Co-polar component (dB relative to main beam gain)

$-12\,(\varphi/\varphi_0)^2$ for $0 \leqslant (\varphi/\varphi_0) \leqslant 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with curve C: Curve C

Curve B: Cross-polar component (dB relative to main beam gain)

-30 for $0 \leqslant (\varphi/\varphi_0) \leqslant 2.51$

after intersection with co-polar pattern: co-polar pattern

Curve C: Minus the on-axis gain (Curve C in this figure illustrates the particular case of an antenna with an on-axis gain of 46 dBi).

In Region 2, when it was necessary to reduce interference, the pattern shown in Figure 11 was used; this use is indicated in the Plan by an appropriate symbol. This pattern is derived from an antenna producing an elliptical beam with fast roll-off in the main lobe. Three curves for different values of φ_0 are shown as examples.

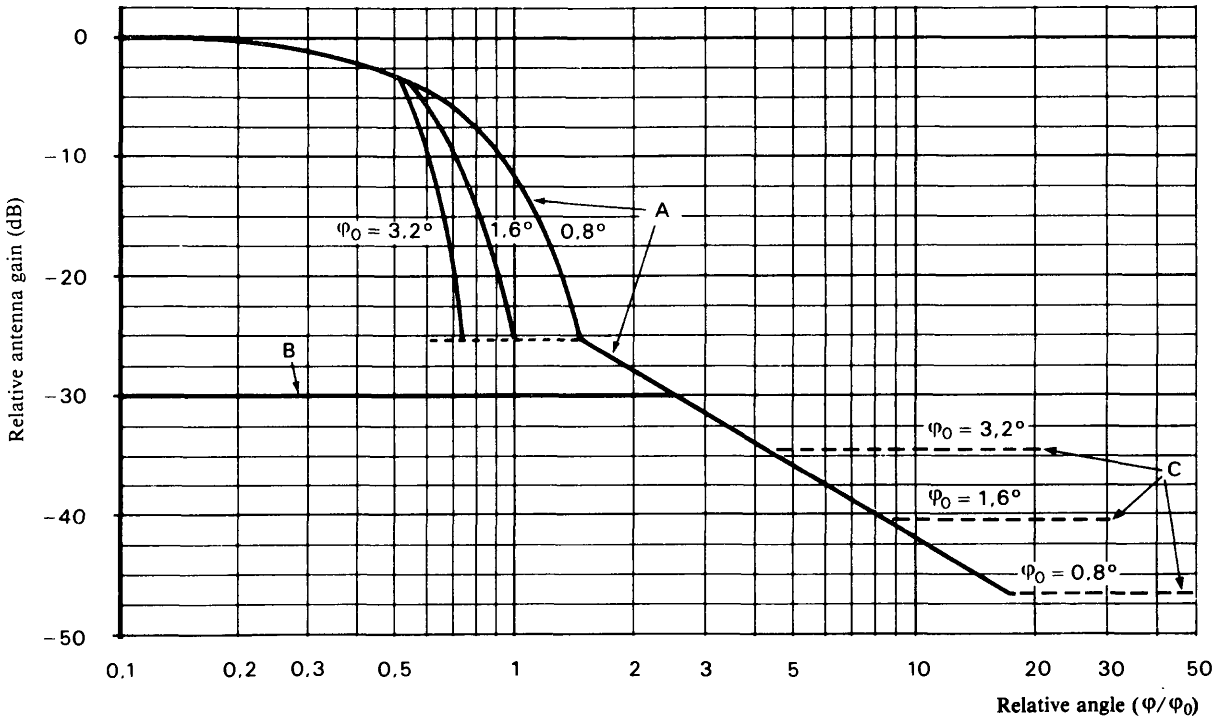

FIGURE 11

Reference patterns for co-polar and cross-polar components for satellite transmitting antennas with fast roll-off in the main beam for Region 2

Curve A: Co-polar component (dB relative to main beam gain)

$-12\ (\varphi/\varphi_0)^2$ for $0 \leqslant (\varphi/\varphi_0) \leqslant 0.5$

$-18.75\ \varphi_0^2\ (\varphi/\varphi_0 - x)^2$ for $0.5 < (\varphi/\varphi_0) \leqslant \left(\frac{1.16}{\varphi_0} + x\right)$

-25.23 for $\left(\frac{1.16}{\varphi_0} + x\right) < (\varphi/\varphi_0) \leqslant 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with curve C: Curve C

Curve B: Cross-polar component (dB relative to main beam gain)

-30 for $0 \leqslant (\varphi/\varphi_0) < 2.51$

after intersection with co-polar pattern: co-polar pattern

Curve C: Minus the on-axis gain (Curves A and C represent examples of three antennas having different values of φ_0 as labelled in Figure 11. The on-axis gains of these antennas are approximately 34, 40 and 46 dBi, respectively).

where:

φ = off-axis angle (degrees)

φ_0 = dimension of the minimum ellipse fitted around the down-link service area in the direction of interest (degrees)

$x = 0.5\left(1 - \frac{0.8}{\varphi_0}\right).$

3.14 *Satellite antenna pointing accuracy*

3.14.1 The deviation of the antenna beam from its nominal pointing direction must not exceed a limit of 0.1° in any direction. Moreover, the angular rotation of a transmitting beam about its axis must not exceed a limit of ± 2° for Regions 1 and 3, and ± 1° for Region 2; the limit on rotation is not necessary for beams of circular cross-section using circular polarization.

3.14.2 The following factors contribute to the total variation in the area on the surface of the Earth illuminated by the satellite beam:

- variations in satellite station-keeping;
- the variations caused by the pointing tolerances, which become more significant for coverage areas with low angles of elevation;
- the effect of the yaw error, which increases as the beam ellipse lengthens.

3.14.3 The effect of these possible variations should be assessed on a case-by-case basis, since their total effect on the area covered will vary with the geometry of the satellite beam, and it would not be reasonable to indicate a single value of shift in the area covered for all situations.

3.14.4 If linear polarization is used for an emission, yaw error makes a significant contribution to increasing the transmitted cross-polarized component; this increases the interference with other carriers which were originally cross-polarized with the emission in question.

3.15 *Limitation of output power in the satellite transmitter*

The output power of a space station transmitter in the broadcasting-satellite service must not rise by more than 0.25 dB relative to its nominal value throughout the life of the satellite.

3.16 *Power flux-density at edge of coverage area*

The value of the power flux-density at the edge of the coverage area exceeded for 99% of the worst month is:

-103 dB(W/m^2) for individual reception in Regions 1 and 3;

-107 dB(W/m^2) for individual reception in Region 2 for 24 MHz, as well as for 27 MHz with respect to the cases mentioned in the footnote to Section 3.8.

-111 dB(W/m^2) for community reception in Regions 1 and 3.

3.17 *Difference between the e.i.r.p. directed towards the edge of the coverage area and that on the axis of the beam*

For planning, the absolute value of the difference between the e.i.r.p. directed towards the edge of the coverage area and that on the axis of the beam should preferably be 3 dB.

If the beam area is larger than the coverage area, the value will be less than 3 dB.

3.18 *Use of energy dispersal*

For planning, an energy dispersal value has been adopted which reduces by 22 dB the spectral power flux-density measured in a 4 kHz bandwidth in relation to that measured in the entire bandwidth; this reduction corresponds to a peak-to-peak deviation of 600 kHz.

ANNEX 6[1]

Criteria for Sharing Between Services

1. *Protection requirements for sharing between services in the 12 GHz band*

1.1 The establishment of sharing criteria for the different services using the 12 GHz band should be based on the protection requirements listed in the table below.

1.2 The values given as "total acceptable" are those necessary to protect the wanted signal. The "single entry" values are those which should be used as a guide for determining sharing criteria. The total interference from all sources must be calculated, since satisfying the "single entry" criteria for each source may not guarantee that the total interference meets the above protection requirements. A "single entry" is defined as the aggregate of emissions from any one station entering any receiver in the wanted service within the channel to be protected.

1.3 The carrier-to-interference ratio (C/I) refers to the ratio of the wanted-to-interfering power at the affected ground station. The value given shall be exceeded for 80% of the worst month for the fixed-satellite service (FSS), and for 99% of the worst month for the broadcasting service (BS) and the broadcasting-satellite service (BSS).

1.4 The term N refers to the post-demodulation noise power at a point of 0 dBm0 relative test tone level in any voice channel of an FDM/FM telephony system. The value given shall not be exceeded for 80% of the worst month.

1.5 The specified values of protection ratio (i.e., the carrier-to-interference power ratio corresponding to a specified picture quality) are applicable, for planning purposes, to television signals of any of the several television standards.

[1] Sections 1 and 2 of this Annex are applicable when the services of Regions 1 or 3 are involved. Section 3 is applicable to all Regions.

Wanted service [1]	Wanted signal [1]	Interfering service [1]	Interfering signal [1]	Protection requirements [2]	
				Total acceptable [3]	Single entry
BSS	TV/FM	BSS, FSS, FS, BS	TV/FM	C/I = 30 dB [4,7]	C/I = 35 dB [4]
FSS	FDM/FM	BSS	TV/FM	N = 500 pW0p [8]	N = 300 pW0p
FSS	TV/FM	BSS, FSS	TV/FM	C/I = 32 dB [5]	C/I = 37 dB [5]
FSS	4φ-PSK	BSS, FSS	TV/FM	C/I = 30 dB	C/I = 35 dB
FSS	FDM/FM	FSS	FDM/FM	N = 1000 pW0p	N = 400 pW0p
FS	FDM/FM	BSS	TV/FM	N = 1000 pW0p	-125 dB$(W/m^2/4$ kHz$)$ [6]
BS	TV/VSB	BSS	TV/FM	C/I = 50 dB	not applicable

Notes: [1] BSS = broadcasting-satellite service
FSS = fixed-satellite service
BS = broadcasting service
FS = fixed service
TV = television
FM = frequency modulation
FDM = frequency division multiplex
4φ-PSK = four-level phase shift keying
VSB = vestigial sideband.

[2] These limits include both up-link and down-link contributions.

[3] Values in dB are protection ratios for the sum of interfering signals. Values in pW0p represent interference noise in the worst telephone channels caused by the sum of interfering signals.

[4] For BSS satellites located at the interfaces of the Regions 1 and 3 Plan and the Region 2 Plan, the C/I ratios should be 1 dB higher.

[5] See CCIR Recommendation 483.

[6] This value may be suitably modified for tropical regions to take account of rain attenuation. Allowance may also be made for polarization discrimination.

[7] C/I = ratio of carrier-to-interfering signal.

[8] N = noise power.

1.6 For BSS systems with FM/TV as the wanted signal, the protection ratios are given for particular reference conditions, the most important of which are:

a) frequency deviation of the wanted signal (12 MHz peak-to-peak);

b) quality of the wanted service (grade 4.5)[1];

c) co-channel carriers (no carrier-frequency offset).

1.7 If system design is based on conditions other than *a)* and *b)* above, the FM/TV protection ratio is given by:

$$R = 12.5 - 20 \log (D_v/12) - Q + 1.1\, Q^2 \qquad \text{(dB)}$$

where:

D_v = nominal peak-to-peak frequency deviation (MHz);

Q = the impairment grade, concerning the interference only.

1.8 When carriers are offset in frequency, condition *c)* does not apply and the adjacent channel protection ratios should be adjusted according to the frequency offset as shown in Figure 1. For example, at a frequency offset of 20 MHz, the total acceptable ratio of protection against interference to an FM/TV signal from another FM/TV signal is 13 dB. The corresponding "single entry" value is 18 dB.

[1] Impairment grade on a 5-point scale as defined in CCIR Recommendation 500.

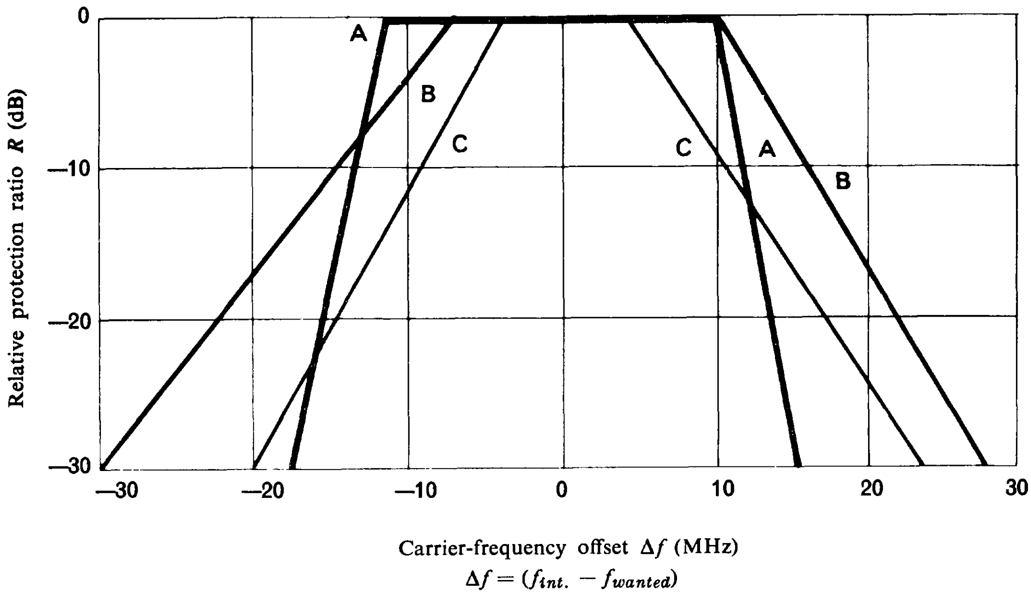

FIGURE 1

Reference case protection ratios relative to co-channel values

Curve A: TV/VSB-wanted, TV/FM interfering

Curve B: TV/FM-wanted, TV/FM interfering

Curve C: TV/FM-wanted, TV/VSB interfering

2. *Reference antenna diameter for a fixed-satellite earth station to be used in calculating interference from space stations in the broadcasting-satellite service*

2.1 For antennas larger than 100 λ (2.5 m) in the fixed-satellite service, the gain of the side-lobes is given by the equation $32 - 25 \log \theta$, where θ is the angle from the boresight (CCIR Recommendation 465). The side-lobe gain is independent of antenna diameter.

2.2 However, in the case of transmitting earth stations, the level of interference radiated into the up-link of other satellite systems would be inversely proportional to the square of the antenna diameter. In this case, the interference decreases with increasing antenna diameter. Since the 11.7 - 12.2 GHz band is only assigned in the space-to-Earth direction in the fixed-satellite service, this point is not of direct concern to the broadcasting-satellite service.

2.3 Hence it does not appear appropriate, for antenna diameters greater than 100 λ, to specify a minimum antenna diameter for receiving earth stations in the fixed-satellite service sharing the band 11.7 - 12.2 GHz. It may be useful to consider a 4.5 m antenna having an efficiency of 60% and an on-axis gain of 53 dB as typical for the purpose of planning the sharing of this band.

3. *Use of energy dispersal in the broadcasting-satellite service*

3.1 Artificial energy dispersal is useful in promoting sharing between the broadcasting-satellite service and the other services to which the band is also allocated.

3.2 Such energy dispersal is achieved by the addition at baseband of a triangular waveform to the video signal to form a composite baseband which, in turn, is used to frequency-modulate the up-link carrier. The frequency of the triangular waveform is usually synchronized at a sub-multiple of the television frame frequency. Typical frequencies range from 12.5 Hz to 30 Hz.

3.3 The table below gives the relative reduction in spectral power flux-density in a 4 kHz bandwidth as a function of the peak-to-peak deviation due to the energy dispersal signal. This table is based on the following equation:

$$\text{Relative reduction (dB) in a 4 kHz band} = 10 \log \frac{\Delta F_{pp} + \delta f_{rms}}{4}$$

where:

ΔF_{pp} = peak-to-peak deviation due to the energy dispersal signal (kHz);

δf_{rms} = rms deviation due to "natural" energy dispersal (kHz).

In compiling the table below, a value of 40 kHz has been assumed for δf_{rms}, on the basis of the value of 10 dB for "natural" dispersion given in Table 4 of CCIR draft Report 631 (Rev. 76).

Reduction of spectral power flux-density relative to a 4 kHz bandwidth

Peak-to-peak deviation (kHz)	Relative reduction (dB)
0	10
100	15.44
200	17.78
300	19.29
400	20.41
500	21.30
600	22.04
700	22.67
800	23.22
900	23.71
1000	24.15

3.4 The value of energy dispersal for the broadcasting-satellite service has been determined such that the spectral power flux-density measured in a 4 kHz bandwidth is reduced by 22 dB relative to that measured in the entire bandwidth; this reduction corresponds to a peak-to-peak deviation of 600 kHz.

ANNEX 7

Orbital Position Limitations

A. In applying the procedure of Article 4 for modifications to the appropriate Regional Plan, administrations should observe the following criteria:

1) No broadcasting satellite serving an area in Region 1 and using a frequency in the band 11.7 - 12.2 GHz shall occupy a nominal orbital position further west than 37° W or further east than 146° E.

2) No broadcasting satellite serving an area in Region 2 that involves an orbital position different from that contained in the Region 2 Plan shall occupy a nominal orbital position:

a) further east than 54° W in the band 12.5 - 12.7 GHz; *or*

b) further east than 44° W in the band 12.2 - 12.5 GHz; *or*

c) further west than 175.2° W in the band 12.2 - 12.7 GHz.

However, modifications necessary to resolve possible incompatibilities during the incorporation of the Regions 1 and 3 feeder-link Plan into the Radio Regulations shall be permitted.

3) Any new orbital position in the Regions 1 and 3 Plan in the range of the orbital arc between 37° W and 10° E associated with a new assignment, or resulting from a modification of an assignment in the Plan, shall be coincident with, or within 1° to the east of, a nominal orbital position in the Region 1 and 3 Plan at the date of entry into force of the Final Acts [1].

In the event of a modification to an assignment in the Regions 1 and 3 Plan, the use of a new nominal orbital position not coincident with any nominal orbital position in the Plan at the date of entry into force of the Final Acts [1] shall involve an 8 dB reduction in the e.i.r.p. compared to that appearing in the Regions 1 and 3 Plan for the assignment before modification.

B. The Region 2 Plan is based on the grouping of the space stations in nominal orbital positions of +0.2° and −0.2° from the centre of the cluster of satellites. Administrations may locate those satellites within a cluster at any orbital position within that cluster, provided they obtain the agreement of administrations having assignments to space stations in the same cluster. (See Section 4.13.1 of Annex 3 to Appendix **30A(Orb-88)** of the Radio Regulations.)

[1] Final Acts of the 1977 Conference, which entered into force on 1 January 1979.

APPENDIX 30A (Orb-88)

Orb-88

Provisions and Associated Plans for Feeder Links for the Broadcasting-Satellite Service (11.7 - 12.5 GHz in Region 1, 12.2 - 12.7 GHz in Region 2 and 11.7 - 12.2 GHz in Region 3) in the Frequency Bands 14.5 - 14.8 GHz [1] and 17.3 - 18.1 GHz in Regions 1 and 3, and 17.3 - 17.8 GHz in Region 2

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[1] This use of the band 14.5 - 14.8 GHz is reserved for countries outside Europe.

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ARTICLE 1

General Definitions

1.1 *Regions 1 and 3 feeder link Plan:* The Plan for the feeder links in the frequency bands 14.5 - 14.8 GHz [1] and 17.3 - 18.1 GHz for the broadcasting-satellite service in Regions 1 and 3 contained in this Appendix together with any modifications resulting from the successful application of the procedure of Article 4 of this Appendix herein referred to as the Regions 1 and 3 Plan.

1.2 *Region 2 feeder link Plan:* The Plan for the feeder links in the frequency band 17.3 - 17.8 GHz for the broadcasting-satellite service in Region 2 contained in this Appendix, together with any modifications resulting from the successful application of the procedure of Article 4 of this Appendix herein referred to as the Region 2 Plan.

1.3 *Frequency assignment in conformity with the Plans:* Any frequency assignment for a receiving space station or transmitting earth station which appears in the Regions 1 and 3 Plan or the Region 2 Plan or for which the procedure of Article 4 of this Appendix has been successfully applied.

1.4 *1983 Conference:* Regional Administrative Radio Conference for the Planning in Region 2 of the Broadcasting-Satellite Service in the Frequency Band 12.2 - 12.7 GHz and Associated Feeder Links in the Frequency Band 17.3 - 17.8 GHz, called in short Regional Administrative Conference for the Planning of the Broadcasting-Satellite Service in Region 2 (RARC Sat-R2), Geneva, 1983.

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[1] This use of the band 14.5 - 14.8 GHz is reserved for countries outside Europe.

1.5 *1985 Conference:* First Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1985, called in short WARC Orb-85.

1.6 *1988 Conference:* Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1988, called in short WARC Orb-88.

ARTICLE 2

Frequency Bands

2.1 The provisions of this Appendix apply to the feeder links in the fixed satellite service (Earth-to-space) in the frequency bands 14.5 - 14.8 GHz and 17.3 - 18.1 GHz for the broadcasting-satellite service in Regions 1 and 3, and 17.3 - 17.8 GHz for the broadcasting-satellite service in Region 2 and to other services to which these bands are allocated in Regions 1, 2 and 3 so far as their relationship to the fixed-satellite service (Earth-to-space) in these bands is concerned.

ARTICLE 3

Execution of the Provisions and Associated Plans

3.1 The Members of the Union in Regions 1, 2 and 3 shall adopt for their feeder-link space and earth stations in the fixed-satellite service (Earth-to-space) in the frequency bands referred to in this Appendix the characteristics specified in the appropriate Regional Plan and the associated provisions.

3.2 Members of the Union shall not change the characteristics specified in the Regions 1 and 3 Plan or in the Region 2 Plan, or bring into use assignments to receiving space stations or transmitting earth stations in the fixed-satellite service or to stations of the other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes of this Appendix.

3.3 The procedures for the use of interim systems in Region 2 for feeder links in the fixed-satellite service for the bands covered by this Appendix are given in Resolution **42 (Rev.Orb-88)**.

ARTICLE 4

Procedure for Modifications to the Plans

4.1 When an administration intends to make a modification to one of the Regional Plans, i.e. either:

a) to modify the characteristics of any of its frequency assignments in the fixed-satellite service which are shown in the appropriate Regional Plan, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use; *or*

b) to include in the Plan a new frequency assignment in the fixed-satellite service; *or*

c) to cancel a frequency assignment in the fixed-satellite service,

the following procedure shall be applied before any notification of the frequency assignment is made to the International Frequency Registration Board (see Article 5 of this Appendix and Resolution **42 (Rev.Orb-88)**).

4.1.1 Before an administration proposes to include in the Plan under the provisions of paragraph 4.1 *b)* a new frequency assignment for reception at a space station[1] or to include in the Plan a new frequency assignment for reception at a space station whose orbital position is not designated in the Plan to that administration, all of the assignments to the service areas involved should normally have been brought into service or have been notified to the Board in accordance with Article 5 of this Appendix. Should this not be the case, the administration concerned shall inform the Board of the reasons thereof.

4.2 *Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or proposed inclusion in that Plan of a new frequency assignment*

For Regions 1 and 3

4.2.1 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Regions 1 and 3 Plan or the inclusion of a new frequency assignment in that Plan shall seek the agreement of those administrations:

4.2.1.1 of Regions 1 and 3 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) in the same channel or an adjacent channel, in the same orbital position or an adjacent orbital position in the range ± 12.5°, which appears in the Plan or in respect of which proposed modifications to the Plan have already been published by the Board in accordance with the provisions of paragraphs 4.2.6.1 and 4.2.7 of this Article; *or*

4.2.1.2 having a frequency assignment in the band 17.7 - 18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth), which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **1060** of the Radio Regulations and which is located within the coordination area of the feeder-link fixed-satellite earth station; *or*

4.2.1.3 having a frequency assignment in the bands 14.5 - 14.8 GHz or 17.7 - 18.1 GHz to a terrestrial station in use or intended to be brought into use within three years of the projected date of bringing the feeder-link modification into use, and which is located within the coordination area of the feeder-link fixed-satellite earth station; *or*

4.2.1.4 having an assignment for feeder links in the fixed-satellite service (Earth-to-space) with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Region 2 feeder-link Plan, or in respect of which proposed modifications to the Plan have already been published by the Board in accordance with the provisions of paragraphs 4.2.6.1 and 4.2.7 of this Article;

4.2.1.5 which are considered affected.

4.2.1.6 The services of an administration are considered to be affected when the limits shown in Annex 1 to this Appendix are exceeded.

4.2.2 The agreement referred to in paragraph 4.2.1 is not required when an administration proposes to bring into use, with characteristics [1] appearing in the Plan, a fixed feeder-link earth station or a transportable feeder-link earth station in the bands 14.5 - 14.8 GHz or 17.3 - 18.1 GHz.

For Region 2

4.2.3 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Region 2 Plan or the inclusion of a new frequency assignment in that Plan shall seek the agreement of those administrations:

4.2.3.1 of Region 2 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) in the same channel or an adjacent channel, which appears in the Plan or in respect of which proposed modifications to the Plan have already been published by the Board in accordance with the provisions of paragraphs 4.2.6.1 and 4.2.7 of this Article; *or*

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[1] The power to be taken into account is obtained by adding the values specified in columns 8 and 9 of the Plan.

4.2.3.2 having a frequency assignment in the band 17.7 - 17.8 GHz to an earth station in the fixed-satellite service (space-to-Earth), which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **1060** of the Radio Regulations and which is located within the coordination area of the feeder-link fixed-satellite earth station; *or*

4.2.3.3 having a frequency assignment in the band 17.7 - 17.8 GHz to a terrestrial station in use or intended to be brought into use within three years of the projected date of bringing the feeder-link modification into use, and which is located within the coordination area of the feeder-link fixed-satellite earth station; *or*

4.2.3.4 having an assignment for feeder links in the fixed-satellite service (Earth-to-space) with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Regions 1 and 3 feeder-link Plan, or in respect of which proposed modifications to the Plan have already been published by the Board in accordance with the provisions of paragraphs 4.2.6.1 and 4.2.7 of this Article;

4.2.3.5 which are considered affected.

4.2.3.6 The services of an administration are considered to be affected when the limits shown in Annex 1 to this Appendix are exceeded.

4.2.4 The agreement referred to in paragraph 4.2.3 is not required when an administration proposes to bring into use, with characteristics appearing in the Plan, a fixed feeder-link earth station in the band 17.3 - 17.8 GHz or a transportable feeder-link earth station in the band 17.3 - 17.7 GHz. Administrations may communicate to the Board the characteristics of such earth stations for inclusion in the Plan.

For all Regions

4.2.5 An administration intending to modify characteristics in one of the Regional Plans shall send to the Board, not earlier than eight years but preferably not later than eighteen months before the date on which the assignment is to be brought into use, the relevant information listed in Annex 2 to this Appendix.

4.2.6 If an administration wishes to modify its assignments in the Plans contained in Appendix **30 (Orb-85)** and in Appendix **30A (Orb-88)**, the eight-year period of paragraph 4.2.5 will be applicable in lieu of the five-year period specified in paragraph 4.3.5 of Appendix **30 (Orb-85)**.

4.2.6.1 Where as a result of the intended modification the limits defined in Annex 1 to this Appendix are not exceeded, this fact shall be indicated when submitting to the Board the information required by paragraph 4.2.5. The Board shall then publish this information in a special section of its weekly circular.

4.2.6.2 In all other cases the administration shall notify the Board of the names of the administrations whose agreement it considers should be sought in order to arrive at the agreement referred to in paragraphs 4.2.1 and 4.2.3 as well as of those with which agreement has already been reached.

4.2.7 The Board shall determine on the basis of Annex 1 to this Appendix the administrations whose frequency assignments are considered to be affected within the meaning of paragraphs 4.2.1 and 4.2.3. The Board shall include the names of those administrations with the information received under paragraph 4.2.6.2 and shall publish the complete information in a special section of its weekly circular. The Board shall immediately send the results of its calculations to the administration proposing the modification to the Plan.

4.2.8 The Board shall send a telegram to the administrations listed in the special section of the weekly circular drawing their attention to the information it contains and shall send them the results of its calculations.

4.2.9 An administration which feels that it should have been included in the list of administrations whose services are considered to be affected may, giving the technical reasons for so doing, request the Board to include its name. The Board shall study this request on the basis of Annex 1 to this Appendix and shall send a copy of the request with an appropriate recommendation to the administration proposing the modification to the Plan.

4.2.10 Any modification to a frequency assignment which is in conformity with the Plan or any inclusion in the Plan of a new frequency assignment which would have the effect of exceeding the limits specified in Annex 1 to this Appendix shall be subject to the agreement of all affected administrations.

4.2.11 The administration seeking agreement or the administration with which agreement is sought may request any additional technical information it considers necessary. The administrations shall inform the Board of such requests.

4.2.12 Comments from administrations on the information published pursuant to paragraph 4.2.7 should be sent either directly to the administration proposing the modification or through the Board. In any event the Board shall be informed that comments have been made.

4.2.13 An administration which has not notified its comments either to the administration seeking agreement or to the Board, within a period of four months following the date of the weekly circular referred to in paragraph 4.2.6.1 or paragraph 4.2.7 shall be understood to have agreed to the proposed modification. This time-limit may be extended by up to three months for an administration which has requested additional information under paragraph 4.2.11 or for an administration which has requested the assistance of the Board under paragraph 4.2.21. In the latter case the Board shall inform the administrations concerned of this request.

4.2.14 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of paragraph 4.2.5 and the consequent procedure with respect to any other administration whose services might be affected as a result of modifications to the initial proposal.

4.2.15 If no comments have been received on the expiry of the periods specified in paragraph 4.2.13, or if agreement has been reached with the administrations which have made comments and with which agreement is necessary, the administration proposing the modification may continue with the appropriate procedure in Article 5 of this Appendix and shall inform the Board, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached.

4.2.16 The agreement of the administrations affected may also be obtained in accordance with this Article, for a specified period.

4.2.17 When the proposed modification to the Plan involves developing countries, administrations shall seek all practicable solutions conducive to the economical development of the broadcasting-satellite systems of these countries.

4.2.18 The Board shall publish in a special section of its weekly circular the information received under paragraph 4.2.15 together with the names of any administrations with which the provisions of this Article have been successfully applied. The frequency assignment concerned shall enjoy the same status as those appearing in the Plan and will be considered as a frequency assignment in conformity with the Plan.

4.2.19 When an administration proposing to modify the characteristics of a frequency assignment or to make a new frequency assignment receives notice of disagreement from an administration whose agreement it has sought, it should first endeavour to solve the problem by exploring all possible means of meeting its requirement. If the problem still cannot be solved by such means, the administration whose agreement has been sought should endeavour to overcome the difficulties as far as possible, and shall state the technical reasons for any disagreement if the administration seeking the agreement requests it to do so.

4.2.20 If no agreement is reached between the administrations concerned, the Board shall carry out any study that may be requested by these administrations; the Board shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.2.21 An administration may at any stage in the procedure described, or before applying it, request the assistance of the Board, particularly in seeking the agreement of another administration.

4.2.22 The relevant provisions of Article 5 of this Appendix shall be applied when frequency assignments are notified to the Board.

4.3 *Cancellation of frequency assignments*

When a frequency assignment in conformity with one of the Regional Plans is no longer required, whether or not as a result of a modification, the administration concerned shall immediately so inform the Board. The Board shall publish this information in a special section of its weekly circular and delete the assignment from the Plan.

4.4 *Master copies of the Plans*

4.4.1 The Board shall maintain up-to-date master copies of the Plans as well as master copies of the margin reports, including for each assignment the overall equivalent protection margins in respect of Region 2 and the feeder-link equivalent protection margins and the overall equivalent protection margins in respect of Regions 1 and 3, taking account of the application of the procedure specified in this Article. Each master copy of the margin reports shall contain the overall equivalent protection margins derived from the Plan as established by the 1983 Conference in the case of Region 2 and the feeder-link equivalent protection margins and the overall equivalent protection margins for the 1988 Conference in the case of Regions 1 and 3 and those derived from all modifications to the Plans as a result of the successful completion of the modification procedure of this Article.

4.4.2 The Secretary-General shall be informed by the Board of any modifications made to the Regional Plans and shall publish up-to-date versions of the Plans in an appropriate form when justified by the circumstances.

ARTICLE 5

Coordination, Notification, Examination and Recording in the Master International Frequency Register of Frequency Assignments to Feeder-Link Transmitting Earth Stations and Receiving Space Stations in the Fixed-Satellite Service

5.1 *Coordination and notification*

5.1.1 When an administration wishes to determine whether it is possible to use, at a given location, an amount of power control which is in excess of that contained in column 9 of the Regions 1 and 3 feeder-link Plan, it shall request the Board to determine the amount of permissible power control (not to exceed 10 dB) from that given location using the procedure contained in Section 3.11 of Annex 3 to this Appendix.

5.1.2 Whenever an administration intends to bring into use a frequency assignment to a transmitting earth station or receiving space station in the fixed-satellite service in the bands between 14.5 GHz and 14.8 GHz and between 17.3 GHz and 18.1 GHz in Regions 1 and 3, and between 17.3 GHz and 17.8 GHz in Region 2, it shall notify this frequency assignment to the Board. For this purpose, the notifying administration shall apply the following provisions.

5.1.3 Before an administration in Region 1 or 3 notifies to the Board or brings into use any frequency assignment to a transmitting feeder-link earth station in the bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz with an e.i.r.p. greater than the sum of the values specified in columns 8 and 9 of the Plan, it shall effect coordination of this assignment with each administration whose territory lies wholly or partly within the coordination area of the planned earth station using the method detailed in Appendix **28**.

5.1.4 Before an administration in Region 1 or 3 notifies to the Board or brings into use any frequency assignment to a transmitting feeder-link earth station in the bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz, it shall effect coordination of this assignment with each administration whose territory lies wholly or partly within the coordination area of the planned earth station, using the method detailed in Appendix **28**, in respect of notices concerning stations of the mobile and fixed services in the bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz and of the fixed-satellite service (space-to-Earth) in the band 17.7 - 18.1 GHz received by the Board prior to 29 August 1988 for recording in the Master Register.

5.1.5 If an administration with which coordination is sought under paragraph 5.1.4 does not respond within three months, the administration intending to bring into use a frequency assignment to a feeder-link earth station shall notify this frequency assignment in accordance with paragraph 5.1.2 above[1].

5.1.6 For any notification under 5.1.2, an individual notice for each frequency assignment shall be drawn up as prescribed in Annex 2 to this Appendix, the various sections of which specify the basic characteristics to be provided as appropriate. It is recommended that the notifying administration should also supply any other data it may consider useful.

5.1.7 Each notice must reach the Board not earlier than three years before the date on which the frequency assignment is to be brought into use. In any case, the notice must reach the Board not later than three months before that date[1].

5.1.8 Any frequency assignment the notice of which reaches the Board after the applicable period specified in paragraph 5.1.7 shall, where it is to be recorded, bear a remark in the Master Register to indicate that it is not in conformity with paragraph 5.1.7.

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[1] In order to facilitate the coordination process, attention is drawn to Resolution **709 (Orb-88)**.

5.1.9 Any notice made under paragraph 5.1.2 which does not contain the characteristics specified in Annex 2 to this Appendix shall be returned by the Board immediately by airmail to the notifying administration with the relevant reasons.

5.1.10 Upon receipt of a complete notice, the Board shall include its particulars, with the date of receipt, in its weekly circular which shall contain the particulars of all such notices received since the publication of the previous circular.

5.1.11 The circular shall constitute the acknowledgements to the notifying administration of the receipt of a complete notice.

5.1.12 Complete notices shall be considered by the Board in order of receipt. The Board shall not postpone its finding unless it lacks sufficient data to reach a decision; moreover, the Board shall not act upon any notice which has a technical bearing on an earlier notice still under consideration by the Board until it has reached a finding with respect to such earlier notice.

5.2 *Examination and recording*

5.2.1 The Board shall examine each notice:

a) with respect to its conformity with the Convention and the relevant provisions of the Radio Regulations (with the exception of those relating to *b)*, *c)*, *d)* and *e)* below); *and*

b) with respect to its conformity with the appropriate Regional Plan; *or* *c)* with respect to its conformity with the appropriate Regional Plan, however, having characteristics differing from those in the Plan in one or more of the following aspects:

– use of a reduced e.i.r.p.,

– use of a reduced coverage area entirely situated within the coverage area appearing in the Plan,

– use of other modulating signals in accordance with the provisions of Section 3.1.3 to Annex 5 of Appendix **30 (Orb-85),**

– in the case of Region 2, use of an orbital position under the conditions specified in paragraph B of Annex 7 to Appendix **30 (Orb-85),**

– in the case of Regions 1 and 3, use of an orbital position under the conditions specified in Section 3.15 of Annex 3 to Appendix **30A (Orb-88)**[1],

– use of an antenna diameter greater than 5 metres for the 17.3 - 18.1 GHz band and 6 metres for the 14.5 - 14.8 GHz band without increasing the on-axis e.i.r.p.,

– in the case of Region 2, use of an antenna diameter greater than 5 metres resulting in a greater on-axis e.i.r.p. if the orbital separation with any other space station is greater than 0.5° ; *or*

d) for Region 2, with respect to its conformity with the provisions of Resolution **42 (Rev.Orb-88)**;

e) for Regions 1 and 3, with respect to its conformity with the provisions of paragraph 5.1.3 and also its conformity with paragraph 5.1.4 or 5.1.5 relating to coordination.

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[1] The Board shall also apply this provision to paragraph 5.2.1 *c)* of Appendix **30 (Orb-85)** for Regions 1 and 3.

5.2.2 When the Board reaches a favourable finding with respect to paragraphs 5.2.1 *a)*, 5.2.1 *b)* and 5.2.1 *e)*, the frequency assignment of an administration shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations all frequency assignments brought into use in conformity with the Plan and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

5.2.2.1 When the Board reaches a favourable finding with respect to paragraphs 5.2.1 *a)*, 5.2.1 *c)* and 5.2.1 *e)*, the frequency assignment shall be recorded in the Master Register. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations, all frequency assignments brought into use in conformity with the Plan and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments. When recording these assignments, the Board shall indicate by an appropriate symbol the characteristics having a value different from that appearing in the Plan.

5.2.2.2 In the case of Region 2, when the Board reaches a favourable finding with respect to paragraph 5.2.1 *a)* but an unfavourable finding with respect to paragraphs 5.2.1 *b)* and 5.2.1 *c)*, it shall examine the notice with respect to the successful application of the provisions of Resolution **42 (Rev.Orb-88)**. A frequency assignment for which the provisions of Resolution **42 (Rev.Orb-88)** have been successfully applied shall be recorded in the Master Register with an appropriate symbol to indicate its interim status. The date of receipt of the notice by the Board shall be entered in Column 2d. In relations between administrations all frequency assignments brought into use following the successful application of the provisions of Resolution **42 (Rev.Orb-88)** and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments. If the finding with respect to paragraph 5.2.1 *d)* is unfavourable, the notice shall be returned immediately by airmail to the notifying administration.

5.2.2.3 In the case of Regions 1 and 3, when the Board reaches a favourable finding with respect to paragraph 5.2.1 *a)* but an unfavourable finding with respect to paragraphs 5.2.1 *b)* and 5.2.1 *c)*, the notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

5.2.2.4 In the case of Regions 1 and 3, when the Board reaches a favourable finding with respect to paragraphs 5.2.1 *a)*, 5.2.1 *b)* and 5.2.1 *c)* but an unfavourable finding with respect to paragraph 5.2.1 *e)*, the notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem. If the unfavourable finding under paragraph 5.2.1 *e)* is due to the coordination under paragraph 5.1.3 only not being effected, the administration shall undertake only to bring this assignment into use with an e.i.r.p. level not greater than the sum of the values specified in columns 8 and 9 of the Regions 1 and 3 Plan.

5.2.2.5 When an assignment is recorded as a result of a favourable finding with respect to paragraph 5.2.1 *e)*, a remark shall be included indicating that coordination has been effected.

5.2.3 Whenever a frequency assignment is recorded in the Master Register, the finding reached by the Board shall be indicated by a symbol in Column 13a.

5.2.4 When the Board reaches an unfavourable finding with respect to paragraphs 5.2.1 *a)*, 5.2.1 *b)* and 5.2.1 *c)*, the notice shall be returned immediately by airmail to the notifying administration with the Board's reasons for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

5.2.5 When the notifying administration resubmits the notice and the finding of the Board becomes favourable with respect to the appropriate parts of paragraph 5.2.1, the notice shall be treated as in paragraph 5.2.2, 5.2.2.1 or 5.2.2.2 as appropriate.

5.2.6 If the notifying administration resubmits the notice without modification and insists on its reconsideration, and if the Board's finding with respect to 5.2.1 remains unfavourable, the notice is returned to the notifying administration in accordance with 5.2.4. In this case, the notifying administration undertakes not to bring into use the frequency assignment until the condition specified in 5.2.5 is fulfilled.

5.2.7 If a frequency assignment notified in advance of bringing into use in conformity with 5.1.3 has received a favourable finding by the Board with respect to the provisions of 5.2.1, it shall be entered provisionally in the Master Register with a special symbol in the Remarks Column indicating the provisional nature of that entry.

5.2.8 When the Board has received confirmation that the frequency assignment has been brought into use, the Board shall remove the symbol in the Master Register.

5.2.9 The date in Column 2c shall be the date of bringing into use notified by the administration concerned. It is given for information only.

5.3 *Cancellation of entries in the Master Register*

5.3.1 If an administration has not confirmed the bringing into use of a frequency assignment under 5.2.8, the Board will make inquiries of the administration not earlier than six months after the expiry of the period specified in 5.1.3. On receipt of the relevant information, the Board will either modify the date of coming into use or cancel the entry.

5.3.2 If the use of any recorded frequency assignment is permanently discontinued, the notifying administration shall so inform the Board within three months, whereupon the entry shall be removed from the Master Register.

ARTICLE 6

Procedure Concerning Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Receiving Terrestrial Stations in Regions 1 and 3 in the Bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz, and in Region 2 in the Band 17.7 - 17.8 GHz, when Frequency Assignments to Feeder-Link Transmitting Earth Stations for the Broadcasting-Satellite Service in Conformity with the Regions 1 and 3 Plan or the Region 2 Plan are Involved

6.1 Administrations planning to implement assignments for terrestrial stations in Regions 1 and 3 in the bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz, and in Region 2 in the 17.7 - 17.8 GHz band should evaluate the level of interference assessed on the basis of coordination contours calculated in accordance with Appendix **28** to the Radio Regulations[1], which might be caused by the closest feeder-link earth station which could be located on the border of the territory of another administration. Should the administration planning terrestrial stations find that interference may be caused by such a feeder-link earth station, it may request the administration responsible for the feeder-link earth station to indicate the geographical coordinates, the antenna characteristics and the elevation angle of the horizon around its actual and planned feeder-link earth stations.

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[1] In the case of Regions 1 and 3, the feeder-link earth-station power to be taken into account is obtained by adding the values specified in columns 8 and 9 of the Plan.

6.2 In the case of Region 2, when the entry in the Plan contains information on specific earth stations, this shall be used in the interference calculations mentioned in paragraph 6.1 above. When such information is not contained in the Region 2 Plan, an administration which receives a request under paragraph 6.1 shall, within a period of three months, communicate the details of the feeder-link earth stations to the administration planning the terrestrial station, and to the Board in order to update the Plan.

6.3 In the case of Regions 1 and 3, an administration which receives a request under paragraph 6.1 shall, within a period of three months, communicate the details of the feeder-link stations to the administration planning the terrestrial station, and to the Board for information.

6.4 If, at the end of a period of three months, the administration responsible for the terrestrial station does not receive a reply, it may request the assistance of the Board.

6.5 If the administration responsible for the feeder-link earth station does not communicate to the Board, within a period of three months, the information requested under paragraph 6.1, this administration shall only implement its feeder-link earth station provided it does not cause harmful interference to the terrestrial station under consideration.

6.6 If, as a result of the application of this Article, an agreement is reached with the administration responsible for the feeder-link earth station or no comments have been received, the administration responsible for the terrestrial station may notify this station under Article **12** of the Radio Regulations for recording in the Master International Frequency Register. A remark shall be included indicating either that an agreement has been reached or that no comments have been received.

ARTICLE 7

Procedure Concerning Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Stations in the Fixed-Satellite Service (Space-to-Earth) in Regions 1 and 3 in the Band 17.7 - 18.1 GHz and in Region 2 in the band 17.7 - 17.8 GHz, when Frequency Assignments to Feeder Links for Broadcasting-Satellite Stations Appearing in the Regions 1 and 3 Plan or the Region 2 Plan are Involved

7.1 The provisions of Articles **11** and **13** and Appendix **29** of the Radio Regulations are applicable to transmitting space stations in the fixed satellite service in the band 17.7 - 18.1 GHz, together with the provisions of Annex 4 to this Appendix, except that in relation to feeder-link stations, the relevant criteria mentioned in Appendix **29** to the Radio Regulations are replaced by those given in Section 1 of Annex 4 to this Appendix.

7.2 Administrations planning to implement assignments for receiving earth stations in Regions 1 and 3 in the 17.7 - 18.1 GHz band and in Region 2 in the 17.7 - 17.8 GHz band in the fixed-satellite service (space-to-Earth) should evaluate the level of interference, assessed on the basis of coordination contours calculated in accordance with Section 3 of Annex 4 to this Appendix, which might be caused by the closest feeder-link earth station which could be located on the border of the territory of another administration. Should the administration planning receiving earth stations find that interference may be caused by such a feeder-link earth station, it may request the administration responsible for the feeder-link earth stations to indicate the geographical coordinates, the antenna characteristics and the elevation angle of the horizon around its actual and planned feeder-link earth stations.

7.3 In the case of Region 2, when the entry in the Plan contains information on specific earth stations this shall be used in the interference calculations mentioned in paragraph 7.2 above. When such information is not contained in the Plan an administration which receives a request under paragraph 7.2 shall, within a period of three months, communicate the details of the feeder-link earth stations to the administration planning the receiving earth station, and to the Board in order to update the Plan.

7.4 In the case of Regions 1 and 3, an administration which receives a request under paragraph 7.2 shall, within a period of three months, communicate the details of the feeder-link earth stations to the administration planning the receiving earth station, and to the Board for information.

7.5 If, at the end of the period of three months, the administration responsible for the fixed-satellite receiving earth station does not receive a reply, it may request the assistance of the Board.

7.6 If the administration responsible for the feeder-link earth stations does not communicate to the Board, within a period of three months, the information requested under paragraph 7.2, this administration shall only implement its feeder-link earth station provided it does not cause harmful interference to the fixed-satellite earth station under consideration.

7.7 If, as a result of the application of this Article, an agreement is reached with the administration responsible for the feeder-link earth station or no comments have been received, and when the station is recorded in the Master Register in accordance with Article **13** of the Radio Regulations, the Board shall enter a remark indicating either that an agreement has been reached or that no comments have been received.

ARTICLE 8

Miscellaneous Provisions Relating to the Procedures

Section I. Studies and Recommendations

8.1.1 If it is requested by any administration, the Board, using such means at its disposal as are appropriate in the circumstances, shall conduct a study of cases of alleged contravention or non-observance of these provisions, or of harmful interference.

8.1.2 The Board shall thereupon prepare and forward to the administrations concerned a report containing its findings and recommendations for the solution of the problem.

8.1.3 On receiving the Board's recommendations for the solution of the problem, an administration shall promptly acknowledge the receipt by telegram and shall subsequently indicate the action it intends to take. In cases when the Board's suggestions or recommendations are unacceptable to the administrations concerned, further efforts should be made by the Board to find an acceptable solution to the problem.

8.1.4 In a case where, as a result of a study, the Board submits to one or more administrations suggestions or recommendations for the solution of a problem, and where no answer has been received from one or more of these administrations within a period of four months, the Board shall consider that the suggestions or recommendations concerned are unacceptable to the administrations which did not answer. If it was the requesting administration which failed to answer within this period, the Board shall close the study.

Section II. Miscellaneous Provisions

8.2.1 If it is requested by any administration, particularly by an administration of a country in need of special assistance, the Board, using such means at its disposal as are appropriate in the circumstances, shall render the following assistance:

a) computation necessary in the application of Annexes 1, 3 and 4 to this Appendix;

b) any other assistance of a technical nature for completion of the procedures in this Appendix.

8.2.2 In making a request to the Board under paragraph 8.2.1, the administration shall furnish the Board with the necessary information.

ARTICLE 9

Plan for Feeder Links for the Broadcasting-Satellite Service in the Fixed-Satellite Service in the Frequency Band 17.3 - 17.8 GHz in Region 2

9.1 COLUMN HEADINGS OF THE PLAN

Col. 1. *Beam identification* (Column 1 contains the symbol designating the country or the geographical area taken from Table B1 of the Preface to the International Frequency List followed by the symbol designating the service area).

Col. 2. *Nominal orbital position*, in degrees and hundredths of a degree.

Col. 3. *Channel number* (see Table 2 showing channel numbers and corresponding assigned frequencies).

Col. 4. *Boresight geographical coordinates*, in degrees and hundredths of a degree.

Col. 5. *Antenna beamwidth.* This column contains two figures corresponding to the major axis and the minor axis respectively of the elliptical cross section half-power beam, in degrees and hundredths of a degree.

Col. 6. *Orientation of the ellipse* determined as follows: in a plane normal to the beam axis, the direction of a major axis of the ellipse is specified as the angle measured anticlockwise from a line parallel to the equatorial plane to the major axis of the ellipse to the nearest degree.

Col. 7. *Polarization* (1 = direct, 2 = indirect).[1]

Col. 8. Earth station *e.i.r.p.* in the direction of maximum radiation, in dBW.

Col. 9. *Remarks*[2].

9.2 TEXT FOR SYMBOLS IN REMARKS COLUMN OF THE PLAN

1. Fast roll-off space station receiving antenna as defined in Annex 3 (Section 4.6.3) to this Appendix.

2. Television standard with 625 lines using greater video bandwidth and necessary bandwidth of 27 MHz.

3. This assignment may cause interference to feeder-link assignments of Spain, Guinea-Bissau and Portugal in the Regions 1 and 3 feeder-link Plan adopted at the 1988 Conference and shall only be brought into use if:

a) the administrations of Spain, Guinea-Bissau and Portugal agree; *or*

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[1] See Annex 3 (Section 4.8) to this Appendix.

[2] *Note:* The location of earth stations, together with the antenna characteristics and elevation angle of the horizon, are given as an annex to this Plan, and will be published when the Plan is republished in accordance with paragraph 4.4.2 of this Appendix.

b) their feeder-link equivalent protection margins, as defined in Section 1.7 of Annex 3 to this Appendix, are positive.

The affected administrations shall be informed by the notifying administration of the required changes in characteristics before this assignment is brought into use.

4. This assignment may be utilized in the geographical area of Anguilla (AIA) (which is in the beam area).

5. Feeder-link earth stations for this assignment may also be located in the territories of Puerto Rico and the United States Virgin Islands. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

6. Feeder-link earth stations for this assignment may also be located in the States of Alaska and Hawaii. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

7. The feeder-link earth station for this assignment may also be located at the point with geographical coordinates 3°31′ West, 48°46′ North. Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

8. Feeder-link earth stations for this assignment may also be located at the points with the following geographical coordinates:

47°55′ West	15°47′ South	34°53′ West	08°04′ South
43°13′ West	22°55′ South	60°02′ West	03°06′ South
46°38′ West	23°33′ South	38°31′ West	12°56′ South
51°13′ West	30°02′ South	49°15′ West	16°40′ South

Such operation shall not cause more interference nor require more protection than the assignment under the Plan.

9/GR . . . This assignment is part of a group, the number of which follows the symbol. The group consists of the beams and has the number of channels assigned to it as indicated in the table below.

a) The overall equivalent protection margin to be used for the application of Article 4 of this Appendix and Resolution **42 (Rev.Orb-88)** shall be calculated on the following basis:

- for the calculation of interference to assignments that are part of a group, only the interference contributions from assignments that are not part of the same group are to be included; *and*

- for the calculation of interference from assignments belonging to a group of assignments that are not part of that same group, only the worst interference contribution from that group shall be used on a test point to test point basis.

b) If an administration notifies the same frequency in more than one beam of a group for use at the same time, the overall *C/I* produced by all emissions from that group shall not exceed the *C/I* calculated on the basis of *a)* above.

TABLE 1

Group	Beams in the group	Number of channels assigned to the group
GR1	ALS00002 HWA00002 USAPSA02	32 channels
GR2	ALS00003 HWA00003 USAPSA03	32 channels
GR3	ARGINSU4 ARGSUR04	16 channels
GR4	ARGINSU5 ARGSUR05	12 channels
GR5	BOLAND01 CLMAND01 EQACAND1 EQAGAND1 PRUAND02 VENAND03	16 channels
GR6	B SU111 B SU211	32 channels
GR7	B CE311 B CE411 B CE511	32 channels
GR8	B NO611 B NO711 B NO811	32 channels
GR9	B SU112 B SU212 B CE312 B CE412	32 channels
GR10	CAN01101 CAN01201	32 channels
GR11	*Not used*	
GR12	CAN01203 CAN01303 CAN01403	32 channels
GR13	CAN01304 CAN01404 CAN01504	32 channels
GR14	CAN01405 CAN01505 CAN01605	32 channels
GR15	*Not used*	
GR16	CHLCONT4 CHLCONT6	16 channels
GR17	CHLCONT5 PAQPAC01 CHLPAC02	16 channels
GR18	CRBBER01 CRBBLZ01 CRBJMC01 CRBBAH01 CRBECO01	16 channels
GR19	EQACOO01 EQAGOO01	16 channels
GR20	PTRVIR01 USAEHO02	32 channels
GR21	PTRVIR02 USAEHO03	32 channels
GR22	VEN02VEN VEN11VEN	4 channels

Country symbols

1. For the explanation of symbols designating countries or geographical areas in Region 2, see the Preface to the International Frequency List.

2. One additional symbol, CRB, has been created for the purposes of the 1983 Conference only, to designate a geographical area in the Caribbean Area. The five Caribbean beams are identified as follows:

CRBBAH01, CRBBER01, CRBBLZ01, CRBEC001 and CRBJMC01

and are intended collectively to provide coverage for the following countries or geographical areas: AIA, ATG, BAH, BER, BLZ, BRB, CYM, DMA, GRD, GUY, JMC, LCA, MSR, SCN, SUR, TCA, TRD, VCT and VRG to be so used if approved by them.

TABLE 2

TABLE SHOWING CORRESPONDENCE BETWEEN CHANNEL NUMBERS AND ASSIGNED FREQUENCIES

Channel No.	Assigned frequency (MHz)	Channel No.	Assigned frequency (MHz)
1	17324.00	17	17557.28
2	17338.58	18	17571.86
3	17353.16	19	17586.44
4	17367.74	20	17601.02
5	17382.32	21	17615.60
6	17396.90	22	17630.18
7	17411.48	23	17644.76
8	17426.06	24	17659.34
9	17440.64	25	17673.92
10	17455.22	26	17688.50
11	17469.80	27	17703.08
12	17484.38	28	17717.66
13	17498.96	29	17732.24
14	17513.54	30	17746.82
15	17528.12	31	17761.40
16	17542.70	32	17775.98

17324,00 MHz (1)

1	2	3	4		5		6	7	8	9
ALS00002	–166.20	1	–109.94	36 86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	–175.20	1	–116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	–94.20	1	–52.98	–59.81	3.40	0.68	19	1	87.4	9/GR3
ARGSUR04	–94.20	1	–65.04	–43.33	3.32	1.50	40	1	87.4	9/GR3
B CE311	–64.20	1	–40.60	–6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	–45.20	1	–40.27	–6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	–64.20	1	–50.97	–15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	–45.20	1	–50.71	–15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	–64.20	1	–53.10	–2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	–74.20	1	–59.60	–11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	–74.20	1	–60.70	–1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	–74.20	1	–68.76	–4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	–81.20	1	–51.12	–25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	–45 20	1	–50.75	–25.62	2 47	1.48	56	1	87.4	8 9/GR9
B SU211	–81.20	1	–44.51	–16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	–45.20	1	–44.00	–16.87	3.20	1.96	58	1	87.4	8 9/GR9
B AHIFRB1	–87.20	1	–76.06	24.16	1.81	0.70	142	1	87.4	
BERBERMU	–96.20	1	–64.77	32.32	0.60	0.60	90	2	87.4	
B ERBER02	–31.00	1	–64.77	32.32	0.60	0.60	90	1	87.4	2 3
B OLAND01	–115.20	1	–71.37	–4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	–138.20	1	–114.60	51 08	7.28	1.10	160	1	87.4	9/GR10
CAN01201	–138 20	1	–114.60	51 08	7 28	1.10	160	1	87.4	9/GR10
CAN01202	–72.70	1	–81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	–129 20	1	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12

CAN01303	−129.20	1	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	1	−86.71	50.48	8 58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	1	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	−91.20	1	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	1	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	1	−86 71	50.48	8.58	2 54	178	1	87.4	9/GR13
CAN01505	−82.20	1	−84.11	50.20	8.31	2.58	1	1	87 4	9/GR14
CAN01605	−82.20	1	−84 11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01606	−70 70	1	−80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	−106.20	1	−72 23	−35.57	2 60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	1	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	1	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	1	−74.50	5 87	3.98	1.96	118	1	87.4	
EQACAND1	−115.20	1	−71.37	−4.69	6.49	2.57	87	1	87 4	9/GR5
EQAGAND1	−115.20	1	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
FLKANT01	−57 20	1	−44.54	−60.13	3.54	0.68	12	1	87.4	2
FLKFALKS	−31.00	1	−59.90	−51.64	0.60	0 60	90	1	87.4	2 3
GRD00002	−42.20	1	−61 58	12.29	0.60	0.60	90	1	87.4	
HWA00002	−166.20	1	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	−175.20	1	−116.23	37.50	5.60	0 75	132	1	87.4	9/GR2
MEX01NTE	−78.20	1	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	1	−94.84	19.82	3.05	2.09	4	1	87 4	1
MEX02NTE	−136.20	1	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	1	−96.39	19.88	3.18	1.87	157	1	87.4	1

17324,00 MHz (1)

1	2	3	4		5		6	7	8	9
PAQPAC01	−106.20	1	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	1	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	1	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	1	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	1	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SPMFRAN3	−53.20	1	−67.24	47.51	3.16	0.79	7	1	87.4	2 7
TRD00001	−84.70	1	−61.23	10.70	0.60	0.60	90	1	87.4	
URG00001	−71.70	1	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	1	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	1	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110 20	1	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	1	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	1	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	1	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	1	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	1	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	1	−71 37	−4.69	6.49	2.57	87	1	87.4	9/GR5
VRG00001	−79.70	1	−64.37	18.48	0.60	0.60	90	1	87.4	4

ALS00002	–165.80	2	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	–174.80	2	–116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	–93.80	2	–63.96	–30.01	3.86	1.99	48	2	87.4	
ARGNORT5	–54.80	2	–62.85	–29.80	3.24	2.89	47	2	87 4	
ATNBEAM1	–52 80	2	–66.44	14.87	1.83	0.68	39	2	87.4	
B CE311	–63.80	2	–40.60	–6.07	3.04	2.06	174	2	87 4	8 9/GR7
B CE312	–44.80	2	–40.26	–6 06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	–63.80	2	–50.97	–15.26	3.86	1 38	49	2	87.4	8 9/GR7
B CE412	–44.80	2	–50.71	–15 30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	–63.80	2	–53.11	–2.98	2 42	2.15	107	2	87.4	8 9/GR7
B NO611	–73.80	2	–59.60	–11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	–73 80	2	–60.70	–1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	–73.80	2	–68.75	–4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	–101.80	2	–45.99	–19.09	2.22	0.79	62	2	87.4	8
B SU111	–80.80	2	–51.10	–25.64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	–44.80	2	–50.76	–25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	–80.80	2	–44.51	–16.94	3 22	1.37	60	2	87.4	8 9/GR6
B SU212	–44.80	2	–43 99	–16.97	3.27	1.92	59	2	87 4	8 9/GR9
CAN01101	–137.80	2	–114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	–137.80	2	–114.10	50.92	7 22	1.11	160	2	87 4	9/GR10
CAN01202	–72.30	2	–81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	–128.80	2	–113.04	51.04	7 53	1.26	162	2	87.4	9/GR12
CAN01303	–128.80	2	–113.04	51.04	7 53	1 26	162	2	87.4	9/GR12
CAN01304	–90.80	2	–86.57	50.48	8.59	2.54	178	2	87.4	9/GR13

17338,58 MHz (2)

1	2	3	4		5		6	7	8	9
CAN01403	−128.80	2	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01404	−90.80	2	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	−81.80	2	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	−90.80	2	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	−81.80	2	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	−81.80	2	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	−70.30	2	−80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	−105.80	2	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	2	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	2	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	2	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92 30	2	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	2	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	2	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CTR00201	−130.80	2	−84.33	9.67	0.82	0.68	119	2	87.4	
EQAC0001	−94.80	2	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	2	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GUY00302	−33.80	2	−59.07	4.77	1.43	0.85	91	2	87.4	
HNDIFRB2	−107 30	2	−86.23	15.16	1.14	0.85	8	1	87.4	
HTI00002	−83.30	2	−73.28	18.96	0.82	0.68	11	2	87.4	
HWA00002	−165.80	2	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	−174.80	2	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
MEX01NTE	−77.80	2	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	2	−107.36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	−126.80	2	−96.39	19.88	3.19	1.87	158	2	87.4	1
PRU00004	−85.80	2	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	2	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	2	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
TCA00001	−115.80	2	−71.79	21.53	0.60	0.60	90	2	87.4	
USAEH001	−61.30	2	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	2	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	2	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	2	−96.42	36.21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	2	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	2	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	2	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	2	−113.01	40.71	3.74	1.79	149	2	87.4	
VCT00001	−79.30	2	−61 18	13.23	0.60	0.60	90	2	87.4	
VEN11VEN	−103.80	2	−66.79	6.90	2.50	1.77	122	2	87.4	

17353,16 MHz (3)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	3	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	3	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	3	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	3	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	3	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	3	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
ATGSJN01	−79.70	3	−61.79	17.07	0.60	0.60	90	1	87.4	
B CE311	−64.20	3	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45 20	3	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	3	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	3	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	3	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	3	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	3	−60.70	−1 78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74 20	3	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	3	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	3	−50.75	−25 62	2.47	1 48	56	1	87.4	8 9/GR9
B SU211	−81 20	3	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45 20	3	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	3	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	3	−71.37	−4 69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	3	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	3	−59.85	12 93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	3	−114.60	51 08	7.28	1.10	160	1	87.4	9/GR10

CAN01201	−138.20	3	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01202	−72.70	3	−81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	−129.20	3	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01303	−129.20	3	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	3	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	3	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	−91.20	3	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	3	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	3	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01505	−82.20	3	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01605	−82.20	3	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01606	−70.70	3	−80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	−106.20	3	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	3	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	3	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	3	−74.50	5.87	3.98	1.96	118	1	87.4	
CUB00001	−89.20	3	−79.81	21.62	2.24	0.68	168	1	87.4	
EQACAND1	−115.20	3	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	3	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
GRD00002	−42.20	3	−61.58	12.29	0.60	0.60	90	1	87.4	
GRD00059	−57.20	3	−61.58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	−53.20	3	−44.89	66.56	2.70	0.82	173	1	87.4	2
HWA00002	−166.20	3	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	−175.20	3	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2

17353,16 MHz (3)

1	2	3	4		5		6	7	8	9
MEX01NTE	−78.20	3	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	3	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	3	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	3	−96 39	19.88	3.18	1.87	157	1	87.4	1
PAQPAC01	−106.20	3	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	3	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	3	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	3	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	3	−95 23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SURINAM2	−84.70	3	−55.69	4.35	1.00	0.69	86	1	87.4	
URG00001	−71.70	3	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	3	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	3	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	3	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	3	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166 20	3	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	3	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	3	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	3	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	3	−71 37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	4	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	4	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93.80	4	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	4	−62.85	−29.80	3.24	2.89	47	2	87.4	
B CE311	−63.80	4	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	4	−40.26	−6.06	3 44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	4	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44 80	4	−50 71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63 80	4	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	4	−59.60	−11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	4	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73 80	4	−68.75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	4	−45.99	−19 09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	4	−51.10	−25 64	2.76	1 06	50	2	87 4	8 9/GR6
B SU112	−44.80	4	−50.76	−25.62	2.47	1.48	56	2	87 4	8 9/GR9
B SU211	−80.80	4	−44.51	−16.94	3.22	1.37	60	2	87 4	8 9/GR6
B SU212	−44.80	4	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	4	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	−137.80	4	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	−72.30	4	−81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	−128.80	4	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01303	−128.80	4	−113.04	51.04	7 53	1.26	162	2	87.4	9/GR12
CAN01304	−90.80	4	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01403	−128.80	4	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12

17367,74 MHz (4)

1	2	3	4		5		6	7	8	9
CAN01404	−90.80	4	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	−81.80	4	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	−90.80	4	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	−81.80	4	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	−81.80	4	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	−70.30	4	−80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	−105.80	4	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	4	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	4	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	4	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	4	−88.61	17.26	0.64	0 64	90	1	87.4	9/GR18
CRBEC001	−92.30	4	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	4	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CYM00001	−115.80	4	−80.58	19.57	0.60	0.60	90	2	87.4	
DOMIFRB2	−83.30	4	−70.51	18.79	0.98	0.69	167	2	87.4	
EQAC0001	−94.80	4	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	4	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GUFMGG02	−52.80	4	−56.42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	4	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	−174.80	4	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
JMC00005	−33.80	4	−77.27	18.12	0.60	0.60	90	2	87.4	
LCAIFRB1	−79.30	4	−61.15	13.90	0.60	0.60	90	2	87.4	
MEX01NTE	−77.80	4	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	4	−107.36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	–126.80	4	–96 39	19.88	3.19	1.87	158	2	87 4	1
PRU00004	–85 80	4	–74.19	–8.39	3.74	2.45	112	2	87.4	
PTRVIR01	–100.80	4	–93.85	36 31	8.26	3 55	171	2	87.4	1 6 9/GR20
PTRVIR02	–109.80	4	–95.47	36.38	8.10	3.45	168	2	87 4	1 6 9/GR21
SLVIFRB2	–107.30	4	–88.91	13.59	0.60	0 60	90	1	87.4	
USAEH001	–61.30	4	–87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	–100.80	4	–93.85	36.31	8.26	3 55	171	2	87.4	1 6 9/GR20
USAEH003	–109.80	4	–95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	–118.80	4	–96.42	36 21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	–165.80	4	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	–174.80	4	–116.10	37 47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	–147.80	4	–111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	–156.80	4	–113.01	40.71	3.74	1.79	149	2	87.4	
VEN11VEN	–103.80	4	–66.79	6.90	2.50	1.77	122	2	87.4	

17382,32 MHz (5)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	5	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	5	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	5	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGSUR04	−94.20	5	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
B CE311	−64.20	5	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	5	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64 20	5	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	5	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	5	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	5	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	5	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	5	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	5	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	5	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	5	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	5	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
B AHIFRB1	−87.20	5	−76.06	24.16	1.81	0.70	142	1	87.4	
BERBERMU	−96.20	5	−64.77	32.32	0.60	0.60	90	2	87.4	
B ERBER02	−31.00	5	−64.77	32.32	0.60	0.60	90	1	87.4	2 3
B OLAND01	−115.20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	−138.20	5	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01201	−138.20	5	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01202	−72.70	5	−81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	−129.20	5	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12

CAN01303	−129.20	5	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	5	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	5	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	−91.20	5	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	5	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	5	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01505	−82.20	5	−84.11	50 20	8.31	2.58	1	1	87.4	9/GR14
CAN01605	−82.20	5	−84.11	50.20	8.31	2 58	1	1	87.4	9/GR14
CAN01606	−70.70	5	−80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	−106.20	5	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	5	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	5	−74 50	5.87	3.98	1 96	118	1	87.4	
EQACAND1	−115.20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
FLKANT01	−57.20	5	−44.54	−60.13	3.54	0.68	12	1	87.4	2
FLKFALKS	−31.00	5	−59.90	−51.64	0.60	0.60	90	1	87.4	2 3
GRD00002	−42.20	5	−61.58	12.29	0.60	0.60	90	1	87.4	
HWA00002	−166.20	5	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	−175.20	5	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
MEX01NTE	−78.20	5	−105.81	26.01	2 89	2.08	155	1	87.4	1
MEX01SUR	−69.20	5	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	5	−107.21	26.31	3.84	1.55	148	1	87 4	1
MEX02SUR	−127.20	5	−96.39	19.88	3.18	1.87	157	1	87.4	1

17382,32 MHz (5)

1	2	3	4		5		6	7	8	9
PAQPAC01	−106.20	5	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	5	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101 20	5	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	5	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SPMFRAN3	−53.20	5	−67.24	47.51	3.16	0.79	7	1	87.4	2 7
TRD00001	−84.70	5	−61.23	10 70	0.60	0.60	90	1	87.4	
URG00001	−71.70	5	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	5	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	5	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	5	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119 20	5	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	5	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	5	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	5	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	5	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115 20	5	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
VRG00001	−79.70	5	−64.37	18.48	0.60	0.60	90	1	87.4	4

ALS00002	−165.80	6	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	6	−116 10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93.80	6	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	6	−62.85	−29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	−52.80	6	−66.44	14.87	1.83	0.68	39	2	87.4	
B CE311	−63.80	6	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	6	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	6	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44.80	6	−50.71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63 80	6	−53.11	−2.98	2.42	2.15	107	2	87 4	8 9/GR7
B NO611	−73.80	6	−59.60	−11.62	2 86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	6	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	6	−68.75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	6	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	6	−51.10	−25.64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	6	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	−80.80	6	−44.51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	6	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	6	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	−137.80	6	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	−72.30	6	−81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	−128.80	6	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01303	−128.80	6	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	−90.80	6	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13

1	2	3	4		5		6	7	8	9
CAN01403	–128.80	6	–113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01404	–90.80	6	–86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	–81.80	6	–83.80	50 22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	–90.80	6	–86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	–81.80	6	–83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	–81.80	6	–83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	–70.30	6	–80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	–105.80	6	–69.59	–23 20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	–105.80	6	–73.52	–55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	–92.30	6	–76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	–92.30	6	–64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	–92.30	6	–88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	–92.30	6	–60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	–92.30	6	–79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CTR00201	–130.80	6	–84.33	9.67	0.82	0.68	119	2	87.4	
EQAC0001	–94 80	6	–78.31	–1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	–94 80	6	–90.36	–0.57	0.94	0.89	99	1	87.4	9/GR19
GUY00302	–33.80	6	–59.07	4.77	1.43	0.85	91	2	87.4	
HNDIFRB2	–107.30	6	–86.23	15.16	1.14	0.85	8	1	87.4	
HTI00002	–83.30	6	–73.28	18.96	0 82	0 68	11	2	87.4	
HWA00002	–165.80	6	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	–174 80	6	–116 10	37.47	5.60	0.76	132	2	87.4	9/GR2
MEX01NTE	–77.80	6	–105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	–135 80	6	–107 36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	−126.80	6	−96.39	19 88	3 19	1.87	158	2	87 4	1
PRU00004	−85.80	6	−74.19	−8 39	3 74	2.45	112	2	87.4	
PTRVIR01	−100.80	6	−93.85	36.31	8.26	3 55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	6	−95.47	36.38	8.10	3 45	168	2	87.4	1 6 9/GR21
TCA00001	−115 80	6	−71.79	21 53	0 60	0.60	90	2	87.4	
USAEH001	−61 30	6	−87 53	36 18	6.41	3 49	12	2	87.4	1 5 6
USAEH002	−100 80	6	−93.85	36.31	8 26	3.55	171	2	87 4	1 6 9/GR20
USAEH003	−109 80	6	−95 47	36 38	8 10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118 80	6	−96 42	36 21	8 20	3 12	165	2	87.4	1 5 6
USAPSA02	−165 80	6	−109 83	36.82	6 03	1 12	137	2	87.4	9/GR1
USAPSA03	−174.80	6	−116 10	37 47	5 60	0.76	132	2	87 4	9/GR2
USAWH101	−147 80	6	−111 01	40 67	4 38	2.15	162	2	87 4	
USAWH102	−156 80	6	−113 01	40 71	3 74	1.79	149	2	87 4	
VCT00001	−79 30	6	−61 18	13 23	0 60	0.60	90	2	87.4	
VEN11VEN	−103.80	6	−66 79	6 90	2.50	1 77	122	2	87.4	

17411,48 MHz (7)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	7	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	7	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	7	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	7	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	7	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	7	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
ATGSJN01	−79.70	7	−61.79	17.07	0.60	0.60	90	1	87.4	
B CE311	−64.20	7	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	7	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	7	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	7	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	7	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	7	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	7	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	7	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	7	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	7	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	7	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	7	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	7	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	7	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	7	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	7	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	7	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10

CAN01201	–138.20	7	–114.60	51.08	7.28	1.10	160	1	87 4	9/GR10
CAN01202	–72.70	7	–81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	–129.20	7	–113.02	51.08	7 47	1.26	162	1	87.4	9/GR12
CAN01303	–129.20	7	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	–91.20	7	–86.71	50.48	8.58	2 54	178	1	87.4	9/GR13
CAN01403	–129.20	7	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	–91.20	7	–86 71	50 48	8 58	2.54	178	1	87.4	9/GR13
CAN01405	–82.20	7	–84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	–91.20	7	–86.71	50.48	8.58	2 54	178	1	87 4	9/GR13
CAN01505	–82.20	7	–84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01605	–82.20	7	–84 11	50.20	8 31	2.58	1	1	87.4	9/GR14
CAN01606	–70 70	7	–80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	–106.20	7	–72.23	–35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	–106.20	7	–80.06	–30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	–115.20	7	–71.37	–4.69	6 49	2.57	87	1	87.4	9/GR5
CLM00001	–103.20	7	–74.50	5.87	3.98	1.96	118	1	87.4	
CUB00001	–89.20	7	–79.81	21.62	2.24	0.68	168	1	87.4	
EQACAND1	–115.20	7	–71.37	–4.69	6.49	2 57	87	1	87.4	9/GR5
EQAGAND1	–115.20	7	–71.37	–4 69	6 49	2.57	87	1	87.4	9/GR5
GRD00002	–42.20	7	–61.58	12 29	0.60	0.60	90	1	87.4	
GRD00059	–57.20	7	–61 58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	–53.20	7	–44.89	66.56	2.70	0 82	173	1	87.4	2
HWA00002	–166.20	7	–109.94	36 86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	–175.20	7	–116 23	37.50	5 60	0.75	132	1	87 4	9/GR2

17411,48 MHz (7)

1	2	3	4		5		6	7	8	9
MEX01NTE	−78.20	7	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	7	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	7	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127 20	7	−96.39	19.88	3.18	1.87	157	1	87.4	1
PAQPAC01	−106.20	7	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	7	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	7	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	7	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	7	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SURINAM2	−84.70	7	−55.69	4.35	1.00	0.69	86	1	87.4	
URG00001	−71.70	7	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	7	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	7	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	7	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	7	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	7	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	7	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148 20	7	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	7	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	7	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	8	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	8	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93 80	8	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	8	−62.85	−29.80	3.24	2.89	47	2	87.4	
B CE311	−63.80	8	−40.60	−6.07	3 04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	8	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	8	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44.80	8	−50.71	−15 30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63.80	8	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	8	−59.60	−11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	8	−60.70	−1 78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	8	−68 75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	8	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	8	−51.10	−25.64	2 76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	8	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	−80.80	8	−44.51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	8	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	8	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	−137.80	8	−114 10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	−72.30	8	−81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	−128.80	8	−113.04	51.04	7 53	1.26	162	2	87.4	9/GR12
CAN01303	−128.80	8	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	−90.80	8	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01403	−128 80	8	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12

1	2	3	4		5		6	7	8	9
CAN01404	−90 80	8	−86.57	50.48	8 59	2.54	178	2	87.4	9/GR13
CAN01405	−81 80	8	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	−90.80	8	−86.57	50 48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	−81.80	8	−83.80	50 22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	−81.80	8	−83.80	50 22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	−70 30	8	−80.64	50.02	7.88	2 52	6	2	87.4	
CHLCONT4	−105.80	8	−69.59	−23.20	2.21	0.69	68	2	87 4	9/GR16
CHLCONT6	−105 80	8	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	8	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	8	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	8	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	8	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	8	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CYM00001	−115.80	8	−80.58	19.57	0.60	0.60	90	2	87.4	
DOMIFRB2	−83.30	8	−70.51	18.79	0.98	0.69	167	2	87.4	
EQAC0001	−94 80	8	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	8	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GUFMGG02	−52.80	8	−56.42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	8	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	−174.80	8	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
JMC00005	−33.80	8	−77.27	18.12	0.60	0.60	90	2	87.4	
LCAIFRB1	−79.30	8	−61 15	13.90	0.60	0.60	90	2	87.4	
MEX01NTE	−77.80	8	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	8	−107 36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	−126.80	8	−96.39	19.88	3.19	1.87	158	2	87.4	1
PRU00004	−85.80	8	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	8	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	8	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
SLVIFRB2	−107.30	8	−88.91	13.59	0.60	0.60	90	1	87.4	
USAEH001	−61.30	8	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	8	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	8	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	8	−96.42	36.21	8.20	3 12	165	2	87.4	1 5 6
USAPSA02	−165.80	8	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	8	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	8	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	8	−113.01	40.71	3.74	1.79	149	2	87.4	
VEN11VEN	−103.80	8	−66.79	6.90	2.50	1.77	122	2	87.4	

17440,64 MHz (9)

1	2	3	4		5		6	7	8	9
ALS00002	–166 20	9	–109.94	36 86	6 04	1 11	137	1	87 4	9/GR1
ALS00003	–175 20	9	–116 23	37 50	5 60	0 75	132	1	87.4	9/GR2
ARGINSU4	–94.20	9	–52 98	–59.81	3 40	0 68	19	1	87.4	9/GR3
ARGSUR04	–94 20	9	–65 04	–43.33	3.32	1 50	40	1	87.4	9/GR3
B CE311	–64 20	9	–40.60	–6 07	3 04	2.06	174	1	87.4	8 9/GR7
B CE312	–45 20	9	–40.27	–6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	–64 20	9	–50.97	–15.27	3.86	1 38	49	1	87.4	8 9/GR7
B CE412	–45.20	9	–50.71	–15.30	3 57	1.56	52	1	87.4	8 9/GR9
B CE511	–64 20	9	–53.10	–2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	–74 20	9	–59 60	–11 62	2.85	1 69	165	2	87 4	8 9/GR8
B NO711	–74 20	9	–60 70	–1 78	3 54	1.78	126	2	87.4	8 9/GR8
B NO811	–74 20	9	–68.76	–4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	–81.20	9	–51.12	–25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	–45 20	9	–50.75	–25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	–81 20	9	–44 51	–16 95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	–45.20	9	–44.00	–16.87	3.20	1 96	58	1	87.4	8 9/GR9
B AHIFRB1	–87 20	9	–76.06	24.16	1.81	0 70	142	1	87.4	
BERBERMU	–96 20	9	–64.77	32 32	0.60	0.60	90	2	87.4	
B ERBER02	–31 00	9	–64 77	32 32	0.60	0.60	90	1	87.4	2 3
B OLAND01	–115 20	9	–71.37	–4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	–138 20	9	–114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01201	–138 20	9	–114 60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01202	–72.70	9	–81 34	50 02	7.96	2.55	5	1	87.4	
CAN01203	–129 20	9	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12

CAN01303	−129.20	9	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	9	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	9	−113.02	51.08	7 47	1.26	162	1	87.4	9/GR12
CAN01404	−91 20	9	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	9	−84 11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	9	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01505	−82.20	9	−84.11	50.20	8 31	2.58	1	1	87.4	9/GR14
CAN01605	−82.20	9	−84.11	50.20	8.31	2 58	1	1	87 4	9/GR14
CAN01606	−70.70	9	−80.77	50.03	7.88	2.53	6	1	87 4	
CHLCONT5	−106.20	9	−72.23	−35.57	2.60	0.68	55	1	87 4	9/GR17
CHLPAC02	−106.20	9	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115 20	9	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	9	−74.50	5.87	3 98	1.96	118	1	87.4	
EQACAND1	−115.20	9	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	9	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
FLKANT01	−57.20	9	−44.54	−60 13	3.54	0.68	12	1	87 4	2
FLKFALKS	−31.00	9	−59.90	−51.64	0.60	0.60	90	1	87.4	2 3
GRD00002	−42.20	9	−61.58	12.29	0.60	0.60	90	1	87.4	
HWA00002	−166.20	9	−109 94	36.86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	−175.20	9	−116.23	37.50	5.60	0.75	132	1	87 4	9/GR2
MEX01NTE	−78.20	9	−105.81	26.01	2 89	2.08	155	1	87.4	1
MEX01SUR	−69.20	9	−94.84	19 82	3.05	2.09	4	1	87 4	1
MEX02NTE	−136.20	9	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	9	−96.39	19.88	3.18	1.87	157	1	87 4	1

17440,64 MHz (9)

1	2	3	4		5		6	7	8	9
PAQPAC01	−106.20	9	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	9	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	9	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	9	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	9	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SPMFRAN3	−53.20	9	−67.24	47.51	3.16	0.79	7	1	87.4	2 7
TRD00001	−84.70	9	−61.23	10.70	0.60	0.60	90	1	87.4	
URG00001	−71.70	9	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	9	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	9	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	9	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	9	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	9	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	9	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	9	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	9	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	9	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
VRG00001	−79.70	9	−64.37	18.48	0.60	0.60	90	1	87.4	4

ALS00002	−165 80	10	−109.83	36 82	6.03	1 12	137	2	87.4	9/GR1
ALS00003	−174.80	10	−116.10	37.47	5.60	0 76	132	2	87.4	9/GR2
ARGNORT4	−93 80	10	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	10	−62.85	−29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	−52.80	10	−66.44	14.87	1.83	0.68	39	2	87.4	
B CE311	−63.80	10	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	10	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	10	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44 80	10	−50.71	−15.30	3.57	1 56	52	2	87.4	8 9/GR9
B CE511	−63.80	10	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	10	−59.60	−11 62	2 86	1 69	165	1	87.4	8 9/GR8
B NO711	−73.80	10	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	10	−68.75	−4.71	2 37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	10	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	10	−51.10	−25.64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	10	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	−80.80	10	−44.51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	10	−43.99	−16.97	3 27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	10	−114 10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	−137.80	10	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	−72.30	10	−81.23	50 12	7.99	2.53	5	2	87.4	
CAN01203	−128.80	10	−113.04	51 04	7.53	1 26	162	2	87.4	9/GR12
CAN01303	−128.80	10	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	−90.80	10	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13

17455,22 MHz (10)

1	2	3	4		5		6	7	8	9
CAN01403	−128.80	10	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01404	−90.80	10	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	−81.80	10	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	−90.80	10	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	−81.80	10	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	−81.80	10	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	−70.30	10	−80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	−105.80	10	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	10	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	10	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	10	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	10	−88.61	17.26	0 64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	10	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92 30	10	−79 45	17.97	0.99	0.68	151	1	87.4	9/GR18
CTR00201	−130.80	10	−84.33	9.67	0.82	0.68	119	2	87.4	
EQAC0001	−94.80	10	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	10	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GUY00302	−33.80	10	−59.07	4.77	1.43	0.85	91	2	87.4	
HNDIFRB2	−107 30	10	−86.23	15.16	1.14	0.85	8	1	87.4	
HTI00002	−83 30	10	−73.28	18.96	0.82	0.68	11	2	87.4	
HWA00002	−165.80	10	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	−174.80	10	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
MEX01NTE	−77 80	10	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	10	−107.36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	−126.80	10	−96.39	19.88	3.19	1 87	158	2	87.4	1
PRU00004	−85.80	10	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	10	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	10	−95.47	36.38	8 10	3.45	168	2	87 4	1 6 9/GR21
TCA00001	−115.80	10	−71.79	21.53	0.60	0.60	90	2	87.4	
USAEH001	−61.30	10	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	10	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	10	−95.47	36.38	8.10	3 45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	10	−96.42	36.21	8.20	3 12	165	2	87.4	1 5 6
USAPSA02	−165.80	10	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	10	−116.10	37.47	5.60	0 76	132	2	87.4	9/GR2
USAWH101	−147.80	10	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	10	−113.01	40.71	3.74	1.79	149	2	87.4	
VCT00001	−79.30	10	−61.18	13.23	0.60	0 60	90	2	87 4	
VEN11VEN	−103.80	10	−66.79	6.90	2.50	1.77	122	2	87.4	

17469,80 MHz (11)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	11	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	11	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	11	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55 20	11	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	11	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	11	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
ATGSJN01	−79.70	11	−61.79	17.07	0.60	0.60	90	1	87.4	
B CE311	−64.20	11	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	11	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	11	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	11	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	11	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	11	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	11	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	11	−68.76	−4.71	2 37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	11	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	11	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	11	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	11	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	11	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	11	−71.37	−4 69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	11	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	11	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	11	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10

CAN01201	−138.20	11	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01202	−72.70	11	−81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	−129.20	11	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01303	−129.20	11	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	11	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	11	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	−91.20	11	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	11	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	11	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01505	−82.20	11	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01605	−82.20	11	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01606	−70.70	11	−80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	−106.20	11	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	11	−80.06	−30.06	1.36	0 68	69	1	87.4	9/GR17
CLMAND01	−115.20	11	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	11	−74.50	5.87	3.98	1.96	118	1	87.4	
CUB00001	−89.20	11	−79.81	21.62	2.24	0.68	168	1	87.4	
EQACAND1	−115.20	11	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	11	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
GRD00002	−42.20	11	−61.58	12.29	0.60	0.60	90	1	87.4	
GRD00059	−57.20	11	−61.58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	−53.20	11	−44.89	66.56	2.70	0.82	173	1	87.4	2
GUY00201	−84.70	11	−59.19	4.78	1.44	0.85	95	1	87.4	
HWA00002	−166.20	11	−109 94	36.86	6.04	1.11	137	1	87.4	9/GR1

17469,80 MHz (11)

1	2	3	4		5		6	7	8	9
HWA00003	−175.20	11	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
MEX01NTE	−78.20	11	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	11	−94.84	19 82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	11	−107.21	26 31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	11	−96.39	19.88	3.18	1.87	157	1	87 4	1
PAQPAC01	−106.20	11	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	11	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	11	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	11	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	11	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
URG00001	−71.70	11	−56 22	−32.52	1.02	0.89	11	1	87 4	
USAEH001	−61 70	11	−87.57	36.17	6.42	3 49	12	1	87.4	1 5 6
USAEH002	−101.20	11	−93.94	36.32	8.24	3 56	171	1	87 4	1 6 9/GR20
USAEH003	−110.20	11	−95.23	36 29	8.27	3 37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	11	−96.45	36 21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	11	−109 94	36.86	6 04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	11	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	11	−111.02	40.68	4.36	2.15	162	1	87 4	
USAWH102	−157 20	11	−113.07	40 74	3.72	1.78	149	1	87 4	
VENAND03	−115.20	11	−71.37	−4 69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	–165 80	12	–109 83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	–174.80	12	–116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	–93 80	12	–63.96	–30 01	3 86	1.99	48	2	87.4	
ARGNORT5	–54.80	12	–62 85	–29 80	3 24	2.89	47	2	87.4	
B CE311	–63 80	12	–40.60	–6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	–44.80	12	–40.26	–6 06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	–63.80	12	–50.97	–15.26	3 86	1.38	49	2	87.4	8 9/GR7
B CE412	–44 80	12	–50 71	–15.30	3.57	1 56	52	2	87 4	8 9/GR9
B CE511	–63.80	12	–53.11	–2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	–73.80	12	–59 60	–11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	–73 80	12	–60 70	–1.78	3 54	1.78	126	1	87.4	8 9/GR8
B NO811	–73 80	12	–68.75	–4 71	2 37	1.65	73	1	87 4	8 9/GR8
B SE911	–101.80	12	–45 99	–19.09	2 22	0.79	62	2	87 4	8
B SU111	–80.80	12	–51 10	–25 64	2.76	1 06	50	2	87.4	8 9/GR6
B SU112	–44 80	12	–50 76	–25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	–80.80	12	–44 51	–16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	–44 80	12	–43.99	–16.97	3 27	1 92	59	2	87 4	8 9/GR9
CAN01101	–137.80	12	–114 10	50 92	7 22	1 11	160	2	87.4	9/GR10
CAN01201	–137 80	12	–114.10	50 92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	–72 30	12	–81 23	50 12	7.99	2 53	5	2	87.4	
CAN01203	–128.80	12	–113 04	51.04	7.53	1 26	162	2	87.4	9/GR12
CAN01303	–128 80	12	–113 04	51 04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	–90 80	12	–86 57	50 48	8 59	2.54	178	2	87 4	9/GR13
CAN01403	–128 80	12	–113 04	51.04	7 53	1.26	162	2	87.4	9/GR12

17484,38 MHz (12)

1	2	3	4		5		6	7	8	9
CAN01404	−90.80	12	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	−81.80	12	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	−90.80	12	−86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	−81.80	12	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	−81.80	12	−83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	−70.30	12	−80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	−105.80	12	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	12	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	12	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	12	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	12	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	12	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	12	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CYM00001	−115.80	12	−80.58	19.57	0.60	0.60	90	2	87.4	
DOMIFRB2	−83.30	12	−70.51	18 79	0.98	0.69	167	2	87.4	
EQAC0001	−94.80	12	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	12	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GUFMGG02	−52.80	12	−56.42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	12	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	−174.80	12	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
JMC00005	−33.80	12	−77.27	18.12	0.60	0.60	90	2	87.4	
LCAIFRB1	−79.30	12	−61.15	13.90	0.60	0.60	90	2	87.4	
MEX01NTE	−77.80	12	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	12	−107.36	26.32	3.80	1.57	149	2	87.4	1

MEX02SUR	−126 80	12	−96.39	19 88	3.19	1.87	158	2	87 4	1
PRU00004	−85 80	12	−74.19	−8 39	3.74	2.45	112	2	87 4	
PTRVIR01	−100 80	12	−93.85	36.31	8 26	3.55	171	2	87 4	1 6 9/GR20
PTRVIR02	−109 80	12	−95 47	36.38	8 10	3 45	168	2	87 4	1 6 9/GR21
SLVIFRB2	−107.30	12	−88.91	13 59	0 60	0 60	90	1	87.4	
USAEH001	−61 30	12	−87 53	36 18	6 41	3 49	12	2	87.4	1 5 6
USAEH002	−100.80	12	−93.85	36 31	8 26	3 55	171	2	87.4	1 6 9/GR20
USAEH003	−109 80	12	−95.47	36 38	8.10	3 45	168	2	87.4	1 6 9/GR21
USAEH004	−118 80	12	−96 42	36 21	8 20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	12	−109 83	36 82	6 03	1 12	137	2	87.4	9/GR1
USAPSA03	−174 80	12	−116.10	37 47	5.60	0 76	132	2	87 4	9/GR2
USAWH101	−147 80	12	−111.01	40 67	4.38	2 15	162	2	87.4	
USAWH102	−156 80	12	−113 01	40.71	3 74	1 79	149	2	87.4	
VEN11VEN	−103.80	12	−66 79	6.90	2 50	1 77	122	2	87 4	

17498,96 MHz (13)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	13	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	13	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94 20	13	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGSUR04	−94.20	13	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
B CE311	−64.20	13	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	13	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	13	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	13	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	13	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	13	−59.60	−11 62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	13	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	13	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	13	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	13	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	13	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	13	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
B AHIFRB1	−87.20	13	−76.06	24.16	1.81	0.70	142	1	87.4	
BERBERMU	−96.20	13	−64.77	32.32	0.60	0.60	90	2	87.4	
B ERBER02	−31.00	13	−64.77	32.32	0.60	0.60	90	1	87 4	2 3
B OLAND01	−115.20	13	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	−138.20	13	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01201	−138.20	13	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10
CAN01202	−72.70	13	−81.34	50.02	7.96	2.55	5	1	87.4	
CAN01203	−129 20	13	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12

CAN01303	−129.20	13	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	−91.20	13	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01403	−129.20	13	−113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01404	−91.20	13	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01405	−82.20	13	−84 11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01504	−91.20	13	−86.71	50.48	8.58	2.54	178	1	87.4	9/GR13
CAN01505	−82.20	13	−84.11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01605	−82.20	13	−84 11	50.20	8.31	2.58	1	1	87.4	9/GR14
CAN01606	−70.70	13	−80.77	50.03	7.88	2.53	6	1	87.4	
CHLCONT5	−106.20	13	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	13	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	13	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	13	−74 50	5.87	3.98	1.96	118	1	87.4	
EQACAND1	−115.20	13	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	13	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
FLKANT01	−57.20	13	−44 54	−60.13	3.54	0.68	12	1	87.4	2
FLKFALKS	−31.00	13	−59.90	−51.64	0.60	0.60	90	1	87.4	2 3
GRD00002	−42.20	13	−61.58	12.29	0.60	0.60	90	1	87.4	
HWA00002	−166.20	13	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
HWA00003	−175.20	13	−116.23	37.50	5.60	0.75	132	1	87 4	9/GR2
MEX01NTE	−78.20	13	−105.81	26.01	2.89	2 08	155	1	87.4	1
MEX01SUR	−69.20	13	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	13	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	13	−96.39	19.88	3.18	1.87	157	1	87.4	1

17498,96 MHz (13)

1	2	3	4		5		6	7	8	9
PAQPAC01	–106 20	13	–109.18	–27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	–99 20	13	–58 66	–23 32	1.45	1.04	76	1	87.4	
PRUAND02	–115 20	13	–71 37	–4 69	6.49	2.57	87	1	87 4	9/GR5
PTRVIR01	–101 20	13	–93 94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	–110 20	13	–95 23	36 29	8.27	3.37	168	1	87.4	1 6 9/GR21
SPMFRAN3	–53.20	13	–67.24	47.51	3.16	0.79	7	1	87.4	2 7
TRD00001	–84.70	13	–61 23	10.70	0.60	0.60	90	1	87 4	
URG00001	–71 70	13	–56.22	–32.52	1 02	0.89	11	1	87.4	
USAEH001	–61.70	13	–87.57	36.17	6.42	3 49	12	1	87.4	1 5 6
USAEH002	–101 20	13	–93.94	36 32	8.24	3 56	171	1	87.4	1 6 9/GR20
USAEH003	–110 20	13	–95 23	36.29	8 27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	–119.20	13	–96 45	36 21	8 20	3.12	165	1	87 4	1 5 6
USAPSA02	–166 20	13	–109 94	36 86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	–175.20	13	–116 23	37.50	5 60	0 75	132	1	87.4	9/GR2
USAWH101	–148 20	13	–111 02	40.68	4.36	2 15	162	1	87 4	
USAWH102	–157.20	13	–113 07	40.74	3.72	1 78	149	1	87.4	
VENAND03	–115.20	13	–71 37	–4.69	6.49	2.57	87	1	87.4	9/GR5
VRG00001	–79.70	13	–64.37	18.48	0.60	0 60	90	1	87.4	4

17513,54 MHz (14)

ALS00002	−165.80	14	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	14	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93 80	14	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	14	−62.85	−29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	−52 80	14	−66.44	14.87	1 83	0.68	39	2	87.4	
B CE311	−63.80	14	−40 60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	14	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	14	−50.97	−15.26	3.86	1 38	49	2	87.4	8 9/GR7
B CE412	−44.80	14	−50.71	−15 30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63.80	14	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	14	−59.60	−11.62	2 86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	14	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	14	−68.75	−4.71	2.37	1 65	73	1	87 4	8 9/GR8
B SE911	−101.80	14	−45.99	−19.09	2.22	0 79	62	2	87.4	8
B SU111	−80.80	14	−51.10	−25.64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	14	−50.76	−25 62	2 47	1 48	56	2	87 4	8 9/GR9
B SU211	−80.80	14	−44 51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	14	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	14	−114.10	50.92	7 22	1.11	160	2	87.4	9/GR10
CAN01201	−137.80	14	−114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01202	−72.30	14	−81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	−128.80	14	−113 04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01303	−128.80	14	−113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	−90.80	14	−86 57	50.48	8.59	2.54	178	2	87.4	9/GR13

1	2	3	4		5		6	7	8	9
CAN01403	–128 80	14	–113.04	51 04	7.53	1.26	162	2	87.4	9/GR12
CAN01404	–90 80	14	–86 57	50 48	8 59	2.54	178	2	87.4	9/GR13
CAN01405	–81 80	14	–83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	–90 80	14	–86.57	50.48	8 59	2.54	178	2	87.4	9/GR13
CAN01505	–81 80	14	–83.80	50.22	8 35	2.57	2	2	87.4	9/GR14
CAN01605	–81 80	14	–83 80	50.22	8 35	2.57	2	2	87.4	9/GR14
CAN01606	–70 30	14	–80 64	50.02	7 88	2.52	6	2	87.4	
CHLCONT4	–105 80	14	–69.59	–23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	–105.80	14	–73.52	–55 52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	–92 30	14	–76.09	24 13	1 83	0.68	141	1	87.4	9/GR18
CRBBER01	–92 30	14	–64.76	32 13	0.60	0.60	90	1	87 4	9/GR18
CRBBLZ01	–92 30	14	–88 61	17 26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	–92 30	14	–60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	–92 30	14	–79.45	17.97	0 99	0.68	151	1	87.4	9/GR18
CTR00201	–130 80	14	–84 33	9 67	0 82	0.68	119	2	87.4	
EQAC0001	–94 80	14	–78.31	–1 52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	–94.80	14	–90 36	–0.57	0 94	0 89	99	1	87.4	9/GR19
GUY00302	–33.80	14	–59.07	4 77	1 43	0.85	91	2	87.4	
HNDIFRB2	–107 30	14	–86.23	15 16	1 14	0.85	8	1	87.4	
HTI00002	–83 30	14	–73.28	18.96	0.82	0.68	11	2	87.4	
HWA00002	–165.80	14	–109.83	36.82	6.03	1.12	137	2	87 4	9/GR1
HWA00003	–174 80	14	–116 10	37.47	5.60	0.76	132	2	87 4	9/GR2
MEX01NTE	–77 80	14	–105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	–135 80	14	–107.36	26 32	3.80	1.57	149	2	87.4	1

MEX02SUR	–126.80	14	–96 39	19 88	3.19	1.87	158	2	87.4	1
PRU00004	–85.80	14	–74.19	–8 39	3.74	2 45	112	2	87.4	
PTRVIR01	–100.80	14	–93.85	36 31	8 26	3.55	171	2	87 4	1 6 9/GR20
PTRVIR02	–109.80	14	–95.47	36.38	8 10	3.45	168	2	87 4	1 6 9/GR21
TCA00001	–115.80	14	–71.79	21 53	0.60	0.60	90	2	87.4	
USAEH001	–61.30	14	–87.53	36.18	6 41	3.49	12	2	87 4	1 5 6
USAEH002	–100.80	14	–93.85	36 31	8.26	3 55	171	2	87 4	1 6 9/GR20
USAEH003	–109.80	14	–95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	–118 80	14	–96.42	36.21	8 20	3 12	165	2	87.4	1 5 6
USAPSA02	–165.80	14	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	–174.80	14	–116.10	37 47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	–147 80	14	–111.01	40.67	4 38	2.15	162	2	87 4	
USAWH102	–156.80	14	–113.01	40 71	3.74	1.79	149	2	87 4	
VCT00001	–79.30	14	–61.18	13 23	0 60	0 60	90	2	87.4	
VEN11VEN	–103.80	14	–66 79	6 90	2.50	1.77	122	2	87 4	

17528,12 MHz (15)

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	15	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	15	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	15	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	15	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	15	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	15	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
ATGSJN01	−79.70	15	−61.79	17.07	0.60	0.60	90	1	87.4	
B CE311	−64 20	15	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45 20	15	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	15	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	15	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	15	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	15	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	15	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	15	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	15	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	15	−50 75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	15	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	15	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	15	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	15	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	15	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	15	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	15	−114.60	51.08	7.28	1.10	160	1	87.4	9/GR10

CAN01201	–138.20	15	–114.60	51.08	7.28	1 10	160	1	87.4	9/GR10
CAN01202	–72.70	15	–81 34	50.02	7.96	2.55	5	1	87.4	
CAN01203	–129.20	15	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01303	–129.20	15	–113.02	51.08	7.47	1.26	162	1	87.4	9/GR12
CAN01304	–91.20	15	–86.71	50.48	8.58	2 54	178	1	87.4	9/GR13
CAN01403	–129.20	15	–113 02	51.08	7 47	1 26	162	1	87.4	9/GR12
CAN01404	–91.20	15	–86 71	50 48	8.58	2 54	178	1	87.4	9/GR13
CAN01405	–82.20	15	–84.11	50.20	8.31	2.58	1	1	87 4	9/GR14
CAN01504	–91.20	15	–86 71	50 48	8 58	2.54	178	1	87 4	9/GR13
CAN01505	–82.20	15	–84.11	50.20	8.31	2 58	1	1	87 4	9/GR14
CAN01605	–82.20	15	–84.11	50 20	8.31	2 58	1	1	87 4	9/GR14
CAN01606	–70.70	15	–80 77	50 03	7.88	2.53	6	1	87 4	
CHLCONT5	–106.20	15	–72 23	–35.57	2.60	0.68	55	1	87 4	9/GR17
CHLPAC02	–106.20	15	–80 06	–30.06	1.36	0.68	69	1	87 4	9/GR17
CLMAND01	–115 20	15	–71.37	–4.69	6 49	2.57	87	1	87 4	9/GR5
CLM00001	–103.20	15	–74.50	5 87	3 98	1 96	118	1	87 4	
CUB00001	–89.20	15	–79 81	21.62	2.24	0 68	168	1	87.4	
EQACAND1	–115.20	15	–71 37	–4.69	6 49	2.57	87	1	87.4	9/GR5
EQAGAND1	–115.20	15	–71 37	–4.69	6 49	2.57	87	1	87.4	9/GR5
GRD00002	–42 20	15	–61.58	12.29	0 60	0.60	90	1	87.4	
GRD00059	–57.20	15	–61.58	12.29	0.60	0.60	90	1	87 4	
GRLDNK01	–53 20	15	–44.89	66 56	2.70	0.82	173	1	87.4	2
GUY00201	–84.70	15	–59.19	4.78	1.44	0.85	95	1	87.4	
HWA00002	–166.20	15	–109.94	36.86	6.04	1.11	137	1	87.4	9/GR1

17528,12 MHz (15)

1	2	3	4		5		6	7	8	9
HWA00003	−175.20	15	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
MEX01NTE	−78.20	15	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	15	−94.84	19 82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	15	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	15	−96.39	19.88	3.18	1.87	157	1	87.4	1
PAQPAC01	−106.20	15	−109 18	−27 53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	15	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115 20	15	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	15	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	15	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
URG00001	−71.70	15	−56.22	−32.52	1.02	0.89	11	1	87 4	
USAEH001	−61.70	15	−87.57	36.17	6 42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	15	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	15	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	15	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	15	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	15	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	15	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	15	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115 20	15	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	–165.80	16	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	–174.80	16	–116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	–93.80	16	–63.96	–30.01	3.86	1.99	48	2	87.4	
ARGNORT5	–54.80	16	–62.85	–29.80	3.24	2.89	47	2	87.4	
B CE311	–63.80	16	–40.60	–6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	–44.80	16	–40.26	–6.06	3.44	2 09	174	2	87.4	8 9/GR9
B CE411	–63.80	16	–50.97	–15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	–44.80	16	–50.71	–15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	–63.80	16	–53.11	–2.98	2.42	2.15	107	2	87 4	8 9/GR7
B NO611	–73.80	16	–59.60	–11.62	2.86	1 69	165	1	87.4	8 9/GR8
B NO711	–73.80	16	–60.70	–1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	–73.80	16	–68.75	–4.71	2 37	1.65	73	1	87.4	8 9/GR8
B SE911	–101.80	16	–45.99	–19.09	2 22	0.79	62	2	87 4	8
B SU111	–80.80	16	–51.10	–25.64	2.76	1.06	50	2	87 4	8 9/GR6
B SU112	–44.80	16	–50.76	–25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	–80.80	16	–44.51	–16.94	3.22	1 37	60	2	87.4	8 9/GR6
B SU212	–44.80	16	–43.99	–16 97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	–137.80	16	–114.10	50.92	7.22	1.11	160	2	87.4	9/GR10
CAN01201	–137.80	16	–114.10	50.92	7.22	1 11	160	2	87.4	9/GR10
CAN01202	–72.30	16	–81.23	50.12	7.99	2.53	5	2	87.4	
CAN01203	–128.80	16	–113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01303	–128.80	16	–113.04	51.04	7.53	1.26	162	2	87.4	9/GR12
CAN01304	–90.80	16	–86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01403	–128.80	16	–113.04	51.04	7.53	1.26	162	2	87 4	9/GR12

17542,70 MHz (16)

1	2	3	4		5		6	7	8	9
CAN01404	– 90.80	16	– 86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01405	– 81.80	16	– 83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01504	– 90.80	16	– 86.57	50.48	8.59	2.54	178	2	87.4	9/GR13
CAN01505	– 81.80	16	– 83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01605	– 81.80	16	– 83.80	50.22	8.35	2.57	2	2	87.4	9/GR14
CAN01606	– 70 30	16	– 80.64	50.02	7.88	2.52	6	2	87.4	
CHLCONT4	– 105.80	16	– 69.59	– 23.20	2.21	0 69	68	2	87.4	9/GR16
CHLCONT6	– 105.80	16	– 73.52	– 55.52	3.65	1 31	39	2	87.4	9/GR16
CRBBAH01	– 92.30	16	– 76.09	24.13	1.83	0.68	141	1	87 4	9/GR18
CRBBER01	– 92 30	16	– 64 76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	– 92.30	16	– 88 61	17.26	0.64	0.64	90	1	87 4	9/GR18
CRBEC001	– 92.30	16	– 60.07	8.26	4.20	0.86	115	1	87 4	9/GR18
CRBJMC01	– 92.30	16	– 79.45	17.97	0.99	0 68	151	1	87.4	9/GR18
CYM00001	– 115.80	16	– 80.58	19.57	0.60	0.60	90	2	87.4	
DOMIFRB2	– 83 30	16	– 70.51	18 79	0.98	0.69	167	2	87 4	
EQAC0001	– 94.80	16	– 78.31	– 1 52	1.48	1 15	65	1	87.4	9/GR19
EQAG0001	– 94.80	16	– 90.36	– 0.57	0.94	0.89	99	1	87.4	9/GR19
GUFMGG02	– 52.80	16	– 56 42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	– 165.80	16	– 109.83	36 82	6.03	1.12	137	2	87.4	9/GR1
HWA00003	– 174.80	16	– 116 10	37 47	5.60	0.76	132	2	87 4	9/GR2
JMC00005	– 33 80	16	– 77.27	18.12	0 60	0.60	90	2	87 4	
LCAIFRB1	– 79.30	16	– 61.15	13 90	0 60	0 60	90	2	87.4	
MEX01NTE	– 77.80	16	– 105 80	25 99	2 88	2.07	155	2	87 4	1
MEX02NTE	– 135 80	16	– 107.36	26 32	3.80	1 57	149	2	87.4	1

MEX02SUR	−126.80	16	−96.39	19.88	3.19	1.87	158	2	87.4	1
PRU00004	−85.80	16	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	16	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	16	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
SLVIFRB2	−107.30	16	−88.91	13.59	0.60	0.60	90	1	87.4	
USAEH001	−61.30	16	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	16	−93.85	36.31	8.26	3.55	171	2	87 4	1 6 9/GR20
USAEH003	−109.80	16	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	16	−96.42	36.21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	16	−109.83	36.82	6.03	1 12	137	2	87.4	9/GR1
USAPSA03	−174.80	16	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	16	−111 01	40.67	4 38	2.15	162	2	87.4	
USAWH102	−156.80	16	−113.01	40 71	3.74	1.79	149	2	87.4	
VEN11VEN	−103 80	16	−66.79	6.90	2.50	1.77	122	2	87.4	

1	2	3	4		5		6	7	8	9
ALS00002	– 166.20	17	– 109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	– 175.20	17	– 116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	– 94.20	17	– 52.98	– 59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	– 55.20	17	– 44.17	– 59.91	3.77	0 70	13	1	87 4	9/GR4
ARGSUR04	– 94.20	17	– 65.04	– 43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	– 55.20	17	– 63.68	– 43.01	2.54	2.38	152	1	87 4	9/GR4
B CE311	– 64 20	17	– 40.60	– 6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	– 45 20	17	– 40.27	– 6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	– 64.20	17	– 50.97	– 15.27	3.86	1.38	49	1	87 4	8 9/GR7
B CE412	– 45.20	17	– 50.71	– 15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	– 64.20	17	– 53.10	– 2.90	2 44	2.13	104	1	87.4	8 9/GR7
B NO611	– 74.20	17	– 59.60	– 11.62	2.85	1.69	165	2	87 4	8 9/GR8
B NO711	– 74.20	17	– 60.70	– 1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	– 74.20	17	– 68.76	– 4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	– 81.20	17	– 51.12	– 25.63	2.76	1.05	50	1	87 4	8 9/GR6
B SU112	– 45.20	17	– 50.75	– 25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	– 81.20	17	– 44.51	– 16.95	3.22	1.36	60	1	87 4	8 9/GR6
B SU212	– 45.20	17	– 44.00	– 16.87	3.20	1.96	58	1	87 4	8 9/GR9
BERBERMU	– 96.20	17	– 64.77	32.32	0.60	0.60	90	2	87 4	
B ERBER02	– 31.00	17	– 64.77	32.32	0.60	0.60	90	1	87 4	2 3
B OLAND01	– 115.20	17	– 71.37	– 4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	– 138.20	17	– 125.63	57.24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	– 138.20	17	– 112.04	55.95	3 35	0.97	151	1	87.4	9/GR10
CAN01202	– 72.70	17	– 107 70	55.63	2.74	1.12	32	1	87.4	

CAN01203	– 129 20	17	– 111 48	55 61	3 08	1.15	151	1	87.4	9/GR12
CAN01303	– 129.20	17	– 102 42	57 12	3 54	0.91	154	1	87.4	9/GR12
CAN01304	– 91 20	17	– 99 12	57 36	1 98	1.72	2	1	87 4	9/GR13
CAN01403	– 129 20	17	– 89 75	52 02	4.68	0 78	148	1	87 4	9/GR12
CAN01404	– 91.20	17	– 84 82	52 42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	– 82 20	17	– 84 00	52 39	2 84	2 29	172	1	87 4	9/GR14
CAN01504	– 91 20	17	– 72 66	53 77	3 57	1.67	156	1	87 4	9/GR13
CAN01505	– 82 20	17	– 71 77	53 79	3 30	1.89	162	1	87 4	9/GR14
CAN01605	– 82 20	17	– 61 50	49 55	2.65	1 40	143	1	87 4	9/GR14
CAN01606	– 70 70	17	– 61 30	49 55	2 40	1.65	148	1	87.4	
CHLCONT5	– 106 20	17	– 72 23	– 35 57	2 60	0 68	55	1	87 4	9/GR17
CHLPAC02	– 106 20	17	– 80 06	– 30 06	1 36	0.68	69	1	87 4	9/GR17
CLMAND01	– 115 20	17	– 71 37	– 4 69	6.49	2 57	87	1	87 4	9/GR5
CLM00001	– 103 20	17	– 74 50	5 87	3.98	1 96	118	1	87.4	
EQACAND1	– 115.20	17	– 71 37	– 4 69	6 49	2 57	87	1	87 4	9/GR5
EQAGAND1	– 115.20	17	– 71 37	– 4.69	6.49	2 57	87	1	87 4	9/GR5
FLKFALKS	– 31 00	17	– 59 90	– 51 64	0 60	0 60	90	1	87 4	2 3
HWA00002	– 166 20	17	– 165 79	23 42	4 20	0 68	160	1	87 4	9/GR1
HWA00003	– 175 20	17	– 166 10	23 42	4 25	0 68	159	1	87 4	9/GR2
JMC00002	– 92.70	17	– 77 30	18 12	0 62	0.62	90	2	87 4	
$8a1	– 78 20	17	– 105 81	26.01	2.89	2.08	155	1	87 4	1
MEX01NTE										
MEX01SUR	– 69 20	17	– 94 84	19 82	3 05	2.09	4	1	87.4	1
MEX02NTE	– 136 20	17	– 107 21	26 31	3 84	1.55	148	1	87 4	1
MEX02SUR	– 127 20	17	– 96.39	19 88	3 18	1.87	157	1	87 4	1

17557,28 MHz (17)

1	2	3	4		5		6	7	8	9
PAQPAC01	−106.20	17	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	17	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115.20	17	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	17	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	17	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SCN00001	−79.70	17	−62.46	17.44	0.60	0.60	90	1	87.4	
SPMFRAN3	−53.20	17	−67.24	47.51	3.16	0.79	7	1	87.4	2 7
SURINAM2	−84.70	17	−55.69	4.35	1.00	0.69	86	1	87.4	
URG00001	−71.70	17	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	17	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	17	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	17	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	17	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	17	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	17	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	17	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	17	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	17	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	–165.80	18	–109 83	36 82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	–174.80	18	–116.10	37 47	5 60	0.76	132	2	87 4	9/GR2
ARGNORT4	–93.80	18	–63.96	–30 01	3.86	1 99	48	2	87.4	
ARGNORT5	–54 80	18	–62 85	–29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	–52.80	18	–66 44	14.87	1 83	0.68	39	2	87.4	
B CE311	–63 80	18	–40.60	–6.07	3.04	2.06	174	2	87 4	8 9/GR7
B CE312	–44 80	18	–40.26	–6.06	3 44	2.09	174	2	87.4	8 9/GR9
B CE411	–63.80	18	–50 97	–15.26	3.86	1 38	49	2	87 4	8 9/GR7
B CE412	–44 80	18	–50.71	–15.30	3 57	1.56	52	2	87.4	8 9/GR9
B CE511	–63 80	18	–53.11	–2 98	2.42	2.15	107	2	87 4	8 9/GR7
B NO611	–73.80	18	–59.60	–11.62	2.86	1 69	165	1	87.4	8 9/GR8
B NO711	–73 80	18	–60 70	–1 78	3 54	1.78	126	1	87 4	8 9/GR8
B NO811	–73 80	18	–68 75	–4 71	2.37	1 65	73	1	87.4	8 9/GR8
B SE911	–101 80	18	–45 99	–19 09	2.22	0 79	62	2	87.4	8
B SU111	–80 80	18	–51 10	–25.64	2 76	1.06	50	2	87 4	8 9/GR6
B SU112	–44.80	18	–50 76	–25 62	2.47	1 48	56	2	87.4	8 9/GR9
B SU211	–80.80	18	–44 51	–16.94	3.22	1 37	60	2	87 4	8 9/GR6
B SU212	–44.80	18	–43 99	–16 97	3.27	1 92	59	2	87.4	8 9/GR9
B LZ00001	–115 80	18	–88.68	17.27	0.62	0 62	90	2	87 4	
CAN01101	–137.80	18	–125.60	57 24	3.45	1.27	157	2	87.4	9/GR10
CAN01201	–137 80	18	–111 92	55 89	3.33	0.98	151	2	87.4	9/GR10
CAN01202	–72.30	18	–107 64	55 62	2 75	1 11	32	2	87 4	
CAN01203	–128 80	18	–111 43	55.56	3.07	1.15	151	2	87.4	9/GR12
CAN01303	–128 80	18	–102.39	57.12	3.54	0 92	154	2	87 4	9/GR12

1	2	3	4		5		6	7	8	9
CAN01304	−90.80	18	−99.00	57.33	1.96	1.73	1	2	87.4	9/GR13
CAN01403	−128.80	18	−89.70	52.02	4.67	0.79	148	2	87.4	9/GR12
CAN01404	−90.80	18	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81 80	18	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	18	−72.68	53.78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	18	−71.76	53.76	3.30	1.89	162	2	87.4	9/GR14
CAN01605	−81.80	18	−61.54	49.50	2.66	1.39	144	2	87.4	9/GR14
CAN01606	−70.30	18	−61.32	49.51	2.41	1.65	148	2	87.4	
CHLCONT4	−105.80	18	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	18	−73.52	−55.52	3.65	1.31	39	2	87 4	9/GR16
CRBBAH01	−92 30	18	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	18	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	18	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	18	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	18	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
CTR00201	−130.80	18	−84.33	9.67	0.82	0.68	119	2	87.4	
DMAIFRB1	−79.30	18	−61.30	15.35	0.60	0.60	90	2	87.4	
EQAC0001	−94.80	18	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	18	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
HWA00002	−165.80	18	−165.79	23.32	4.20	0.68	160	2	87.4	9/GR1
HWA00003	−174 80	18	−166.10	23.42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77 80	18	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	18	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126.80	18	−96.39	19.88	3.19	1.87	158	2	87.4	1

NCG00003	−107.30	18	−84 99	12.90	1.05	1 01	176	1	87.4	
PRU00004	−85 80	18	−74 19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	18	−93.85	36 31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	18	−95.47	36.38	8 10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	18	−87 53	36 18	6.41	3.49	12	2	87 4	1 5 6
USAEH002	−100.80	18	−93 85	36.31	8 26	3.55	171	2	87 4	1 6 9/GR20
USAEH003	−109.80	18	−95.47	36 38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	18	−96 42	36 21	8.20	3 12	165	2	87.4	1 5 6
USAPSA02	−165.80	18	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	18	−116 10	37.47	5 60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	18	−111 01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156 80	18	−113.01	40.71	3 74	1.79	149	2	87 4	
VEN11VEN	−103.80	18	−66.79	6 90	2.50	1 77	122	2	87.4	

1	2	3	4		5		6	7	8	9
ALS00002	−166 20	19	−109.94	36 86	6 04	1.11	137	1	87.4	9/GR1
ALS00003	−175 20	19	−116 23	37.50	5 60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94 20	19	−52 98	−59 81	3 40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55 20	19	−44.17	−59 91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94 20	19	−65.04	−43 33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55 20	19	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64.20	19	−40 60	−6.07	3 04	2 06	174	1	87 4	8 9/GR7
B CE312	−45.20	19	−40 27	−6.06	3.44	2 09	174	1	87.4	8 9/GR9
B CE411	−64.20	19	−50 97	−15.27	3 86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	19	−50 71	−15.30	3 57	1.56	52	1	87.4	8 9/GR9
B CE511	−64 20	19	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74 20	19	−59.60	−11.62	2 85	1.69	165	2	87.4	8 9/GR8
B NO711	−74 20	19	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	19	−68 76	−4.71	2.37	1 65	73	2	87.4	8 9/GR8
B SU111	−81 20	19	−51 12	−25.63	2.76	1 05	50	1	87.4	8 9/GR6
B SU112	−45 20	19	−50 75	−25 62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	19	−44 51	−16 95	3 22	1.36	60	1	87 4	8 9/GR6
B SU212	−45.20	19	−44.00	−16.87	3 20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96 20	19	−64 77	32.32	0 60	0.60	90	2	87.4	
B OLAND01	−115.20	19	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	19	−64.61	−16.71	2 52	2 19	85	1	87.4	
B RB00001	−92 70	19	−59.85	12.93	0.60	0.60	90	2	87 4	
CAN01101	−138 20	19	−125.63	57 24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	−138 20	19	−112.04	55.95	3.35	0.97	151	1	87.4	9/GR10

CAN01202	–72.70	19	–107.70	55.63	2.74	1.12	32	1	87 4	
CAN01203	–129.20	19	–111.48	55.61	3.08	1.15	151	1	87.4	9/GR12
CAN01303	–129.20	19	–102.42	57.12	3.54	0.91	154	1	87.4	9/GR12
CAN01304	–91.20	19	–99.12	57.36	1.98	1.72	2	1	87.4	9/GR13
CAN01403	–129.20	19	–89.75	52.02	4.68	0.78	148	1	87.4	9/GR12
CAN01404	–91.20	19	–84.82	52.42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	–82.20	19	–84.00	52.39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	–91.20	19	–72.66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	–82.20	19	–71.77	53.79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	–82.20	19	–61.50	49.55	2.65	1.40	143	1	87.4	9/GR14
CAN01606	–70.70	19	–61.30	49.55	2.40	1.65	148	1	87 4	
CHLCONT5	–106.20	19	–72.23	–35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	–106.20	19	–80.06	–30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	–115.20	19	–71.37	–4.69	6 49	2.57	87	1	87.4	9/GR5
CLM00001	–103.20	19	–74.50	5.87	3.98	1.96	118	1	87.4	
CUB00001	–89.20	19	–79.81	21.62	2 24	0.68	168	1	87.4	
EQACAND1	–115.20	19	–71.37	–4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	–115.20	19	–71.37	–4.69	6.49	2.57	87	1	87.4	9/GR5
GRD00059	–57.20	19	–61.58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	–53.20	19	–44.89	66.56	2.70	0 82	173	1	87.4	2
GUY00201	–84.70	19	–59.19	4.78	1.44	0.85	95	1	87 4	
HWA00002	–166.20	19	–165.79	23.42	4.20	0.68	160	1	87.4	9/GR1
HWA00003	–175.20	19	–166.10	23.42	4.25	0.68	159	1	87.4	9/GR2
MEX01NTE	–78.20	19	–105.81	26.01	2.89	2.08	155	1	87.4	1

17586,44 MHz (19)

1	2	3	4		5		6	7	8	9
MEX01SUR	−69 20	19	−94.84	19 82	3 05	2 09	4	1	87 4	1
MEX02NTE	−136 20	19	−107 21	26 31	3 84	1 55	148	1	87 4	1
MEX02SUR	−127 20	19	−96 39	19 88	3 18	1 87	157	1	87 4	1
MSR00001	−79 70	19	−61.73	16 75	0.60	0 60	90	1	87.4	4
PAQPAC01	−106 20	19	−109 18	−27 53	0 60	0.60	90	1	87 4	9/GR17
PRG00002	−99 20	19	−58.66	−23 32	1.45	1 04	76	1	87.4	
PRUAND02	−115 20	19	−71.37	−4.69	6.49	2 57	87	1	87.4	9/GR5
PTRVIR01	−101 20	19	−93 94	36 32	8 24	3 56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110 20	19	−95.23	36 29	8.27	3 37	168	1	87 4	1 6 9/GR21
URG00001	−71 70	19	−56 22	−32 52	1 02	0 89	11	1	87.4	
USAEH001	−61 70	19	−87.57	36.17	6 42	3.49	12	1	87.4	1 5 6
USAEH002	−101 20	19	−93 94	36 32	8 24	3 56	171	1	87.4	1 6 9/GR20
USAEH003	−110 20	19	−95 23	36 29	8 27	3 37	168	1	87 4	1 6 9/GR21
USAEH004	−119 20	19	−96 45	36.21	8.20	3 12	165	1	87 4	1 5 6
USAPSA02	−166 20	19	−109.94	36 86	6 04	1.11	137	1	87 4	9/GR1
USAPSA03	−175 20	19	−116 23	37 50	5 60	0 75	132	1	87.4	9/GR2
USAWH101	−148 20	19	−111 02	40 68	4 36	2 15	162	1	87 4	
USAWH102	−157 20	19	−113.07	40.74	3.72	1.78	149	1	87 4	
VENAND03	−115 20	19	−71 37	−4 69	6 49	2.57	87	1	87 4	9/GR5

ALS00002	–165 80	20	–109.83	36 82	6.03	1.12	137	2	87 4	9/GR1
ALS00003	–174.80	20	–116 10	37 47	5 60	0 76	132	2	87 4	9/GR2
ARGNORT4	–93 80	20	–63.96	–30.01	3.86	1.99	48	2	87.4	
ARGNORT5	–54 80	20	–62.85	–29.80	3 24	2.89	47	2	87.4	
B CE311	–63.80	20	–40 60	–6.07	3 04	2.06	174	2	87.4	8 9/GR7
B CE312	–44 80	20	–40 26	–6 06	3 44	2.09	174	2	87.4	8 9/GR9
B CE411	–63.80	20	–50 97	–15.26	3 86	1 38	49	2	87 4	8 9/GR7
B CE412	–44.80	20	–50 71	–15.30	3.57	1 56	52	2	87.4	8 9/GR9
B CE511	–63 80	20	–53 11	–2 98	2 42	2 15	107	2	87.4	8 9/GR7
B NO611	–73 80	20	–59 60	–11 62	2.86	1.69	165	1	87 4	8 9/GR8
B NO711	–73 80	20	–60 70	–1 78	3 54	1 78	126	1	87 4	8 9/GR8
B NO811	–73 80	20	–68 75	–4 71	2.37	1 65	73	1	87 4	8 9/GR8
B SE911	–101.80	20	–45 99	–19 09	2 22	0 79	62	2	87 4	8
B SU111	–80.80	20	–51 10	–25.64	2 76	1 06	50	2	87 4	8 9/GR6
B SU112	–44 80	20	–50 76	–25 62	2 47	1 48	56	2	87.4	8 9/GR9
B SU211	–80.80	20	–44 51	–16 94	3 22	1.37	60	2	87 4	8 9/GR6
B SU212	–44.80	20	–43.99	–16 97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	–137 80	20	–125 60	57 24	3 45	1.27	157	2	87.4	9/GR10
CAN01201	–137.80	20	–111 92	55 89	3 33	0.98	151	2	87.4	9/GR10
CAN01202	–72 30	20	–107.64	55.62	2.75	1 11	32	2	87 4	
CAN01203	–128 80	20	–111 43	55.56	3 07	1 15	151	2	87 4	9/GR12
CAN01303	–128 80	20	–102 39	57 12	3.54	0.92	154	2	87.4	9/GR12
CAN01304	–90 80	20	–99 00	57 33	1.96	1.73	1	2	87.4	9/GR13
CAN01403	–128.80	20	–89.70	52.02	4.67	0.79	148	2	87.4	9/GR12

17601,02 MHz (20)

1	2	3	4		5		6	7	8	9
CAN01404	−90.80	20	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81.80	20	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	20	−72.68	53.78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	20	−71.76	53.76	3.30	1.89	162	2	87.4	9/GR14
CAN01605	−81.80	20	−61.54	49.50	2.66	1.39	144	2	87.4	9/GR14
CAN01606	−70.30	20	−61.32	49.51	2.41	1.65	148	2	87.4	
CHLCONT4	−105 80	20	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	20	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	20	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	20	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	20	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	20	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	20	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
EQAC0001	−94 80	20	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	20	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GRD00003	−79.30	20	−61.62	12.34	0.60	0.60	90	2	87.4	
GTMIFRB2	−107.30	20	−90.50	15.64	1.03	0.74	84	1	87.4	
GUFMGG02	−52.80	20	−56.42	8 47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	20	−165.79	23.32	4.20	0.68	160	2	87.4	9/GR1
HWA00003	−174.80	20	−166.10	23.42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77.80	20	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	20	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126.80	20	−96.39	19.88	3.19	1.87	158	2	87.4	1
PNRIFRB2	−121.00	20	−80.15	8.46	1 01	0.73	170	1	87.4	

PRU00004	– 85 80	20	– 74.19	– 8.39	3.74	2.45	112	2	87.4	
PTRVIR01	– 100 80	20	– 93.85	36.31	8 26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	– 109.80	20	– 95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	– 61.30	20	– 87 53	36.18	6.41	3.49	12	2	87 4	1 5 6
USAEH002	– 100.80	20	– 93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	– 109.80	20	– 95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	– 118.80	20	– 96.42	36.21	8.20	3 12	165	2	87.4	1 5 6
USAPSA02	– 165.80	20	– 109 83	36 82	6.03	1 12	137	2	87 4	9/GR1
USAPSA03	– 174.80	20	– 116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	– 147.80	20	– 111 01	40.67	4 38	2 15	162	2	87.4	
USAWH102	– 156.80	20	– 113.01	40.71	3 74	1 79	149	2	87.4	
VEN02VEN	– 103.80	20	– 66.79	6.90	2 50	1.77	122	2	87 4	9/GR22
VEN11VEN	– 103.80	20	– 66 79	6.90	2.50	1 77	122	2	87.4	9/GR22

1	2	3	4		5		6	7	8	9
ALS00002	−166 20	21	−109 94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	21	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94 20	21	−52.98	−59 81	3.40	0.68	19	1	87 4	9/GR3
ARGINSU5	−55 20	21	−44 17	−59 91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94 20	21	−65.04	−43 33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55 20	21	−63 68	−43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64 20	21	−40.60	−6.07	3 04	2.06	174	1	87.4	8 9/GR7
B CE312	−45 20	21	−40.27	−6 06	3.44	2 09	174	1	87.4	8 9/GR9
B CE411	−64 20	21	−50.97	−15.27	3 86	1 38	49	1	87 4	8 9/GR7
B CE412	−45 20	21	−50 71	−15.30	3.57	1 56	52	1	87.4	8 9/GR9
B CE511	−64 20	21	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74 20	21	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74 20	21	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74 20	21	−68 76	−4 71	2 37	1.65	73	2	87 4	8 9/GR8
B SU111	−81 20	21	−51.12	−25.63	2 76	1.05	50	1	87.4	8 9/GR6
B SU112	−45 20	21	−50 75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81 20	21	−44.51	−16.95	3 22	1.36	60	1	87.4	8 9/GR6
B SU212	−45 20	21	−44.00	−16 87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96 20	21	−64 77	32 32	0.60	0.60	90	2	87.4	
B OLAND01	−115 20	21	−71.37	−4 69	6.49	2 57	87	1	87.4	9/GR5
CAN01101	−138 20	21	−125 63	57 24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	−138 20	21	−112.04	55.95	3 35	0 97	151	1	87 4	9/GR10
CAN01202	−72 70	21	−107.70	55.63	2.74	1.12	32	1	87.4	
CAN01203	−129.20	21	−111 48	55 61	3 08	1.15	151	1	87.4	9/GR12

CAN01303	−129.20	21	−102.42	57 12	3.54	0.91	154	1	87.4	9/GR12
CAN01304	−91.20	21	−99.12	57 36	1.98	1.72	2	1	87.4	9/GR13
CAN01403	−129.20	21	−89.75	52.02	4.68	0 78	148	1	87.4	9/GR12
CAN01404	−91.20	21	−84 82	52.42	3.10	2 05	152	1	87.4	9/GR13
CAN01405	−82 20	21	−84.00	52.39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	−91.20	21	−72 66	53 77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	−82.20	21	−71.77	53 79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	−82.20	21	−61.50	49 55	2.65	1.40	143	1	87.4	9/GR14
CAN01606	−70.70	21	−61.30	49 55	2.40	1.65	148	1	87.4	
CHLCONT5	−106.20	21	−72.23	−35.57	2.60	0.68	55	1	87 4	9/GR17
CHLPAC02	−106.20	21	−80.06	−30 06	1 36	0 68	69	1	87 4	9/GR17
CLMAND01	−115.20	21	−71 37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	21	−74.50	5 87	3 98	1 96	118	1	87.4	
EQACAND1	−115.20	21	−71.37	−4 69	6.49	2 57	87	1	87.4	9/GR5
EQAGAND1	−115.20	21	−71.37	−4.69	6.49	2.57	87	1	87 4	9/GR5
HWA00002	−166.20	21	−165 79	23.42	4 20	0 68	160	1	87 4	9/GR1
HWA00003	−175.20	21	−166 10	23.42	4.25	0 68	159	1	87 4	9/GR2
JMC00002	−92.70	21	−77 30	18.12	0.62	0 62	90	2	87 4	
MEX01NTE	−78 20	21	−105 81	26 01	2.89	2.08	155	1	87 4	1
MEX01SUR	−69 20	21	−94 84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136 20	21	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	21	−96.39	19 88	3 18	1.87	157	1	87.4	1
PAQPAC01	−106 20	21	−109.18	−27.53	0 60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	21	−58.66	−23.32	1 45	1.04	76	1	87.4	

17615,60 MHz (21)

1	2	3	4		5		6	7	8	9
PRUAND02	−115 20	21	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101 20	21	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	21	−95.23	36.29	8.27	3.37	168	1	87 4	1 6 9/GR21
SCN00001	−79.70	21	−62.46	17.44	0.60	0.60	90	1	87.4	
SPMFRAN3	−53.20	21	−67.24	47.51	3.16	0.79	7	1	87 4	2 7
SURINAM2	−84.70	21	−55.69	4 35	1.00	0.69	86	1	87.4	
URG00001	−71.70	21	−56.22	−32 52	1 02	0.89	11	1	87.4	
USAEH001	−61.70	21	−87.57	36.17	6.42	3 49	12	1	87.4	1 5 6
USAEH002	−101 20	21	−93.94	36.32	8.24	3 56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	21	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	21	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	21	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	21	−116.23	37.50	5.60	0 75	132	1	87.4	9/GR2
USAWH101	−148.20	21	−111 02	40.68	4 36	2.15	162	1	87 4	
USAWH102	−157.20	21	−113 07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	21	−71.37	−4.69	6 49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	22	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	22	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93.80	22	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	22	−62.85	−29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	−52.80	22	−66.44	14.87	1.83	0.68	39	2	87.4	
B CE311	−63 80	22	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	22	−40 26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	22	−50.97	−15.26	3.86	1.38	49	2	87 4	8 9/GR7
B CE412	−44.80	22	−50.71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63.80	22	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	22	−59.60	−11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	22	−60.70	−1.78	3.54	1.78	126	1	87 4	8 9/GR8
B NO811	−73.80	22	−68 75	−4.71	2 37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	22	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	22	−51.10	−25.64	2.76	1.06	50	2	87 4	8 9/GR6
B SU112	−44.80	22	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	−80.80	22	−44.51	−16.94	3.22	1.37	60	2	87 4	8 9/GR6
B SU212	−44.80	22	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
B LZ00001	−115.80	22	−88.68	17.27	0.62	0.62	90	2	87.4	
CAN01101	−137.80	22	−125.60	57.24	3.45	1.27	157	2	87.4	9/GR10
CAN01201	−137.80	22	−111.92	55.89	3.33	0.98	151	2	87.4	9/GR10
CAN01202	−72.30	22	−107.64	55 62	2.75	1.11	32	2	87.4	
CAN01203	−128.80	22	−111.43	55.56	3.07	1.15	151	2	87.4	9/GR12
CAN01303	−128.80	22	−102.39	57.12	3.54	0.92	154	2	87.4	9/GR12

17630,18 MHz (22)

1	2	3	4		5		6	7	8	9
CAN01304	−90.80	22	−99.00	57.33	1.96	1 73	1	2	87 4	9/GR13
CAN01403	−128 80	22	−89.70	52.02	4 67	0 79	148	2	87.4	9/GR12
CAN01404	−90 80	22	−84 78	52.41	3 09	2.06	153	2	87.4	9/GR13
CAN01405	−81.80	22	−84 02	52.34	2 82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	22	−72 68	53.78	3.57	1 67	157	2	87.4	9/GR13
CAN01505	−81.80	22	−71.76	53.76	3.30	1 89	162	2	87 4	9/GR14
CAN01605	−81.80	22	−61 54	49.50	2 66	1 39	144	2	87 4	9/GR14
CAN01606	−70.30	22	−61.32	49 51	2 41	1 65	148	2	87 4	
CHLCONT4	−105 80	22	−69.59	−23 20	2 21	0.69	68	2	87 4	9/GR16
CHLCONT6	−105.80	22	−73.52	−55.52	3 65	1 31	39	2	87.4	9/GR16
CRBBAH01	−92 30	22	−76 09	24.13	1 83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	22	−64.76	32.13	0.60	0.60	90	1	87 4	9/GR18
CRBBLZ01	−92 30	22	−88 61	17 26	0.64	0 64	90	1	87 4	9/GR18
CRBEC001	−92 30	22	−60.07	8 26	4 20	0 86	115	1	87.4	9/GR18
CRBJMC01	−92 30	22	−79.45	17 97	0 99	0 68	151	1	87.4	9/GR18
CTR00201	−130.80	22	−84.33	9.67	0.82	0 68	119	2	87.4	
DMAIFRB1	−79.30	22	−61 30	15 35	0.60	0.60	90	2	87.4	
EQAC0001	−94.80	22	−78.31	−1.52	1.48	1.15	65	1	87 4	9/GR19
EQAG0001	−94.80	22	−90.36	−0.57	0 94	0.89	99	1	87.4	9/GR19
HWA00002	−165 80	22	−165.79	23.32	4.20	0 68	160	2	87.4	9/GR1
HWA00003	−174 80	22	−166 10	23.42	4.25	0 68	159	2	87 4	9/GR2
MEX01NTE	−77 80	22	−105.80	25 99	2 88	2.07	155	2	87.4	1
MEX02NTE	−135 80	22	−107 36	26 32	3.80	1.57	149	2	87 4	1
MEX02SUR	−126 80	22	−96.39	19.88	3.19	1 87	158	2	87 4	1

NCG00003	−107 30	22	−84 99	12.90	1 05	1 01	176	1	87.4	
PRU00004	−85.80	22	−74.19	−8 39	3.74	2.45	112	2	87 4	
PTRVIR01	−100.80	22	−93.85	36.31	8 26	3.55	171	2	87 4	1 6 9/GR20
PTRVIR02	−109 80	22	−95.47	36.38	8 10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	22	−87 53	36.18	6.41	3 49	12	2	87 4	1 5 6
USAEH002	−100 80	22	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	22	−95 47	36 38	8.10	3 45	168	2	87.4	1 6 9/GR21
USAEH004	−118 80	22	−96.42	36.21	8.20	3.12	165	2	87 4	1 5 6
USAPSA02	−165.80	22	−109.83	36.82	6.03	1 12	137	2	87 4	9/GR1
USAPSA03	−174.80	22	−116 10	37 47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	22	−111 01	40.67	4 38	2 15	162	2	87 4	
USAWH102	−156 80	22	−113.01	40.71	3 74	1.79	149	2	87.4	
VEN11VEN	−103 80	22	−66 79	6.90	2.50	1.77	122	2	87.4	

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	23	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	23	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	23	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	23	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	23	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	23	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64.20	23	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	23	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	23	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	23	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	23	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	23	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	23	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	23	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	23	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	23	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	23	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	23	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	23	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	23	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	23	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	23	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	23	−125.63	57.24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	−138.20	23	−112.04	55.95	3.35	0.97	151	1	87.4	9/GR10

CAN01202	−72.70	23	−107.70	55.63	2.74	1.12	32	1	87.4	
CAN01203	−129.20	23	−111.48	55.61	3.08	1 15	151	1	87.4	9/GR12
CAN01303	−129.20	23	−102.42	57.12	3.54	0.91	154	1	87.4	9/GR12
CAN01304	−91.20	23	−99.12	57.36	1.98	1.72	2	1	87.4	9/GR13
CAN01403	−129.20	23	−89.75	52.02	4.68	0.78	148	1	87 4	9/GR12
CAN01404	−91.20	23	−84.82	52.42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	−82.20	23	−84.00	52.39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	−91.20	23	−72.66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	−82.20	23	−71.77	53.79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	−82.20	23	−61.50	49.55	2.65	1.40	143	1	87.4	9/GR14
CAN01606	−70.70	23	−61.30	49.55	2.40	1.65	148	1	87.4	
CHLCONT5	−106.20	23	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	23	−80.06	−30.06	1.36	0.68	69	1	87 4	9/GR17
CLMAND01	−115.20	23	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	23	−74.50	5 87	3.98	1.96	118	1	87.4	
CUB00001	−89.20	23	−79.81	21.62	2.24	0.68	168	1	87 4	
EQACAND1	−115.20	23	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	23	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
GRD00059	−57.20	23	−61.58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	−53.20	23	−44.89	66.56	2.70	0.82	173	1	87.4	2
GUY00201	−84.70	23	−59.19	4.78	1.44	0.85	95	1	87.4	
HWA00002	−166 20	23	−165.79	23.42	4.20	0.68	160	1	87.4	9/GR1
HWA00003	−175.20	23	−166.10	23.42	4.25	0.68	159	1	87.4	9/GR2
MEX01NTE	−78.20	23	−105.81	26 01	2.89	2.08	155	1	87.4	1

17644,76 MHz (23)

1	2	3	4		5		6	7	8	9
MEX01SUR	– 69.20	23	– 94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	– 136.20	23	– 107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	– 127 20	23	– 96.39	19.88	3.18	1.87	157	1	87.4	1
MSR00001	– 79.70	23	– 61.73	16.75	0.60	0.60	90	1	87.4	4
PAQPAC01	– 106.20	23	– 109.18	– 27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	– 99.20	23	– 58.66	– 23.32	1.45	1.04	76	1	87.4	
PRUAND02	– 115.20	23	– 71.37	– 4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	– 101.20	23	– 93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	– 110.20	23	– 95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
URG00001	– 71 70	23	– 56.22	– 32.52	1.02	0.89	11	1	87.4	
USAEH001	– 61.70	23	– 87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	– 101.20	23	– 93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	– 110.20	23	– 95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	– 119.20	23	– 96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	– 166.20	23	– 109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	– 175.20	23	– 116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	– 148.20	23	– 111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	– 157.20	23	– 113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	– 115.20	23	– 71.37	– 4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	24	−109.83	36.82	6 03	1.12	137	2	87.4	9/GR1	
ALS00003	−174.80	24	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2	
ARGNORT4	−93.80	24	−63.96	−30.01	3.86	1.99	48	2	87.4		
ARGNORT5	−54.80	24	−62.85	−29.80	3.24	2.89	47	2	87.4		
B CE311	−63.80	24	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7	
B CE312	−44.80	24	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9	
B CE411	−63 80	24	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7	
B CE412	−44.80	24	−50.71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9	
B CE511	−63.80	24	−53.11	−2.98	2.42	2.15	107	2	87 4	8 9/GR7	
B NO611	−73.80	24	−59.60	−11 62	2.86	1.69	165	1	87.4	8 9/GR8	
B NO711	−73.80	24	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8	
B NO811	−73.80	24	−68.75	−4.71	2 37	1.65	73	1	87.4	8 9/GR8	
B SE911	−101.80	24	−45.99	−19.09	2.22	0.79	62	2	87.4	8	
B SU111	−80.80	24	−51.10	−25.64	2.76	1.06	50	2	87.4	8 9/GR6	
B SU112	−44 80	24	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9	
B SU211	−80.80	24	−44.51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6	
B SU212	−44 80	24	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9	
CAN01101	−137.80	24	−125.60	57 24	3.45	1.27	157	2	87.4	9/GR10	
CAN01201	−137.80	24	−111.92	55.89	3.33	0.98	151	2	87.4	9/GR10	
CAN01202	−72.30	24	−107 64	55.62	2.75	1.11	32	2	87.4		
CAN01203	−128.80	24	−111 43	55.56	3.07	1.15	151	2	87.4	9/GR12	
CAN01303	−128 80	24	−102.39	57.12	3 54	0.92	154	2	87.4	9/GR12	
CAN01304	−90.80	24	−99.00	57.33	1.96	1.73	1	2	87.4	9/GR13	
CAN01403	−128.80	24	−89.70	52 02	4.67	0.79	148	2	87.4	9/GR12	

1	2	3	4		5		6	7	8	9
CAN01404	−90 80	24	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81 80	24	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90 80	24	−72.68	53.78	3 57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	24	−71.76	53.76	3.30	1.89	162	2	87.4	9/GR14
CAN01605	−81.80	24	−61.54	49.50	2.66	1.39	144	2	87.4	9/GR14
CAN01606	−70 30	24	−61.32	49.51	2.41	1.65	148	2	87.4	
CHLCONT4	−105 80	24	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	24	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92 30	24	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	24	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	24	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	24	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	24	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
EQAC0001	−94.80	24	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94 80	24	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GRD00003	−79.30	24	−61.62	12.34	0 60	0.60	90	2	87.4	
GTMIFRB2	−107.30	24	−90.50	15.64	1.03	0.74	84	1	87.4	
GUFMGG02	−52.80	24	−56.42	8.47	4 16	0.81	123	2	87.4	2 7
HWA00002	−165.80	24	−165.79	23.32	4 20	0.68	160	2	87.4	9/GR1
HWA00003	−174.80	24	−166.10	23.42	4 25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77.80	24	−105.80	25.99	2 88	2.07	155	2	87.4	1
MEX02NTE	−135.80	24	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126.80	24	−96.39	19.88	3 19	1.87	158	2	87.4	1
PNRIFRB2	−121.00	24	−80.15	8.46	1.01	0.73	170	1	87.4	

PRU00004	−85.80	24	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	24	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	24	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	24	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	24	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	24	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	24	−96.42	36.21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	24	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	24	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	24	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	24	−113.01	40.71	3.74	1.79	149	2	87.4	
VEN02VEN	−103.80	24	−66.79	6.90	2.50	1.77	122	2	87.4	9/GR22
VEN11VEN	−103.80	24	−66.79	6.90	2.50	1.77	122	2	87.4	9/GR22

1	2	3	4		5		6	7	8	9
ALS00002	−166 20	25	−109 94	36.86	6.04	1 11	137	1	87.4	9/GR1
ALS00003	−175 20	25	−116.23	37.50	5 60	0 75	132	1	87.4	9/GR2
ARGINSU4	−94 20	25	−52 98	−59.81	3.40	0 68	19	1	87.4	9/GR3
ARGINSU5	−55 20	25	−44 17	−59 91	3 77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	25	−65 04	−43 33	3 32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55 20	25	−63 68	−43 01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64 20	25	−40 60	−6 07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45 20	25	−40 27	−6 06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64 20	25	−50.97	−15 27	3.86	1 38	49	1	87.4	8 9/GR7
B CE412	−45 20	25	−50 71	−15 30	3 57	1 56	52	1	87 4	8 9/GR9
B CE511	−64 20	25	−53 10	−2 90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74 20	25	−59 60	−11 62	2.85	1.69	165	2	87 4	8 9/GR8
B NO711	−74 20	25	−60 70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74 20	25	−68 76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81 20	25	−51 12	−25 63	2 76	1.05	50	1	87 4	8 9/GR6
B SU112	−45 20	25	−50 75	−25 62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81 20	25	−44 51	−16 95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	25	−44 00	−16.87	3 20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96 20	25	−64 77	32.32	0 60	0.60	90	2	87.4	
B OLAND01	−115 20	25	−71 37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	−138 20	25	−125 63	57 24	3 45	1.27	157	1	87 4	9/GR10
CAN01201	−138 20	25	−112 04	55.95	3 35	0 97	151	1	87.4	9/GR10
CAN01202	−72 70	25	−107 70	55 63	2 74	1.12	32	1	87.4	
CAN01203	−129.20	25	−111 48	55.61	3 08	1.15	151	1	87 4	9/GR12

CAN01303	–129.20	25	–102 42	57 12	3.54	0 91	154	1	87.4	9/GR12
CAN01304	–91.20	25	–99.12	57 36	1.98	1.72	2	1	87 4	9/GR13
CAN01403	–129 20	25	–89 75	52.02	4.68	0.78	148	1	87.4	9/GR12
CAN01404	–91 20	25	–84 82	52.42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	–82.20	25	–84 00	52 39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	–91 20	25	–72 66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	–82.20	25	–71.77	53.79	3.30	1 89	162	1	87.4	9/GR14
CAN01605	–82.20	25	–61 50	49.55	2 65	1.40	143	1	87 4	9/GR14
CAN01606	–70 70	25	–61.30	49.55	2.40	1.65	148	1	87.4	
CHLCONT5	–106.20	25	–72.23	–35 57	2.60	0 68	55	1	87 4	9/GR17
CHLPAC02	–106.20	25	–80.06	–30 06	1.36	0.68	69	1	87 4	9/GR17
CLMAND01	–115.20	25	–71.37	–4.69	6.49	2.57	87	1	87 4	9/GR5
CLM00001	–103.20	25	–74.50	5 87	3 98	1.96	118	1	87.4	
EQACAND1	–115.20	25	–71 37	–4.69	6 49	2.57	87	1	87 4	9/GR5
EQAGAND1	–115 20	25	–71 37	–4 69	6.49	2.57	87	1	87 4	9/GR5
HWA00002	–166.20	25	–165 79	23 42	4.20	0.68	160	1	87.4	9/GR1
HWA00003	–175.20	25	–166.10	23.42	4.25	0.68	159	1	87.4	9/GR2
JMC00002	–92.70	25	–77.30	18.12	0.62	0 62	90	2	87.4	
MEX01NTE	–78 20	25	–105.81	26 01	2.89	2.08	155	1	87.4	1
MEX01SUR	–69.20	25	–94 84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	–136.20	25	–107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	–127.20	25	–96.39	19 88	3.18	1.87	157	1	87.4	1
PAQPAC01	–106 20	25	–109 18	–27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	–99 20	25	–58.66	–23.32	1.45	1.04	76	1	87.4	

17673,92 MHz (25)

1	2	3	4		5		6	7	8	9
PRUAND02	−115.20	25	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	25	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	25	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
SCN00001	−79.70	25	−62.46	17.44	0.60	0.60	90	1	87.4	
SPMFRAN3	−53.20	25	−67.24	47.51	3.16	0.79	7	1	87.4	2 7
SURINAM2	−84.70	25	−55.69	4.35	1.00	0.69	86	1	87.4	
URG00001	−71.70	25	−56.22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	25	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	25	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	25	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	25	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	25	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	25	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	25	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157.20	25	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	25	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	–165.80	26	–109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	–174.80	26	–116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	–93.80	26	–63.96	–30.01	3.86	1.99	48	2	87.4	
ARGNORT5	–54.80	26	–62.85	–29.80	3 24	2.89	47	2	87.4	
ATNBEAM1	–52.80	26	–66.44	14.87	1.83	0 68	39	2	87.4	
B CE311	–63.80	26	–40.60	–6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	–44.80	26	–40.26	–6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	–63.80	26	–50.97	–15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	–44.80	26	–50.71	–15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	–63.80	26	–53.11	–2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	–73.80	26	–59.60	–11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	–73.80	26	–60.70	–1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	–73.80	26	–68.75	–4.71	2.37	1.65	73	1	87 4	8 9/GR8
B SE911	–101.80	26	–45.99	–19.09	2.22	0.79	62	2	87 4	8
B SU111	–80.80	26	–51.10	–25.64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	–44.80	26	–50.76	–25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	–80.80	26	–44.51	–16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	–44.80	26	–43.99	–16.97	3.27	1.92	59	2	87.4	8 9/GR9
B LZ00001	–115.80	26	–88.68	17.27	0.62	0.62	90	2	87.4	
CAN01101	–137.80	26	–125.60	57.24	3.45	1 27	157	2	87.4	9/GR10
CAN01201	–137.80	26	–111.92	55.89	3.33	0 98	151	2	87.4	9/GR10
CAN01202	–72.30	26	–107.64	55.62	2.75	1.11	32	2	87.4	
CAN01203	–128.80	26	–111.43	55.56	3.07	1.15	151	2	87.4	9/GR12
CAN01303	–128.80	26	–102.39	57.12	3.54	0.92	154	2	87.4	9/GR12

1	2	3	4		5		6	7	8	9
CAN01304	−90.80	26	−99.00	57.33	1.96	1.73	1	2	87.4	9/GR13
CAN01403	−128.80	26	−89.70	52.02	4.67	0.79	148	2	87.4	9/GR12
CAN01404	−90.80	26	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81 80	26	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	26	−72.68	53.78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	26	−71.76	53.76	3.30	1.89	162	2	87 4	9/GR14
CAN01605	−81.80	26	−61 54	49.50	2.66	1.39	144	2	87.4	9/GR14
CAN01606	−70 30	26	−61 32	49.51	2.41	1.65	148	2	87 4	
CHLCONT4	−105 80	26	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105 80	26	−73.52	−55.52	3.65	1.31	39	2	87 4	9/GR16
CRBBAH01	−92.30	26	−76.09	24.13	1 83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	26	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92 30	26	−88.61	17.26	0 64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	26	−60 07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92 30	26	−79 45	17.97	0.99	0.68	151	1	87.4	9/GR18
CTR00201	−130 80	26	−84.33	9.67	0.82	0 68	119	2	87.4	
DMAIFRB1	−79 30	26	−61.30	15.35	0.60	0 60	90	2	87.4	
EQAC0001	−94 80	26	−78.31	−1.52	1.48	1 15	65	1	87.4	9/GR19
EQAG0001	−94 80	26	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
HWA00002	−165 80	26	−165.79	23 32	4.20	0.68	160	2	87.4	9/GR1
HWA00003	−174 80	26	−166 10	23 42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77.80	26	−105.80	25 99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135 80	26	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126 80	26	−96.39	19.88	3.19	1.87	158	2	87.4	1

NCG00003	−107.30	26	−84.99	12.90	1.05	1.01	176	1	87.4	
PRU00004	−85.80	26	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	26	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	26	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	26	−87.53	36 18	6.41	3 49	12	2	87.4	1 5 6
USAEH002	−100.80	26	−93.85	36.31	8.26	3.55	171	2	87 4	1 6 9/GR20
USAEH003	−109.80	26	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	26	−96 42	36.21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	26	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	26	−116.10	37.47	5 60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	26	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	26	−113.01	40.71	3.74	1 79	149	2	87.4	
VEN11VEN	−103 80	26	−66.79	6.90	2.50	1.77	122	2	87.4	

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1	2	3	4		5		6	7	8	9
ALS00002	−166.20	27	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	27	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	27	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	27	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	27	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	27	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64.20	27	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	27	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	27	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	27	−50 71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	27	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	27	−59 60	−11.62	2 85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	27	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74 20	27	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	27	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45 20	27	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	27	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	27	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96 20	27	−64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	27	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	27	−64.61	−16.71	2.52	2.19	85	1	87.4	
B RB00001	−92.70	27	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	27	−125.63	57.24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	−138.20	27	−112.04	55.95	3.35	0.97	151	1	87.4	9/GR10

CAN01202	−72.70	27	−107.70	55.63	2.74	1.12	32	1	87.4	
CAN01203	−129.20	27	−111.48	55.61	3.08	1.15	151	1	87.4	9/GR12
CAN01303	−129.20	27	−102.42	57.12	3.54	0.91	154	1	87.4	9/GR12
CAN01304	−91.20	27	−99.12	57.36	1.98	1.72	2	1	87.4	9/GR13
CAN01403	−129.20	27	−89.75	52.02	4.68	0.78	148	1	87.4	9/GR12
CAN01404	−91.20	27	−84.82	52.42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	−82.20	27	−84.00	52.39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	−91.20	27	−72.66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	−82.20	27	−71.77	53.79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	−82.20	27	−61.50	49.55	2.65	1.40	143	1	87.4	9/GR14
CAN01606	−70.70	27	−61.30	49.55	2.40	1.65	148	1	87.4	
CHLCONT5	−106.20	27	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	27	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	27	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	27	−74.50	5.87	3.98	1.96	118	1	87.4	
CUB00001	−89.20	27	−79.81	21.62	2.24	0.68	168	1	87.4	
EQACAND1	−115.20	27	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	27	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
GRD00059	−57.20	27	−61.58	12.29	0.60	0.60	90	1	87.4	
GRLDNK01	−53.20	27	−44.89	66.56	2.70	0.82	173	1	87.4	2
GUY00201	−84.70	27	−59.19	4.78	1.44	0.85	95	1	87.4	
HWA00002	−166.20	27	−165.79	23.42	4.20	0.68	160	1	87.4	9/GR1
HWA00003	−175.20	27	−166.10	23.42	4 25	0.68	159	1	87.4	9/GR2
MEX01NTE	−78.20	27	−105.81	26.01	2.89	2.08	155	1	87.4	1

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1	2	3	4		5		6	7	8	9
MEX01SUR	−69.20	27	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	27	−107.21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	27	−96.39	19.88	3.18	1.87	157	1	87.4	1
MSR00001	−79.70	27	−61.73	16.75	0.60	0.60	90	1	87.4	4
PAQPAC01	−106.20	27	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	27	−58.66	−23.32	1.45	1.04	76	1	87.4	
PRUAND02	−115 20	27	−71.37	−4.69	6.49	2 57	87	1	87.4	9/GR5
PTRVIR01	−101 20	27	−93.94	36.32	8.24	3.56	171	1	87 4	1 6 9/GR20
PTRVIR02	−110.20	27	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
URG00001	−71.70	27	−56 22	−32.52	1.02	0 89	11	1	87 4	
USAEH001	−61 70	27	−87 57	36 17	6 42	3.49	12	1	87 4	1 5 6
USAEH002	−101 20	27	−93.94	36 32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110 20	27	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	27	−96.45	36.21	8.20	3.12	165	1	87.4	1 5 6
USAPSA02	−166.20	27	−109.94	36.86	6.04	1.11	137	1	87 4	9/GR1
USAPSA03	−175 20	27	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148 20	27	−111.02	40.68	4 36	2 15	162	1	87.4	
USAWH102	−157.20	27	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115.20	27	−71.37	−4 69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	28	−109 83	36.82	6 03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	28	−116.10	37.47	5 60	0 76	132	2	87.4	9/GR2
ARGNORT4	−93.80	28	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	28	−62.85	−29 80	3.24	2.89	47	2	87.4	
B CE311	−63.80	28	−40.60	−6 07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	28	−40 26	−6 06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	28	−50.97	−15 26	3.86	1.38	49	2	87 4	8 9/GR7
B CE412	−44.80	28	−50.71	−15.30	3.57	1 56	52	2	87.4	8 9/GR9
B CE511	−63.80	28	−53 11	−2.98	2 42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	28	−59.60	−11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	−73 80	28	−60.70	−1 78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	28	−68 75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	28	−45.99	−19.09	2 22	0 79	62	2	87 4	8
B SU111	−80.80	28	−51 10	−25.64	2 76	1.06	50	2	87 4	8 9/GR6
B SU112	−44 80	28	−50.76	−25 62	2.47	1.48	56	2	87 4	8 9/GR9
B SU211	−80.80	28	−44 51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44 80	28	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	28	−125 60	57 24	3.45	1 27	157	2	87 4	9/GR10
CAN01201	−137 80	28	−111.92	55.89	3.33	0.98	151	2	87.4	9/GR10
CAN01202	−72 30	28	−107 64	55 62	2 75	1 11	32	2	87 4	
CAN01203	−128.80	28	−111 43	55 56	3 07	1.15	151	2	87.4	9/GR12
CAN01303	−128.80	28	−102.39	57.12	3.54	0.92	154	2	87.4	9/GR12
CAN01304	−90 80	28	−99.00	57.33	1.96	1.73	1	2	87.4	9/GR13
CAN01403	−128 80	28	−89 70	52 02	4 67	0 79	148	2	87.4	9/GR12

1	2	3	4		5		6	7	8	9
CAN01404	−90.80	28	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81.80	28	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	28	−72.68	53.78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	28	−71.76	53.76	3.30	1.89	162	2	87.4	9/GR14
CAN01605	−81.80	28	−61.54	49.50	2.66	1.39	144	2	87.4	9/GR14
CAN01606	−70.30	28	−61.32	49.51	2.41	1.65	148	2	87.4	
CHLCONT4	−105.80	28	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	28	−73.52	−55.52	3.65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92.30	28	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	28	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	28	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	28	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	28	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
EQAC0001	−94.80	28	−78.31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	28	−90.36	−0.57	0.94	0.89	99	1	87.4	9/GR19
GRD00003	−79 30	28	−61.62	12.34	0.60	0.60	90	2	87.4	
GTMIFRB2	−107.30	28	−90.50	15.64	1.03	0.74	84	1	87.4	
GUFMGG02	−52.80	28	−56.42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	28	−165.79	23.32	4.20	0.68	160	2	87.4	9/GR1
HWA00003	−174.80	28	−166.10	23.42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77.80	28	−105.80	25.99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	28	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126.80	28	−96.39	19.88	3.19	1.87	158	2	87.4	1
PNRIFRB2	−121.00	28	−80.15	8.46	1.01	0.73	170	1	87.4	

PRU00004	−85.80	28	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	28	−93.85	36 31	8.26	3 55	171	2	87 4	1 6 9/GR20
PTRVIR02	−109.80	28	−95.47	36.38	8.10	3 45	168	2	87.4	1 6 9/GR21
USAEH001	−61 30	28	−87.53	36.18	6.41	3.49	12	2	87 4	1 5 6
USAEH002	−100.80	28	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109 80	28	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	28	−96.42	36 21	8 20	3 12	165	2	87.4	1 5 6
USAPSA02	−165 80	28	−109.83	36.82	6.03	1.12	137	2	87 4	9/GR1
USAPSA03	−174 80	28	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	28	−111.01	40.67	4.38	2 15	162	2	87.4	
USAWH102	−156 80	28	−113.01	40 71	3.74	1 79	149	2	87 4	
VEN02VEN	−103 80	28	−66 79	6 90	2 50	1.77	122	2	87.4	9/GR22
VEN11VEN	−103.80	28	−66.79	6.90	2 50	1 77	122	2	87 4	9/GR22

17732,24 MHz (29)

1	2	3	4		5		6	7	8	9
ALS00002	–166.20	29	–109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	–175.20	29	–116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	–94.20	29	–52.98	–59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	–55.20	29	–44.17	–59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	–94.20	29	–65.04	–43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	–55.20	29	–63.68	–43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	–64.20	29	–40.60	–6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	–45.20	29	–40.27	–6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	–64.20	29	–50.97	–15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	–45.20	29	–50.71	–15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	–64.20	29	–53.10	–2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	–74.20	29	–59.60	–11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	–74.20	29	–60.70	–1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	–74.20	29	–68.76	–4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	–81.20	29	–51.12	–25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	–45.20	29	–50.75	–25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	–81.20	29	–44.51	–16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	–45.20	29	–44.00	–16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	–96.20	29	–64.77	32.32	0.60	0.60	90	2	87.4	
B OLAND01	–115.20	29	–71.37	–4.69	6.49	2.57	87	1	87.4	9/GR5
CAN01101	–138.20	29	–125.63	57.24	3.45	1.27	157	1	87.4	9/GR10
CAN01201	–138.20	29	–112.04	55.95	3.35	0.97	151	1	87.4	9/GR10
CAN01202	–72.70	29	–107.70	55.63	2.74	1.12	32	1	87.4	
CAN01203	–129.20	29	–111.48	55.61	3.08	1.15	151	1	87.4	9/GR12

CAN01303	−129.20	29	−102.42	57.12	3 54	0.91	154	1	87.4	9/GR12
CAN01304	−91.20	29	−99.12	57.36	1.98	1.72	2	1	87.4	9/GR13
CAN01403	−129.20	29	−89.75	52.02	4.68	0.78	148	1	87.4	9/GR12
CAN01404	−91.20	29	−84.82	52.42	3.10	2.05	152	1	87.4	9/GR13
CAN01405	−82.20	29	−84.00	52.39	2.84	2.29	172	1	87.4	9/GR14
CAN01504	−91 20	29	−72.66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	−82.20	29	−71.77	53.79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	−82.20	29	−61.50	49.55	2.65	1.40	143	1	87.4	9/GR14
CAN01606	−70.70	29	−61.30	49.55	2.40	1.65	148	1	87.4	
CHLCONT5	−106.20	29	−72.23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106.20	29	−80.06	−30.06	1.36	0.68	69	1	87.4	9/GR17
CLMAND01	−115.20	29	−71 37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	29	−74.50	5.87	3.98	1.96	118	1	87.4	
EQACAND1	−115.20	29	−71.37	−4.69	6 49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	29	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
HWA00002	−166.20	29	−165.79	23.42	4.20	0.68	160	1	87.4	9/GR1
HWA00003	−175.20	29	−166.10	23.42	4.25	0.68	159	1	87.4	9/GR2
JMC00002	−92.70	29	−77.30	18.12	0.62	0.62	90	2	87.4	
MEX01NTE	−78.20	29	−105.81	26.01	2.89	2.08	155	1	87.4	1
MEX01SUR	−69.20	29	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	29	−107 21	26.31	3.84	1.55	148	1	87.4	1
MEX02SUR	−127.20	29	−96.39	19.88	3.18	1.87	157	1	87.4	1
PAQPAC01	−106.20	29	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	29	−58.66	−23.32	1.45	1.04	76	1	87.4	

17732,24 MHz (29)

1	2	3	4		5		6	7	8	9
PRUAND02	−115.20	29	−71 37	−4.69	6 49	2.57	87	1	87 4	9/GR5
PTRVIR01	−101 20	29	−93 94	36 32	8 24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	29	−95 23	36 29	8 27	3.37	168	1	87 4	1 6 9/GR21
SCN00001	−79 70	29	−62.46	17.44	0 60	0 60	90	1	87.4	
SPMFRAN3	−53 20	29	−67 24	47.51	3.16	0.79	7	1	87 4	2 7
SURINAM2	−84 70	29	−55.69	4 35	1.00	0.69	86	1	87.4	
URG00001	−71.70	29	−56 22	−32 52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	29	−87 57	36 17	6 42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	29	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	29	−95.23	36.29	8.27	3.37	168	1	87 4	1 6 9/GR21
USAEH004	−119 20	29	−96 45	36.21	8.20	3.12	165	1	87 4	1 5 6
USAPSA02	−166 20	29	−109.94	36.86	6.04	1 11	137	1	87.4	9/GR1
USAPSA03	−175.20	29	−116.23	37.50	5.60	0 75	132	1	87.4	9/GR2
USAWH101	−148.20	29	−111 02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157 20	29	−113.07	40.74	3.72	1.78	149	1	87 4	
VENAND03	−115.20	29	−71.37	−4.69	6 49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	30	−109 83	36.82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	30	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93.80	30	−63.96	−30.01	3.86	1.99	48	2	87.4	
ARGNORT5	−54.80	30	−62.85	−29.80	3.24	2.89	47	2	87.4	
ATNBEAM1	−52.80	30	−66.44	14.87	1.83	0.68	39	2	87.4	
B CE311	−63.80	30	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	30	−40.26	−6.06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	30	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44.80	30	−50.71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63.80	30	−53.11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73 80	30	−59.60	−11.62	2.86	1.69	165	1	87 4	8 9/GR8
B NO711	−73.80	30	−60.70	−1.78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	30	−68.75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	30	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	30	−51.10	−25 64	2.76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	30	−50.76	−25.62	2.47	1.48	56	2	87.4	8 9/GR9
B SU211	−80.80	30	−44.51	−16.94	3.22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	30	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
B LZ00001	−115.80	30	−88.68	17.27	0.62	0.62	90	2	87.4	
CAN01101	−137.80	30	−125.60	57.24	3.45	1.27	157	2	87.4	9/GR10
CAN01201	−137.80	30	−111.92	55.89	3.33	0.98	151	2	87.4	9/GR10
CAN01202	−72.30	30	−107 64	55.62	2.75	1.11	32	2	87.4	
CAN01203	−128.80	30	−111.43	55.56	3.07	1.15	151	2	87.4	9/GR12
CAN01303	−128.80	30	−102.39	57 12	3.54	0.92	154	2	87.4	9/GR12

17746,82 MHz (30)

1	2	3	4		5		6	7	8	9
CAN01304	−90.80	30	−99.00	57 33	1.96	1.73	1	2	87 4	9/GR13
CAN01403	−128 80	30	−89.70	52.02	4 67	0.79	148	2	87 4	9/GR12
CAN01404	−90.80	30	−84 78	52 41	3 09	2.06	153	2	87.4	9/GR13
CAN01405	−81.80	30	−84.02	52 34	2 82	2.30	172	2	87.4	9/GR14
CAN01504	−90 80	30	−72.68	53 78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	30	−71.76	53.76	3 30	1 89	162	2	87 4	9/GR14
CAN01605	−81 80	30	−61 54	49.50	2 66	1 39	144	2	87 4	9/GR14
CAN01606	−70.30	30	−61.32	49 51	2.41	1.65	148	2	87.4	
CHLCONT4	−105.80	30	−69.59	−23 20	2.21	0.69	68	2	87 4	9/GR16
CHLCONT6	−105 80	30	−73.52	−55.52	3 65	1.31	39	2	87.4	9/GR16
CRBBAH01	−92 30	30	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92 30	30	−64.76	32.13	0.60	0.60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	30	−88.61	17.26	0 64	0 64	90	1	87.4	9/GR18
CRBEC001	−92.30	30	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92.30	30	−79 45	17.97	0 99	0.68	151	1	87.4	9/GR18
CTR00201	−130.80	30	−84.33	9.67	0.82	0 68	119	2	87.4	
DMAIFRB1	−79.30	30	−61.30	15.35	0 60	0.60	90	2	87.4	
EQAC0001	−94.80	30	−78 31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	30	−90.36	−0.57	0 94	0.89	99	1	87.4	9/GR19
HWA00002	−165.80	30	−165.79	23.32	4.20	0.68	160	2	87.4	9/GR1
HWA00003	−174.80	30	−166.10	23.42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77 80	30	−105.80	25 99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	30	−107.36	26.32	3 80	1.57	149	2	87.4	1
MEX02SUR	−126 80	30	−96 39	19.88	3.19	1.87	158	2	87.4	1

NCG00003	−107.30	30	−84.99	12.90	1.05	1.01	176	1	87.4	
PRU00004	−85.80	30	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	30	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	30	−95 47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	30	−87.53	36 18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	30	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	30	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	30	−96.42	36.21	8.20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	30	−109.83	36.82	6.03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	30	−116.10	37.47	5 60	0.76	132	2	87.4	9/GR2
USAWH101	−147 80	30	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	30	−113.01	40.71	3.74	1.79	149	2	87.4	
VEN11VEN	−103.80	30	−66.79	6.90	2.50	1.77	122	2	87.4	

1	2	3	4		5		6	7	8	9
ALS00002	−166.20	31	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
ALS00003	−175.20	31	−116.23	37.50	5.60	0.75	132	1	87.4	9/GR2
ARGINSU4	−94.20	31	−52.98	−59.81	3.40	0.68	19	1	87.4	9/GR3
ARGINSU5	−55.20	31	−44.17	−59.91	3.77	0.70	13	1	87.4	9/GR4
ARGSUR04	−94.20	31	−65.04	−43.33	3.32	1.50	40	1	87.4	9/GR3
ARGSUR05	−55.20	31	−63.68	−43.01	2.54	2.38	152	1	87.4	9/GR4
B CE311	−64.20	31	−40.60	−6.07	3.04	2.06	174	1	87.4	8 9/GR7
B CE312	−45.20	31	−40.27	−6.06	3.44	2.09	174	1	87.4	8 9/GR9
B CE411	−64.20	31	−50.97	−15.27	3.86	1.38	49	1	87.4	8 9/GR7
B CE412	−45.20	31	−50.71	−15.30	3.57	1.56	52	1	87.4	8 9/GR9
B CE511	−64.20	31	−53.10	−2.90	2.44	2.13	104	1	87.4	8 9/GR7
B NO611	−74.20	31	−59.60	−11.62	2.85	1.69	165	2	87.4	8 9/GR8
B NO711	−74.20	31	−60.70	−1.78	3.54	1.78	126	2	87.4	8 9/GR8
B NO811	−74.20	31	−68.76	−4.71	2.37	1.65	73	2	87.4	8 9/GR8
B SU111	−81.20	31	−51.12	−25.63	2.76	1.05	50	1	87.4	8 9/GR6
B SU112	−45.20	31	−50.75	−25.62	2.47	1.48	56	1	87.4	8 9/GR9
B SU211	−81.20	31	−44.51	−16.95	3.22	1.36	60	1	87.4	8 9/GR6
B SU212	−45.20	31	−44.00	−16.87	3.20	1.96	58	1	87.4	8 9/GR9
BERBERMU	−96.20	31	−64.77	32 32	0.60	0.60	90	2	87.4	
B OLAND01	−115.20	31	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
B OL00001	−87.20	31	−64.61	−16.71	2 52	2.19	85	1	87.4	
B RB00001	−92.70	31	−59.85	12.93	0.60	0.60	90	2	87.4	
CAN01101	−138.20	31	−125.63	57.24	3.45	1 27	157	1	87.4	9/GR10
CAN01201	−138.20	31	−112.04	55.95	3.35	0.97	151	1	87.4	9/GR10

CAN01202	−72 70	31	−107.70	55.63	2.74	1 12	32	1	87.4	
CAN01203	−129.20	31	−111.48	55.61	3.08	1.15	151	1	87.4	9/GR12
CAN01303	−129.20	31	−102.42	57.12	3 54	0 91	154	1	87 4	9/GR12
CAN01304	−91.20	31	−99.12	57.36	1.98	1 72	2	1	87.4	9/GR13
CAN01403	−129.20	31	−89.75	52.02	4.68	0.78	148	1	87 4	9/GR12
CAN01404	−91.20	31	−84.82	52.42	3.10	2 05	152	1	87 4	9/GR13
CAN01405	−82.20	31	−84.00	52.39	2.84	2.29	172	1	87 4	9/GR14
CAN01504	−91.20	31	−72 66	53.77	3.57	1.67	156	1	87.4	9/GR13
CAN01505	−82.20	31	−71 77	53.79	3.30	1.89	162	1	87.4	9/GR14
CAN01605	−82.20	31	−61.50	49.55	2.65	1.40	143	1	87 4	9/GR14
CAN01606	−70.70	31	−61.30	49.55	2.40	1 65	148	1	87.4	
CHLCONT5	−106.20	31	−72 23	−35.57	2.60	0.68	55	1	87.4	9/GR17
CHLPAC02	−106 20	31	−80.06	−30.06	1.36	0.68	69	1	87 4	9/GR17
CLMAND01	−115.20	31	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
CLM00001	−103.20	31	−74.50	5 87	3.98	1 96	118	1	87.4	
CUB00001	−89.20	31	−79 81	21 62	2.24	0.68	168	1	87.4	
EQACAND1	−115.20	31	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
EQAGAND1	−115.20	31	−71.37	−4 69	6.49	2.57	87	1	87.4	9/GR5
GRD00059	−57.20	31	−61.58	12 29	0.60	0.60	90	1	87.4	
GRLDNK01	−53.20	31	−44 89	66.56	2.70	0.82	173	1	87 4	2
GUY00201	−84.70	31	−59 19	4.78	1.44	0.85	95	1	87.4	
HWA00002	−166.20	31	−165.79	23.42	4 20	0.68	160	1	87 4	9/GR1
HWA00003	−175.20	31	−166.10	23 42	4 25	0.68	159	1	87.4	9/GR2
MEX01NTE	−78.20	31	−105.81	26.01	2.89	2.08	155	1	87.4	1

17761,40 MHz (31)

1	2	3	4		5		6	7	8	9
MEX01SUR	−69.20	31	−94.84	19.82	3.05	2.09	4	1	87.4	1
MEX02NTE	−136.20	31	−107.21	26.31	3.84	1 55	148	1	87.4	1
MEX02SUR	−127.20	31	−96.39	19 83	3.18	1.87	157	1	87.4	1
MSR00001	−79 70	31	−61.73	16 75	0.60	0.60	90	1	87.4	4
PAQPAC01	−106 20	31	−109.18	−27.53	0.60	0.60	90	1	87.4	9/GR17
PRG00002	−99.20	31	−58.66	−23 32	1.45	1.04	76	1	87.4	
PRUAND02	−115 20	31	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5
PTRVIR01	−101.20	31	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
PTRVIR02	−110.20	31	−95.23	36.29	8.27	3.37	168	1	87.4	1 6 9/GR21
URG00001	−71.70	31	−56 22	−32.52	1.02	0.89	11	1	87.4	
USAEH001	−61.70	31	−87.57	36.17	6.42	3.49	12	1	87.4	1 5 6
USAEH002	−101.20	31	−93.94	36.32	8.24	3.56	171	1	87.4	1 6 9/GR20
USAEH003	−110.20	31	−95.23	36.29	8.27	3 37	168	1	87.4	1 6 9/GR21
USAEH004	−119.20	31	−96.45	36.21	8.20	3 12	165	1	87.4	1 5 6
USAPSA02	−166 20	31	−109.94	36.86	6.04	1.11	137	1	87.4	9/GR1
USAPSA03	−175.20	31	−116 23	37.50	5.60	0.75	132	1	87.4	9/GR2
USAWH101	−148.20	31	−111.02	40.68	4.36	2.15	162	1	87.4	
USAWH102	−157 20	31	−113.07	40.74	3.72	1.78	149	1	87.4	
VENAND03	−115 20	31	−71.37	−4.69	6.49	2.57	87	1	87.4	9/GR5

ALS00002	−165.80	32	−109.83	36 82	6.03	1.12	137	2	87.4	9/GR1
ALS00003	−174.80	32	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
ARGNORT4	−93.80	32	−63.96	−30.01	3.86	1 99	48	2	87.4	
ARGNORT5	−54.80	32	−62.85	−29.80	3.24	2.89	47	2	87.4	
B CE311	−63.80	32	−40.60	−6.07	3.04	2.06	174	2	87.4	8 9/GR7
B CE312	−44.80	32	−40.26	−6 06	3.44	2.09	174	2	87.4	8 9/GR9
B CE411	−63.80	32	−50.97	−15.26	3.86	1.38	49	2	87.4	8 9/GR7
B CE412	−44.80	32	−50.71	−15.30	3.57	1.56	52	2	87.4	8 9/GR9
B CE511	−63.80	32	−53 11	−2.98	2.42	2.15	107	2	87.4	8 9/GR7
B NO611	−73.80	32	−59.60	−11.62	2.86	1.69	165	1	87.4	8 9/GR8
B NO711	−73.80	32	−60.70	−1 78	3.54	1.78	126	1	87.4	8 9/GR8
B NO811	−73.80	32	−68.75	−4.71	2.37	1.65	73	1	87.4	8 9/GR8
B SE911	−101.80	32	−45.99	−19.09	2.22	0.79	62	2	87.4	8
B SU111	−80.80	32	−51.10	−25.64	2 76	1.06	50	2	87.4	8 9/GR6
B SU112	−44.80	32	−50.76	−25.62	2.47	1.48	56	2	87 4	8 9/GR9
B SU211	−80.80	32	−44.51	−16.94	3 22	1.37	60	2	87.4	8 9/GR6
B SU212	−44.80	32	−43.99	−16.97	3.27	1.92	59	2	87.4	8 9/GR9
CAN01101	−137.80	32	−125.60	57.24	3.45	1.27	157	2	87.4	9/GR10
CAN01201	−137.80	32	−111 92	55.89	3.33	0.98	151	2	87.4	9/GR10
CAN01202	−72.30	32	−107.64	55.62	2.75	1.11	32	2	87.4	
CAN01203	−128.80	32	−111.43	55.56	3.07	1.15	151	2	87.4	9/GR12
CAN01303	−128.80	32	−102.39	57.12	3.54	0.92	154	2	87 4	9/GR12
CAN01304	−90.80	32	−99.00	57.33	1.96	1.73	1	2	87.4	9/GR13
CAN01403	−128.80	32	−89.70	52.02	4.67	0.79	148	2	87.4	9/GR12

17775,98 MHz (32)

1	2	3	4		5		6	7	8	9
CAN01404	−90.80	32	−84.78	52.41	3.09	2.06	153	2	87.4	9/GR13
CAN01405	−81.80	32	−84.02	52.34	2.82	2.30	172	2	87.4	9/GR14
CAN01504	−90.80	32	−72 68	53.78	3.57	1.67	157	2	87.4	9/GR13
CAN01505	−81.80	32	−71.76	53.76	3.30	1.89	162	2	87.4	9/GR14
CAN01605	−81 80	32	−61.54	49.50	2 66	1.39	144	2	87.4	9/GR14
CAN01606	−70.30	32	−61.32	49.51	2.41	1.65	148	2	87.4	
CHLCONT4	−105.80	32	−69.59	−23.20	2.21	0.69	68	2	87.4	9/GR16
CHLCONT6	−105.80	32	−73.52	−55.52	3.65	1 31	39	2	87.4	9/GR16
CRBBAH01	−92.30	32	−76.09	24.13	1.83	0.68	141	1	87.4	9/GR18
CRBBER01	−92.30	32	−64.76	32.13	0.60	0 60	90	1	87.4	9/GR18
CRBBLZ01	−92.30	32	−88.61	17.26	0.64	0.64	90	1	87.4	9/GR18
CRBEC001	−92.30	32	−60.07	8.26	4.20	0.86	115	1	87.4	9/GR18
CRBJMC01	−92 30	32	−79.45	17.97	0.99	0.68	151	1	87.4	9/GR18
EQAC0001	−94.80	32	−78 31	−1.52	1.48	1.15	65	1	87.4	9/GR19
EQAG0001	−94.80	32	−90.36	−0 57	0.94	0.89	99	1	87.4	9/GR19
GRD00003	−79.30	32	−61 62	12.34	0.60	0.60	90	2	87.4	
GTMIFRB2	−107 30	32	−90.50	15 64	1.03	0.74	84	1	87 4	
GUFMGG02	−52.80	32	−56.42	8.47	4.16	0.81	123	2	87.4	2 7
HWA00002	−165.80	32	−165.79	23.32	4 20	0 68	160	2	87 4	9/GR1
HWA00003	−174.80	32	−166.10	23.42	4.25	0.68	159	2	87.4	9/GR2
MEX01NTE	−77.80	32	−105.80	25 99	2.88	2.07	155	2	87.4	1
MEX02NTE	−135.80	32	−107.36	26.32	3.80	1.57	149	2	87.4	1
MEX02SUR	−126 80	32	−96.39	19.88	3.19	1 87	158	2	87.4	1
PNRIFRB2	−121.00	32	−80.15	8 46	1.01	0.73	170	1	87.4	

PRU00004	−85.80	32	−74.19	−8.39	3.74	2.45	112	2	87.4	
PTRVIR01	−100.80	32	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
PTRVIR02	−109.80	32	−95.47	36.38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH001	−61.30	32	−87.53	36.18	6.41	3.49	12	2	87.4	1 5 6
USAEH002	−100.80	32	−93.85	36.31	8.26	3.55	171	2	87.4	1 6 9/GR20
USAEH003	−109.80	32	−95.47	36 38	8.10	3.45	168	2	87.4	1 6 9/GR21
USAEH004	−118.80	32	−96.42	36.21	8 20	3.12	165	2	87.4	1 5 6
USAPSA02	−165.80	32	−109.83	36.82	6 03	1.12	137	2	87.4	9/GR1
USAPSA03	−174.80	32	−116.10	37.47	5.60	0.76	132	2	87.4	9/GR2
USAWH101	−147.80	32	−111.01	40.67	4.38	2.15	162	2	87.4	
USAWH102	−156.80	32	−113.01	40.71	3.74	1.79	149	2	87.4	
VEN02VEN	−103.80	32	−66.79	6 90	2.50	1.77	122	2	87.4	9/GR22
VEN11VEN	−103.80	32	−66.79	6.90	2.50	1.77	122	2	87.4	9/GR22

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ARTICLE 9A

Plan for Feeder Links for the Broadcasting-Satellite Service in the Fixed-Satellite Service in the Frequency Bands 14.5 - 14.8 GHz and 17.3 - 18.1 GHz in Regions 1 and 3

9A.1 COLUMN HEADINGS OF THE PLAN

Col. 1. *Beam identification* (Column 1 contains the symbol designating the country or the geographical area taken from Table B1 of the Preface to the International Frequency List followed by the symbol designating the service area).

Col. 2. *Nominal orbital position*, in degrees and tenths of a degree.

Col. 3. *Channel number* (see Tables 2A and 2B showing channel numbers and corresponding assigned frequencies).

Col. 4. *Boresight geographical coordinates*, in degrees and tenths of a degree.

Col. 5. *Antenna beamwidth.* This column contains two figures corresponding to the major axis and the minor axis respectively of the elliptical cross-section half-power beam, in degrees and hundredths of a degree.

Col. 6. *Orientation of the ellipse* determined as follows: in a plane normal to the beam axis, the direction of a major axis of the ellipse is specified as the angle measured anticlockwise from a line parallel to the equatorial plane to the major axis of the ellipse, to the nearest degree.

Col. 7. *Polarization* (1 = direct, 2 = indirect).

Col. 8. Nominal earth station *e.i.r.p.*, in dBW.

Col. 9. Permitted increase in earth station *e.i.r.p.* in dB for the purpose of power control (see Section 3.11 of Annex 3 to this Appendix).

Col. 10. *Remarks.*

9A.2 TEXT FOR SYMBOLS IN REMARKS COLUMN OF THE PLAN

1. Fast roll-off space station receiving antenna as defined in Annex 3 (Section 3.7.3) of this Appendix.

2. For this assignment the diameter of the earth station antenna is 7 m and the system noise temperature is 3000 K.

3. India may also locate feeder-link earth stations near the point 29 °N, 77.3 °E on the condition that this does not affect the equivalent protection margins of other administrations.

4. In order to improve the up-link margins for channel 23, the satellite receiving antenna will use a shaped beam.

5. This assignment in the Plan is for the period up to 31 December 2001 and during this period Saudi Arabia may use the frequencies 14 516.90 MHz and 14 574.44 MHz instead of channels 01 and 04 respectively.

6. During the 1988 Conference, the Kingdom of Bhutan became the 165th Member of the Union and the Conference decided to provide four assignments for a feeder-link to a space station of the broadcasting-satellite service, which does not yet have any assignments in Appendix **30 (Orb-85)**.

7. This assignment uses feeder-link frequencies which are not a linear translation of the down-link Plan. This results in potential radiation of a coherent unwanted frequency corresponding to the second harmonic of the shift frequency and falling in the frequency band allocated to down-links (11.7 - 12.5 GHz).

Every possible and sufficient technical means shall be adopted in the space station to eliminate such unwanted frequency radiation.

8. This assignment is part of a group, the number of which follows the symbol. The group consists of the beams and has the number of channels assigned to it as indicated in Table 1.

a) The overall equivalent protection margin to be used for the application of Article 4 of this Appendix shall be calculated on the following basis:

– for the calculation of interference to assignments that are part of a group, only the interference contributions from assignments that are not part of the same group are to be included; *and*

– for the calculation of interference from assignments belonging to a group of assignments that are not part of that same group, only the worst interference contribution from that group shall be used on a test point to test point basis.

b) If an administration notifies the same frequency in more than one beam of a group for use at the same time, the overall *C/I* produced by all emissions from that group shall not exceed the *C/I* calculated on the basis of *a)* above.

TABLE 1

Group	Beams in the group		Number of channels assigned to the group
GR1	TKL05800,	TKL05801	2 channels
GR2	NIU05400,	NIU05401	2 channels
GR3	CKH05200,	CKH05201	4 channels
GR4	CKH05300,	CKH05301	4 channels
GR5	REU09700,	REU09701	5 channels
GR6	NCL10000,	NCL10001	4 channels
GR7	MYT09800,	MYT09801	5 channels
GR8	WAL10200,	WAL10201	4 channels
GR9	PLM33700,	PLM33701	5 channels
GR10	CAR33800,	CAR33801	5 channels
GR11	WAK33400,	WAK33401	5 channels
GR12	MRL33300,	MRL33301	5 channels
GR13	SMA33500,	SMA33501	5 channels
GR14	MRA33200,	MRA33201	5 channels
GR15	GUM33100,	GUM33101	5 channels

9. The Federal Republic of Germany and Switzerland have agreed that their feeder-link channels can be interchanged for a limited period of time ending in the year 2001 as follows:

2 with 22, 6 with 26, 10 with 30, 14 with 34, 18 with 38.

PART A

TABLE 2A

Table showing correspondence between channel numbers and assigned frequencies for the feeder links in the frequency band 14.5 - 14.8 GHz

Channel No.	Assigned feeder-link frequency (MHz)
1	14 525.30
2	14 544.48
3	14 563.66
4	14 582.84
5	14 602.02
6	14 621.20
7	14 640.38
8	14 659.56
9	14 678.74
10	14 697.92
11	14 717.10
12	14 736.28
13	14 755.46
14	14 774.64

14 525.30 MHz (01)

1	2	3	4		5		6	7	8	9	10
ARS00300	17.0	01	44.6	23.4	4.21	2.48	145	1	82.0	0.5	
IFB02100	5.0	01	24.5	−28.0	3.13	1.68	27	1	82.0	2.8	
IND04300	56.0	01	77.8	11.1	1.36	1.28	172	2	82.0	10.0	3.
IND04400	68.0	01	79 5	22.3	2.19	1.42	146	2	82.0	6.1	3.
ISR11000	−13.0	01	34.9	31.4	0.94	0.60	117	2	82.0	4.1	
MRC20900	−25.0	01	−8.9	28.9	3.96	1.55	50	1	82.0	0.9	
NMB02500	−19.0	01	17.5	−21.6	2.66	1.90	48	1	82.0	2.0	
YMS26700	11.0	01	48.8	15.2	1.76	1.54	176	1	82.0	2.1	

14 544.48 MHz (02)

CPV30100	−31.0	02	−24.0	16.0	0.86	0.70	144	1	82.0	2.5	
ETH09200	23.0	02	39.7	9.1	3.50	2.40	124	1	82.0	10.0	
IND04500	56.0	02	76.2	19.5	1.58	1.58	21	1	82.0	10.0	3.
IND04800	68.0	02	86.2	25.0	1.56	0.90	120	1	82.0	6.3	3.
MOZ30700	−1.0	02	34.0	−18.0	3.57	1.38	55	1	82.0	3.6	
NIG11900	−19.0	02	7.8	9.4	2.16	2.02	45	2	82.0	2.8	
PAK12700	38.0	02	69.6	29.5	2.30	2.16	14	2	82.0	3.9	
PNG13100	110.0	02	147.7	−6.3	2.50	2.18	169	2	89.0	10.0	
SNG15100	74.0	02	103.8	1.3	0.60	0.60	0	1	82.0	10.0	
STP24100	−13.0	02	7.0	0.8	0.60	0.60	0	1	82.0	10.0	
TGO22600	−25.0	02	0.8	8.6	1.52	0.60	105	1	82.0	5.5	
UGA05100	11.0	02	32.3	1.2	1.46	1.12	60	2	82.0	5.6	

14 563.66 MHz (03)

IND03800	56.0	03	75.9	33.4	1.52	1.08	33	2	82.0	10.0	3.
IND04700	68.0	03	93.3	11.1	1.92	0.60	96	2	82.0	10.0	3.
IR10900	34.0	03	54.2	32.4	3.82	1.82	149	1	82.0	3.3	
YMS26700	11.0	03	48.8	15.2	1.76	1.54	176	1	82.0	2.9	
ZMB31400	−1.0	03	27.5	−13.1	2.38	1.48	39	2	82.0	2.9	

14 582.84 MHz (04)

ARS34000	17.0	04	44.6	23.4	4.21	2.48	145	2	82.0	0.5	
CPV30100	−31.0	04	−24.0	16.0	0.86	0.70	144	1	82.0	2.5	
IND04000	56.0	04	73.0	25.0	1.82	1.48	58	1	82.0	10.0	3.
IND04200	68.0	04	79.3	27.7	2.14	1.16	147	1	82.0	10.0	3.
MOZ30700	−1.0	04	34.0	−18.0	3.57	1.38	55	1	82.0	3.6	
NIG11900	−19.0	04	7.8	9.4	2.16	2.02	45	2	82.0	2.8	
PAK28300	38.0	04	74.7	33.9	1.34	1.13	160	2	82.0	2.8	
PNG27100	128.0	04	148.0	−6.7	2.80	2.05	155	2	89.0	10.0	
STP24100	−13.0	04	7.0	0.8	0.60	0.60	0	1	82.0	10.0	
TGO22600	−25.0	04	0.8	8.6	1.52	0.60	105	1	82.0	5.5	
UGA05100	11.0	04	32.3	1.2	1.46	1.12	60	2	82.0	5.6	

14 602.02 MHz (05)

1	2	3	4		5		6	7	8	9	10
IFB02100	5.0	05	24.5	−28.0	3.13	1.68	27	1	82.0	2.8	
IND03900	56.0	05	72.7	11.2	1.26	0.60	107	2	82.0	10.0	3.
IND04600	68.0	05	84.7	20.5	1.60	0.86	30	2	82.0	10.0	3.
ISR11000	−13.0	05	34.9	31.4	0.94	0.60	117	2	82.0	4.1	
MRC20900	−25.0	05	−8.9	28.9	3.96	1.55	50	1	82.0	0.9	
NMB02500	−19.0	05	17.5	−21.6	2.66	1.90	48	1	82.0	2.0	
YMS26700	11.0	05	48.8	15.2	1.76	1.54	176	1	82.0	2.1	
ZMB31400	−1.0	05	27.5	−13.1	2.38	1.48	39	2	82.0	3.4	

14 621.20 MHz (06)

CPV30100	−31.0	06	−24.0	16.0	0.86	0.70	144	1	82.0	2.5	
ETH09200	23.0	06	39.7	9.1	3.50	2.40	124	1	82.0	10.0	
IND03700	68.0	06	93.0	25.5	1.46	1.13	40	1	82.0	6.4	3.
IND04100	56.0	06	78.4	16.0	2.08	1.38	35	1	82.0	10.0	3.
MOZ30700	−1.0	06	34.0	−18.0	3.57	1.38	55	1	82.0	3.7	
NIG11900	−19.0	06	7.8	9.4	2.16	2.02	45	2	82.0	2.8	
PAK12700	38.0	06	69.6	29.5	2.30	2.16	14	2	82.0	3.9	
PNG13100	110.0	06	147.7	−6.3	2.50	2.18	169	2	89.0	10.0	
SNG15100	74.0	06	103.8	1.3	0.60	0.60	0	1	82.0	10.0	
STP24100	−13.0	06	7.0	0.8	0.60	0.60	0	1	82.0	10.0	
TGO22600	−25.0	06	0.8	8.6	1.52	0.60	105	1	82.0	5.5	
UGA05100	11.0	06	32.3	1.2	1.46	1.12	60	2	82.0	5.6	

14 640.38 MHz (07)

IFB02100	5.0	07	24.5	−28.0	3.13	1.68	27	1	82.0	2.8	
IND04300	56.0	07	77.8	11.1	1.36	1.28	172	2	82.0	10.0	3.
IND04600	68.0	07	84.7	20.5	1.60	0.86	30	2	82.0	10.0	3.
IRN10900	34.0	07	54.2	32.4	3.82	1.82	149	1	82.0	3.3	
MRC20900	−25.0	07	−8.9	28.9	3.96	1.55	50	1	82.0	0.9	
SEN22200	−37.0	07	−14.4	13.8	1.46	1.04	139	1	82.0	5.4	
YMS26700	11.0	07	48.8	15.2	1.76	1.54	176	1	82.0	2.1	
ZMB31400	−1.0	07	27.5	−13.1	2.38	1.48	39	2	82.0	3.4	

14 659.56 MHz (08)

CPV30100	−31.0	08	−24.0	16.0	0.86	0.70	144	1	82.0	2.5	
ETH09200	23.0	08	39.7	9.1	3.50	2.40	124	1	82.0	10.0	
IND04100	56.0	08	78.4	16.0	2.08	1.38	35	1	82.0	10.0	3.
IND04800	68.0	08	86.2	25.0	1.56	0.90	120	1	82.0	10.0	3.
MOZ30700	−1.0	08	34.0	−18.0	3.57	1.38	55	1	82.0	3.3	
NIG11900	−19.0	08	7.8	9.4	2.16	2.02	45	2	82.0	2.8	
PAK28300	38.0	08	74.7	33.9	1.34	1.13	160	2	82.0	2.8	
PNG27100	128.0	08	148.0	−6.7	2.80	2.05	155	2	89.0	10.0	
STP24100	−13.0	08	7.0	0.8	0.60	0.60	0	1	82.0	10.0	
UGA05100	11.0	08	32.3	1.2	1.46	1.12	60	2	82.0	5.6	

14 678.74 MHz (09)

1	2	3	4		5		6	7	8	9	10
IFB02100	5.0	09	24.5	−28.0	3.13	1.68	27	1	82.0	2.8	
IND03800	56.0	09	75.9	33.4	1.52	1.08	33	2	82.0	10.0	3.
IND04400	68.0	09	79.5	22.3	2.19	1.42	146	2	82.0	6.1	3.
ISR11000	−13.0	09	34.9	31.4	0.94	0.60	117	2	82.0	4.1	
MRC20900	−25.0	09	−8.9	28.9	3.96	1.55	50	1	82.0	0.9	
NMB02500	−19.0	09	17.5	−21.6	2.66	1.90	48	1	82.0	2.0	
YMS26700	11.0	09	48.8	15.2	1.76	1.54	176	1	82.0	2.1	
ZMB31400	−1.0	09	27.5	−13.1	2.38	1.48	39	2	82.0	3.4	

14 697.92 MHz (10)

ETH09200	23.0	10	39.7	9.1	3.50	2.40	124	1	82.0	10.0	
IND04200	68.0	10	79.3	27.7	2.14	1.16	147	1	82.0	3.2	3.
IND04500	56.0	10	76.2	19.5	1.5B	1.58	21	1	82.0	10.0	3.
NIG11900	−19.0	10	7.8	9.4	2.16	2.02	45	2	82.0	2.8	
PNG13100	110.0	10	147.7	−6.3	2.50	2.18	169	2	89.0	10.0	
SNG15100	74.0	10	103.8	1.3	0.60	0.60	0	1	82.0	10.0	
TGO22600	−25.0	10	0.8	8.6	1.52	0.60	105	1	82.0	5.5	
UGA05100	11.0	10	32.3	1.2	1.46	1.12	60	2	82.0	5.6	

14 717.10 MHz (11)

IFB02100	5.0	11	24.5	−28.0	3.13	1.68	27	1	82.0	2.8	
IND04700	68.0	11	93.3	11.1	1.92	0.60	96	2	82.0	10.0	3.
IRN10900	34.0	11	54.2	32.4	3.82	1.82	149	1	82.0	3.3	
ISR11000	−13.0	11	34.9	31.4	0.94	0.60	117	2	82.0	4.1	
MRC20900	−25.0	11	−8.9	28.9	3.96	1.55	50	1	82.0	0.9	
SEN22200	−37.0	11	−14.4	13.8	1.46	1.04	139	1	82.0	5.4	
ZMB31400	−1.0	11	27.5	−13.1	2.38	1.48	39	2	82.0	2.9	

14 736.28 MHz (12)

CPV30100	−31 0	12	−24.0	16.0	0.86	0.70	144	1	82.0	2.5	
ETH09200	23.0	12	39.7	9.1	3.50	2.40	124	1	82.0	10.0	
IND04000	56 0	12	73.0	25.0	1.82	1.48	58	1	82.0	10.0	3.
MOZ30700	−1.0	12	34.0	−18.0	3.57	1.38	55	1	82.0	3.3	
PAK21000	38.0	12	72.1	30.8	1.16	0.72	90	2	82 0	3 B	
PNG27100	128.0	12	148.0	−6.7	2.80	2.05	155	2	89.0	10.0	
STP24100	−13.0	12	7.0	0.8	0.60	0 60	0	1	82.0	10.0	

14 755.46 MHz (13)

1	2	3	4		5		6	7	8	9	10
IND03900	56.0	13	72.7	11.2	1.26	0.60	107	2	82.0	10.0	3.
NMB02500	–19.0	13	17.5	–21.6	2.66	1.90	48	1	82.0	2.7	

14 774.64 MHz (14)

IND03700	68.0	14	93.0	25.5	1.46	1.13	40	1	82.0	6.4	3.
PNG13100	110.0	14	147.7	–6.3	2.50	2.18	169	2	89.0	10.0	
SNG15100	74.0	14	103.8	1.3	0.60	0.60	0	1	82.0	10.0	
TGO22600	–25.0	14	0.8	8.6	1.52	0.60	105	1	82.0	5.5	

PART B

TABLE 2B

Table showing correspondence between channel numbers and assigned frequencies for the feeder links in the frequency band 17.3 GHz - 18.1 GHz

Channel No.	Assigned feeder-link frequency (MHz)	Channel No.	Assigned feeder-link frequency (MHz)
1	17 327.48	21	17 711.08
2	17 346.66	22	17 730.26
3	17 365.84	23	17 749.44
4	17 385.02	24	17 768.62
5	17 404.20	25	17 787.80
6	17 423.38	26	17 806.98
7	17 442.56	27	17 826.16
8	17 461.74	28	17 845.34
9	17 480.92	29	17 864.52
10	17 500.10	30	17 883.70
11	17 519.28	31	17 902.88
12	17 538.46	32	17 922.06
13	17 557.64	33	17 941.24
14	17 576.82	34	17 960.42
15	17 596.00	35	17 979.60
16	17 615.18	36	17 998.78
17	17 634.36	37	18 017.96
18	17 653.54	38	18 037.14
19	17 672.72	39	18 056.32
20	17 691.90	40	18 075.50

1	2	3	4		5		6	7	8	9	10
AFG24600	50.0	01	67.0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00500	98.0	01	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
CAR33800	122.0	01	151.1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR10
CAR33801	122.0	01	−157.5	21.0	2.02	0.60	115	2	87.0	2.2	8/GR10
CHN15500	62.0	01	101.9	33.5	5.10	2.80	143	1	84.0	10.0	
CHN16200	92.0	01	108.1	33.7	5.00	4.00	148	1	84.0	8.2	
CHN16300	79.8	01	116.0	39.2	1.20	0.80	132	2	84.0	10.0	
CME30000	−13.0	01	12.7	6.2	2.54	1.68	87	2	84.0	5.4	
E 12900	−31.0	01	−3.1	39.9	2.10	1.14	154	1	84.0	5.9	
F 09300	−19.0	01	2.6	45.9	2.50	0.98	160	2	84.0	0.9	
FJI19300	152.0	01	179.4	−17.9	1.04	0.98	67	2	84.0	10.0	
GUI19200	−37.0	01	−11.0	10.2	1.58	1.04	147	1	85.0	7.6	
IND03900	56.0	01	72.7	11.2	1.26	0.60	107	2	84.0	10.0	3.
INS03500	104.0	01	115.2	−1.7	9.14	3.43	170	2	84.0	10.0	
J 11100	110.0	01	134.5	31.5	3.52	3.30	68	1	87.0	3.7	
LBY28000	−25.0	01	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
MDG23600	29.0	01	46.2	−18.6	2.57	0.80	67	1	84.0	10.0	
NZL05500	158.0	01	172.3	−39.7	2.88	1.56	47	2	84.0	10.0	
PLM33700	170.0	01	−166.3	−0.2	7.97	1.04	72	2	87.0	10.0	8/GR9
PLM33701	170 0	01	−124.8	39.2	4.43	0.73	132	2	87.0	2.2	8/GR9
POL13200	−1.0	01	17.2	51.8	2.00	2.00	0	1	87.0	0.4	
QAT24700	17.0	01	51.1	25.3	0.60	0.60	0	2	84.0	1.5	
SMR31100	−37.0	01	12.5	43.9	0.60	0.60	0	2	83.0	10.0	
SMZ31300	−1.0	01	31.5	−26.5	0.62	0.60	66	2	82.0	4.7	
THA14200	74.0	01	100.7	13.2	2.B2	1.54	106	2	84.0	9.0	
TUR14500	5.0	01	34.3	39.0	3.13	1.38	168	2	84.0	10.0	
TZA22500	11.0	01	34.6	−6.2	2.41	1.72	129	2	84.0	6.5	
URS06400	23.0	01	47.2	40.9	2.00	2.00	0	1	89.0	4.1	2.
URS06702	44.0	01	73.8	41.4	2.00	2.00	0	1	89.0	3.6	2.
WAK33400	140.0	01	152.5	11.7	7.89	3.52	0	1	87.0	3.2	8/GR11
WAK33401	140.0	01	−157.5	21.0	1.63	0.67	131	2	87.0	2.2	8/GR11
YUG14800	−7.0	01	18.6	43.8	2.21	0.92	156	2	85.0	10.0	

ALG25100	−25.0	02	1.5	27.6	3.65	2.94	135	2	84.0	1.6	
ARS27500	17.0	02	44.6	23.4	4.21	2.48	145	1	84.0	1.4	
AUS00800	128.0	02	133.7	−24.4	6.78	5.90	172	1	87.0	4.0	1.
BOT29700	−1.0	02	23.3	−22.2	2.13	1.50	36	1	85.0	2.7	
CHN15400	62.0	02	101.9	33.5	5.10	2.80	143	2	84.0	4.3	
CHN16100	92.0	02	108.1	33.7	5.00	4.00	148	2	84.0	8.2	
CKH05200	158.0	02	−161.0	−19.8	1.02	0.64	132	1	84.0	3.9	8/GR3
CKH05201	158.0	02	172.3	−39.7	2.88	1.56	47	1	84.0	7.7	8/GR3
CLN21900	50.0	02	80.6	7.7	1.18	0.60	106	2	84.0	10.0	
D 08700	−19.0	02	9.6	49.9	1.62	0.72	147	1	84.0	0.2	9.
FNL10300	5.0	02	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
GNB30400	−31.0	02	−15.0	12.0	0.90	0 60	172	1	84.0	7.4	
IND03700	68.0	02	93.0	25.5	1.46	1.13	40	1	84.0	9.0	3.
INS02800	80.2	02	113.6	−1.4	6.73	3.33	160	1	84.0	10.0	
IRL21100	−31.0	02	−8.2	53.2	0.84	0.60	162	2	84.0	3.5	
KOR11200	110.0	02	127.5	36.0	1.24	1.02	168	2	89.0	3.2	
LAO28400	74.0	02	103.7	18.1	2.16	0.78	133	1	84.0	9.6	
MAU24200	29.0	02	59.8	−18.9	1.62	1.24	55	2	84.0	10.0	
MLA22800	86.0	02	114.1	3.9	2.34	1.12	45	2	84.0	10.0	
MLI32700	−37.0	02	−2.0	19.0	2.66	1.26	127	2	87.0	1.5	
MRL33300	146.0	02	153.1	11.5	7.87	3.64	1	2	87.0	3.1	8/GR12
MRL33301	146.0	02	−157.5	21.0	1.63	0.67	131	2	87.0	2.2	8/GR12
NCL10000	140.0	02	166.0	−21.0	1.14	0.72	146	2	84.0	9.1	8/GR6
NCL10001	140.0	02	−177.1	−13.6	1.22	0.60	46	2	84.0	9.6	8/GR6
PAK12700	38.0	02	69.6	29.5	2.30	2.16	14	2	84.0	3.7	
ROU13600	−1.0	02	25.0	45.7	1.38	0.66	155	2	86.0	1.7	
SOM31200	23.0	02	45.0	6.4	3.26	1.54	71	2	84.0	3.7	
TCD14300	−13.0	02	18.1	15.5	3.40	1.72	107	1	84.0	1.4	
WAL10200	140.0	02	−176.8	−14.0	0.74	0.60	29	2	84.0	10.0	8/GR8
WAL10201	140.0	02	166.1	−21.3	1.31	0.82	133	2	84.0	9.6	8/GR8
YEM26600	11.0	02	44.3	15.1	1.14	0.70	109	2	84.0	2.6	
ZAI32300	−19.0	02	21.3	−6.8	2.80	1.52	149	2	84.0	8.0	

1	2	3	4		5		6	7	8	9	10
AFG24500	50.0	03	67.0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00400	98.0	03	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
BEN23300	−19.0	03	2.2	9.5	1.44	0.68	97	1	84.0	7.6	
BRU33000	74.0	03	114.7	4.4	0.60	0.60	0	2	84.0	10.0	
CHN15700	62.0	03	101.9	33.5	5.10	2.80	143	1	84.0	10.0	
CHN16000	92.0	03	108.1	33.7	5.00	4.00	148	1	84.0	8.2	
COM20700	29.0	03	44.1	−12.1	0.76	0.60	149	1	84.0	10.0	
GAB26000	−13.0	03	11.8	−0.6	1.43	1.12	64	2	84.0	10.0	
GMB30200	−37.0	03	−15.1	13.4	0.79	0.60	4	1	83.0	7.6	
GRC10500	5.0	03	24.5	38.0	2.03	1.29	159	2	84.0	10.0	
IND04300	56.0	03	77.8	11.1	1.36	1.28	172	2	84.0	10.0	3.
INS03600	104.0	03	115.2	−1.7	9.14	3.43	170	2	84.0	10.0	
IRN10900	34.0	03	54.2	32.4	3.82	1.82	149	1	84.0	3.1	
J 11100	110.0	03	134.5	31.5	3.52	3.30	68	1	87.0	3.7	
LBN27900	11.0	03	35.8	33.9	0.60	0.60	0	1	84.0	5.2	
LBR24400	−31.0	03	−9.3	6.6	1.22	0.70	133	2	84.0	10.0	
LBY32100	−25.0	03	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
LIE25300	−37.0	03	9.5	47.1	0.60	0.60	0	2	84.0	0.4	
LUX11400	−19.0	03	6.0	49.8	0.68	0.68	0	2	84.0	0.9	
MRA33200	122.0	03	151.1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR14
MRA33201	122.0	03	−157.5	21.0	2.02	0.60	115	2	87.0	2.2	8/GR14
NRU30900	134.0	03	167.0	−0.5	0.60	0.60	0	1	84.0	10.0	
POR13300	−31.0	03	−8.0	39.6	0.92	0.60	112	1	84.0	5.4	
SMA33500	170.0	03	−166.3	−0.2	7.97	1.04	72	1	87.0	10.0	8/GR13
SMA33501	170.0	03	−124.8	39.2	4.43	0.73	132	1	87.0	2.2	8/GR13
SMO05700	158.0	03	−172.3	−13.7	0.60	0.60	0	2	84.0	10.0	
TCH14400	−1.0	03	17.2	51.8	2.00	2.00	0	1	84.0	1.8	
URS06100	23.0	03	24.8	56.7	2.00	2.00	0	1	89.0	4.3	2., 4.
URS07300	44.0	03	58.0	59.0	2.00	2.00	0	2	89.0	3.7	2.
VTN32500	86.0	03	108.0	14.8	3.80	1.90	126	1	84.0	10.0	
VUT12800	140.0	03	168.0	−16.4	1.52	0.68	87	1	84.0	10.0	
YUG14900	−7.0	03	18.6	43.8	2.21	0.92	156	2	84.0	9.5	

ALG25200	−25.0	04	1.5	27 6	3 65	2 94	135	2	84.0	1 5	
AND34100	−37.0	04	1 6	42.5	0.60	0 60	0	1	84.0	0.6	
ARS00300	17 0	04	44 6	23.4	4.21	2 48	145	1	84.0	1 4	
AUS00700	128 0	04	133.6	−24.4	6.75	5.90	172	1	87 0	4 0	1.
AUT01600	−19.0	04	12 2	47.5	1.14	0.63	166	1	84.0	0 7	
BUL02000	−1.0	04	25 0	43.0	2.00	2.00	0	2	84.0	3 3	
CHN15600	62.0	04	101.9	33 5	5.10	2 80	143	2	84 0	10 0	
CHN16100	92.0	04	108 1	33 7	5.00	4 00	148	2	84 0	8 2	
CKH05300	158.0	04	−161 0	−19 8	1.00	0.60	132	1	84.0	3 9	8/GR4
CKH05301	158 0	04	172.3	−39.7	2 88	1 56	47	1	84.0	7.7	8/GR4
EGY02600	−7.0	04	29 7	26.8	2.33	1 72	136	1	86 0	1.5	
G 02700	−31 0	04	−3 5	53.8	1 84	0.72	142	2	84 0	1 4	
IND04800	68.0	04	86.2	25.0	1.56	0 90	120	1	86.0	8.8	3
INS02800	80.2	04	113 6	−1.4	6.73	3 33	160	1	84 0	10.0	
KOR11200	110.0	04	127 5	36 0	1.24	1.02	168	2	89.0	3.6	
LAO28400	74.0	04	103.7	18.1	2.16	0.78	133	1	84.0	10.0	
MAU24300	29 0	04	56.8	−13.9	1.56	1.38	65	2	84.0	10.0	
MLA22800	86.0	04	114.1	3.9	2 34	1 12	45	2	84.0	10.0	
MLI32800	−37.0	04	−7.6	13 2	1.74	1.24	171	2	87 0	5 9	
MLT14700	−13 0	04	14.3	35 9	0.60	0.60	0	2	84.0	10.0	
OCE10100	−160.0	04	−145.0	−16.3	4.34	3.54	4	1	84.0	10.0	
PAK28300	38.0	04	74.7	33.9	1.34	1.13	160	2	84.0	3.7	
RRW31000	11.0	04	30.0	−2 1	0.66	0.60	42	1	84.0	7.0	
S 13800	5.0	04	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
URS06000	23.0	04	37 7	55.8	2.00	2.00	0	2	89.0	2.7	2.
ZAI32200	−19.0	04	22.4	0 0	2.16	1.88	48	2	84.0	10.0	

1	2	3	4		5		6	7	8	9	10
AFG24600	50.0	05	67.0	34.3	1.89	1.19	18	2	84.D	3.4	
AUS00500	98.0	05	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
BTN03100	86.0	05	90.5	27.3	1.13	0.82	0	2	84.0	9.0	6.
CAR33800	122.0	05	151.1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR10
CAR33801	122.0	05	−157.5	21.0	2.02	0.60	115	2	87.0	2.2	8/GR10
CHN15500	62.0	05	101.9	33.5	5.10	2.80	143	1	84.0	10.0	
CHN16200	92.0	05	108.1	33.7	5.00	4.00	148	1	84.0	8.2	
CHN16400	79.8	05	112.2	37.4	1.06	0.76	111	2	84.0	10.0	
CME30000	−13.0	05	12.7	6.2	2.54	1.68	87	2	84.0	5.4	
E 12900	−31.0	05	−3.1	39.9	2.10	1.14	154	1	84.0	3.1	
F 09300	−19.0	05	2.6	45.9	2.50	0.98	160	2	84.0	0.7	
FJI19300	152.0	05	179.4	−17.9	1.04	0.98	67	2	84.0	10.0	
GUI19200	−37.0	05	−11.0	10.2	1.58	1.04	147	1	85.0	6.5	
IND04400	68.0	05	79.5	22.3	2.19	1.42	146	2	84.0	8.6	3.
INS03500	104.0	05	115.2	−1.7	9.14	3.43	170	2	84.0	10.0	
J 11100	110.0	05	134.5	31.5	3.52	3.30	68	1	87.0	3.7	
LBY28000	−25.0	05	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
MDG23600	29.0	05	46.2	−18.6	2.57	0.80	67	1	84.0	10.0	
NZL05500	158.0	05	172.3	−39.7	2.88	1.56	47	2	84.0	10.0	
PLM33700	170.0	05	−166.3	−0.2	7.97	1.04	72	2	87.0	10.0	8/GR9
PLM33701	170.0	05	−124.8	39.2	4.43	0.73	132	2	87.0	2.2	8/GR9
POL13200	−1.0	05	17.2	51.8	2.00	2.00	0	1	87.0	0.2	
QAT24700	17.0	05	51.1	25.3	0.60	0.60	0	2	84.0	1.5	
SMR31100	−37.0	05	12.5	43.9	0.60	0.60	0	2	83.0	8.8	
SWZ31300	−1.0	05	31.5	−26.5	0.62	0.60	66	2	82.0	4.7	
THA14200	74.0	05	100.7	13.2	2.82	1.54	106	2	84.0	8.9	
TUR14500	5.0	05	34.3	39.0	3.13	1.38	168	2	84.0	10.0	
TZA22500	11.0	05	34.6	−6.2	2.41	1.72	129	2	84.0	6.1	
URS06400	23.0	05	47.2	40.9	2.00	2.00	0	1	89.0	4.1	2.
URS06700	44.0	05	37.7	55.8	2.00	2.00	0	2	89.0	2.0	2.
WAK33400	140.0	05	152.5	11.7	7.89	3.52	0	1	87.0	3.2	8/GR11
WAK33401	140.0	05	−157.5	21.0	1.63	0.67	131	2	87.0	2.2	8/GR11
YUG14800	−7.0	05	18.6	43.8	2.21	0.92	156	2	85.0	9.3	

ALG25100	−25.0	06	1.5	27 6	3.65	2.94	135	2	84.0	1.6	
ARS27500	17.0	06	44 6	23.4	4.21	.2 48	145	1	84.0	1.4	
AUS00800	128.0	06	133 7	−24 4	6.78	5 90	172	1	87.0	4 0	1
BOT29700	−1.0	06	23.3	−22.2	2.13	1.50	36	1	85.0	2.7	
CHN15400	62.0	06	101.9	33 5	5.10	2.80	143	2	84 0	10 0	
CHN16100	92.0	06	108 1	33.7	5 00	4 00	148	2	84 0	8 2	
CKH05200	158 0	06	−161 0	−19.8	1 02	0.64	132	1	84.0	3.9	8/GR3
CKH05201	158.0	06	172.3	−39.7	2.88	1.56	47	1	84 0	7.7	8/GR3
CLN21900	50.0	06	80.6	7.7	1 18	0 60	106	2	84.0	10.0	
D 08700	−19.0	06	9 6	49.9	1.62	0 72	147	1	84.0	0.5	9
FNL10300	5 0	06	17.0	61 5	2.00	1.00	10	1	84 0	4.2	
GNB30400	−31 0	06	−15.0	12 0	0.90	0.60	172	1	84.0	7 4	
IND04500	56.0	06	76 2	19.5	1 58	1.58	21	1	84 0	8 0	3
INS02800	80 2	06	113.6	−1 4	6.73	3.33	160	1	84.0	10 0	
IRL21100	−31 0	06	−8.2	53.2	0.84	0 60	162	2	84 0	3.9	
KOR11200	110.0	06	127.5	36.0	1.24	1.02	168	2	89.0	3.6	
LAO28400	74.0	06	103.7	18.1	2 16	0.78	133	1	84 0	10.0	
MAU24200	29 0	06	59.8	−18 9	1.62	1.24	55	2	84.0	10 0	
MLA22800	86.0	06	114 1	3.9	2 34	1 12	45	2	84.0	10.0	
MLI32700	−37.0	06	−2.0	19.0	2.66	1 26	127	2	87 0	1 5	
MRL33300	146.0	06	153.1	11.5	7.87	3.64	1	2	87.0	3.1	8/GR12
MRL33301	146 0	06	−157.5	21.0	1.63	0 67	131	2	87 0	2.2	8/GR12
NCL10000	140.0	06	166 0	−21.0	1 14	0.72	146	2	84.0	9.1	8/GR6
NCL10001	140 0	06	−177 1	−13.6	1.22	0.60	46	2	84 0	9.6	8/GR6
PAK12700	38 0	06	69.6	29.5	2 30	2.16	14	2	84 0	3.7	
ROU13600	−1.0	06	25.0	45.7	1.38	0.66	155	2	86.0	1 7	
SOM31200	23.0	06	45 0	6.4	3.26	1.54	71	2	84 0	3.7	
TCD14300	−13.0	06	18 1	15 5	3.40	1 72	107	1	84 0	1.4	
WAL10200	140.0	06	−176.8	−14.0	0 74	0 60	29	2	84.0	10 0	8/GR8
WAL10201	140.0	06	166.1	−21.3	1 31	0 82	133	2	84 0	9 6	8/GR8
YEM26600	11 0	06	44 3	15 1	1.14	0 70	109	2	84.0	2 6	
ZAI32300	−19.0	06	21 3	−6.8	2.80	1 52	149	2	84.0	8 0	

1	2	3	4		5		6	7	8	9	10
AFG24500	50.0	07	67.0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00400	98.0	07	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
BEN23300	−19.0	07	2.2	9.5	1.44	0.68	97	1	84.0	7.6	
BRU33000	74.0	07	114.7	4.4	0.60	0.60	0	2	84.0	10.0	
CHN15700	62 0	07	101.9	33.5	5.10	2.80	143	1	84.0	10.0	
CHN16000	92.0	07	108.1	33.7	5.00	4.00	148	1	84.0	8.2	
COM20700	29.0	07	44.1	−12.1	0.76	0.60	149	1	84.0	10.0	
GAB26000	−13.0	07	11.8	−0.6	1.43	1.12	64	2	84.0	10.0	
GMB30200	−37.0	07	−15.1	13.4	0.79	0.60	4	1	83.0	7.6	
GRC10500	5.0	07	24.5	38.0	2.03	1.29	159	2	84.0	10.0	
IND04700	68.0	07	93.3	11.1	1.92	0.60	96	2	84.0	10.0	3.
INS03600	104.0	07	115.2	−1.7	9.14	3.43	170	2	84.0	10.0	
IRN10900	34.0	07	54.2	32.4	3.82	1.82	149	1	84.0	3.1	
J 11100	110.0	07	134.5	31.5	3.52	3.30	68	1	87.0	3.7	
LBN27900	11 0	07	35.8	33.9	0.60	0.60	0	1	84.0	5.2	
LBR24400	−31.0	07	−9.3	6.6	1.22	0.70	133	2	84.0	10.0	
LBY32100	−25.0	07	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
LIE25300	−37.0	07	9.5	47.1	0.60	0.60	0	2	84.0	0.4	
LUX11400	−19.0	07	6.0	49.8	0.68	0.68	0	2	84.0	0.9	
MRA33200	122.0	07	151.1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR14
MRA33201	122.0	07	−157.5	21.0	2.02	0.60	115	2	87.0	2.2	8/GR14
NRU30900	134.0	07	167.0	−0.5	0.60	0.60	0	1	84.0	10.0	
POR13300	−31.0	07	−8.0	39.6	0.92	0.60	112	1	84.0	5.4	
SMA33500	170.0	07	−166.3	−0.2	7.97	1.04	72	1	87.0	10.0	8/GR13
SMA33501	170.0	07	−124.8	39.2	4.43	0.73	132	1	87.0	2.2	8/GR13
SMO05700	158.0	07	−172.3	−13.7	0.60	0.60	0	2	84.0	10.0	
TCH14400	−1.0	07	17.2	51.8	2.00	2.00	0	1	84.0	1.8	
URS06100	23.0	07	24.8	56.7	2.00	2.00	0	1	89.0	4.3	2., 4.
URS07200	44.0	07	58.0	59.0	2.00	2.00	0	2	89.0	3.7	2.
VTN32500	86.0	07	108.0	14.8	3.80	1.90	126	1	84.0	10.0	
VUT12800	140.0	07	168.0	−16.4	1.52	0.68	87	1	84.0	10.0	
YUG14900	−7.0	07	18.6	43.8	2.21	0.92	156	2	84.0	9.5	

ALG25200	−25.0	08	1.5	27.6	3.65	2.94	135	2	84.0	1.5	
AND34100	−37.0	08	1.6	42.5	0.60	0.60	0	1	84.0	0.6	
ARS00300	17.0	08	44.6	23.4	4.21	2.48	145	1	84.0	1.4	
AUS00700	128.0	0B	133.6	−24.4	6.75	5.90	172	1	87.0	4.0	1.
AUT01600	−19.0	08	12.2	47.5	1.14	0.63	166	1	84.0	0.7	
BUL02000	−1.0	08	25.0	43.0	2.00	2.00	0	2	84.0	3.3	
CHN15600	62.0	08	101.9	33.5	5.10	2.80	143	2	84.0	10.0	
CHN17300	92.0	08	115.7	27.4	1.14	0.94	99	2	84.0	9 3	
CKH05300	158.0	08	−161.0	−19.8	1.00	0.60	132	1	84.0	3.9	8/GR4
CKH05301	158.0	08	172.3	−39.7	2.88	1.56	47	1	84.0	7.7	8/GR4
EGY02600	−7.0	08	29.7	26.8	2.33	1.72	136	1	86.0	1.5	
G 02700	−31.0	08	−3 5	53.8	1.84	0.72	142	2	84.0	1.4	
IND04000	56.0	08	73.0	25.0	1.82	1.48	58	1	84.0	4.7	3.
INS02800	80.2	08	113.6	−1.4	6.73	3.33	160	1	84.0	10.0	
KDR11200	110.0	08	127.5	36.0	1.24	1.02	168	2	89.0	3.6	
LAO28400	74.0	08	103.7	18.1	2.16	0.78	133	1	84.0	10.0	
MAU24300	29.0	08	56.8	−13.9	1.56	1.38	65	2	84.0	10.0	
MLA22800	86.0	08	114.1	3.9	2.34	1.12	45	2	84.0	10.0	
MLI32800	−37.0	08	−7.6	13.2	1.74	1.24	171	2	87.0	5.9	
MLT14700	−13.0	08	14.3	35.9	0.60	0.60	0	2	84.0	10.0	
OCE10100	−160.0	08	−145.0	−16.3	4.34	3.54	4	1	84.0	10.0	
PAK28300	38.0	08	74.7	33.9	1.34	1.13	160	2	84.0	3.7	
RRW31000	11.0	08	30.0	−2.1	0.66	0.60	42	1	84.0	7 0	
S 13800	5.0	08	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
URS06000	23.0	08	37.7	55.8	2.00	2.00	0	2	89.0	2.7	2.
ZAI32200	−19.0	08	22.4	0.0	2.16	1.88	48	2	84.0	10.0	

1	2	3	4		5		6	7	8	9	10
AFG24600	50 0	09	67 0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00500	98 0	09	130 5	– 24.3	6.22	4.71	51	1	87 0	4.6	1.
BTN03100	86 0	09	90.5	27.3	1.13	0 82	0	2	84.0	8.9	6.
CAR33800	122 0	09	151 1	11 6	6 48	3.49	179	2	87.0	3 9	8/GR10
CAR33801	122 0	09	– 157 5	21 0	2 02	0.60	115	2	87.0	2.2	8/GR10
CHN15500	62 0	09	101 9	33.5	5 10	2.80	143	1	84 0	10 0	
CHN16200	92 0	09	108.1	33 7	5.00	4.00	148	1	84.0	8.2	
CHN16500	79 8	09	111 4	41.8	1.58	1.20	15	2	84.0	3.9	
CME30000	– 13 0	09	12 7	6.2	2 54	1.68	87	2	84.0	5.4	
E 12900	– 31 0	09	– 3 1	39 9	2 10	1 14	154	1	84 0	3.1	
F 09300	– 19 0	09	2 6	45 9	2 50	0 98	160	2	84.0	0.7	
FJI19300	152 0	09	179 4	– 17.9	1 04	0.98	67	2	84.0	10.0	
GUI19200	– 37 0	09	– 11 0	10 2	1 58	1 04	147	1	85 0	6 5	
IND03900	56 0	09	72 7	11 2	1 26	0.60	107	2	84 0	10.0	3
INS03500	104 0	09	115 2	– 1.7	9.14	3 43	170	2	84 0	10 0	
J 11100	110 0	09	134 5	31 5	3.52	3 30	68	1	87.0	3 7	
LBY28000	– 25 0	09	17.5	26 3	3.68	1.84	130	1	84 0	1 5	
MDG23600	29 0	09	46 2	– 18 6	2 57	0.80	67	1	84.0	10.0	
NZL05500	158 0	09	172 3	– 39.7	2.88	1.56	47	2	84 0	10.0	
PLM33700	170 0	09	– 166 3	– 0.2	7 97	1 04	72	2	87 0	10.0	8/GR9
PLM33701	170 0	09	– 124 8	39 2	4.43	0.73	132	2	87 0	2.2	8/GR9
POL13200	– 1 0	09	17 2	51 8	2.00	2.00	0	1	87 0	0 2	
QAT24700	17 0	09	51 1	25 3	0.60	0 60	0	2	84 0	1.5	
SMR31100	– 37 0	09	12.5	43 9	0.60	0 60	0	2	83 0	8 8	
SWZ31300	– 1 0	09	31 5	– 26 5	0.62	0 60	66	2	82 0	4 7	
THA14200	74.0	09	100 7	13.2	2.B2	1 54	106	2	84 0	8 9	
TUR14500	5 0	09	34 3	39 0	3.13	1.38	168	2	84.0	10 0	
TZA22500	11 0	09	34 6	– 6.2	2 41	1 72	129	2	84 0	6 1	
URS06400	23 0	09	47 2	40 9	2.00	2.00	0	1	89.0	4.1	2.
URS06700	44.0	09	37.7	55.8	2.00	2 00	0	2	89 0	2.0	2
WAK33400	140 0	09	152 5	11.7	7 89	3.52	0	1	87 0	3 2	8/GR11
WAK33401	140 0	09	– 157 5	21 0	1.63	0.67	131	2	87.0	2 2	8/GR11
YUG14800	– 7 0	09	18 6	43 8	2.21	0.92	156	2	85 0	9 3	

ALG25100	-25.0	10	1.5	27.6	3.65	2.94	135	2	84.0	1.6	
ARS27500	17 0	10	44.6	23.4	4.21	2.48	145	1	84.0	1.4	
AUS00800	128 0	10	133 7	-24 4	6 78	5 90	172	1	87.0	4.0	1.
BOT29700	-1.0	10	23 3	-22.2	2.13	1.50	36	1	85.0	2.7	
CHN15400	62.0	10	101 9	33.5	5.10	2.80	143	2	84.0	4.7	
CHN17100	92.0	10	117.2	32.0	1.20	0.74	126	2	84.0	10.0	
CHN18700	79 8	10	106.6	26.7	1.14	0.94	179	1	84.0	9.3	
CKH05200	158 0	10	-161.D	-19.8	1.02	0.64	132	1	84.0	3.9	8/GR3
CKH05201	158 0	10	172.3	-39.7	2.88	1.56	47	1	84.0	7.7	8/GR3
CLN21900	50.0	10	80.6	7.7	1.18	0.60	106	2	84.0	10 0	
D 08700	-19.0	10	9.6	49.9	1.62	0 72	147	1	84.0	0.5	9.
FNL10300	5.0	10	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
GNB30400	-31 0	10	-15.0	12.0	0.90	0.60	172	1	84.0	7.4	
IND03700	68.0	10	93 0	25.5	1.46	1.13	40	1	84.0	9.7	3.
IRL21100	-31.0	10	-8.2	53.2	0.84	0.60	162	2	84 0	3.9	
KOR11200	110 0	10	127.5	36.0	1.24	1.02	168	2	89.0	3.6	
LAO28400	74.0	10	103.7	18.1	2.16	0.78	133	1	84.0	10.0	
MAU24200	29.0	10	59.8	-18 9	1.62	1.24	55	2	84.0	10.0	
MLI32700	-37.0	10	-2.0	19.0	2.66	1.26	127	2	87.0	1.5	
MRL33300	146.0	10	153.1	11.5	7.87	3.64	1	2	87.0	3.1	8/GR12
MMRL33301	146.0	10	-157.5	21.0	1.63	0.67	131	2	87.0	2.2	8/GR12
NCL10000	140.0	10	166.0	-21.0	1.14	0.72	146	2	84.0	9.1	8/GR6
NCL10001	140.0	10	-177.1	-13.6	1.22	0.60	46	2	84.0	9.6	8/GR6
PAK12700	38.0	10	69.6	29.5	2.30	2.16	14	2	84.0	3.7	
ROU13600	-1.0	10	25.0	45.7	1.38	0.66	155	2	86.0	1.7	
SOM31200	23.0	10	45.0	6.4	3.26	1.54	71	2	84.0	3.7	
TCD14300	-13.0	10	18.1	15.5	3.40	1.72	107	1	84.0	1.4	
WAL10200	140.0	10	-176.8	-14 0	0.74	0.60	29	2	84.0	10.0	8/GR8
WAL10201	140 0	10	166.1	-21.3	1.31	0.82	133	2	84.0	9.6	8/GR8
YEM26600	11.0	10	44.3	15.1	1.14	0.70	109	2	84.0	2.6	
ZAI32300	-19.0	10	21 3	-6.8	2.80	1.52	149	2	84.0	8.0	

1	2	3	4		5		6	7	8	9	10
AFG24500	50.0	11	67 0	34.3	1.89	1.19	18	2	86		
AUS00400	98.0	11	130 5	– 24.3	6.22	4.71	51	1	87.0	4.6	1.
BEN23300	– 19.0	11	2.2	9.5	1.44	0.68	97	1	84.0	7.6	
CHN15700	62 0	11	101.9	33.5	5.10	2.80	143	1	84.0	10.0	
CHN16000	92.0	11	108.1	33.7	5.00	4.00	148	1	84.0	8.2	
COM20700	29.0	11	44.1	– 12.1	0.76	0.60	149	1	84.0	10.0	
GAB26000	– 13.0	11	11.8	– 0.6	1.43	1.12	64	2	84.0	10.0	
GMB30200	– 37.0	11	– 15.1	13 4	0.79	0.60	4	1	83.0	7.6	
GRC10500	5 0	11	24.5	38.0	2.03	1.29	159	2	84.0	10.0	
IND04300	56.0	11	77.8	11.1	1.36	1 28	172	2	84.0	10.0	3.
INS03600	104.0	11	115.2	– 1.7	9.14	3.43	170	2	84.0	10.0	
IRN10900	34.0	11	54.2	32.4	3.82	1.82	149	1	84.0	3.1	
J 11100	110.0	11	134.5	31.5	3.52	3.30	68	1	87.0	3.7	
LBN27900	11.0	11	35.8	33.9	0.60	0.60	0	1	84.0	5.2	
LBR24400	– 31 0	11	– 9.3	6.6	1.22	0.70	133	2	84.0	10.0	
LBY32100	– 25 0	11	17.5	26 3	3.68	1.84	130	1	84.0	1.5	
LIE25300	– 37 0	11	9.5	47 1	0.60	0 60	0	2	84 0	0.4	
LUX11400	– 19 0	11	6.0	49.8	0 68	0 68	0	2	84 0	0.9	
MRA33200	122.0	11	151 1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR14
MRA33201	122 0	11	– 157 5	21 0	2 02	0.60	115	2	87.0	2 2	8/GR14
NRU30900	134 0	11	167 0	– 0 5	0.60	0.60	0	1	84.0	10.0	
POR13300	– 31 0	11	– 8.0	39.6	0.92	0 60	112	1	84.0	5 4	
SMA33500	170 0	11	– 166 3	– 0.2	7.97	1.04	72	1	87.0	10.0	8/GR13
SMA33501	170 0	11	– 124.8	39.2	4.43	0.73	132	1	87 0	2 2	8/GR13
SMO05700	158 0	11	– 172.3	– 13.7	0.60	0.60	0	2	84.0	10 0	
TCH14400	– 1 0	11	17.2	51.8	2.00	2.00	0	1	84.0	1.8	
URS06101	23.0	11	29.5	51.4	2 00	2 00	0	1	89.0	3.9	2
VTN32500	86.0	11	108.0	14.8	3.80.	1.90	126	1	84.0	10.0	
VUT12800	140 0	11	168.0	– 16.4	1.52	0.68	87	1	84.0	10.0	
YUG14900	– 7 0	11	18.6	43.8	2.21	0.92	156	2	84.0	9 5	

ALG25200	−25.0	12	1.5	27.6	3 65	2.94	135	2	84.0	1.5	
AND34100	−37.0	12	1 6	42.5	0 60	0.60	0	1	84.0	0.6	
ARS00300	17 0	12	44 6	23.4	4.21	2.48	145	1	84 0	1.4	
AUS00700	128.0	12	133.6	−24.4	6.75	5 90	172	1	87.0	4.0	1.
AUT01600	−19.0	12	12.2	47.5	1.14	0.63	166	1	84.0	0 7	
BGD22000	74 0	12	90.3	23.6	1.46	0 84	135	1	84.0	8.7	
BUL02000	−1 0	1Z	25.0	43.0	2.00	2.00	0	2	84 0	3.3	
CHN15600	62.0	1Z	101.9	33.5	5 10	2.80	143	2	84 0	10.0	
CHN17000	92 0	12	119 5	33.0	1.34	0.64	155	2	84.0	10.0	
CHN17800	79.8	12	111.5	27.4	1.22	0.86	130	1	84 0	9 6	
CKH05300	158.0	12	−161.0	−19.8	1.00	0 60	132	1	84.0	3.9	8/GR4
CKH05301	158.0	12	172.3	−39.7	2.88	1.56	47	1	84.0	7.7	8/GR4
DNK08900	5.0	12	17 0	61.5	2.00	1.00	10	1	84.0	4.2	
EGY02600	−7.0	12	29.7	26.8	2.33	1 72	136	1	86.0	1 5	
G 02700	−31.0	12	−3.5	53.8	1.84	0.72	142	2	84.0	1 4	
IND04800	68 0	12	86.2	25 0	1 56	0.90	120	1	86 0	8.8	3.
KOR11200	110.0	12	127.5	36.0	1.24	1.02	168	2	89 0	3.4	
MAU24300	29 0	12	56 8	−13.9	1.56	1.38	65	2	84.0	10 0	
MLD30600	44.0	12	73.1	6.0	0.96	0.60	90	1	84.0	10.0	
MLI32800	−37.0	12	−7.6	13.2	1.74	1.24	171	2	87.0	5.9	
MLT14700	−13.0	12	14.3	35.9	0.60	0.60	0	2	84.0	10.0	
OCE10100	−160.0	12	−145.0	−16.3	4.34	3.54	4	1	84.0	10.0	
PAK21000	38.0	12	72.1	30.8	1.16	0.72	90	2	84.0	5.0	
RRW31000	11.0	12	30.0	−2.1	0.66	0.60	42	1	84.0	7.0	
URS06000	23.0	12	37.7	55.8	2.00	2.00	0	2	89.0	2.7	2.
URS06900	44.0	12	64.B	38.3	2.00	2.00	0	2	89.0	3.7	2.
ZAI32200	−19.0	12	22.4	0.0	2.16	1 88	48	2	84 0	10 0	

1	2	3	4		5		6	7	8	9	10
AFG24600	50 0	13	67 0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00500	98 0	13	130.5	−24.3	6.22	4.71	51	1	87 0	4.6	1
BTN03100	86.0	13	90.5	27.3	1.13	0.82	0	2	84 0	8 9	6
CAR33800	122.0	13	151.1	11 6	6.48	3 49	179	2	87.0	3.9	8/GR10
CAR33801	122.0	13	−157.5	21.0	2.02	0 60	115	2	87.0	2.2	8/GR10
CHN15501	62.0	13	88.3	31.5	3.38	1.45	162	1	84.0	3 3	
CHN18000	92.0	13	113 1	23.1	4 70	3.50	96	1	84.0	10 0	
CME30000	−13.0	13	12 7	6.2	2 54	1 68	87	2	84.0	5 4	
E 12900	−31.0	13	−3.1	39.9	2 10	1.14	154	1	84.0	3.1	
F 09300	−19.0	13	2 6	45.9	2 50	0.98	160	2	84.0	0 7	
GUI19200	−37.0	13	−11 0	10.2	1 58	1 04	147	1	85.0	6.5	
IND04400	68 0	13	79 5	22 3	2 19	1.42	146	2	84.0	8 6	3
INS03500	104 0	13	115 2	−1.7	9.14	3.43	170	2	84.0	10.0	
J 11100	110 0	13	134 5	31 5	3.52	3.30	68	1	87.0	3 7	
LBY28000	−25 0	13	17.5	26 3	3.68	1.84	130	1	84.0	1 5	
MDG23600	29 0	13	46.2	−18 6	2.57	0.80	67	1	84.0	10 0	
NZL05500	158.0	13	172 3	−39 7	2.88	1.56	47	2	84.0	1 6	
NZL28700	128 0	13	173 0	−41 0	3.30	1 28	48	2	84 0	10.0	
PLM33700	170.0	13	−166.3	−0.2	7.97	1.04	72	2	87.0	10.0	8/GR9
PLM33701	170.0	13	−124.8	39.2	4.43	0 73	132	2	87.0	2.2	8/GR9
POL13200	−1 0	13	17.2	51.8	2.00	2.00	0	1	87.0	0.2	
QAT24700	17 0	13	51 1	25.3	0 60	0 60	0	2	84 0	1.5	
SMR31100	−37.0	13	12 5	43.9	0.60	0 60	0	2	83.0	8.8	
SWZ31300	−1.0	13	31 5	−26.5	0.62	0 60	66	2	82 0	4.7	
THA14200	74 0	13	100 7	13.2	2.82	1 54	106	2	84 0	10.0	
TUR14500	5 0	13	34 3	39 0	3.13	1.38	168	2	84.0	10.0	
TZA22500	11.0	13	34 6	−6.2	2.41	1 72	129	2	84 0	6.1	
URS06400	23 0	13	47 2	40.9	2.00	2.00	0	1	89.0	4.1	2.
URS06701	44 0	13	58.0	59.0	2.00	2 00	0	1	89.0	3.7	2.
WAK33400	140.0	13	152.5	11.7	7.89	3.52	0	1	87.0	3.2	8/GR11
WAK33401	140 0	13	−157.5	21.0	1.63	0.67	131	2	87.0	2.2	8/GR11
YUG14800	−7 0	13	18.6	43.8	2.21	0.92	156	2	85.0	9.3	

ALG25100	– 25 0	14	1 5	27.6	3 65	2.94	135	2	84 0	1 6	
ARS27500	17 0	14	44 6	23.4	4.21	2 48	145	1	84 0	1 4	
AUS00800	128 0	14	133 7	– 24.4	6 78	5.90	172	1	87.0	4.0	1.
BGD22000	74.0	14	90 3	23 6	1 46	0 84	135	1	84 0	8 7	
BOT29700	– 1.0	14	23 3	– 22 2	2 13	1 50	36	1	85 0	2.7	
CHN15401	62 0	14	83.9	40 5	2.75	2.05	177	2	84.0	3 4	
CHN17200	92 0	14	120 4	29.1	0.96	0.84	123	2	84 0	10.0	
CHN18100	79 8	14	108.5	23 8	1 41	1 08	153	1	84 0	10 0	
CKH05200	158 0	14	– 161 0	– 19 8	1 02	0 64	132	1	84.0	2.2	8/GR3
CKH05201	158.0	14	172 3	– 39.7	2.88	1.56	47	1	84 0	1 6	8/GR3
CLN21900	50.0	14	80.6	7 7	1 18	0 60	106	2	84 0	10 0	
D 08700	– 19 0	14	9 6	49 9	1 62	0 72	147	1	84 0	0.5	9
GNB30400	– 31 0	14	– 15 0	12.0	0.90	0 60	172	1	84.0	7 4	
IND04500	56.0	14	76.2	19 5	1 58	1 58	21	1	84 0	8 0	3.
IRL21100	– 31 0	14	– 8 2	53.2	0 84	0.60	162	2	84 0	3 9	
KRE28600	110 0	14	127.0	39 1	1.30	1 10	31	2	87.0	3 2	
MAU24200	29 0	14	59 8	– 18 9	1 62	1.24	55	2	84 0	10 0	
MLI32700	– 37.0	14	– 2 0	19 0	2.66	1 26	127	2	87.0	1.5	
MRL33300	146 0	14	153 1	11 5	7.87	3 64	1	2	87 0	3 4	8/GR12
MRL33301	146.0	14	– 157 5	21 0	1 63	0.67	131	2	87.0	2 2	8/GR12
NCL10000	140 0	14	166.0	– 21 0	1 14	0 72	146	2	84.0	9 6	8/GR6
NCL10001	140.0	14	– 177 1	– 13 6	1.22	0 60	46	2	84 0	10.0	8/GR6
NOR12000	5.0	14	17 0	61 5	2.00	1.00	10	1	84.0	4 2	
PAK21000	38.0	14	72 1	30.8	1 16	0.72	90	2	84.0	5.5	
ROU13600	– 1.0	14	25 0	45.7	1 38	0.66	155	2	86 0	1.7	
SOM31200	23 0	14	45.0	6.4	3.26	1 54	71	2	84.0	3.7	
TCD14300	– 13 0	14	18.1	15 5	3.40	1.72	107	1	84.0	1.4	
WAL10200	140 0	14	– 176 8	– 14.0	0.74	0 60	29	2	84 0	9 6	8/GR8
WAL10201	140.0	14	166 1	– 21 3	1 31	0 82	133	2	84.0	9.1	8/GR8
YEM26600	11 0	14	44 3	15 1	1.14	0 70	109	2	84.0	2.6	
ZAI32300	– 19 0	14	21 3	– 6 8	2.80	1.52	149	2	84 0	8 0	

1	2	3	4		5		6	7	8	9	10
AFG24500	50.0	15	67.0	34.3	1.89	1.19	18	2	84.0	3.4	
AUS00400	98.0	15	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
BEN23300	−19.0	15	2.2	9.5	1.44	0.68	97	1	84.0	7.6	
CHN15800	79.8	15	106.0	32.5	5.00	3.70	150	2	84.0	3.6	
CHN17400	92.0	15	118.1	25.9	1.02	0.84	82	1	84.0	10.0	
COM20700	29.0	15	44.1	−12.1	0.76	0.60	149	1	84.0	10.0	
GAB26000	−13 0	15	11.8	−0.6	1.43	1.12	64	2	84.0	10.0	
GMB30200	−37.0	15	−15.1	13.4	0.79	0.60	4	1	83.0	7.6	
GRC10500	5.0	15	24.5	38.0	2.03	1.29	159	2	84.0	10.0	
IND04700	68.0	15	93.3	11.1	1.92	0.60	96	2	84.0	10.0	3.
INS03600	104.0	15	115.2	−1.7	9.14	3.43	170	2	84.0	10.0	
IRN10900	34.0	15	54.2	32.4	3.82	1.82	149	1	84.0	3.1	
J 11100	110 0	15	134.5	31.5	3.52	3.30	68	1	87.0	3.2	
LBN27900	11 0	15	35.8	33.9	0.60	0.60	0	1	84.0	5.2	
LBR24400	−31 0	15	−9.3	6.6	1.22	0.70	133	2	84.0	10.0	
LBY32100	−25 0	15	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
LIE25300	−37 0	15	9.5	47.1	0.60	0.60	0	2	84.0	0.4	
LUX11400	−19.0	15	6.0	49.8	0.68	0.68	0	2	84.0	0.9	
MRA33200	122.0	15	151.1	11.6	6.48	3.49	179	2	87.0	3.9	8/GR14
MRA33201	122.0	15	−157.5	21.0	2.02	0.60	115	2	87.0	2.2	8/GR14
NRU30900	134.0	15	167.0	−0.5	0.60	0.60	0	1	84.0	10.0	
POR13300	−31.0	15	−8.0	39.6	0.92	0.60	112	1	84.0	5.4	
SMA33500	170.0	15	−166.3	−0.2	7.97	1.04	72	1	87.0	10.0	8/GR13
SMA33501	170.0	15	−124.8	39.2	4.43	0.73	132	1	87.0	2.2	8/GR13
SMO05700	158.0	15	−172.3	−13.7	0.60	0.60	0	2	84 0	10.0	
TCH14400	−1.0	15	17.2	51.8	2.00	2.00	0	1	84.0	1.8	
URS06100	23 0	15	24.8	56.7	2.00	2.00	0	1	89.0	4.3	2., 4.
VTN32500	86 0	15	108.0	14.8	3.80	1.90	126	1	84.0	10.0	
VUT12800	140 0	15	168.0	−16.4	1.52	0.68	87	1	84.0	10.0	
YUG14900	−7.0	15	18.6	43.8	2.21	0.92	156	2	84.0	9.5	

ALG25200	−25.0	16	1.5	27.6	3.65	2.94	135	2	84.0	1.5	
AND34100	−37.0	16	1 6	42.5	0.60	0.60	0	1	84.0	0.6	
ARS00300	17.0	16	44.6	23.4	4.21	2.48	145	1	84.0	1.4	
AUS00700	128.0	16	133.6	−24.4	6.75	5.90	172	1	87.0	4.0	1.
AUT01600	−19.0	16	12.2	47.5	1.14	0.63	166	1	84.0	0.7	
BUL02000	−1.0	16	25.0	43.0	2.00	2.00	0	2	84.0	3.3	
CHN16900	92.0	16	118.5	36.4	1.16	0.76	11	2	84.0	10.0	
CHN18600	62.0	16	102.5	30.2	1.91	1.23	147	1	84.0	10.0	
CKH05300	158.0	16	−161.0	−19.8	1.00	0.60	132	1	84.0	2.2	8/GR4
CKH05301	158.0	16	172.3	−39.7	2.88	1.56	47	1	84.0	10.0	8/GR4
DNK08900	5.0	16	17.0	61.5	2.00	1.00	10	1	84 0	4.2	
EGY02600	−7.0	16	29.7	26.8	2.33	1 72	136	1	86 0	1.5	
G 02700	−31.0	16	−3.5	53.8	1.84	0.72	142	2	84.0	1.4	
IND04000	56.0	16	73.0	25.0	1.82	1.48	58	1	84.0	4.7	3
KRE28600	110.0	16	127 0	39 1	1.30	1.10	31	2	87.0	3.2	
MAU24300	29.0	16	56.8	−13.9	1.56	1.38	65	2	84.0	10.0	
MLA22700	86.0	16	102.1	4.1	1.62	0.82	135	2	84.0	10.0	
MLD30600	44.0	16	73.1	6.0	0.96	0.60	90	1	84.0	10 0	
MLI32800	−37.0	16	−7.6	13.2	1.74	1.24	171	2	87.0	5.9	
MLT14700	−13.0	16	14 3	35.9	0.60	0.60	0	2	84.0	10.0	
OCE10100	−160.0	16	−145.0	−16.3	4.34	3.54	4	1	84.0	10.0	
PHL28500	98.0	16	121.3	11.1	3.46	1.76	99	2	84.0	10.0	
RRW31000	11.0	16	30.0	−2.1	0.66	0.60	42	1	84.0	7.0	
URS06000	23.0	16	37.7	55.8	2 00	2.00	0	2	89.0	2.7	2.
URS06900	44 0	16	64.8	38.3	2.00	2.00	0	2	89.0	3.7	2
ZAI32200	−19.0	16	22.4	0.0	2.16	1.88	48	2	84.0	10.0	

1	2	3	4		5		6	7	8	9	10
AUS00500	98.0	17	130.5	−24.3	6.22	4.71	51	1	87.0	4.8	1
BRM29800	74.0	17	97.1	19.1	3.58	1.48	104	2	84.0	9.6	
BTN03100	86.0	17	90.5	27.3	1.13	0.82	0	2	84.0	8.9	6.
CAR33800	122.0	17	151.1	11.6	6.48	3.49	179	2	87.0	9.6	8/GR10
CAR33801	122.0	17	−157.5	21.0	2.02	0 60	115	2	87.0	10 0	8/GR10
CHN16700	92.0	17	124.3	43.7	1 98	0.72	156	1	84.0	7.9	
CHN18200	79.8	17	108.7	35.1	1.42	0.88	109	2	84 0	10.0	
CME30000	−13.0	17	12.7	6 2	2.54	1.68	87	2	84.0	5.4	
E 12900	−31.0	17	−3.1	39.9	2.10	1.14	154	1	84.0	3.1	
F 09300	−19.0	17	2.6	45.9	2.50	0.98	160	2	84.0	0.7	
GUI19200	−37.0	17	−11.0	10.2	1.58	1.04	147	1	85.0	6.5	
IND04600	68.0	17	84.7	20.5	1.60	0.86	30	2	84.0	10.0	3.
INS03200	80.2	17	113.6	−1.4	6.73	3.33	160	1	84.0	10.0	
LBY28000	−25.0	17	17 5	26.3	3.68	1.84	130	1	84.0	1.5	
MDG23600	29.0	17	46 2	−18.6	2.57	0.80	67	1	84.0	10 0	
NPL12200	50.0	17	83 7	28.3	1.72	0 60	163	1	84.0	10.0	
NZL28700	128.0	17	173.0	−41.0	3.30	1 28	48	2	84.0	10.0	
PLM33700	170.0	17	−166.3	−0.2	7.97	1.04	72	2	87.0	9.6	8/GR9
PLM33701	170.0	17	−124.8	39.2	4.43	0 73	132	2	87.0	10.0	8/GR9
POL13200	−1.0	17	17.2	51.8	2.00	2.00	0	1	87.0	0.2	
QAT24700	17.0	17	51.1	25.3	0.60	0.60	0	2	84.0	1 5	
SMR31100	−37.0	17	12.5	43.9	0.60	0.60	0	2	83.0	8.8	
SWZ31300	−1.0	17	31 5	−26.5	0.62	0.60	66	2	82.0	4.7	
TUR14500	5.0	17	34.3	39.0	3.13	1.38	168	2	84 0	10.0	
TZA22500	11.0	17	34.6	−6.2	2.41	1.72	129	2	84.0	6 1	
URS06400	23.0	17	47.2	40.9	2.00	2.00	0	1	89.0	4.1	2.
WAK33400	140.0	17	152.5	11.7	7 89	3.52	0	1	87.0	9.6	8/GR11
WAK33401	140.0	17	−157.5	21.0	1.63	0.67	131	2	87.0	5.7	8/GR11
YUG14800	−7.0	17	18 6	43.8	2.21	0.92	156	2	85 0	9.3	

ALG25100	−25.0	18	1.5	27.6	3.65	2.94	135	2	84.0	1.6	
ARS27500	17.0	18	44 6	23.4	4.21	2.48	145	1	84.0	1.4	
AUS00800	128.0	18	133.7	−24.4	6.78	5.90	172	1	87.0	4.1	1.
BGD22000	74.0	18	90 3	23 6	1.46	0.84	135	1	84.0	6.5	
BOT29700	−1 0	18	23.3	−22.2	2.13	1.50	36	1	85.0	2.7	
CBG29900	68.0	18	105.0	12.7	1.01	0.90	110	2	84.0	10.0	
CHN15900	79.8	18	106.0	32.5	5.00	3.70	150	1	84 0	3.6	
CHN18500	62.0	18	95.7	35.4	2.10	1.14	156	2	84.0	10.0	
D 08700	−19.0	18	9.6	49.9	1.62	0.72	147	1	84.0	0.5	9.
GNB30400	−31.0	18	−15.0	12.0	0.90	0.60	172	1	84.0	7 4	
IND04100	56.0	18	78.4	16.0	2 08	1.38	35	1	84.0	10.0	3.
INS03000	80.2	18	113.6	−1.4	6.73	3.33	160	2	84.0	10.0	
IRL21100	−31.0	18	−8.2	53.2	0.84	0.60	162	2	84 0	3.9	
KRE28600	110.0	18	127.0	39.1	1.30	1.10	31	2	87.0	2.0	
MAU24200	29.0	18	59.8	−18.9	1.62	1.24	55	2	84.0	10.0	
MLA22700	86.0	18	102.1	4.1	1 62	0 82	135	2	84.0	10.0	
MLI32700	−37.0	18	−2.0	19.0	2.66	1.26	127	2	87.0	1.5	
MRL33300	146.0	18	153.1	11.5	7.87	3.64	1	2	87.0	9.6	8/GR12
MRL33301	146.0	18	−157.5	21.0	1.63	0.67	131	2	87.0	6.9	8/GR12
NOR12000	5.0	18	17.0	61 5	2.00	1 00	10	1	84.0	4 2	
PAK281Q0	38.0	18	65.2	27.9	1.52	1.42	28	2	84.0	5.2	
PHL28500	98.0	18	121.3	11.1	3.46	1.76	99	2	84.0	10.0	
ROU13600	−1.0	18	25.0	45.7	1.38	0.66	155	2	86.0	1 7	
SOM31200	23.0	18	45.0	6.4	3.26	1.54	71	2	84.0	3 7	
TCD14300	−13.0	18	18 1	15.5	3.40	1.72	107	1	84.0	1 4	
URS07000	44.0	18	73.8	41.4	2.00	2.00	0	1	89.0	2 8	2.
YEM26600	11.0	18	44.3	15.1	1.14	0 70	109	2	84.0	2.6	
ZAI32300	−19.0	18	21.3	−6.8	2.80	1.52	149	2	84.0	8.0	

1	2	3	4		5		6	7	8	9	10
AUS00400	98.0	19	130.5	−24.3	6.22	4.71	51	1	87.0	4.6	1.
BEN23300	−19.0	19	2.2	9.5	1.44	0.68	97	1	84.0	7 6	
BRM29800	74 0	19	97.1	19.1	3.58	1.48	104	2	84.0	9 6	
CHN15800	79.8	19	106 0	32.5	5.00	3.70	150	2	84 0	3.6	
CHN17900	92 0	19	112.2	21.9	1 84	1.22	37	1	84.0	10.0	
GAB26000	−13.0	19	11.8	−0.6	1.43	1.12	64	2	84.0	10.0	
GMB30200	−37.0	19	−15.1	13.4	0.79	0.60	4	1	83.0	7.6	
GRC10500	5 0	19	24.5	38.0	2.03	1.29	159	2	84.0	10.0	
IND03800	56.0	19	75 9	33.4	1.52	1.08	33	2	84 0	5.1	3.
INS03200	80 2	19	113 6	−1.4	6.73	3.33	160	1	84.0	10.0	
INS03600	104 0	19	115 2	−1.7	9.14	3.43	170	2	84.0	10.0	
IRN10900	34 0	19	54.2	32.4	3.82	1.82	149	1	84 0	3 1	
LBN27900	11.0	19	35.8	33 9	0.60	0.60	0	1	84.0	5.2	
LBY32100	−25.0	19	17.5	26.3	3.68	1.84	130	1	84.0	1.5	
LIE25300	−37.0	19	9.5	47.1	0.60	0.60	0	2	84.0	0.5	
LUX11400	−19.0	19	6.0	49.8	0.68	0.68	0	2	84.0	0.8	
MRA33200	122.0	19	151.1	11.6	6.48	3.49	179	2	87.0	9.6	8/GR14
MRA33201	122.0	19	−157.5	21.0	2 02	0.60	115	2	87.0	10.0	8/GR14
NIU05400	158.0	19	−169.8	−19.0	0.60	0.60	0	1	84.0	10.0	8/GR2
NIU05401	158.0	19	172.3	−39.7	2.88	1.56	47	1	84 0	7 7	8/GR2
NPL12200	50.0	19	83.7	28.3	1.72	0.60	163	1	84 0	10.0	
POR13300	−31.0	19	−8.0	39.6	0.92	0.60	112	1	84.0	5 3	
SMA33500	170.0	19	−166.3	−0.2	7.97	1.04	72	1	87.0	9.6	8/GR13
SMA33501	170.0	19	−124.8	39.2	4.43	0.73	132	1	87 0	10.0	8/GR13
TCH14400	−1.0	19	17.2	51.8	2.00	2.00	0	1	84.0	1.2	
URS06100	23.0	19	24.8	56.7	2.00	2.00	0	1	89 0	4.3	2., 4.
URS07700	110 0	19	137 0	50.5	2.00	2.00	0	1	89.0	2 5	2.
YUG14900	−7.0	19	18.6	43.8	2.21	0.92	156	2	84.0	9 4	

ALG25200	−25.0	20	1.5	27.6	3 65	2.94	135	2	84.0	1.5	
AND34100	−37.0	20	1.6	42.5	0 60	0.60	0	1	84 0	0.3	
ARS00300	17.0	20	44.6	23.4	4.21	2.48	145	1	84.0	2.2	
AUS00700	128 0	20	133 6	−24.4	6.75	5.90	172	1	87.0	4.1	1.
AUT01600	−19.0	20	12 2	47.5	1.14	0.63	166	1	84.0	1.6	
BGD22000	74 0	20	90.3	23.6	1.46	0.84	135	1	84.0	6.7	
BUL02000	−1 0	20	25.0	43.0	2.00	2.00	0	2	84.0	2.5	
CBG29900	68.0	20	105.0	12.7	1 01	0.90	110	2	84.0	10.0	
CHN15900	79 8	20	106.0	32 5	5.00	3.70	150	1	84 0	3.6	
CHN18400	62.0	20	101.0	37.9	2.78	0.82	144	2	84.0	4.2	
DNK08900	5.0	20	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
EGY02600	−7 0	20	29.7	26.8	2.33	1.72	136	1	86.0	1.6	
G 02700	−31 0	20	−3.5	53.8	1 84	0 72	142	2	84 0	4.8	
IND04200	68.0	20	79.3	27.7	2.14	1 16	147	1	89.0	4.7	3.
INS03000	80.2	20	113.6	−1.4	6.73	3.33	160	2	84 0	10.0	
KRE28600	110.0	20	127.0	39.1	1.30	1.10	31	2	87.0	2.0	
MLA22700	86.0	20	102 1	4.1	1.62	0.82	135	2	84.0	10.0	
MLI32800	−37.0	20	−7 6	13.2	1.74	1.24	171	2	87.0	5.9	
PAK28200	38 0	20	68.5	25.8	1.32	0.62	133	2	84.0	5.0	
PHL28500	98.0	20	121.3	11.1	3.46	1.76	99	2	84.0	10.0	
RRW31000	11.0	20	30.0	−2.1	0.66	0.60	42	1	84.0	7.6	
TKL05800	158.0	20	−171.8	−8.9	0.70	0.60	35	2	84.0	10.0	8/GR1
TKL05801	158.0	20	172.3	−39.7	2.88	1.56	47	2	84.0	7.7	8/GR1
URS06500	23.0	20	37 7	55.8	2.00	2.00	0	2	89.0	1.1	2.
URS06600	44.0	20	64.8	38.3	2 00	2.00	0	1	89.0	3.8	2.
URS07900	140.0	20	137 0	50.5	2.00	2.00	0	1	89.0	10.0	2.
ZAI32200	−19 0	20	22 4	0.0	2.16	1.88	48	2	84.0	10.0	

17 711.08 MHz (21)

1	2	3	4		5		6	7	8	9	10
ALB29600	−7.0	21	20.1	41.0	1.17	0.65	128	2	84.0	9.8	
AUS00500	98.0	21	130.5	−24.3	6.22	4.71	51	1	87.0	4.8	1.
BEL01800	−19.0	21	4.6	50.6	0.82	0.60	167	2	84.0	0.5	
BFA10700	−31.0	21	−1.5	12.2	1.45	1.14	29	2	84.0	8.1	
BLR06200	23.0	21	29.5	51.4	2.00	2.00	0	1	89.0	0.8	2.
BRM29800	74.0	21	97.1	19.1	3.58	1.48	104	2	84.0	9.6	
CHN17500	92.0	21	121.4	23.8	1.14	0.82	64	1	84.0	10.0	
CHN17600	79.8	21	113.7	33.9	1.20	0.80	141	2	84.0	10.0	
CYP08600	5.0	21	33.3	35.1	0.60	0.60	0	2	84.0	10.0	
DDR21600	−1.0	21	17.2	51.8	2.00	2.00	0	1	84.0	0.0	
DJI09900	23.0	21	42.5	11.6	0.60	0.60	0	2	84.0	3.7	
GUM33100	122.0	21	151.1	11.6	6.48	3.49	179	1	87.0	3.9	8/GR15
GUM33101	122.0	21	−157.5	21.0	2.02	0.60	115	1	87.0	2.2	8/GR15
IND03800	56.0	21	75.9	33.4	1.52	1.08	33	2	84.0	5.1	3.
INS03200	80.2	21	113.6	−1.4	6.73	3.33	160	1	84.0	10.0	
ISL04900	−31.0	21	−19.0	64.9	1.D0	0.60	177	1	82.0	3.1	
KEN24900	11.0	21	37.9	1.1	2.29	1.56	94	2	84.0	6.4	
MCO11600	−37.0	21	7.4	43.7	0.60	0.60	0	2	83.0	6.0	
NPL12200	50.0	21	83.7	28.3	1.72	0.60	163	1	84.0	10.0	
NZL28700	128.0	21	173.0	−41.0	3.30	1.28	48	2	84.0	10.0	
TON21500	170.0	21	−174.7	−18.0	1.41	0.68	85	1	84.0	10.0	
UAE27400	17.0	21	53.6	24.4	0.98	0.80	162	2	84.0	2.5	

AUS00800	128.0	22	133.7	−24.4	6.78	5.90	172	1	87.0	4.1	1.
BDI27000	11.0	22	29.9	−3.1	0.71	0.60	80	1	84.0	7.5	
BGD22000	74.0	22	90.3	23.6	1.46	0.84	135	1	84.0	6.5	
CBG29900	68.0	22	105.0	12.7	1.01	0.90	110	2	84.0	10.0	
CHN15900	79.8	22	106 0	32.5	5.00	3.70	150	1	84.0	3.6	
CHN16800	92.0	22	124.8	48.1	2.68	0.92	157	1	84.0	4.0	
CHN18300	62.0	22	104.8	39.0	1.48	0.60	142	2	84 0	4.5	
COG23500	−13.0	22	14.6	−0.7	2.02	1.18	59	1	84.0	10.0	
CTI23700	−31.0	22	−5.8	7 4	1.55	1 43	162	1	84.0	10.0	
FNL10400	5.0	22	17 0	61.5	2.00	1.00	10	1	84.0	1.6	
HNG10600	−1.0	22	22.2	45.6	2.00	2.00	0	2	84.0	1.3	
IND04200	68.0	22	79.3	27.7	2.14	1.16	147	1	89.0	4.7	3.
INS03000	80.2	22	113.6	−1.4	6.73	3.33	160	2	84.0	10.0	
KRE28600	110.0	22	127.0	39.1	1.30	1.10	31	2	87.0	1.6	
KWT11300	17 0	22	47.6	29.2	0.68	0.60	145	1	84.0	3.2	
MLA22700	86.0	22	102.1	4.1	1.62	0.82	135	2	84.0	10.0	
MTN22300	−37.0	22	−12.2	18.5	2.62	1.87	150	2	86.0	1.4	
PAK28100	38.0	22	65.2	27.9	1 52	1.42	28	2	84.0	5.4	
PHL28500	98.0	22	121.3	11.1	3.46	1.76	99	2	84.0	10.0	
REU09700	29.0	22	55.6	−19.2	1.56	0.78	96	2	84.0	10.0	8/GR5
REU09701	29.0	22	3.7	45.2	1.94	1.68	24	2	84.0	6.1	8/GR5
SDN23100	−7.0	22	29.9	12.9	2.64	2.08	155	1	86.0	2.5	
SUI14000	−19.0	22	8.2	46.6	0.98	0.70	171	1	84.0	0.3	9.
SYR22900	11.0	22	38 3	34.9	1.04	0.90	7	2	84.0	3.2	
TUN15000	−25.0	22	9.5	33.5	1.88	0.72	135	2	84.0	3.4	
URS07000	44.0	22	73.8	41.4	2.00	2.00	0	1	89.0	2.7	2.
URS08100	140.0	22	168.5	65.5	2.00	2.00	0	2	89.0	10.0	2.

1	2	3	4		5		6	7	8	9	10
AGL29500	−13.0	23	16.5	−12.0	3.09	2.26	84	2	84.0	4.2	
ARS34000	17.0	23	44.6	23.4	4.21	2.48	145	2	84.0	1.4	
AUS00400	98.0	23	130.5	−24.3	6.22	4.71	51	1	87.0	4.8	1.
BRM29800	74.0	23	97.1	19.1	3.58	1.48	104	2	84.0	9.6	
CHN15800	79.8	23	106.0	32.5	5.00	3.70	150	2	84.0	3.6	
CNR13000	−31.0	23	−15.7	28.4	1.54	0.60	5	1	84.0	4.5	
CVA08500	−37.0	23	10.8	41.5	2.00	0.60	138	1	84.0	10.0	
GHA10800	−25.0	23	−1.2	7.9	1.48	1.06	102	1	83.0	6.0	
GNE30300	−19.0	23	10.3	1.5	0.68	0.60	10	1	84.0	10.0	
HOL21300	−19.0	23	5.4	52.0	0.76	0.60	171	2	84.0	0.5	
IND04600	68.0	23	84.7	20.5	1.60	0.86	30	2	84.0	10.0	3.
INS03200	80.2	23	113.6	−1.4	6.73	3.33	160	1	84.0	10.0	
ISL05000	5.0	23	−19.5	61.0	2.20	0.80	4	2	84.0	1.8	
JOR22400	11.0	23	35.8	31.4	0.84	0.78	114	1	85.0	2.5	
NIU05400	158.0	23	−169.8	−19.0	0.60	0.60	0	1	84.0	9.6	8/GR2
NIU05401	158.0	23	172.3	−39.7	2.88	1.56	47	1	84.0	1.4	8/GR2
SDN23000	−7.0	23	29.9	9.8	2.95	2.17	123	2	86.0	2.8	
SRL25900	−31.0	23	−11.8	8.6	0.78	0.68	114	2	84.0	10.0	
URS06100	23.0	23	24.8	56.7	2.00	2.00	0	1	89.0	4.3	2., 4.
URS064X0	23.0	23	47.2	40.9	2.00	2.00	0	2	89.0	3.9	2., 4.
URS07700	110.0	23	137.0	50.5	2.00	2.00	0	1	89.0	2.6	2.
ZWE13500	−1.0	23	29.6	−18.8	1.46	1.36	37	1	85.0	3.0	

AUS00700	128.0	24	133.6	−24.4	6.75	5.90	172	1	87.0	4.1	1.
AZR13400	−31.0	24	−23.4	36.1	2.56	0.70	158	2	84.0	6.2	7.
CAF25800	−13.0	24	21.0	6.3	2.25	1.68	31	1	84.0	8.4	
CBG29900	68.0	24	105.0	12.7	1.01	0.90	110	2	84.0	10.0	
CHN16600	92.0	24	121.1	41.7	1.52	0.78	154	1	84.0	7.9	
CHN17700	79.8	24	111.8	30.8	1.42	0.82	160	1	84.0	10.0	
CHN18800	62.0	24	101.5	25.1	1.86	1.08	132	1	84.0	10.0	
DNK09000	5.0	24	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
I 08200	−19.0	24	12.3	41.3	2.38	0.98	137	1	84.0	2.0	
IND04100	56.0	24	78.4	16.0	2.08	1.38	35	1	84.0	10.0	3.
INS03000	80.2	24	113.6	−1.4	6.73	3.33	160	2	84.0	10.0	
IRQ25600	11.0	24	43.5	33.0	2.28	1.32	145	2	84.0	3.1	
LSO30500	5.0	24	27.8	−29.8	0.66	0.60	36	2	84.0	4.7	
MLA22700	86.0	24	102.1	4.1	1.62	0.82	135	2	84.0	10.0	
MTN28800	−37.0	24	−7 8	23.4	1.63	1.10	141	2	86.0	1.4	
MWI30800	−1.0	24	34.1	−13.0	1.54	0.60	87	2	84.0	2.7	
MYT09800	29.0	24	45.1	−12.8	0.60	0.60	0	2	84.0	10.0	8/GR7
MYT09801	29.0	24	3.7	45.6	1.98	1.71	22	2	84.0	6.1	8/GR7
NGR11500	−25.0	24	8.3	16.8	2.54	2.08	44	2	85.0	1.5	
OMA12300	17.0	24	55.6	21.0	1.88	1.02	100	1	85.0	2.0	
PAK28200	38.0	24	68.5	25.8	1.32	0.62	133	2	84.0	5.0	
PHL28500	98.0	24	121.3	11.1	3.46	1.76	99	2	84.0	10.0	
SDN23200	−7.0	24	29.6	18.4	2.54	2.09	167	1	86.0	1.4	
TKL05800	158.0	24	−171.8	−8.9	0.70	0.60	35	2	84.0	9 6	8/GR1
TKL05801	158.0	24	172.3	−39.7	2.88	1.56	47	2	84.0	1.4	8/GR1
URS06601	44.0	24	73.B	41.4	2.00	2.00	0	2	89.0	4.5	2.
URS07900	140.0	24	137.0	50.5	2.00	2.00	0	1	89.0	10.0	2.

17 787.80 MHz (25)

1	2	3	4		5		6	7	8	9	10
ALB29600	−7 0	25	20.1	41.0	1.17	0.65	128	2	84.0	10.0	
BEL01800	−19.0	25	4.6	50.6	0.82	0.60	167	2	84.0	0.5	
BFA10700	−31.0	25	−1.5	12.2	1.45	1 14	29	2	84.0	8.1	
BLR06201	23.0	25	24.8	56.7	2.00	2.00	0	1	89.0	4.3	2.
CYP08600	5 0	25	33.3	35.1	0.60	0.60	0	2	84.0	10.0	
DDR21600	−1.0	25	17.2	51.8	2 00	2.00	0	1	84.0	0.0	
DJI09900	23.0	25	42.5	11.6	0.60	0.60	0	2	84.0	3.7	
GUM33100	122.0	25	151.1	11.6	6.48	3.49	179	1	87.0	3.9	8/GR15
GUM33101	122.0	25	−157.5	21.0	2.02	0.60	115	1	87.0	2.2	8/GR15
ISL04900	−31 0	25	−19.0	64.9	1.00	0.60	177	1	82.0	6.0	
KEN24900	11 0	25	37.9	1.1	2.29	1.56	94	2	84 0	6.4	
MCO11600	−37.0	25	7.4	43.7	0.60	0.60	0	2	83.0	10.0	
MNG24800	74 0	25	107.5	47.8	2.00	2.00	0	1	89.0	3.8	2.
TON21500	170.0	25	−174.7	−18.0	1.41	0.68	85	1	84.0	10.0	
UAE27400	17.0	25	53.6	24.4	0.98	0.80	162	2	84.0	2.5	
URS07800	110.0	25	110.0	60.0	2.00	2.00	0	2	89.0	10.0	2.

AUS00600	98.0	26	130.5	−24.3	6.22	4.71	51	2	87.0	10.0	1.
AUS00900	128.0	26	133.7	−24.4	6.78	5.90	172	2	87.0	4.1	1.
BDI27000	11.0	26	29.9	−3.1	0.71	0.60	80	1	84.0	7.5	
COG23500	−13.0	26	14.6	−0.7	2.02	1.18	59	1	84.0	10.0	
CTI23700	−31.0	26	−5.8	7.4	1.55	1.43	162	1	84.0	10.0	
FNL10400	5.0	26	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
HNG10600	−1.0	26	22.2	45.6	2.00	2.00	0	2	84.0	1.1	
KWT11300	17.0	26	47.6	29 2	0.68	0.60	145	1	84.0	2.6	
MTN22300	−37.0	26	−12.2	18.5	2.62	1.87	150	2	86.0	1.4	
REU09700	29.0	26	55.6	−19.2	1.56	0.78	96	2	84.0	10.0	8/GR5
REU09701	29.0	26	3.7	45.2	1.94	1.68	24	2	84.0	6.1	8/GR5
SDN23100	−7.0	26	29.9	12.9	2.64	2.08	155	1	86.0	2.5	
SUI14000	−19.0	26	8.2	46.6	0.98	0.70	171	1	84.0	0.3	9.
SYR22900	11.0	26	38.3	34.9	1.04	0.90	7	2	84.0	2.8	
TUN15000	−25.0	26	9.5	33.5	1.88	0.72	135	2	84.0	3.4	
URS06800	44.0	26	73.8	41.4	2.00	2.00	0	1	89.0	10.0	2.
URS07400	74.0	26	37.7	55.8	2.00	2.00	0	2	89.0	4.0	2.
URS08000	140.0	26	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.

17 826.16 MHz (27)

1	2	3	4		5		6	7	8	9	10
AGL29500	−13.0	27	16.5	−12.0	3 09	2.26	84	2	84.0	4.2	
BHR25500	17 0	27	50.5	26.1	0.60	0.60	0	2	84.0	3.0	
CNR13000	−31.0	27	−15.7	28.4	1.54	0.60	5	1	84.0	4.5	
CVA08300	−37 0	27	12.4	41.8	0.60	0.60	0	1	84.0	10.0	
DNK09100	5.0	27	−19.5	61 0	2.20	0.80	4	2	84.0	1.8	
GHA10800	−25.0	27	−1 2	7 9	1.48	1.06	102	1	83.0	6.0	
GNE30300	−19 0	27	10.3	1.5	0 68	0.60	10	1	84.0	10 0	
HOL21300	−19.0	27	5.4	52.0	0.76	0.60	171	2	84.0	0.5	
JOR22400	11.0	27	35.8	31 4	0.84	0.78	114	1	85.0	2.5	
SDN23000	−7 0	27	29.9	9.8	2.95	2.17	123	2	86.0	2 8	
SRL25900	−31 0	27	−11.8	8 6	0.78	0.68	114	2	84.0	10.0	
URS05900	23 0	27	47.2	40.9	2.00	2.00	0	1	89.0	3.9	2.
URS07700	110 0	27	137.0	50.5	2.00	2.00	0	1	89.0	10.0	2.
ZWE13500	−1 0	27	29.6	−18.8	1.46	1 36	37	1	85 0	3.0	

AUS00600	98.0	28	130 5	−24.3	6.22	4.71	51	2	87.0	10.0	1
AUS00900	128.0	28	133 7	−24.4	6.78	5.90	172	2	87.0	4 1	1.
AZR13400	−31.0	28	−23.4	36 1	2.56	0.70	158	2	84.0	6 2	7
CAF25800	−13 0	28	21 0	6.3	2.25	1.68	31	1	84.0	8.4	
I 08200	−19.0	28	12 3	41.3	2.38	0.98	137	1	84.0	2.0	
IRQ25600	11.0	28	43.5	33.0	2.28	1.32	145	2	84.0	2 7	
LSO30500	5.0	28	27.8	−29.8	0.66	0.60	36	2	84.0	4 7	
MTN28800	−37.0	28	−7.8	23.4	1.63	1.10	141	2	86 0	1.4	
MW130800	−1 0	28	34.1	−13.0	1.54	0.60	87	2	84 0	2.7	
MYT09800	29.0	28	45.1	−12.8	0.60	0.60	0	2	84.0	10.0	8/GR7
MYT09801	29 0	28	3 7	45.6	1.98	1.71	22	2	84 0	6.1	8/GR7
NGR11500	−25.0	28	8.3	16.8	2.54	2.08	44	2	85.0	1.5	
NOR12100	5.0	28	17.0	61.5	2.00	1.00	10	1	84 0	1.6	
OMA12300	17 0	28	55.6	21.0	1.88	1.02	100	1	85.0	2.0	
SDN23200	−7 0	28	29.6	18.4	2.54	2.09	167	1	86.0	1.4	
URS06602	44.0	28	58.0	59.0	2.00	2.00	0	1	89.0	10.0	2.
URS07600	74.0	28	92.8	56.1	2.00	2.00	0	2	89.0	0.3	2.
URS07900	140.0	28	137.0	50.5	2.00	2 00	0	1	89.0	10 0	2.

17 864.52 MHz (29)

1	2	3	4		5		6	7	8	9	10
ALB29600	−7.0	29	20.1	41.0	1.17	0.65	128	2	84.0	10.0	
BEL01800	−19.0	29	4.6	50.6	0.82	0.60	167	2	84.0	0.5	
BFA10700	−31.0	29	−1.5	12.2	1.45	1.14	29	2	84.0	8.1	
CYP08600	5.0	29	33.3	35.1	0.60	0.60	0	2	84.0	10.0	
DDR21600	−1.0	29	17.2	51.8	2.00	2.00	0	1	84.0	0.0	
DJI09900	23.0	29	42.5	11.6	0.60	0.60	0	2	84.0	3.7	
GUM33100	122.0	29	151.1	11.6	6.48	3.49	179	1	87.0	3.9	8/GR15
GUM33101	122.0	29	−157.5	21.0	2.02	0.60	115	1	87.0	2.2	8/GR15
ISL04900	−31.0	29	−19.0	64.9	1.00	0.60	177	1	82.0	6.0	
KEN24900	11.0	29	37.9	1.1	2.29	1.56	94	2	84.0	6.4	
MCO11600	−37.0	29	7.4	43.7	0.60	0.60	0	2	83.0	10.0	
MNG24800	74.0	29	107.5	47.8	2.00	2.00	0	1	89.0	0.6	2.
SEN22200	−37.0	29	−14.4	13.8	1.46	1.04	139	1	85.0	6.4	
TON21500	170.0	29	−174.7	−18.0	1.41	0.68	85	1	84.0	10.0	
UAE27400	17.0	29	53.6	24.4	0.98	0.80	162	2	84.0	2.2	
UKR06300	23.0	29	29.5	51.4	2.00	2.00	0	1	89.0	4.0	2.

AUS00600	98.0	30	130.5	−24.3	6.22	4.71	51	2	87.0	10.0	1.
AUS00900	128.0	30	133.7	−24.4	6.78	5.90	172	2	87.0	4.1	1.
BDI27000	11.0	30	29.9	−3.1	0.71	0.60	80	1	84.0	7.5	
COG23500	−13.0	30	14.6	−0.7	2.02	1.18	59	1	84.0	10.0	
CTI23700	−31.0	30	−5.8	7.4	1.55	1.43	162	1	84.0	10.0	
HNG10600	−1.0	30	22.2	45.6	2.00	2.00	0	2	84.0	1.1	
KWT11300	17.0	30	47.6	29.2	0.68	0.60	145	1	84.0	2.6	
MTN22300	−37.0	30	−12.2	18.5	2.62	1.87	150	2	86.0	1.4	
REU09700	29.0	30	55.6	−19.2	1.56	0.78	96	2	84.0	10.0	8/GR5
REU09701	29.0	30	3.7	45.2	1.94	1 68	24	2	84.0	6.1	8/GR5
S 13900	5.0	30	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
SDN23100	−7.0	30	29.9	12.9	2.64	2.08	155	1	86.0	2.5	
SUI14000	−19.0	30	8.2	46.6	0.98	0.70	171	1	84.0	0.3	9.
SYR22900	11.0	30	38.3	34.9	1.04	0.90	7	2	84.0	2.8	
TUNI5000	−25.0	30	9.5	33.5	1.88	0.72	135	2	84.0	3.4	
URS06801	44.0	30	64.8	38.3	2.00	2.00	0	1	89.0	10.0	2.
URS07400	74.0	30	37.7	55.8	2.00	2.00	0	2	89.0	4.0	2.
URS08000	140.0	30	137.0	50.5	2.00	2 00	0	2	89.0	10.0	2.

17 902.88 MHz (31)

1	2	3	4		5		6	7	8	9	10
AGL29500	−13.0	31	16.5	−12.0	3.09	2.26	84	2	84.0	4.2	
BHR25500	17.0	31	50.5	26.1	0.60	0.60	0	2	84.0	3.0	
CNR13000	−31.0	31	−15.7	28.4	1.54	0.60	5	1	84.0	4.5	
CVA08300	−37.0	31	12.4	41.8	0.60	0.60	0	1	84.0	10.0	
GHA10800	−25.0	31	−1.2	7.9	1.48	1.06	102	1	83.0	6.0	
GNE30300	−19.0	31	10.3	1.5	0.68	0.60	10	1	84.0	10.0	
HOL21300	−19.0	31	5.4	52.0	0.76	0.60	171	2	84.0	0.5	
ISL05000	5.0	31	−19.5	61.0	2.20	0.80	4	2	84.0	1.8	
JOR22400	11.0	31	35.8	31.4	0.84	0.78	114	1	85.0	2.5	
SDN23000	−7.0	31	29.9	9.8	2.95	2.17	123	2	86.0	2.8	
SRL25900	−31.0	31	−11.8	8.6	0.78	0.68	114	2	84.0	10.0	
URS05901	23.0	31	29.5	51.4	2.00	2.00	0	2	89.0	3.9	2.
URS07701	110.0	31	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.
ZWE13500	−1.0	31	29.6	−18.8	1.46	1.36	37	1	85.0	3.0	

AUS00600	98.0	32	130.5	–24 3	6.22	4.71	51	2	87.0	10.0	1.
AUS00900	128.0	32	133.7	–24.4	6.78	5.90	172	2	87.0	4.1	1.
AZR13400	–31.0	32	–23.4	36.1	2.56	0.70	158	2	84.0	6.2	7.
CAF25800	–13.0	32	21.0	6.3	2.25	1.68	31	1	84.0	8.4	
I 08200	–19.0	32	12.3	41.3	2.38	0.98	137	1	84.0	2.0	
IRQ25600	11.0	32	43.5	33.0	2.28	1.32	145	2	84.0	2.7	
LSO30500	5.0	32	27.8	–29.8	0.66	0.60	36	2	84.0	4.7	
MTN28800	–37.0	32	–7.8	23 4	1.63	1.10	141	2	86.0	1.4	
MWI30800	–1.0	32	34.1	–13.0	1.54	0.60	87	2	84.0	2.7	
MYT09800	29.0	32	45.1	–12.8	0.60	0.60	0	2	84.0	10.0	8/GR7
MYT09801	29.0	32	3.7	45.6	1.98	1.71	22	2	84.0	6.1	8/GR7
NGR11500	–25.0	32	8.3	16.8	2.54	2.08	44	2	85.0	1.5	
NOR12100	5.0	32	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
OMA12300	17.0	32	55.6	21.0	1.88	1.02	100	1	85.0	2.0	
SDN23200	–7.0	32	29.6	18.4	2.54	2.09	167	1	86 0	1.4	
URS06601	44.0	32	73.8	41.4	2.00	2.00	0	2	89.0	10.0	2.
URS07500	74.0	32	92.8	56.1	2.00	2.00	0	2	89 0	0.1	2.
URS07900	140.0	32	137.0	50.5	2.00	2.00	0	1	89.0	10.0	2.

17 941.24 MHz (33)

1	2	3	4		5		6	7	8	9	10
ALB29600	−7 0	33	20.1	41.0	1.17	0.65	128	2	84.0	10.0	
BEL01800	−19.0	33	4.6	50.6	0.82	0.60	167	2	84.0	0.5	
BFA10700	−31.0	33	−1.5	12.2	1.45	1.14	29	2	84.0	8.1	
CYP08600	5.0	33	33.3	35.1	0.60	0.60	0	2	84.0	10.0	
DDR21600	−1.0	33	17.2	51.8	2.00	2.00	0	1	84.0	0.0	
DJI09900	23.0	33	42.5	11.6	0.60	0.60	0	2	84.0	3.7	
GUM33100	122.0	33	151.1	11.6	6.48	3.49	179	1	87.0	3.9	8/GR15
GUM33101	122.0	33	−157.5	21.0	2.02	0.60	115	1	87.0	2.2	8/GR15
ISL04900	−31 0	33	−19.0	64.9	1.00	0.60	177	1	82.0	6.0	
KEN24900	11.0	33	37.9	1.1	2.29	1.56	94	2	84.0	6.4	
MCO11600	−37.0	33	7.4	43.7	0.60	0.60	0	2	83.0	10.0	
MNG24800	74.0	33	107.5	47.8	2.00	2.00	0	1	89.0	0.6	2.
SEN22200	−37.0	33	−14.4	13.8	1.46	1.04	139	1	85.0	6.4	
TON21500	170.0	33	−174.7	−18.0	1.41	0.68	85	1	84.0	10.0	
UAE27400	17.0	33	53.6	24.4	0.98	0.80	162	2	84.0	2.2	
UKR06300	23.0	33	29.5	51.4	2.00	2.00	0	1	89.0	4.0	2.

BDI27000	11.0	34	29.9	−3.1	0.71	0.60	80	1	84.0	7.5	
COG23500	−13.0	34	14.6	−0.7	2.02	1.18	59	1	84.0	10.0	
CTI23700	−31.0	34	−5.8	7.4	1.55	1.43	162	1	84.0	10.0	
HNG10600	−1.0	34	22.2	45.6	2.00	2.00	0	2	84.0	1.1	
KWT11300	17.0	34	47.6	29.2	0.68	0.60	145	1	84.0	2.6	
MTN22300	−37.0	34	−12.2	18.5	2.62	1.87	150	2	86.0	1.4	
REU09700	29.0	34	55.6	−19.2	1.56	0.78	96	2	84 0	10.0	8/GR5
REU09701	29.0	34	3.7	45.2	1.94	1 68	24	2	84.0	6.1	8/GR5
S 13800	5.0	34	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
SDN23100	−7.0	34	29.9	12.9	2.64	2.08	155	1	86.0	2.5	
SUI14000	−19.0	34	8.2	46.6	0.98	0.70	171	1	84.0	0.3	9.
SYR22900	11.0	34	38.3	34.9	1.04	0.90	7	2	84.0	2.8	
TUN15000	−25.0	34	9.5	33.5	1.88	0.72	135	2	84.0	3.4	
URS07100	44.0	34	73.8	41.4	2.00	2.00	0	1	89.0	10.0	2.
URS07400	74.0	34	37.7	55.8	2.00	2.00	0	2	89.0	4.0	2.
URS08000	140.0	34	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.

17 979.60 MHz (35)

1	2	3	4		5		6	7	8	9	10
AGL29500	−13.0	35	16.5	−12.0	3.09	2.26	84	2	84.0	4.2	
BHR25500	17.0	35	50.5	26.1	0.60	0.60	0	2	84.0	3.0	
CNR13000	−31.0	35	−15.7	28.4	1.54	0 60	5	1	84.0	4.5	
CVA08300	−37 0	35	12 4	41.8	0.60	0.60	0	1	84.0	10.0	
DNK09100	5.0	35	−19.5	61.0	2.20	0.80	4	2	84.0	1.8	
GHA10800	−25.0	35	−1.2	7.9	1.48	1.06	102	1	83.0	6.0	
GNE30300	−19 0	35	10.3	1.5	0.68	0.60	10	1	84.0	10.0	
HOL21300	−19.0	35	5.4	52.0	0.76	0.60	171	2	84.0	0.5	
JOR22400	11.0	35	35.8	31.4	0.84	0.78	114	1	85.0	2.5	
SDN23000	−7.0	35	29.9	9.8	2.95	2.17	123	2	86.0	2 8	
SRL25900	−31.0	35	−11.8	8.6	0.78	0.68	114	2	84.0	10.0	
URS05902	23.0	35	37.7	55.8	2.00	2.00	0	2	89.0	2.7	2.
URS07701	110.0	35	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.
ZWE13500	−1 0	35	29.6	−18.8	1.46	1.36	37	1	85.0	3.0	

AUS00600	98 0	36	130.5	−24.3	6.22	4.71	51	2	87.0	10.0	1.
AUS00900	128 0	36	133.7	−24.4	6.78	5.90	172	2	87.0	4.1	1.
AZR13400	−31 0	36	−23.4	36.1	2.56	0.70	158	2	84.0	6.2	7.
CAF25800	−13.0	36	21.0	6.3	2.25	1.68	31	1	84.0	8.4	
DNK09000	5.0	36	17.0	61.5	2.00	1.00	10	1	84.0	4.2	
I 08200	−19.0	36	12.3	41.3	2.38	0.98	137	1	84.0	2.0	
IRQ25600	11.0	36	43.5	33 0	2.28	1.32	145	2	84.0	2.7	
LSO30500	5.0	36	27.8	−29 8	0.66	0.60	36	2	84 0	4.7	
MTN28300	−37.0	36	−7 8	23.4	1.63	1.10	141	2	86.0	1.4	
MWI30800	−1.0	36	34.1	−13.0	1.54	0.60	87	2	84.0	2.7	
MYT09800	29.0	36	45.1	−12.8	0.60	0.60	0	2	84.0	10.0	8/GR7
MYT09801	29.0	36	3.7	45.6	1.98	1.71	22	2	84 0	6.1	8/GR7
NGR11500	−25.0	36	8.3	16.8	2.54	2.08	44	2	85.0	1.5	
OMA12300	17.0	36	55.6	21.0	1.88	1.02	100	1	85.0	2.0	
SDN23200	−7.0	36	29.6	18.4	2.54	2.09	167	1	86.0	1.4	
URS06603	44.0	36	37.7	55.8	2.00	2.00	0	2	89.0	10.0	2.
URS07900	140.0	36	137.0	50.5	2.00	2.00	0	1	89.0	10.0	2.

18 017.96 MHz (37)

1	2	3	4		5		6	7	8	9	10
ALB29600	−7.0	37	20.1	41.0	1.17	0.65	128	2	84.0	10.0	
BEL01800	−19.0	37	4.6	50.6	0.82	0.60	167	2	84.0	0.5	
BFA10700	−31.0	37	−1.5	12.2	1.45	1.14	29	2	84.0	8.1	
CYP08600	5.0	37	33.3	35.1	0.60	0.60	0	2	84.0	10.0	
DDR21600	−1.0	37	17.2	51.8	2.00	2.00	0	1	84.0	0.0	
DJI09900	23.0	37	42.5	11.6	0.60	0.60	0	2	84.0	3.7	
GUM33100	122.0	37	151.1	11.6	6.48	3.49	179	1	87.0	9.6	8/GR15
GUM33101	122.0	37	−157.5	21.0	2.02	0.60	115	1	87.0	10.0	8/GR15
ISL04900	−31.0	37	−19.0	64.9	1.00	0.60	177	1	82.0	6.0	
KEN24900	11.0	37	37.9	1.1	2.29	1.56	94	2	84.0	6.4	
MCO11600	−37.0	37	7.4	43.7	0.60	0.60	0	2	83.0	10.0	
MNG24800	74.0	37	107.5	47.8	2.00	2.00	0	1	89.0	4.0	2.
SEN22200	−37.0	37	−14.4	13.8	1.46	1.04	139	1	85.0	6.4	
UAE27400	17.0	37	53.6	24.4	0.98	0.80	162	2	84.0	2.2	
UKR06300	23.0	37	29.5	51.4	2.00	2.00	0	1	89.0	4.0	2.

BDI27000	11.0	38	29.9	−3.1	0.71	0.60	80	1	84.0	7.5	
COG23500	−13.0	38	16.6	−0.7	2.02	1.18	59	1	84.0	10.0	
CTI23700	−31.0	38	−5.8	7.4	1.55	1.43	162	1	84.0	10.0	
HNG10600	−1.0	38	22.2	45.6	2.00	2.00	0	2	84.0	1.1	
KWT11300	17.0	38	47.6	29.2	0.68	0.60	145	1	84.0	2.6	
MTN22300	−37.0	38	−12.2	18.5	2.62	1.87	150	2	86.0	1.4	
NOR12000	5.0	38	17.0	61.5	2.00	1.00	10	1	84.0	1.6	
REU09700	29.0	38	55.6	−19.2	1.56	0.78	96	2	84.0	9.6	8/GR5
REU09701	29.0	38	3.7	45.2	1.94	1.68	24	2	84.0	6.1	8/GR5
SDN23100	−7.0	38	29.9	12.9	2.64	2.08	155	1	86.0	2.5	
SUI14000	−19.0	38	8.2	46.6	0.98	0.70	171	1	84.0	0.3	9.
SYR33900	11.0	38	37.6	34.2	1.32	0.88	74	2	84.0	3.0	
TUN27200	−25.0	38	2.5	32.0	3.59	1.75	175	2	84.0	3.1	
URS07100	44.0	38	73.8	41.4	2.00	2.00	0	1	89.0	10.0	2.
URS07400	74.0	38	37.7	55.8	2.00	2.00	0	2	89.0	4.0	2.
URS08000	140.0	38	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.

18 056.32 MHz (39)

1	2	3	4		5		6	7	8	9	10
AGL29500	−13 0	39	16.5	−12.0	3.09	2.26	84	2	84.0	4.2	
BHR25500	17.0	39	50 5	26.1	0.60	0.60	0	2	84.0	2.6	
CNR13000	−31.0	39	−15 7	28.4	1.54	0.60	5	1	84 0	4.5	
CVA08300	−37.0	39	12.4	41.8	0.60	0.60	0	1	84.0	10.0	
GHA10800	−25.0	39	−1.2	7.9	1.48	1.06	102	1	83.0	6.0	
GNE30300	−19.0	39	10.3	1.5	0.68	0.60	10	1	84.0	10.0	
HOL21300	−19.0	39	5.4	52.0	0.76	0.60	171	2	84.0	0.5	
ISL05000	5 0	39	−19.5	61.0	2.20	0.80	4	2	84.0	1.8	
JOR22400	11 0	39	35.8	31.4	0.84	0.78	114	1	85 0	2.2	
MNG24800	74.0	39	107.5	47.8	2.00	2.00	0	1	89.0	4.0	2.
SDN23000	−7.0	39	29.9	9.8	2.95	2.17	123	2	86.0	2.8	
SRL25900	−31 0	39	−11 8	8.6	0.78	0.68	114	2	84.0	10.0	
URS05902	23.0	39	37 7	55.8	2.00	2.00	0	2	89.0	4.5	2.
URS07701	110.0	39	137.0	50.5	2.00	2.00	0	2	89.0	10.0	2.
ZWE13500	−1.0	39	29.6	−18.8	1.46	1.36	37	1	85.0	3.0	

AUS00600	98.0	40	130 5	−24.3	6.22	4.71	51	2	87 0	10.0	1.
AUS00900	128.0	40	133.7	−24.4	6.78	5.90	172	2	87.0	10.0	1.
AZR13400	−31.0	40	−23.4	36.1	2.56	0.70	158	2	84.0	6.2	7.
CAF25800	−13.0	40	21.0	6.3	2.25	1.68	31	1	84.0	8.4	
I 08200	−19.0	40	12.3	41.3	2.38	0.98	137	1	84.0	4.7	
IRQ25600	11.0	40	43.5	33.0	2.28	1.32	145	2	84.0	2.7	
LSO30500	5.0	40	27.8	−29.8	0.66	0.60	36	2	84.0	4.7	
MTN28800	−37.0	40	−7.8	23.4	1.63	1.10	141	2	86.0	1.4	
MWI30800	−1.0	40	34.1	−13 0	1.54	0.60	87	2	84.0	2.7	
MYT09800	29.0	40	45.1	−12.8	0.60	0.60	0	2	84.0	9.6	8/GR7
MYT09801	29.0	40	3.7	45.6	1.98	1.71	22	2	84.0	6.1	8/GR7
NGR11500	−25 0	40	8.3	16.8	2.54	2.08	44	2	85.0	1.5	
OMA12300	17.0	40	55.6	21.0	1.88	1.02	100	1	85.0	3.2	
S 13900	5.0	40	17 0	61.5	2.00	1 00	10	1	84.0	1.6	
SDN23200	−7.0	40	29 6	18.4	2.54	2 09	167	1	86.0	1 6	
URS06603	44.0	40	37.7	55.8	2.00	2.00	0	2	89.0	10.0	2.
URSO7900	140.0	40	137.0	50.5	2.00	2.00	0	1	89.0	10.0	2

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ARTICLE 10

Interference

10.1 The Members of the Union shall endeavour to agree on the action required to reduce harmful interference which might be caused by the application of these provisions and the associated Plans.

ARTICLE 11

Period of Validity of the Provisions and Associated Plans

11.1 The provisions and associated Plans have been prepared in order to meet the requirements for feeder links for the broadcasting-satellite service in the bands concerned for a period extending until at least 1 January 1994.

11.2 In any event, the provisions and associated Plans shall remain in force until their revision by a competent administrative radio conference convened in accordance with the relevant provisions of the Convention in force.

ANNEX 1

Limits for Determining Whether a Service of an Administration is Considered to be Affected by a Proposed Modification to One of the Regional Plans or when it is Necessary Under this Appendix to Seek the Agreement of any Other Administration

1. *Limits applicable to protect a frequency assignment in the band 17.7 - 18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth)* (see paragraphs 4.2.1.2 and 4.2.3.2 of Article 4)

An administration shall be considered as being affected if, upon application of the procedures of Section 3 of Annex 4 to this Appendix, that administration is included in the coordination area of the frequency assignment to a transmitting feeder-link earth station.

For the purpose of this calculation, the feeder-link transmitting earth station parameters notified by the administration, which may differ from those given in Annex 3 to this Appendix, are used.

2. *Limits applicable to protect a terrestrial station in the bands 14.5 - 14.8 GHz and 17.7 - 18.1 GHz* (see paragraphs 4.2.1.3 and 4.2.3.3 of Article 4)

An administration shall be considered as being affected if, upon application of the procedures of Appendix **28** to the Radio Regulations, that administration is included in the coordination area of the frequency assignment to a transmitting feeder-link earth station[1].

[1] In Regions 1 and 3, for the application of the procedures of Appendix **28**, the e.i.r.p. for the feeder-link earth station is the sum of the values specified in columns 8 and 9 of the Plan.

For the purpose of this calculation, the feeder-link transmitting earth station parameters notified by the administration, which may differ from those given in Annex 3 to this Appendix, are used.

3. *Limits to the change in the overall equivalent protection margin with respect to frequency assignments in conformity with the Region 2 Plan* [1]

With respect to the modification to the Region 2 Plan and when it is necessary under this Appendix to seek the agreement of any other administration of Region 2, except in cases covered by Resolution **42 (Rev.Orb-88)**, an administration shall be considered affected if the overall equivalent protection margin[2] corresponding to a test point of its entry in the Plan, including the cumulative effect of any previous modification to the Plan or any previous agreement, falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below the value resulting from:

- the Plan as established by the 1983 Conference; *or*
- a modification of the assignment in accordance with this Appendix; *or*
- a new entry in the Plan under Article 4 of this Appendix; *or*
- any agreement reached in accordance with this Appendix except for Resolution **42 (Rev.Orb-88)**.

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[1] With respect to Section 3 the limit specified relates to the overall equivalent protection margin calculated in accordance with Section 1.12 of Annex 3 to this Appendix.

[2] For the definition of the overall equivalent protection margin, see Section 1.14 of Annex 5 to Appendix **30 (Orb-85)**.

4. *Limits to the change in the feeder-link equivalent protection margin with respect to frequency assignments in conformity with the Regions 1 and 3 Plan*[1]

With respect to the modification to the Regions 1 and 3 Plan and when it is necessary under this Appendix to seek the agreement of any other administration of Region 1 or 3, an administration shall be considered affected if the feeder-link equivalent protection margin[2] corresponding to a test point of its entry in the Plan, including the cumulative effect of any previous modification to the Plan or any previous agreement, falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below the value resulting from:

- the Plan as established by the 1988 Conference; *or*
- a modification of the assignment in accordance with this Appendix; *or*
- a new entry in the Plan under Article 4 of this Appendix; *or*
- any agreement reached in accordance with this Appendix.

5. *Limits applicable to protect a frequency assignment in the bands 17.3 - 18.1 GHz (Regions 1 and 3) and 17.3 - 17.8 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)*

An administration in Region 1 or 3 shall be considered affected by a proposed modification in Region 2 or vice versa when the power flux-density arriving at the receiving space station of a broadcasting-satellite

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[1] With respect to Section 4, the limit specified relates to the feeder-link equivalent protection margin calculated in accordance with Section 1.7 of Annex 3 to this Appendix.

[2] For the definition of the equivalent protection margin, see Section 1.7 of Annex 3 to this Appendix.

feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to 3%,

where:

$\Delta T/T$ is calculated in accordance with the method given in Appendix **29**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the total RF bandwidth of the feeder-link carriers (24 MHz for Region 2 and 27 MHz for Regions 1 and 3).

Interim systems of Region 2 in accordance with Resolution **42 (Rev.Orb-88)** shall not be taken into consideration when applying this provision to proposed modifications to the Regions 1 and 3 Plan. However, this provision shall be applied to Region 2 interim systems with respect to the Regions 1 and 3 Plan.

ANNEX 2

Basic Characteristics to be Furnished in Notices[1] Relating to Feeder-Link Stations in the Fixed-Satellite Service Operating in the Frequency Bands 14.5 - 14.8 GHz and 17.3 - 18.1 GHz[2]

1. The following information shall be provided in notices relating to both transmitting earth stations and receiving space stations.

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[1] The Board shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Annex. The Board is further invited to consider the feasibility of a single notice for feeder-link earth stations operating within more than one feeder-link service area.

[2] Only those notices relating to frequency assignments for space stations and earth stations used for telecommand and tracking purposes associated with the Plan shall be furnished in accordance with Appendix **3**.

1.1 Country and beam identification.

1.2 Assigned frequency.

1.3 Assigned frequency band.

1.4 Date of bringing into use.

1.5 Designation of emission (in accordance with Article **4** of the Radio Regulations).

1.6 Modulation characteristics:

a) type of modulation;

b) pre-emphasis characteristics;

c) TV system;

d) sound-broadcasting characteristics;

e) frequency deviation;

f) composition of the baseband;

g) type of multiplexing of the video and sound signals;

h) energy dispersal characteristics.

2. The following additional information shall be provided in notices relating to transmitting earth stations.

2.1 Identity of the transmitting feeder-link station.

2.2 In the case of Region 2, geographical coordinates of the feeder-link earth station in the frequency band 17.7 - 17.8 GHz.

2.3 In all other cases, feeder-link service area for a feeder-link earth station identified by a set of a maximum of ten feeder-link test points.

2.4 Identity of the associated space station with which communication is to be established.

2.5 Rain-climatic zone for each test point (for guidance see Figures 1, 2 and 3 of Annex 3 to this Appendix).

2.6 Power characteristics of the transmission:

a) The following information is required for each assigned frequency:

- total transmitting power (dBW) in the assigned frequency band supplied to the input of the antenna;

- for the band 17.3 - 18.1 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the worst 1 MHz band;

- for the band 14.5 - 14.8 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the worst 4 kHz band;

- for the band 17.3 - 17.8 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the total RF bandwidth (24 MHz for Region 2 or 27 MHz for Regions 1 and 3).

b) Additional information required if power control is used (see Sections 3.11 and 4.10 of Annex 3 to this Appendix):

- range, expressed in dB, above the transmitting power used in *a)* above.

2.7 Transmitting antenna characteristics of the earth station:

a) antenna diameter (metres);

b) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);

c) half-power beamwidth in degrees (describe in detail if not symmetrical);

d) measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation), or reference radiation diagram to be used for coordination;

e) type of polarization;

f) sense of polarization;

g) horizon elevation angle in degrees and the antenna gain in the direction of the horizon for each azimuth[1] around the earth station;

h) altitude of the antenna above mean sea level, in metres;

i) minimum elevation angle, in degrees.

2.8 Regular hours of operation (UTC).

2.9 Coordination.

2.10 Agreements.

2.11 Other information.

2.12 Operating administration or company.

3. The following information shall be provided in notices relating to receiving space stations.

3.1 Orbital position (from the Greenwich Meridian).

3.2 Identity of the space station.

3.3 Class of station.

3.4 Space station receiving antenna characteristics:

a) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);

b) shape of the beam (circular, elliptical or other);

c) pointing accuracy (degrees);

d) type of polarization;

---

[1] At suitable increments, e.g. every five degrees, in tabular or graphic form.

e) sense of polarization;

f) for circular beams, indicate the following:

- half-power beamwidth in degrees;
- co-polar and cross-polar radiation patterns;
- nominal intersection of the antenna beam axis with the Earth (boresight longitude and latitude);

g) for elliptical beams, indicate the following:

- co-polar and cross-polar radiation patterns;
- rotation accuracy (degrees);
- orientation (degrees);
- major axis (degrees) at the half-power beamwidth;
- minor axis (degrees) at the half-power beamwidth;
- nominal intersection of the antenna beam axis with the Earth (boresight longitude and latitude);

h) for beams of other than circular or elliptical shape, indicate the following:

- co-polar and cross-polar gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite onto a plane perpendicular to the axis from the centre of the Earth to the satellite. The isotropic gain shall be indicated at each contour which corresponds to a decrease in gain of 2, 4, 6, 10 and 20 dB and thereafter at 10 dB intervals down to a value of 0 dB relative to an isotropic radiator;
- wherever practicable, a numerical equation or table providing the necessary information to allow the gain contours to be plotted;

i) for an assignment in the bands 14.5 - 14.8 GHz or 17.7 - 18.1 GHz, the isotropic gain in the direction of those parts of the geostationary-satellite orbit which are not obstructed by the Earth. Use a diagram showing estimated isotropic gain relative to orbit longitude.

3.5 Receiver system noise temperature referred to the output of the antenna (kelvins).

3.6 Station-keeping accuracy (degrees).

3.7 Regular hours of operation (UTC).

3.8 Coordination.

3.9 Agreements.

3.10 Other information.

3.11 Operating administration or company.

3.12 Range of automatic gain control[1].

ANNEX 3 *

Technical Data Used in Establishing the Provisions and Associated Plans and which Should be Used for their Application

1. DEFINITIONS

1.1 *Feeder link*

The term feeder link, as defined in No. **109** of the Radio Regulations, is further qualified to indicate a fixed-satellite service link in the frequency band 17.3 - 17.8 GHz in the Region 2 broadcasting-satellite

[1] See Sections 3.10 and 4.9 of Annex 3 to this Appendix.

* *Note by the General Secretariat:* Subsequent to WARC Orb-88, certain errors have been discovered in the technical information for fast roll-off antenna patterns as contained in Appendices **30A(Orb-88)** and **30B**. This technical information as corrected by the IFRB derives from other relevant Conference decisions and is given in the provisional IFRB Rule of Procedure No. H38, published in IFRB Circular-letter No. 790 of 12 july 1989. Copies of the latter may be obtained directly from the IFRB.

service Plan and in the frequency bands 14.5 - 14.8 GHz, and 17.3 - 18.1 GHz in the Regions 1 and 3 Plan from any earth station within the feeder-link service area to the associated space station in the broadcasting-satellite service.

1.2 *Feeder-link beam area*

The area delineated by the intersection of the half-power beam of the satellite receiving antenna with the surface of the Earth.

1.3 *Feeder-link service area*

The area on the surface of the Earth within the feeder-link beam area within which the administration responsible for the service has the right to locate transmitting earth stations for the purpose of providing feeder links to broadcasting-satellite space stations.

1.4 *Nominal orbital position*

The longitude of a position in the geostationary-satellite orbit associated with a frequency assignment to a space station in a space radiocommunication service. The position is given in degrees from the Greenwich meridian.

1.5 *Adjacent channel*

The RF channel in the broadcasting-satellite service frequency Plan, or in the associated feeder-link frequency Plan, which is situated immediately higher or lower in frequency with respect to the RF reference channel.

1.6 *Second adjacent channel (Region 2)*

The RF channel in the broadcasting-satellite service frequency Plan, or in the associated feeder-link frequency Plan, which is situated immediately beyond either of the adjacent channels.

1.7 *Feeder-link equivalent protection margin for Regions 1 and 3*

The feeder-link equivalent protection margin (M_u) is given by the formula:

$$M_u = -10 \log \left(10^{-M_1/10} + 10^{-M_2/10} + 10^{-M_3/10}\right) \text{ dB}$$

where:

M_1 is the value in dB of the protection margin for the same channel, i.e.:

$$M_1 = \left[\frac{\text{wanted power}}{\text{sum of the co-channel interfering powers}}\right] (\text{dB}) - \text{co-channel protection ratio (dB)}$$

M_2 and M_3 are the values in dB of the protection margin for the upper and lower adjacent channels respectively, i.e.:

$$M_2 = \left[\frac{\text{wanted power}}{\text{sum of the upper adjacent channel interfering powers}}\right] (\text{dB}) - \text{adjacent channel protection ratio (dB)}$$

$$M_3 = \left[\frac{\text{wanted power}}{\text{sum of the lower adjacent channel interfering powers}}\right](\text{dB}) - \text{adjacent channel protection ratio (dB)}$$

All powers are evaluated at the receiver input. All protection ratios are given in Section 3.3 of this Annex.

1.8 *Overall carrier-to-interference ratio (Region 2)*

The overall carrier-to-interference ratio is the ratio of the wanted carrier power to the sum of all interfering RF powers in a given channel including both feeder links and down-links. The overall carrier-to-interference ratio due to interference from the given channel is calculated as the reciprocal of the sum of the reciprocals of the feeder-link carrier-to-interference ratio and the down-link carrier-to-interference ratio referred to the satellite receiver input and earth station receiver input, respectively[1].

1.9 *Overall co-channel protection margin (Region 2)*

The overall co-channel protection margin in a given channel is the difference in dB between the overall co-channel carrier-to-interference ratio and the co-channel protection ratio.

[1] In Region 2 there are a total of five overall carrier-to-interference ratios used in the analysis of the Plan, namely, co-channel, upper and lower adjacent channels and upper and lower second adjacent channels. In Regions 1 and 3, three ratios are used, namely, co-channel and upper and lower adjacent channels; furthermore, it was decided to assess the relative contributions of the feeder links and down-links separately.

1.10 *Overall adjacent channel protection margin (Region 2)*

The overall adjacent channel protection margin is the difference, in dB, between the overall adjacent channel carrier-to-interference ratio and the adjacent channel protection ratio.

1.11 *Overall second adjacent channel protection margin (Region 2)*

The overall second adjacent channel protection margin is the difference in dB between the overall second adjacent channel carrier-to-interference ratio and the second adjacent channel protection ratio.

1.12 *Overall equivalent protection margin*

For Region 2

The overall equivalent protection margin M is given in dB by the expression:

$$M = -10 \log \left(\sum_{i=1}^{5} 10^{(-M_i/10)} \right) \qquad \text{(dB)}$$

where:

M_1 = overall co-channel protection margin, in dB (as defined in Section 1.9);

M_2, M_3 = overall adjacent channel protection margins for the upper and lower adjacent channels respectively, in dB (as defined in Section 1.10);

M_4, M_5 = overall second adjacent channel protection margins for the upper and lower second adjacent channels respectively, in dB (as defined in Section 1.11).

The adjective "equivalent" indicates that the protection margins for all interference sources from the adjacent and second adjacent as well as co-channel interference sources have been included.

For Regions 1 and 3[1]

The overall equivalent protection margin M is given in dB by the expression:

$$M = -10 \log \left(10^{-\left(M_u + R_{cu}\right)/10} + 10^{-\left(M_d + R_{cd}\right)/10}\right) - R_{co}$$

where:

M_u = equivalent protection margin for the feeder link (as defined in Section 1.7 of this Annex);

M_d = equivalent protection margin for the down-link (as defined in Section 3.4, Annex 5 to Appendix **30 (Orb-85)**);

R_{cu} = co-channel feeder-link protection ratio;

---

[1] For Regions 1 and 3, this formula replaces the formula given in Section 1.14 of Annex 5 to Appendix **30 (Orb-85)**.

R_{cd} = co-channel down-link protection ratio;

R_{co} = co-channel overall protection ratio.

The values of the protection ratios are as follows:

R_{cu} = 40 dB

R_{cd} = 31 dB

R_{co} = 30 dB

The adjective "equivalent" indicates that the protection margins for all interference sources from the adjacent channels as well as co-channel interference sources have been included.

2. RADIO PROPAGATION FACTORS

The propagation loss on an Earth-space path is equal to the free-space path loss plus the atmospheric absorption loss plus the rain attenuation exceeded for 1% of the worst month in Region 2. In Regions 1 and 3, the atmospheric absorption loss is not included.

2.1 *Atmospheric absorption*

For Region 2 (see Figure 2)

The loss due to atmospheric absorption (i.e., clear-sky attenuation) is given by:

$$A_a = \frac{92.20}{\cos\theta}\left(0.020F_o + 0.008\,\rho F_w\right) \quad \text{(dB)} \qquad \text{for } \theta < 5°$$

where:

$$F_o = \left\{24.88 \tan \theta + 0.339 \sqrt{1416.77 \tan^2 \theta + 5.51}\right\}^{-1}$$

$$F_w = \left\{40.01 \tan \theta + 0.339 \sqrt{3663.79 \tan^2 \theta + 5.51}\right\}^{-1}$$

and:

$$A_a = \frac{0.0478 + 0.0118 \rho}{\sin \theta} \qquad \text{(dB)} \qquad \text{for } \theta \geq 5^\circ$$

where:

θ = the elevation angle (degrees),

ρ = the surface water vapour concentration, g/m^3, with
ρ = 10 g/m^3 for rain-climatic zones A to K and
ρ = 20 g/m^3 for rain-climatic zones M to P

For Regions 1 and 3 (see Figures 1 and 3)

In the Regions 1 and 3 feeder-link Plan, the atmospheric absorption loss is not included for the calculation of margins.

2.2 *Rain attenuation*

The propagation model for feeder links using circularly polarized signals is based on the value of rain attenuation for 1% of the worst month.

Figures 1, 2 and 3 give the rain climatic zones for Regions 1, 2 and 3.

Figure 4 presents a plot of rain attenuation of circularly polarized signals exceeded for 1% of the worst month at 17.5 GHz as a function of earth station latitude and elevation angle for each of the rain climatic zones in Region 2.

For calculation, the following data are needed:

$R_{0\,01}$: point rainfall rate for the location exceeded for 0.01% of an average year (mm/h)

h_o: the height above mean sea level of the earth station (km)

θ: the elevation angle (degrees)

f: frequency (GHz)

ζ: latitude of earth station (degrees).

Mean frequencies will be used for calculations for the frequency bands, i.e. 17.7 GHz and 14.65 GHz for Regions 1 and 3, 17.5 GHz for Region 2.

Step 1: The mean zero-degree isotherm height h_F is:

$$h_F = 5.1 - 2.15 \log \left[1 + 10^{\frac{(|\zeta|-27)}{25}}\right] \qquad \text{(km)}$$

Step 2: The rain height h_R is:

$$h_R = C \cdot h_F$$

where: $C = 0.6$ for $0° \leqslant |\zeta| < 20°$

$C = 0.6 + 0.02\,(|\zeta|-20)$ for $20° \leqslant |\zeta| < 40°$

$C = 1$ for $|\zeta| \geqslant 40°$

Step 3: The slant-path length, L_s, below the rain height is:

$$L_s = \frac{2(h_R - h_o)}{\left[\sin^2\theta + 2\,\dfrac{(h_R - h_o)}{R_e}\right]^{1/2} + \sin\theta} \qquad \text{(km)}$$

where:

R_e is the effective radius of the Earth (8.500 km)

Step 4: The horizontal projection, L_G, of the slant-path is:

$$L_G = L_s \cos\theta \qquad \text{(km)}$$

Step 5: The rain path reduction factor $r_{0.01}$, for 0.01% of the time is:

$$r_{0\,01} = \frac{90}{90 + 4\,L_G}$$

Step 6: The specific attenuation γ_R is determined from:

$$\gamma_R = k\,(R_{0\,01})^{\alpha} \qquad \text{(dB/km)}$$

where:

$R_{0\,01}$ is given in Table 5 for each rain climatic zone. The frequency dependent coefficients k and α are given in Table 6 and the rain climatic zones are given in Figures 1, 2 and 3 for Regions 1, 2 and 3.

TABLE 5

Rainfall intensity (R) for the rain climatic zones (exceeded for 0.01% of an average year)

Rain climatic zone	A	B	C	D	E	F	G	H	J	K	L	M	N	P
Rainfall intensity (mm/h)	8	12	15	19	22	28	30	32	35	42	60	63	95	145

TABLE 6

Frequency dependent coefficients

Frequency (GHz)	k	α	
14.65	0.0327	1.149	For Regions 1 and 3
17.5	0.0521	1.114	For Region 2
17.7	0.0531	1.110	For Regions 1 and 3

Step 7: The attenuation exceeded for 1% of the worst month is:

$$A_{1\%} = 0.223\ \gamma_R\ L_s\ r_{0.01}\ \text{(dB) for Regions 1 and 3}$$

$$A_{1\%} = 0.21\ \gamma_R\ L_s\ r_{0.01}\ \text{(dB) for Region 2}$$

2.3 *Rain attenuation limit*

In the analysis of the Plan for Region 2, a maximum rain attenuation on the feeder link of 13 dB was considered assuming that other means would be used at the implementation stage to compensate for larger rain attenuation on the feeder link.

In the analysis of the Regions 1 and 3 Plan, no rain attenuation is included in the margins.

2.4 *Depolarization*

Rain and ice can cause depolarization of radio frequency signals. The level of the co-polar component relative to the depolarized component is given by the cross-polarization discrimination (XPD) ratio. For the feeder link, the XPD ratio, in dB, not exceeded for 1% of the worst month, is given by:

$$XPD = 30 \log f - 40 \log (\cos \theta) - V \log A_p \text{ (dB) for } 5^\circ \leqslant \theta \leqslant 60^\circ$$

where: $V = 20$ for 14.5 - 14.8 GHz

and: $V = 23$ for 17.3 - 18.1 GHz

where: A_p: co-polar rain attenuation exceeded for 1% of the worst month

f: frequency (GHz)

θ: elevation angle (degrees)

For values of θ greater than 60°, use $\theta = 60°$ in the above equation.

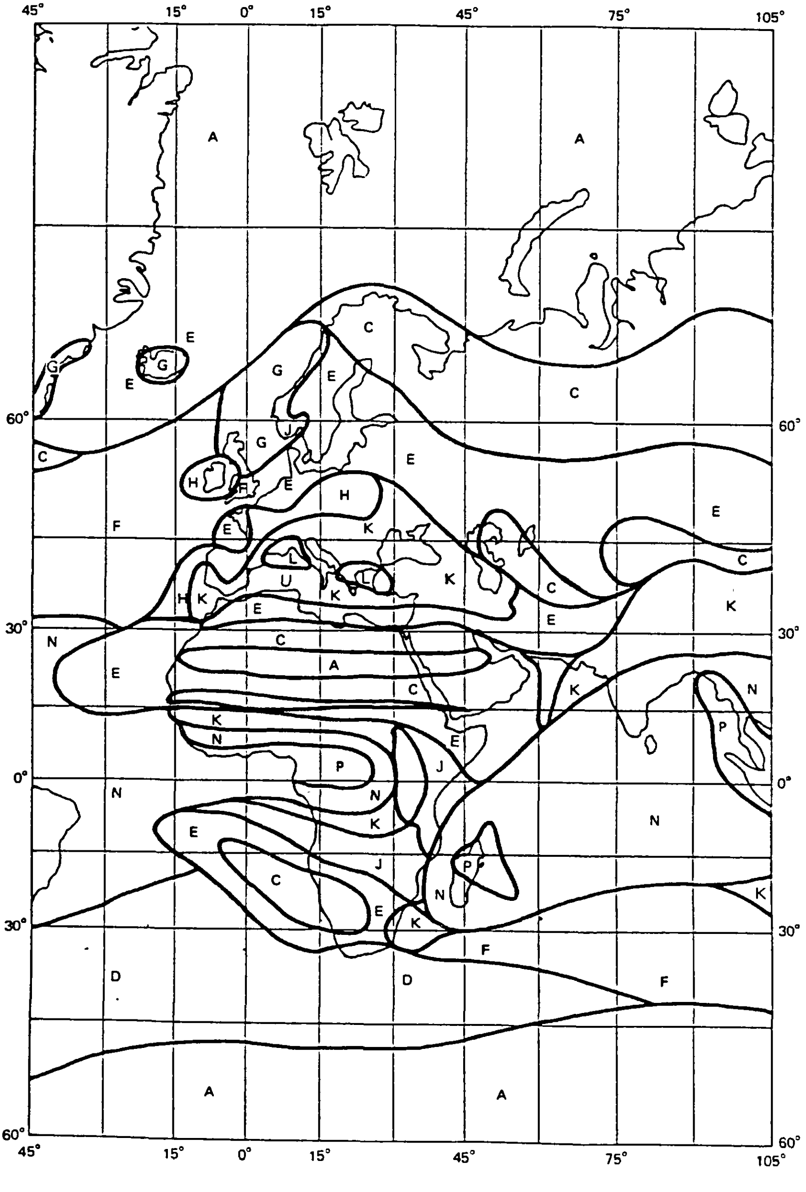


FIGURE 1

Rain climatic zones (Regions 1 and 3)

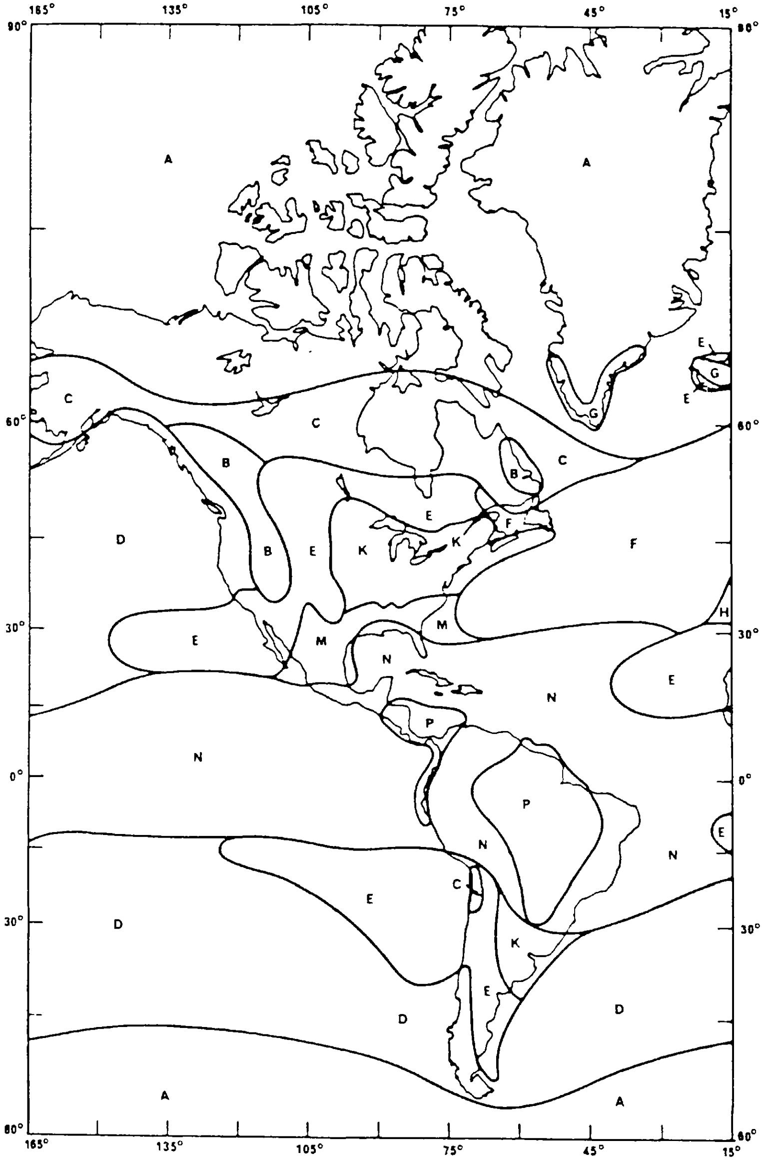


FIGURE 2

Rain climatic zones (Region 2)

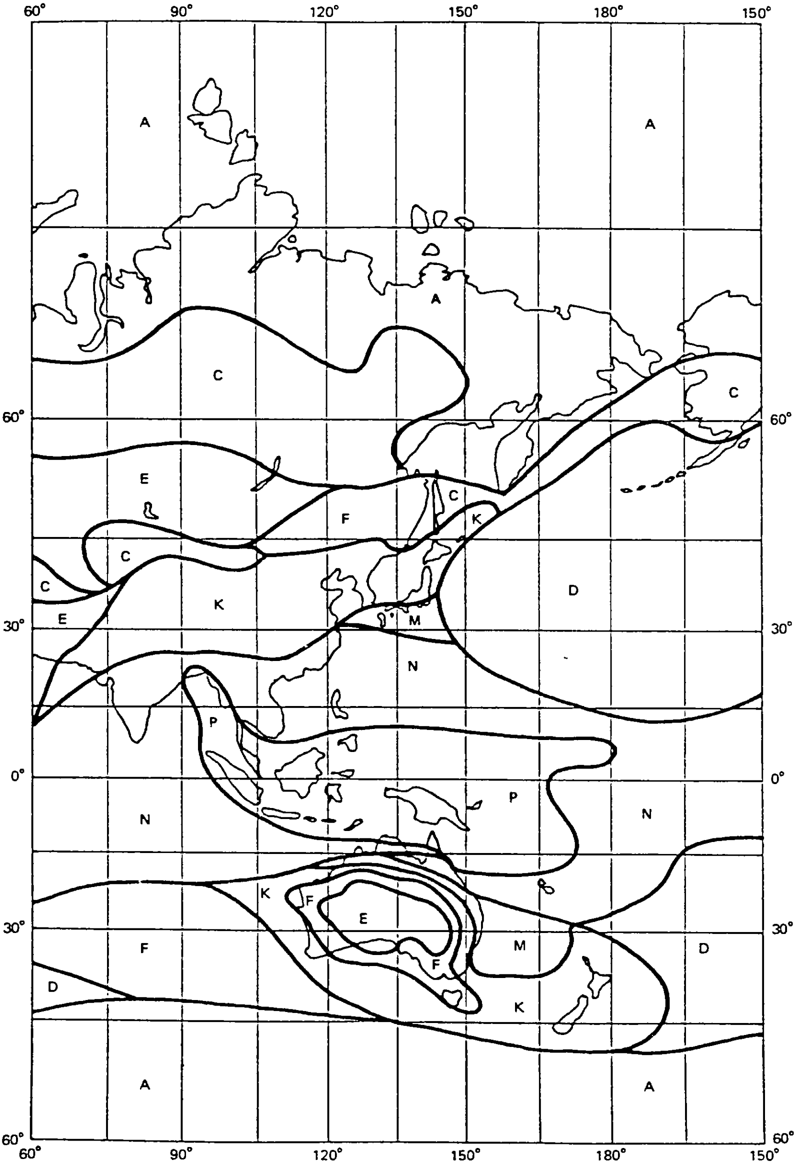
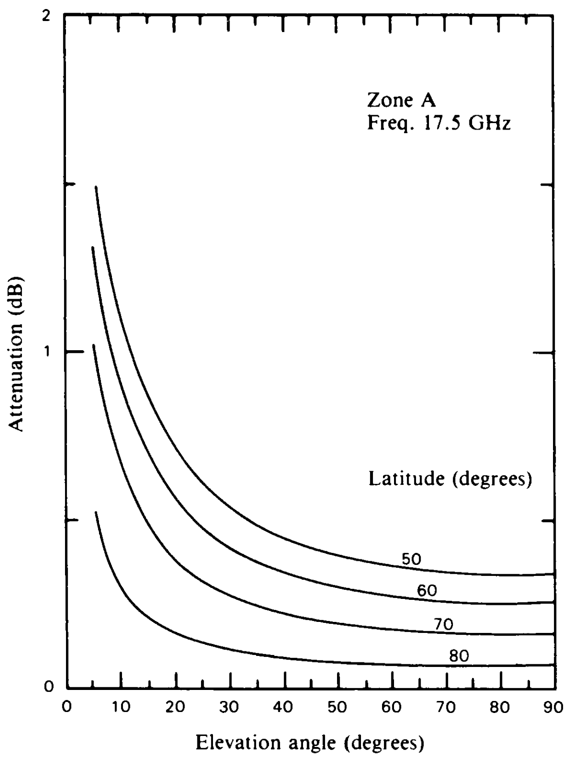
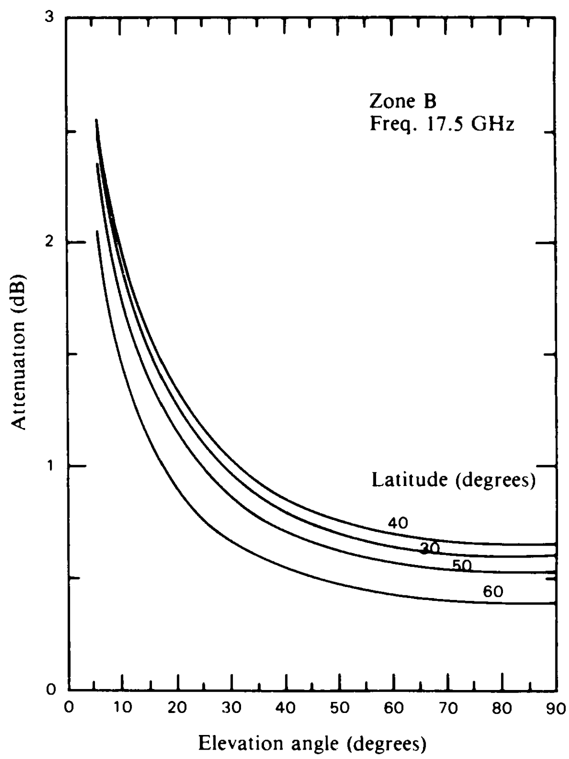


FIGURE 3

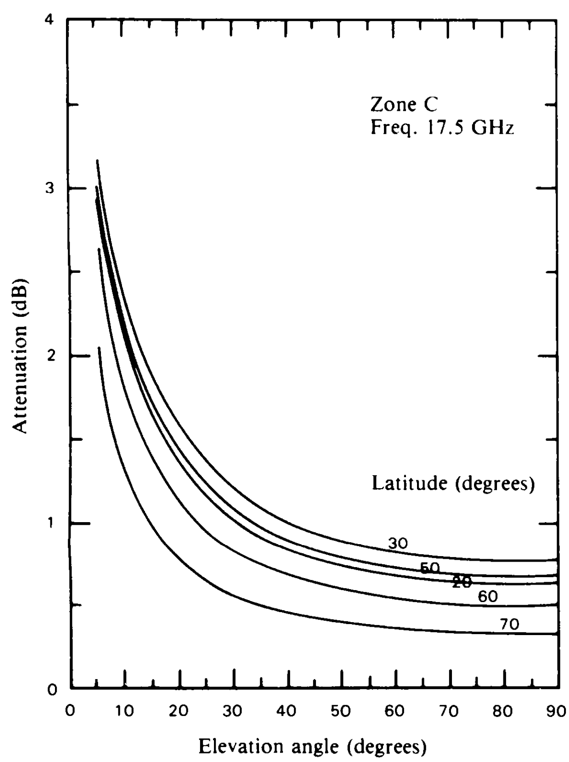
Rain climatic zones (Regions 1 and 3)



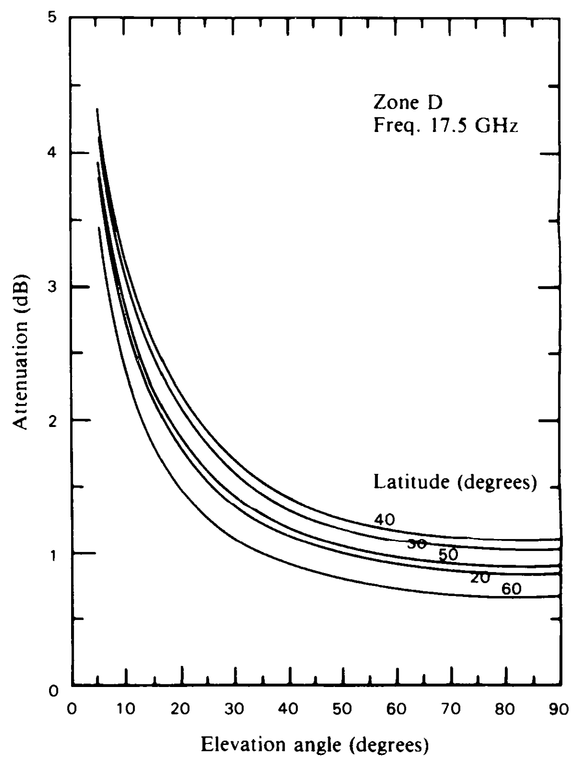
a) Rain climatic zone A



b) Rain climatic zone B



c) Rain climatic zone C



d) Rain climatic zone D

FIGURE 4

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain climatic zones

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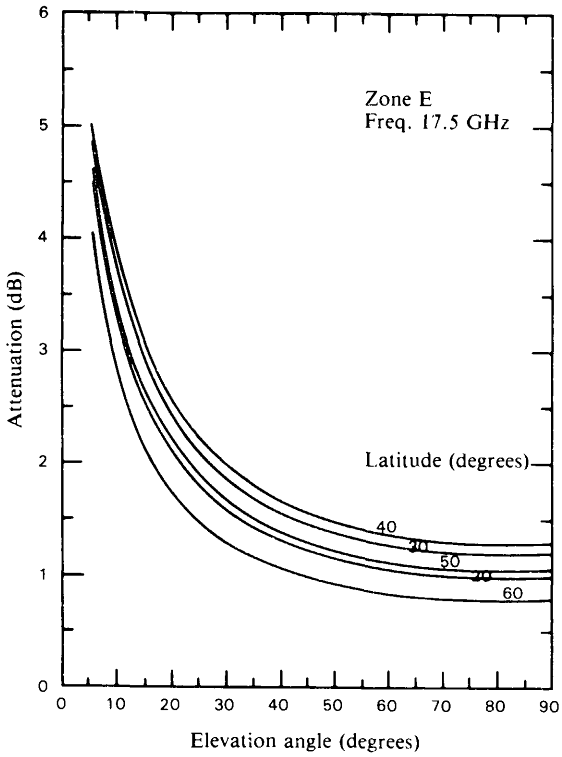
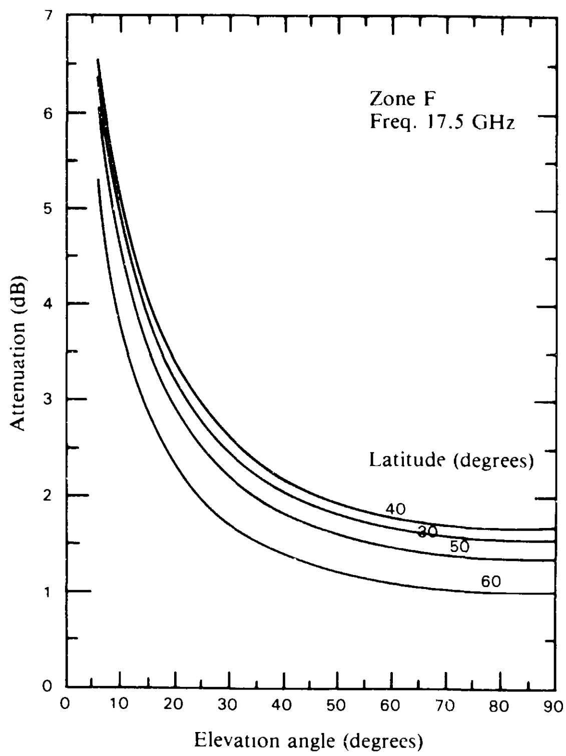
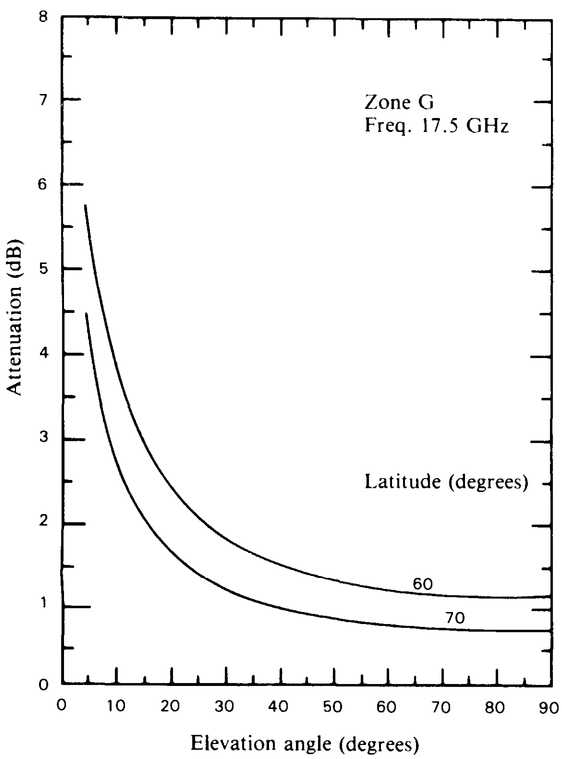


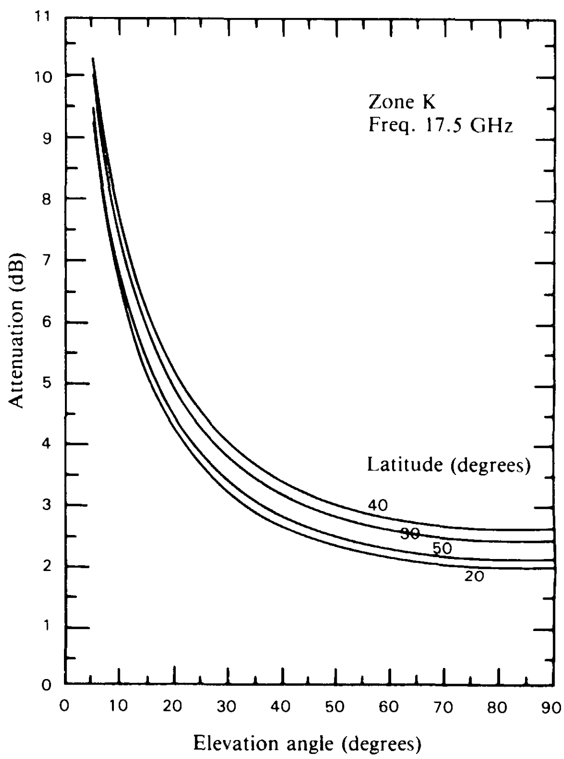
e) Rain climatic zone E



f) Rain climatic zone F



g) Rain climatic zone G



h) Rain climatic zone K

FIGURE 4 (*cont.*)

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain climatic zones

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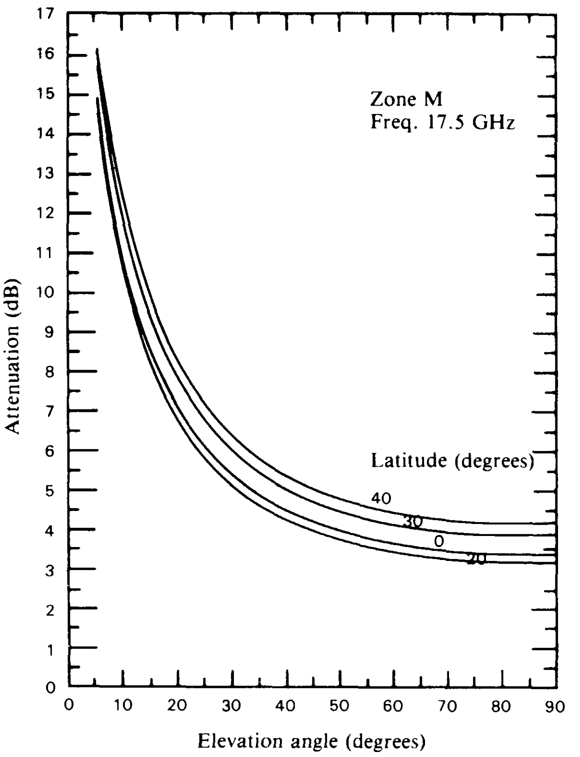
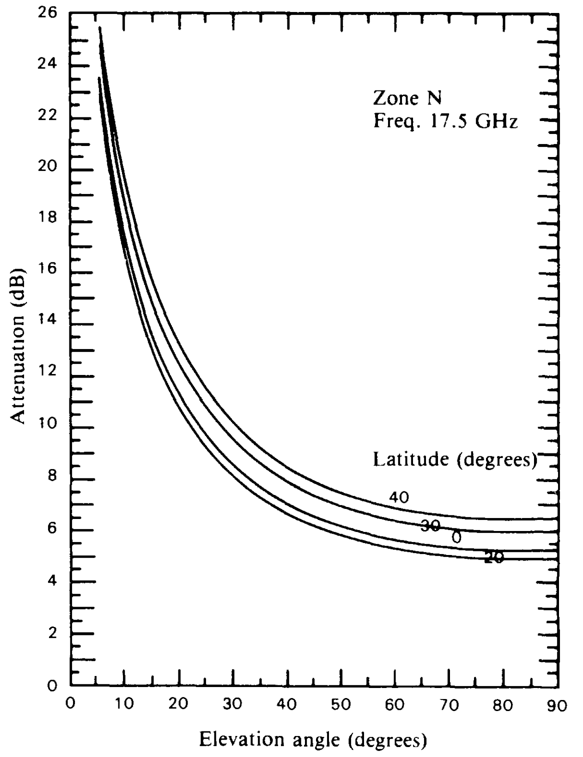
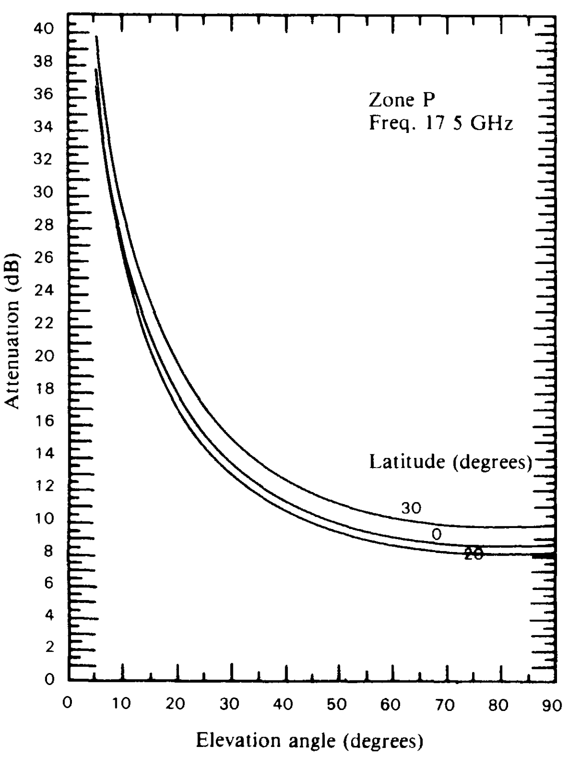


i) Rain climatic zone M



j) Rain climatic zone N



k) Rain climatic zone P

FIGURE 4 ***(end)***

Rain attenuation values exceeded for 1% of the worst month (sea level) for Region 2 rain climatic zones

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2.5 *Procedure for calculating the carrier-to-interference ratio at a space station receiver input*

In Region 2, the calculation of the feeder-link carrier-to-interference ratio (exceeded for 99% of the worst month) at a space station receiver input used to obtain the overall equivalent protection margin at a test point assumes a rain attenuation value not exceeded for 99% of the worst month on the wanted feeder-link path. For the interfering feeder-link signal path, clear sky propagation (i.e., including atmospheric absorption only) is assumed.

In Regions 1 and 3, the calculation of the feeder-link carrier-to-interference ratio at a space station receiver input used to obtain the feeder-link equivalent protection margin at a test point assumes free space conditions on the wanted feeder-link path and on the interfering feeder-link path.

3. BASIC TECHNICAL CHARACTERISTICS FOR REGIONS 1 AND 3

3.1 *Translation frequency and guard bands*

a) *17 GHz feeder links*

The feeder-link Plan generally uses a frequency translation of 5.6 GHz between the 17 GHz feeder-link channels and the 12 GHz down-link channels. Other values of the translation frequency may be used, provided that the corresponding channels have been assigned to the space station of the administration concerned.

With the value of frequency translation between the feeder-link frequency band (17.3 - 18.1 GHz in Regions 1 and 3) and the down-link frequency band (11.7 - 12.5 GHz in Region 1 and 11.7 - 12.2 GHz in Region 3), the guard bands present in the down-link Plan result in corresponding bandwidths of 11 MHz at the upper and 14 MHz at the lower feeder-link band edges. These feeder-link guard bands may be used for transmissions in the space operation service.

b) *14 GHz feeder links*

As the maximum available bandwidth for the feeder-link band 14.5 - 14.8 GHz is only 300 MHz against 800 MHz and 500 MHz in the down-link Plan for Regions 1 and 3 respectively, several translation frequencies must be considered to allow any channel in the Plan to be used. Consequently, a particular feeder-link channel has been assigned to several BSS Plan channels simultaneously.

Generally, the translation frequencies from the feeder-link channels are:

a) 2797.82 MHz to down-link BSS channels 1 to 14

b) 2529.30 MHz to down-link BSS channels 15 to 28

c) 2260.78 MHz to down-link BSS channels 29 to 40

The guard bands are 11.80 MHz at the lower band edge and 11.86 MHz at the upper band edge.

3.2 *Carrier-to-noise ratio*

Section 3.3 of Annex 5 to Appendix **30 (Orb-85)** provides guidance for planning and the basis for the evaluation of the carrier-to-noise ratios of the feeder-link and down-link Plans.

As guidance for planning, the reduction in quality in the down-link due to thermal noise in the feeder link is taken as equivalent to a degradation in the down-link carrier-to-noise ratio of approximately 0.5 dB not exceeded for 99% of the worst month.

For down-links, as indicated in Appendix **30 (Orb-85)**, the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977, adopted a *C/N* value of 14.5 dB for 99% of the worst month at the edge of the service area. The required feeder link *C/N* is 24 dB for 99% of the worst month, at the edge of the service area, to produce an overall *C/N* performance of 14 dB.

3.3 *Protection ratios*

For planning in Regions 1 and 3, the following protection ratios have been applied for the purpose of calculating the feeder-link equivalent protection margins:

- co-channel protection ratio = 40 dB;
- adjacent channel protection ratio = 21 dB.

The method for the calculation of the feeder-link equivalent protection margin is given in Section 1.7 of this Annex.

3.4 *Feeder-link e.i.r.p.*

The level of e.i.r.p. of each feeder link is specified in column 8 of the Plan.

The level of e.i.r.p. specified in the Plan can only be exceeded under certain conditions explained in Section 3.11 of this Annex (see also Article 5, paragraph 5.1.1 of this Appendix).

3.5 *Transmitting antenna*

3.5.1 *Antenna diameter*

The feeder-link Plan is based on an antenna diameter of 5 metres for the band 17.3 - 18.1 GHz and 6 metres for the band 14.5 - 14.8 GHz.

The minimum antenna diameter permitted in the Plan is 2.5 metres. However, for antennas smaller than 5 metres for the 17.3 - 18.1 GHz band and 6 metres for the 14.5 - 14.8 GHz band, the off-axis e.i.r.p. shall not exceed the limits indicated in Figure A of Section 3.5.3 of this Annex.

3.5.2 *On-axis gain*

The on-axis gain for the 5-metre antenna at 17.3 - 18.1 GHz and for the 6-metre antenna at 14.5 to 14.8 GHz is taken as 57 dBi.

3.5.3 *Off-axis e.i.r.p. of transmitting antennas*

The co-polar and cross-polar off-axis e.i.r.p. for planning in Regions 1 and 3 are given in Figure A.

3.5.4 *Pointing accuracy*

The Plan has been developed to accommodate a loss in gain of 1 dB due to earth station antenna mis-pointing.

3.6 *Transmitter power*

The maximum transmitter power delivered to the input of the antenna of the feeder-link earth station per 27 MHz television channel shall be such as to ensure that the e.i.r.p. envelope in Section 3.5.3 is not exceeded except under certain conditions specified in Section 3.11 of this Annex.

3.7 *Satellite receiving antenna*

3.7.1 *Cross-section of receiving antenna beam*

Planning has been based on beams of elliptical or circular cross-section. When the assignments are implemented, or when the Plan is modified, administrations may use non-elliptical or shaped beams.

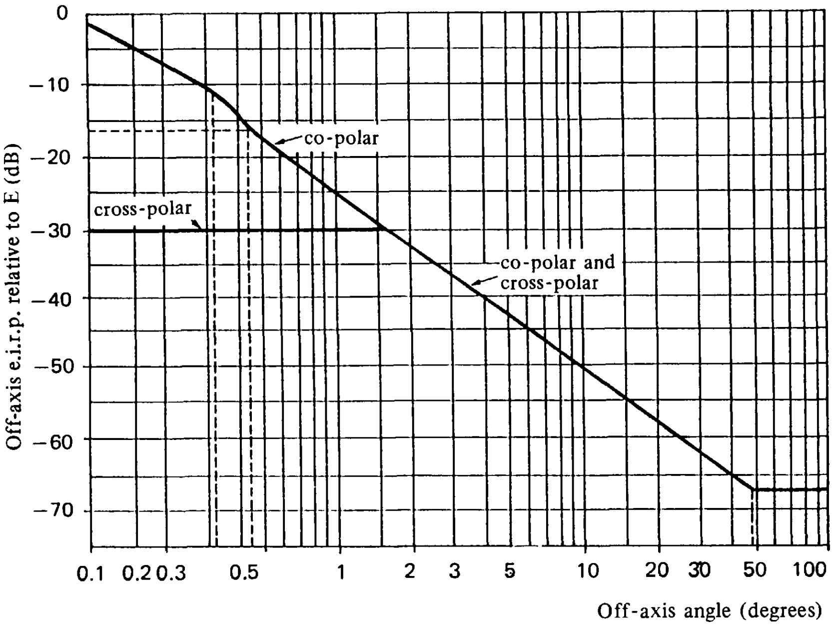

FIGURE A

Earth station e.i.r.p. at angles off antenna axis

Co-polar component (dBW):

E (dBW)	for $0° < \theta \leqslant 0.1°$
$E - 21 - 20 \log \theta$ (dBW)	for $0.1° < \theta \leqslant 0.32°$
$E - 5.7 - 53.2\ \theta^2$ (dBW)	for $0.32° < \theta \leqslant 0.44°$
$E - 25 - 25 \log \theta$ (dBW)	for $0.44° < \theta \leqslant 48°$
$E - 67$ (dBW)	for $\theta > 48°$

Cross-polar component (dBW):

$E - 30$ (dBW)	for $0° \leqslant \theta \leqslant 1.6°$
$E - 25 - 25 \log \theta$ (dBW)	for $1.6° < \theta \leqslant 48°$
$E - 67$ (dBW)	for $\theta > 48°$

where:

E (dBW) is the earth station e.i.r.p. on the antenna axis;

and

θ = off-axis angle referred to the main lobe axis (degrees).

The value of E to be taken into account in the above formulae is specified in column 8 of the Plan.

If the cross-section of the receiving antenna beam is elliptical, the effective beamwidth φ_0 is a function of the angle of rotation q between the plane containing the satellite and the major axis of the beam cross-section and the plane in which the beamwidth is required.

The relationship between the maximum gain of an antenna and the half-power beamwidth can be derived from the expression:

$$G_m = 27\,843/ab$$

or

$$G_m(\text{dB}) = 44.44 - 10 \log a - 10 \log b$$

where:

a and b are the angles (in degrees) subtended at the satellite by the major and minor axes of the elliptical cross-section of the beam.

An antenna efficiency of 55% is assumed.

3.7.2 *Minimum beamwidth*

A minimum value of 0.6° for the half-power beamwidth of the receiving antenna has been used for planning.

3.7.3 *Reference patterns*

The reference patterns for the co-polar and cross-polar components of the satellite receiving antenna used in the Plan are given in Figure B.

In some cases, to reduce co-polar interference, the pattern shown in Figure C is used; this use is indicated in the Plan by note 1. This pattern is derived from an antenna producing an elliptical beam with fast roll-off in the main lobe. Three curves for different values of φ_0 are shown as examples.

3.7.4 *Pointing accuracy*

The deviation of the receiving antenna beam from its nominal pointing direction must not exceed 0.2° in any direction. Moreover, the angular rotation of the receiving beam about its axis must not exceed ±1°; this limit is not necessary for beams of circular cross-section using circular polarization.

3.8 *System noise temperature*

The satellite system noise temperature values generally used in the Plan are 1800 K for 17 GHz and 1500 K for 14 GHz.

3.9 *Polarization*

In Regions 1 and 3, circular polarization is used for the purpose of planning the feeder links.

For the definitions of the terms "direct and indirect polarization", see Section 3.2.3 of Annex 5 to Appendix **30 (Orb-85)**.

3.10 *Automatic gain control*

The down-link Plan was based on constant satellite output power. However, the feeder-link Plan does not take account of the effect of automatic gain control on board satellites. Up to 15 dB of automatic gain control is permitted, subject to no increase in interference to other satellite systems.

3.11 *Power control*

In Regions 1 and 3, a permitted increase which may be used to overcome rain fading for each assignment is included in the Plan.

In the calculation, in cases where satellites do not use common or adjacent channels cross-polarized to each other, the maximum permissible e.i.r.p. increase, which must not exceed 10 dB, corresponds to the amount of rain attenuation which occurs on the interfering feeder link.

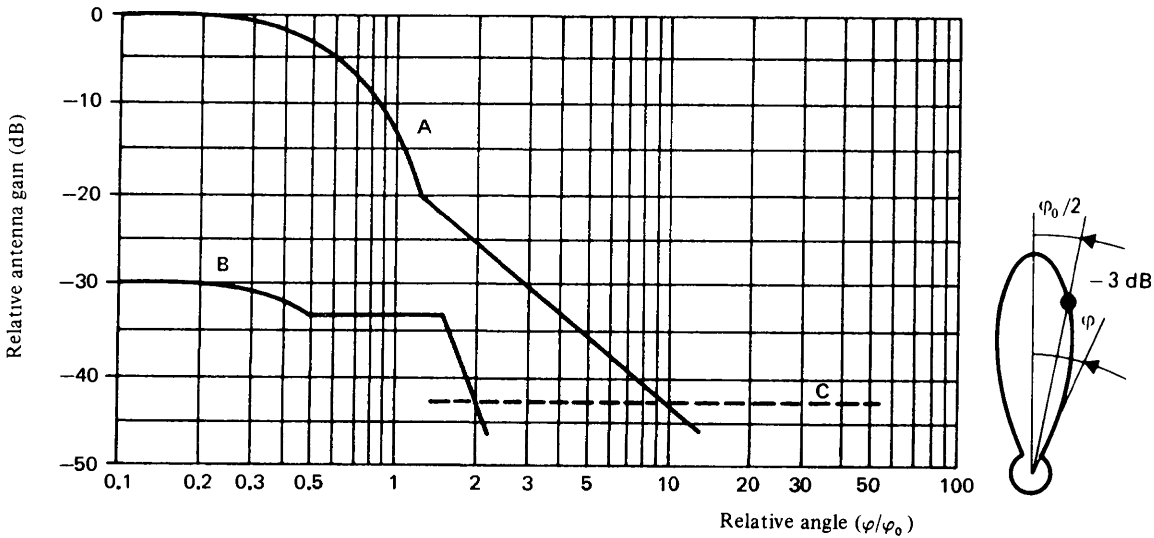

FIGURE B

Satellite receive antenna reference pattern generally used in Regions 1 et 3

Curve A: Co-polar component

The co-polar reference pattern is given by the formula:

Co-polar relative gain (dB)

$$G = -12\left(\frac{\varphi}{\varphi_0}\right)^2 \qquad \text{for} \quad 0 \leqslant \frac{\varphi}{\varphi_0} \leqslant 1.30$$

$$G = -17.5 - 25 \log\left(\frac{\varphi}{\varphi_0}\right) \qquad \text{for} \quad \frac{\varphi}{\varphi_0} > 1.30$$

After intersection with curve C: as curve C (curve C equals minus the on-axis gain).

Curve B: Cross-polar component

The cross-polar reference pattern is given by the formula:

Cross-polar relative gain (dB)

$$G = -30 - 12\left(\frac{\varphi}{\varphi_0}\right)^2 \qquad \text{for} \quad 0 \leqslant \frac{\varphi}{\varphi_0} \leqslant 0.5$$

$$G = -33 \qquad \text{for} \quad 0.5 < \frac{\varphi}{\varphi_0} \leqslant 1.67$$

$$G = -40 - 40 \log\left(\frac{\varphi}{\varphi_0} - 1\right) \qquad \text{for} \quad \frac{\varphi}{\varphi_0} > 1.67$$

After intersection with curve C: as curve C (curve C equals minus the on-axis gain).

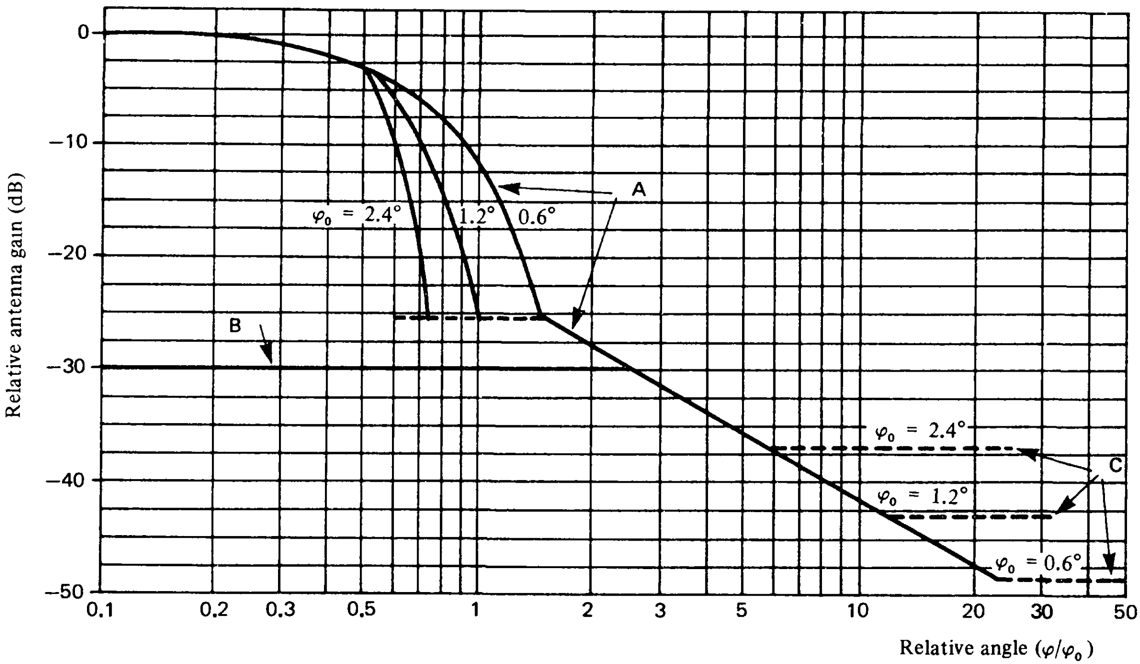

FIGURE C

Reference patterns for co-polar and cross-polar components for satellite receiving antennas with fast roll-off in the main beam for Regions 1 and 3

Curve A: Co-polar component (dB relative to main beam gain)

$-12\ (\varphi/\varphi_0)^2$ for $0 \leqslant \varphi/\varphi_0 \leqslant 0.5$

$-33.33\ \varphi_0^2\ (\varphi/\varphi_0 - x)^2$ for $0.5 < \varphi/\varphi_0 \leqslant \dfrac{0.87}{\varphi_0} + x$

-25.23 for $\dfrac{0.87}{\varphi_0} + x < \varphi/\varphi_0 \leqslant 1.413$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $\varphi/\varphi_0 > 1.413$

After intersection with Curve C: as Curve C.

Curve B: Cross-polar component (dB relative to main beam gain)

-30 for $0 \leqslant \varphi/\varphi_0 < 2.51$

After intersection with curve A: as curve A.

Curve C: Minus the on-axis gain (Curves A and C represent examples for three antennas having different values of φ_0 as labelled in Figure C. The on-axis gains of these antennas are 37, 43 and 49 dBi, respectively).

where:

φ = off-axis angle (degrees);

φ_0 = dimension of the minimum ellipse fitted around the feeder-link service area in the direction of interest (degrees);

$$x = 0.5\left(1 - \frac{0.6}{\varphi_0}\right).$$

On the other hand, in cases where satellites use common or adjacent channels cross-polarized, the maximum permissible e.i.r.p. increase is expressed as a function of the rain attenuation, but is in general less than the amount of rain attenuation due to rain-induced depolarization.

3.11.1 *Method for determination of the increase in e.i.r.p. during rain attenuation for an assignment over the Plan value*

Condition to be observed

The increase in e.i.r.p. of the assignment studied must not entail an impairment of more than 0.5 dB of the feeder-link equivalent protection margin of any other assignment to any other administration.

Calculation method

3.11.1.1 Compile a list of all assignments of other administrations (A, B, C, . . .) in the same orbital position and the two adjacent positions liable to suffer interference from the assignment studied.

3.11.1.2 Calculate the feeder-link equivalent protection margin of assignment A in free space conditions, taking account of all interference sources affecting A at the worst test points, namely:

- for assignment A: the point corresponding to the minimum C/N ratio;
- for each interference source affecting A: the point corresponding to the maximum interference power affecting A.

3.11.1.3 Introduce for the assignment studied the rain attenuation for 0.1% of the worst month and the corresponding rain depolarization value.

3.11.1.4 Recalculate the feeder-link equivalent protection margin of assignment A at the worst test points, namely:

- for assignment A: the test point used in Section 3.11.1.2 above;
- for the assignment studied: the test point corresponding to the maximum interference power affecting A.

At this stage, the e.i.r.p. of the assignment studied is that contained in the Plan.

3.11.1.5 Increase the e.i.r.p. of the assignment studied by 0.1 dB and recalculate the equivalent up-link margin of A as in Section 3.11.1.4 above.

3.11.1.6 Repeat the operation of Section 3.11.1.5 above until the equivalent up-link margin of assignment A is impaired by more than 0.5 dB in relation to the value found under Section 3.11.1.2 above, or until the e.i.r.p. increase exceeds 10 dB or the rain attenuation (see Section 3.11.1.3). Adopt the e.i.r.p. increase in the preceding iteration step.

3.11.1.7 Repeat the operations in Sections 3.11.1.2 to 3.11.1.6 above, considering the assignments B, C, . . .

3.11.1.8 Adopt the smallest of the increases in e.i.r.p. found under Section 3.11.1.6 above for the various assignments A, B, C, . . .

3.11.2 *Propagation model*

3.11.2.1 For the calculation of rain attenuation for 0.1% of the worst month, the model described in Section 2.2 of this Annex should be used. It shall be assumed that the 0.1% value is 3.3 times the 1% value in dB.

3.11.2.2 Rain depolarization shall be calculated on the basis of attenuation, using the method described in Section 2.4 of this Annex.

3.11.3 *Variation of power with rain attenuation*

The instantaneous increase in power to overcome rain attenuation must not exceed the bounds given by the characteristics shown in Figure 5.

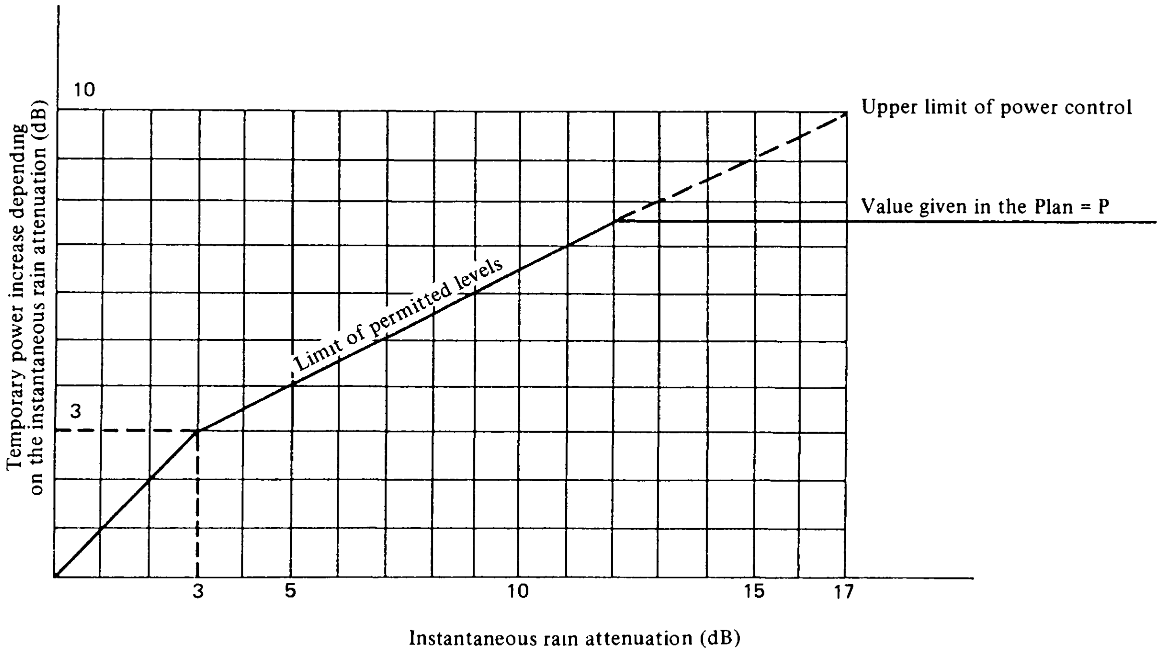

FIGURE 5

Characteristic for up-link power control

P: The value of permitted increase given in the Plan, or calculated by the IFRB, which varies for each assignment. The upper limit of this value is 10 dB.

3.11.4 *Procedures*

3.11.4.1 An administration wishing to introduce power control may use a value not exceeding that given in column 9 of the Plan or it may request, where this is possible, the use of a higher value for a given earth station location. In this latter case, it shall request the IFRB to calculate the maximum permissible value for that site. The administration shall provide the Board with the coordinates of the station, the proposed antenna characteristics, including the off-axis co-polar and cross-polar characteristics, and the rain climatic zone.

3.11.4.2 The IFRB shall calculate the permissible increase in power using the method described in Section 3.11.1.

3.11.4.3 The IFRB shall communicate the results of the calculations to the requesting administrations as well as to those administrations whose feeder-link equivalent protection margin is reduced.

In any case, the permitted increase in e.i.r.p. above that shown in column 8 of the Plan shall not exceed 10 dB.

3.11.4.4 In the event of modifications to the Plan, the IFRB shall recalculate the value of power control for the assignment subject to the modification and insert the appropriate value for that assignment in column 9 of the Plan. A modification to the Plan shall not require the adjustment of the values of permissible power increase of other assignments in the Plan.

3.12 *Site diversity*

3.13 *Depolarization compensation*

The Plan is developed without the use of depolarization compensation. Depolarization compensation is permitted only to the extent that interference to other satellites does not increase by more than 0.5 dB[1] relative to that calculated in the feeder-link Plan.

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[1] This margin has to be shared between power control effects and depolarization compensation effects when both are involved (see Section 3.11).

3.14 *Amplitude-modulation to phase-modulation conversion*

The degradation caused by AM to PM conversion was taken into account when calculating the carrier-to-noise ratio of the feeder link. A value of 2.0 dB was allowed.

3.15 *Orbit positions*

The Plan is generally based on the use of regular arrangements of 6° from 37° W to 29° E and from 38° E to 160° W. The orbital positions are those given in the Plan plus the 116° E, 164° E, 176° E, 178° W, 172° W, 166° W positions.

The Regions 1 and 3 Plan is also based on the grouping of space stations in nominal orbital positions of ± 0.2° from the centre of the cluster.

Generally, the space stations are shown in the Plan in the centre of the cluster. However, in some cases, the space stations are shown at the edge of the cluster. Administrations may locate satellites within a cluster at any orbital position within that cluster, provided they obtain the agreement of other administrations having assignments to space stations in the same cluster.

4. BASIC TECHNICAL CHARACTERISTICS FOR REGION 2

4.1 *Translation frequency and guard bands*

The feeder-link Plan is based on the use of a single frequency translation of 5.1 GHz between the 17 GHz feeder-link channels and the 12 GHz down-link channels. Other values of the translation frequency may be used, provided that the corresponding channels have been assigned to the space station of the administration concerned.

With a single value frequency translation between the feeder-link frequency band (17.3 - 17.8 GHz) and the down-link frequency band (12.2 - 12.7 GHz), the guard bands present in the down-link Plan result in corresponding bandwidths of 12 MHz at the upper and lower feeder-link band edges. These feeder-link guard bands may be used for transmissions in the space operation service.

4.2 *Carrier-to-noise ratio*

Section 3.3 of Annex 5 to Appendix **30 (Orb-85)** provides guidance for planning and the basis for the evaluation of the carrier-to-noise ratios of the feeder-link and down-link Plans.

As a guidance for planning, the reduction in quality in the down-link due to thermal noise in the feeder link is taken as equivalent to a degradation in the down-link carrier-to-noise ratio of approximately 0.5 dB not exceeded for 99% of the worst month.

4.3 *Carrier-to-noise ratio*

Section 3.4 of Annex 5 to Appendix **30 (Orb-85)** provides guidance for planning for the contribution of the feeder-link co-channel interference to the overall co-channel carrier-to-interference ratio. However, the feeder-link and down-link Plans are evaluated on the overall equivalent protection margin which includes the combined down-link and feeder-link contributions. Definitions 1.7, 1.8, 1.9, 1.10 and 1.11 of this Annex and the protection ratios given in Section 3.4 of Annex 5 to Appendix **30 (Orb-85)** are used in the analysis of the Plans.

For the adjacent channels, the Plan is based on an orbital separation of 0.4° between nominally co-located satellites having cross-polarized adjacent channel assignments.

For the second adjacent channels, the Plan is based on a 10 dB improvement on the feeder-link carrier-to-interference ratio due to the satellite receive filtering.

4.4 *Transmitting antenna*

4.4.1 *Antenna diameter*

The feeder-link Plan is based on an antenna diameter of 5 metres.

The minimum antenna diameter permitted in the Plan is 2.5 metres. However, the feeder-link carrier-to-noise ratio and carrier-to-interference ratio resulting from the use of antennas with diameters smaller than 5 metres would generally be less than those calculated in the Plan.

The use of antennas larger than 5 metres, with corresponding values of on-axis e.i.r.p. higher than the planned value (indicated in Section 4.4.3) but without augmented off-axis e.i.r.p., is permitted if the orbital separation between the assigned orbital location of the administration and the assigned orbital location of any other administration is greater than 0.5°.

Antennas with diameters larger than 5 metres can also be implemented if the above orbital separation is less than 0.5° and if the e.i.r.p. of the desired feeder-link earth station does not exceed the planned value of e.i.r.p.

If the above orbital separation is less than 0.5° and if the e.i.r.p. of the desired feeder-link earth station exceeds the planned value, agreement between administrations is required.

4.4.2 *Reference patterns of transmitting antennas*

The co-polar and cross-polar reference patterns of transmitting antennas used for planning in Region 2 are given in Figure 6.

4.4.3 *Antenna efficiency*

The Plan is based on an antenna efficiency of 65%. The corresponding on-axis gain for an antenna having a 5-metre diameter is 57.4 dBi at 17.55 GHz, and the corresponding value of e.i.r.p. used for planning purposes is 87.4 dBW.

4.4.4 *Pointing accuracy*

The Plan has been developed to accommodate a loss in gain due to earth station antenna mis-pointing of 1 dB. Under no circumstances shall the Plan allow for a mis-pointing angle greater than 0.1°.

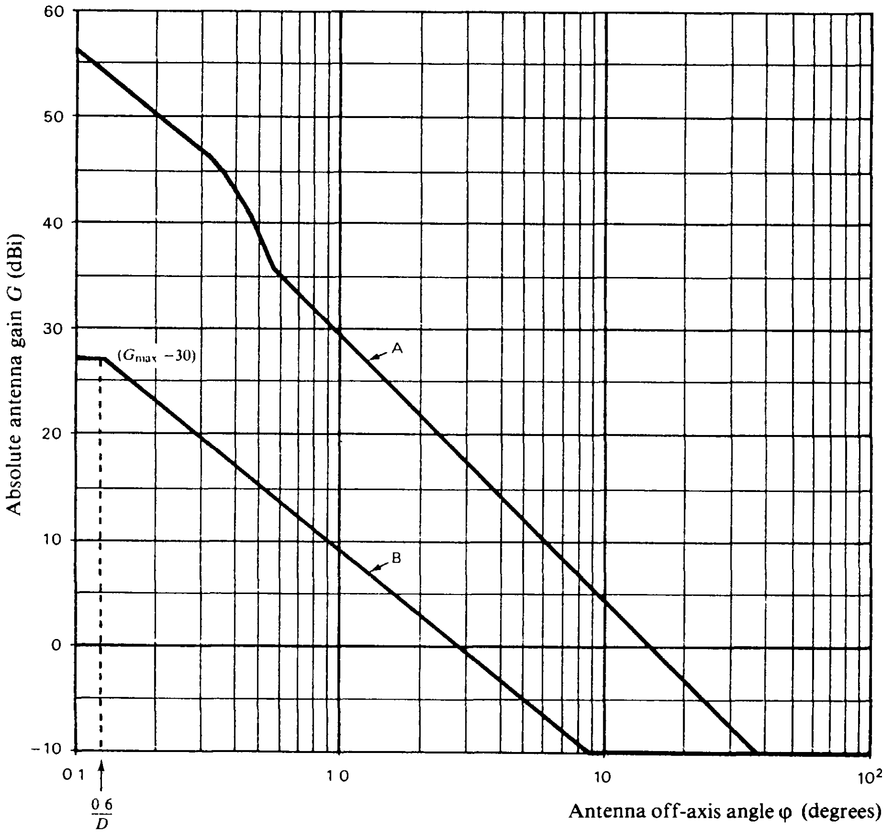

FIGURE 6

Reference patterns for co-polar and cross-polar components for transmitting antennas for Region 2

Curve A: Co-polar component (dBi)

$36 - 20 \log \varphi$	for	$0.1° \leqslant \varphi < 0.32°$
$51.3 - 53.2\ \varphi^2$	for	$0.32° \leqslant \varphi < 0.54°$
$29 - 25 \log \varphi$	for	$0.54° \leqslant \varphi < 36°$
-10	for	$\varphi \geqslant 36°$

Curve B: Cross-polar component (dBi)

$G_{max} - 30$	for	$\varphi < \left(\frac{0.6}{D}\right)^{\circ}$
$9 - 20 \log \varphi$	for	$\left(\frac{0.6}{D}\right)^{\circ} \leqslant \varphi < 8.7°$
-10	for	$\varphi \geqslant 8.7°$

where:

φ = off-axis angle referred to the main-lobe axis (degrees);

G_{max} = on-axis co-polar gain of the antenna (dBi);

D = diameter of the antenna in metres ($D \geqslant 2.5$).

Note 1: In the angular range between 0.1° and 0.54°, the co-polar gain must not exceed the reference pattern.

Note 2: In the angular range between 0° and $(0.6/D)°$, the cross polar gain must not exceed the reference pattern.

Note 3: At the larger off-axis angles and for 90% of all side-lobe peaks in each of the reference angular windows, the gain must not exceed the reference pattern. The reference angular windows are 0.54° to 1°, 1° to 2°, 2° to 4°, 4° to 7°, 7° to 10°, 10° to 20°, 20° to 40°, 40° to 70°, 70° to 100° and 100° to 180°. The first reference angular window for evaluating the cross-polar component should be $(0.6/D)°$ to 1°.

4.5 *Transmit power*

The maximum transmit power delivered to the input of the antenna of the feeder-link earth station is 1000 watts per 24 MHz television channel. This level of power can only be exceeded under certain conditions specified in Section 4.10 of this Annex.

4.6 *Receiving antenna*

4.6.1 *Cross-section of receiving antenna beam*

Planning has been based on beams of elliptical or circular cross-section. When the assignments are implemented, or when the Plan is modified, administrations may use non-elliptical or shaped beams.

If the cross-section of the receiving antenna beam is elliptical, the effective beamwidth φ_0 is a function of the angle of rotation q between the plane containing the satellite and the major axis of the beam cross-section and the plane in which the beamwidth is required.

The relationship between the maximum gain of an antenna and the half-power beamwidth can be derived from the expression:

$$G_m = 27\,843/ab$$

or

$$G_m(\text{dB}) = 44.44 - 10 \log a - 10 \log b$$

where:

a and b are the angles (in degrees) subtended at the satellite by the major and minor axes of the elliptical cross-section of the beam.

An antenna efficiency of 55% is assumed.

4.6.2 *Minimum beamwidth*

A minimum value of 0.6° for the half-power beamwidth of the receiving antenna has been agreed on for planning.

4.6.3 *Reference patterns*

The reference patterns for the co-polar and cross-polar components of the satellite receiving antenna used in preparing the Plan are given in Figure 7.

Where it was necessary to reduce interference, the pattern shown in Figure 8 was used; this use will be indicated in the Plan by an appropriate symbol. This pattern is derived from an antenna producing an elliptical beam with fast roll-off in the main lobe. Three curves for different values of φ_0 are shown as examples.

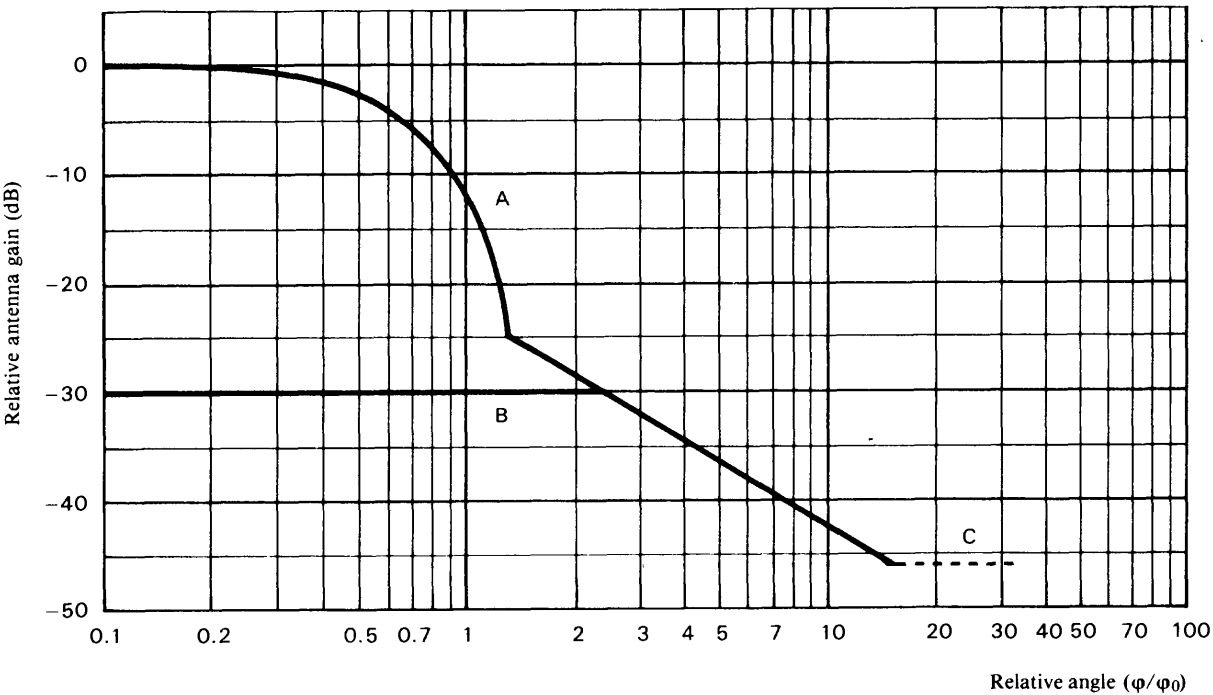

FIGURE 7

Reference patterns for co-polar and cross-polar components for satellite receiving antenna in Region 2

Curve A: Co-polar component (dB relative to main beam gain)

$-12\ (\varphi/\varphi_0)^2$ for $0 \leqslant (\varphi/\varphi_0) \leqslant 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with Curve C: as Curve C

Curve B: Cross-polar component (dB relative to main beam gain)

-30 for $0 \leqslant (\varphi/\varphi_0) \leqslant 2.51$

after intersection with Curve A: as Curve A

Curve C: Minus the on-axis gain (Curve C in this figure illustrates the particular case of an antenna with an on-axis gain of 46 dBi)

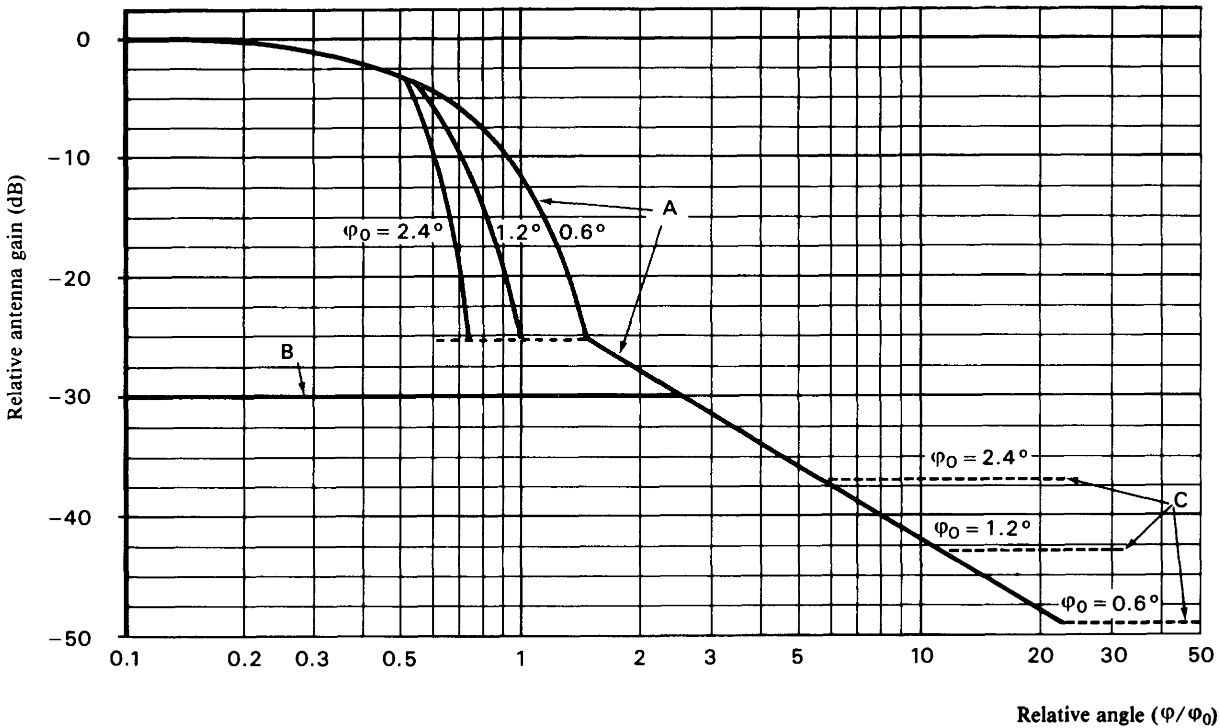

FIGURE 8

Reference patterns for co-polar and cross-polar components for satellite receiving antennas with fast roll-off in the main beam for Region 2

Curve A: Co-polar component (dB relative to main beam gain)

$-12\,(\varphi/\varphi_0)^2$	for	$0 \leqslant \varphi/\varphi_0 \leqslant 0.5$
$-33.33\,\varphi_0^2\,(\varphi/\varphi_0 - x)^2$	for	$0.5 < \varphi/\varphi_0 \leqslant \dfrac{0.87}{\varphi_0} + x$
-25.23	for	$\dfrac{0.87}{\varphi_0} + x < \varphi/\varphi_0 \leqslant 1.413$
$-\left(22 + 20\log(\varphi/\varphi_0)\right)$	for	$\dfrac{\varphi}{\varphi_0} > 1.413$

after intersection with Curve C: as Curve C

Curve B: Cross-polar component (dB relative to main beam gain)

-30	for	$0 \leqslant \varphi/\varphi_0 < 2.51$

after intersection with Curve A: as Curve A

Curve C: Minus the on-axis gain (Curves A and C represent examples for three antennas having different values of φ_0 as labelled in Figure 8. The on-axis gains of these antennas are 37, 43 and 49 dBi, respectively).

where:

φ = off-axis angle (degrees)

φ_0 = dimension of the minimum ellipse fitted around the feeder-link service area in the direction of interest (degrees)

$$x = 0.5\left(1 - \frac{0.6}{\varphi_0}\right).$$

4.6.4 *Pointing accuracy*

The deviation of the receiving antenna beam from its nominal pointing direction must not exceed 0.1° in any direction. Moreover, the angular rotation of the receiving beam about its axis must not exceed ± 1°; this latter limit is not necessary for beams of circular cross-section using circular polarization.

4.7 *System noise temperature*

The Plan is based on a value of 1500 K for the satellite system noise temperature.

4.8 *Polarization*

4.8.1 In Region 2, for the purpose of planning the feeder links, circular polarization is used.

4.8.2 In the cases where there are polarization constraints, use of polarization other than circular is permitted only upon agreement of administrations that may be affected.

4.9 *Automatic gain control*

4.9.1 The Plan is based on the use of automatic gain control on board satellites to maintain a constant signal level at the satellite transponder output.

4.9.2 The dynamic range of automatic gain control is limited to 15 dB when satellites are located within 0.4° of each other and operate on cross-polarized adjacent channels serving common or adjacent feeder-link service areas.

4.9.3 The 15 dB limit of automatic gain control does not apply to satellites other than those specified in paragraph 4.9.2 above.

4.10 *Power control*

The Plan has been developed without the use of power control.

The use of transmit power levels higher than those given in Section 4.5 is permitted only when rain attenuation exceeds 5 dB at 17 GHz. In such cases, the transmit power may be increased by the amount that the instantaneous rain attenuation exceeds 5 dB at 17 GHz up to the limit given in Table I.

TABLE I

Transmit radio frequency power (delivered to the imput of the feeder-link earth station antenna) permitted in excess of 1000 watts as a function of elevation angle

Elevation angle of feeder-link earth station antenna (degrees)	Transmit power permitted in excess of 1000 watts (dB)
0 to 40	0
40 to 50	2
50 to 60	3
60 to 90	5

4.11 *Site diversity*

Site diversity refers to the alternate use during rain of two or more transmitting earth stations which may be separated by sufficient distance to ensure uncorrelated rainfall conditions.

The use of site diversity is permitted and is considered to be an effective technique for maintaining high carrier-to-noise ratio and carrier-to-interference ratio during periods of moderate to severe rain attenuation. However, the Plan is not based on the use of site diversity.

4.12 *Depolarization compensation*

The Plan is developed without the use of depolarization compensation. Depolarization compensation is permitted only to the extent that interference to other satellites does not increase by more than 0.5 dB relative to that calculated in the feeder-link Plan.

4.13 *Minimum separation between satellites*

Figure 9 illustrates two adjacent clusters of satellites separated by 0.9° between the centres of the clusters. Aη identifies a satellite of administration η. A cluster is formed by two or more satellites separated by 0.4° and located at two nominal orbital positions as specified in the Plan; one position for right-hand polarized channels and the other position for left-hand polarized channels.

4.13.1 *Satellites of the same cluster*

The Plan is based on an orbital separation of 0.4° between satellites having cross-polarized adjacent channels (i.e. satellites located at +0.2° and −0.2° from the centre of the cluster). However, satellites within a cluster may be located at any orbital position within the cluster, requiring only the agreement of the other administrations having satellites sharing the same cluster. Such orbital positioning of satellites within a cluster is illustrated in Figure 9 by some of the satellites A5, A6 and A7.

The station-keeping tolerance of ± 0.1° indicated in Section 3.11 of Annex 5 to Appendix **30 (Orb-85)** must be applied to satellites located at any position within the 0.4° wide cluster.

4.13.2 *Satellites of different clusters*

In the Plan, the orbital separation between the centres of adjacent clusters of satellites is at least 0.9°. The value of 0.9° is also the minimum orbital separation to provide flexibility in the implementation of feeder links indicated in Section 4.4.1 of this Annex without the need for an agreement (see Section 4.13.1 of this Annex).

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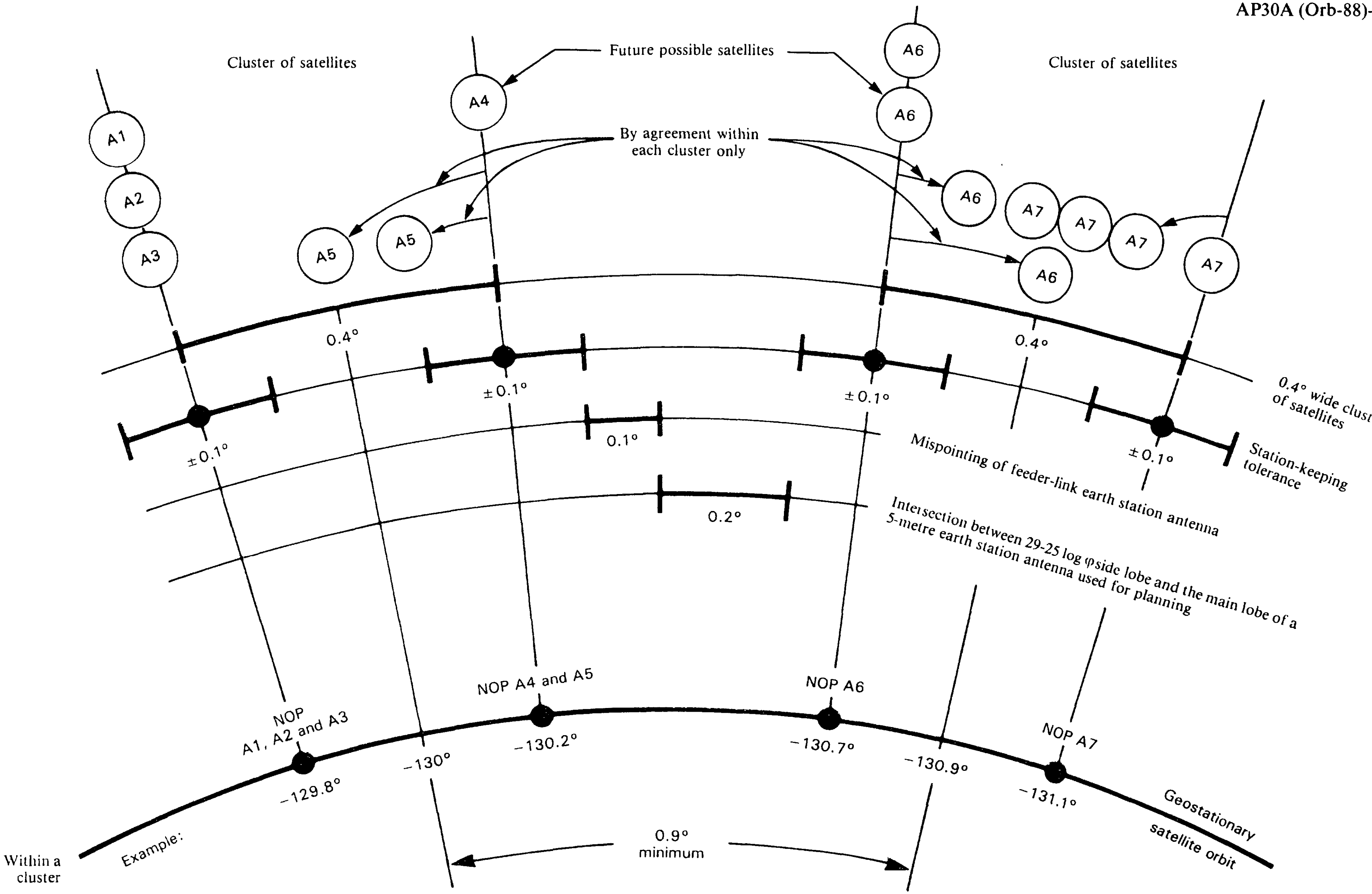

Aη: Specific Administration
NOP 1: Nominal orbital position, right hand polarization
NOP 2: Nominal orbital position, left hand polarization

FIGURE 9

Exploded view of geostationary satellite orbit

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ANNEX 4

Criteria for Sharing Between Services

1. *Threshold values for determining when coordination is required between a transmitting space station in the fixed-satellite service and a receiving space station in the feeder-link Plans in the frequency bands 17.7 - 18.1 GHz (Regions 1 and 3) and 17.7 - 17.8 GHz (Region 2)*

With respect to paragraph 7.1, Article 7 of this Appendix, coordination of a transmitting space station in the fixed-satellite service with a broadcasting-satellite feeder link in the Regions 1 and 3 Plan or the Region 2 Plan is required, for inter-satellite geocentric angular separations of less than 3° or greater than 150°, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station of another administration would cause an increase in the noise temperature of the feeder-link space station which exceeds a threshold value of $\Delta T_s T_s$ corresponding to 4%. $\Delta T_s / T_s$ is calculated in accordance with Case II of the method given in Appendix **29**.

The above provision does not apply when the geocentric angular separation, between a transmitting space station in the fixed-satellite service and a receiving space station in the feeder-link Plan, exceeds 150° of arc and the free-space power flux-density of the transmitting space station in the fixed-satellite service does not exceed a value of -137 dB(W/m^2/MHz) on the Earth's surface at the equatorial Earth limb.

2. *Not used.*

3. *Method for the determination of the coordination area around a feeder-link transmitting earth station of the Region 2 and Regions 1 and 3 Plans with respect to receiving earth stations in the fixed-satellite service in the frequency band 17.7 - 18.1 GHz*

3.1 *Introduction*

In the frequency band 17.7 - 17.8 GHz in Region 2 and 17.7 - 18.1 GHz in Regions 1 and 3, which is allocated to the fixed-satellite service, in both the Earth-to-space direction (for broadcasting-satellite service feeder links only), and the space-to-Earth direction, emissions from transmitting feeder-link earth stations might cause interference at receiving earth stations in the fixed-satellite service.

Electromagnetic coupling of an emission originating at a feeder-link earth station into a receiving earth station might occur through two propagation mechanisms or "modes":

Propagation mode (1): coupling along a great circle tropospheric interference horizon path;

Propagation mode (2): coupling through scatter from hydrometeors.

The determination of whether emissions from a feeder-link earth station might cause unacceptable interference in a receiving earth station is by means of coordination contours drawn around a feeder-link earth station on a map. When a receiving earth station is located within either or both coordination contours, i.e., within the coordination area, there is a possibility of unacceptable interference.

The procedure for the determination of the coordination area for a feeder-link earth station in relation to a receiving earth station in the fixed-satellite service is similar to that described in Appendix **28** but differs from it in the details described below.

3.2 *Determination of the coordination contour for propagation mode (1)*

The distance at which a signal of power $P_{t'}$ (dBW) applied to the antenna terminals of a feeder-link earth station will produce a received power $P_r(p)$ at the antenna terminals of a receiving earth station, for propagation mode (1), is given by:

$$d_1 = (P_{t'} + G_{t'} + G_r - P_r(p) - A_0 - A_h)/\beta \qquad \text{(km)} \qquad (1)$$

as derived from equations (2) and (8) of Appendix **28**,

where:

$P_{t'}$ = maximum RF power (dBW) in any 1 MHz band applied to the antenna terminals of a feeder-link earth station;

$G_{t'}$ = gain (dB) of the feeder-link earth station antenna towards the physical horizon on the azimuth to the receiving earth station;

G_r = gain (dB) of the receiving earth station antenna towards the physical horizon on the azimuth to the feeder-link earth station;

$P_r(p)$ = permissible interfering RF power (dBW) in any 1 MHz band to be exceeded for no more than p% of the time at the antenna terminals of the receiving earth station;

A_0 = constant equal to 145.0 dB;

A_h = sum (dB) of available site shielding at the feeder-link earth station, $A_{ht'}$, and at the receiving earth station, A_{hr}, on the respective azimuth towards the other earth station (both in dB);

β = rate of attenuation along the interference path (dB/km), a function of the radio-climatic zone and of p as used in $P_r(p)$ above.

To determine the coordination contour for propagation mode (1) for a feeder-link earth station, equation (1) is solved for all azimuths around the earth station site (in suitable increments; e.g., every 5°), and the resulting distances plotted for all azimuths on a map of suitable scale from the earth station site. The connection of the so marked distance points constitutes the coordination contour for the feeder-link earth station.

3.3 *Determination of parameters used in equation (1)*

The parameters used in equation (1) are determined as follows:

3.3.1 *Determination of $G_{t'}$ and G_r*

The determination of $G_{t'}$ follows the procedure set forth in Annex II to Appendix **28** using the notified feeder-link earth station antenna pattern.

For the receiving earth station, a minimum main beam elevation angle of 5° is assumed for which the reference antenna radiation diagram of paragraph 4 of Annex II to Appendix **28** yields, in the absence of site shielding, a horizon antenna gain of $G_r = 14.5$ dB.

3.3.2 *Determination of $A_{ht'}$ and A_{hr}*

The calculation of $A_{ht'}$ requires the determination of the horizon elevation angle θ (degrees) for all azimuths around a feeder-link earth station site. With these horizon elevation angles and the frequency of $f = 17.75$ GHz, $A_{ht'}$ is then calculated for each azimuth from equation (7a) of Appendix **28** for $\theta > 0°$, and it should be taken as equal to 0 dB for $\theta < 0°$.

For the fixed-satellite receiving earth station, the assumption must be made that no site shielding is available; hence, $A_{hr} = 0$ dB.

3.3.3 *Determination of $P_r(p)$ and p*

The maximum permissible interfering RF power in any 1 MHz band is taken, under nominal conditions, to be limited to 15% of the total noise received at an earth station, or about 20% of the thermal noise of the receiving system. This corresponds to a value of -7 dB for the parameter J of Appendix **28**. For percentages of time of less than 0.003%, a permissible increase in the interference by 5 dB is assumed (parameter $M(p)$ of Appendix **28**). Considering further that the band 17.7 - 17.8 GHz is also shared with terrestrial services, the assumption is made that up to three equivalent entries of interference may be present which, however, produce their maximum interference during periods uncorrelated in time, thus allowing each to produce the maximum permissible value of interfering RF power during $p = 0.001\%$ of the time.

Therefore, according to equation (3) of Appendix **28**:

$$P_r(p) = 10 \log(kTB) - 2 \qquad \text{(dB(W/MHz))} \qquad (2)$$

which, with

$k =$ Boltzmann's constant,

$B =$ 1 MHz, and

$T =$ receiving system noise temperature, assumed to be 200 K

yields:

$P_r(p) = -147.6$ (dB(W/MHz)),

with $p = 0.001\%$ of the time.

3.3.4 *Determination of β*

The rates of attenuation for a percentage of time of 0.001%, for the three radio-climatic zones as defined in paragraph 3.1 of Appendix **28** at 17.75 GHz, are the following:

Zone A: $\beta_A = 0.198$ dB/km
Zone B: $\beta_B = 0.06$ dB/km
Zone C: $\beta_C = 0.074$ dB/km

3.3.5 *Graphical method*

Figure 1 provides curves by means of which d_1 may be determined when only a single radio-climatic zone is involved. The three curves shown are for the three radio-climatic zones as defined in Appendix **28**. The abscissa is given in terms of the parameter P as defined below:

$$P = P_{t'} + G_{t'} + G_r - P_r(p) - A_0 - A_h \qquad \text{(dB)}$$

3.4 *Mixed zone contours*

When the solution of equation (1) yields a distance d_1, which, on the azimuth under consideration, produces a point which lies in a different radio-climatic zone from that in which the feeder-link earth station is located, it is necessary to determine a mixed-zone coordination distance for that azimuth. Thus, if the feeder-link earth station is located in a radio-climatic zone identified by the suffix "a" and the solution of equation (1) produces a distance which ends in another radio-climatic zone, identified by the suffix "b" (a and b referring to any one of the zones A, B or C, with $a \neq b$), the coordination distance is calculated from:

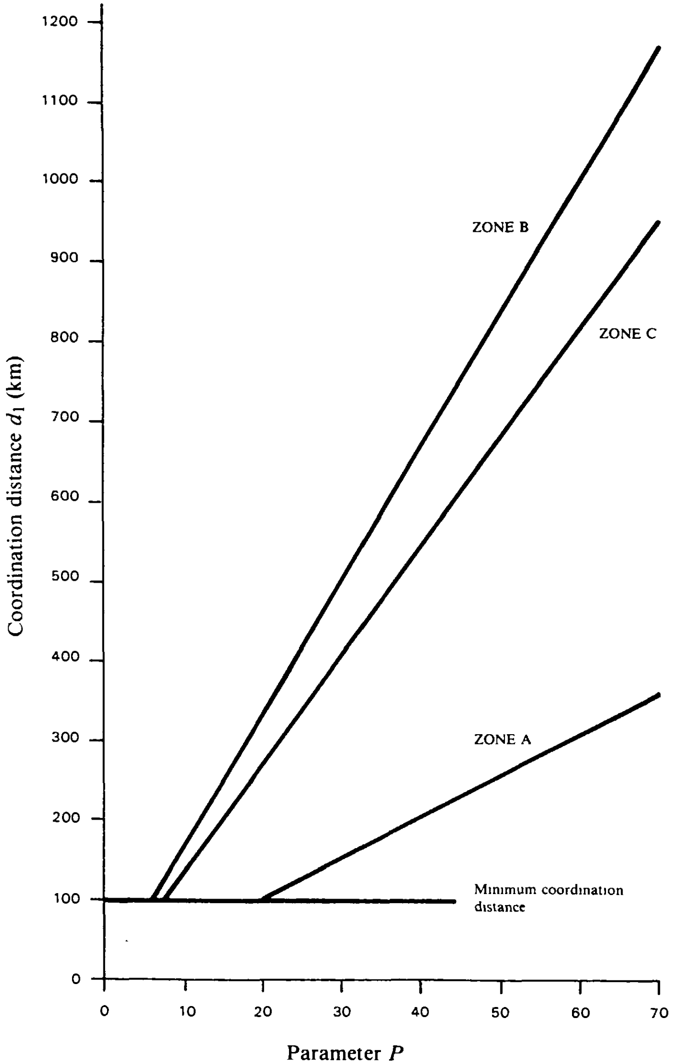
$$d_1 = \frac{P - d_a\beta_a}{\beta_b} + d_a \qquad \text{(km)} \qquad (3)$$

where d_a is the distance (km) from the feeder-link earth station site to the boundary between the two climatic zones.

For the rare case where more than two radio-climatic zones are involved, the applicable equation would be:

$$d_1 = \frac{P - d_a\beta_a - d_b\beta_b}{\beta_c} + d_a + d_b \qquad \text{(km)} \qquad (4)$$

where the subscript "c" denotes the zone farthest away from the feeder-link earth station site within which the coordination distance ends.



$$P = P_{t'} + G_{t'} + G_r - P_r(p) - A_0 - A_h \text{ (dB)}$$

FIGURE 1

Coordination distance as a function of parameter P.
Propagation mode(1); 17.75 GHz; p = 0.001% of the time

3.5 *Determination of the coordination contour for propagation mode (2)*

In the case of scattering from hydrometeors, the high main beam e.i.r.p. from a transmitting feeder-link earth station antenna and the expected high sensitivity of a fixed-satellite service receiving earth station suggest that interference from a feeder-link earth station into a fixed-satellite earth station may be unacceptable only when either earth station can see the main beam of the other, below the maximum altitudes from which significant hydrometeor scatter reflectivity prevails.

Accordingly, to avoid such mutual visibility conditions, the rain scatter distance d_r is to be that distance at which the receiving earth station's horizon intersects the maximum expected rain scatter altitude h_s[1].

3.5.1 *Rain scatter distance d_r*

For an assumed horizon elevation angle of zero degree at the fixed-satellite receiving earth station, d_r is given by:

$$d_r = 130 \sqrt{h_s} \qquad \text{(km)} \qquad (5)$$

in a 4/3 earth radius reference atmosphere, with

$$h_s = 5.1 - 2.15 \log \left(1 + 10^{(\varphi - 27)/25}\right) \qquad \text{(km)} \qquad (6)$$

where φ is the latitude (North or South) of the feeder-link earth station site (degrees).

---

[1] The maximum scatter height h_s is similar to the maximum rain height h_R of Section 2.4.2 of Annex 5, Appendix **30 (Orb-85)**, used in the calculation of effective path-length for the determination of rain attenuation, except that the factor "c" of Section 2.4.2 of Annex 5, Appendix **30 (Orb-85)**, is omitted.

The rain scatter distance d_r so calculated yields the rain scatter coordination contour for the feeder-link earth station by the procedure described in paragraph 4.5 of Appendix **28**.

3.5.2 *Graphical method*

Figure 2 provides a curve by means of which the rain scatter distance d_r may be read directly for a given feeder-link earth station latitude ζ.

3.6 *Minimum coordination distance*

The minimum coordination distance for a feeder-link earth station shall be 100 km.

3.7 *Coordination area*

The coordination area for a feeder-link earth station is the total area contained within the combined coordination contours for propagation modes (1) and (2).

3.8 In the case of Regions 1 and 3, the e.i.r.p. to be taken into account is derived by adding the values specified in columns 8 and 9 of the Plan.

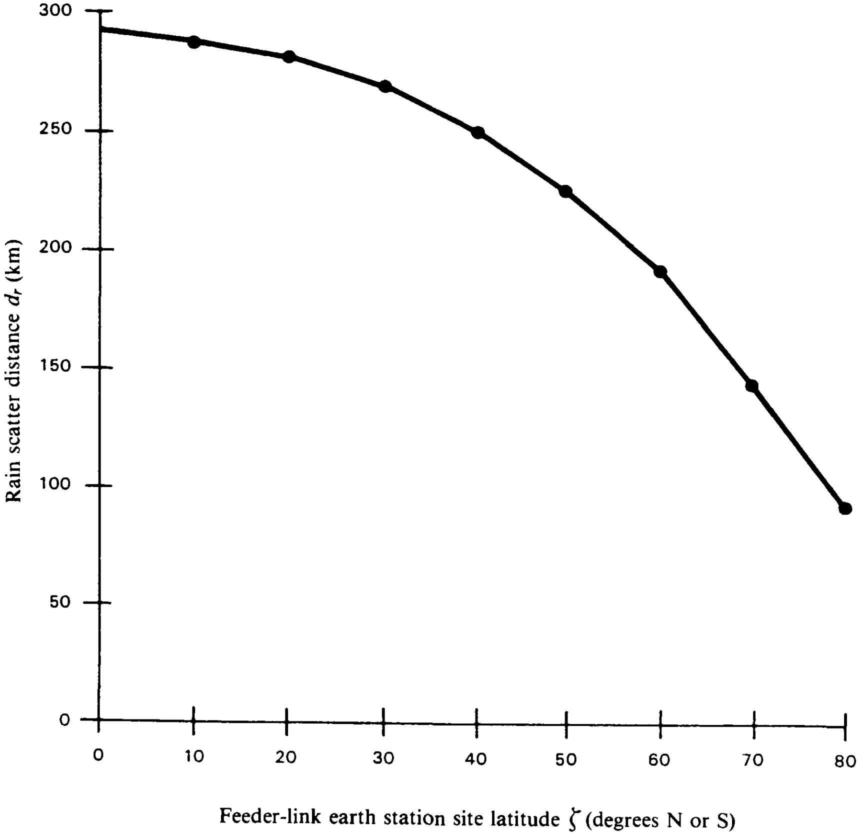


FIGURE 2

Rain scatter distance d_r as a function of feeder-link earth station site latitude ζ

APPENDIX 30B

Orb-88

Provisions and Associated Plan for the Fixed-Satellite Service in the Frequency Bands 4 500 - 4 800 MHz, 6 725 - 7 025 MHz, 10.70 - 10.95 GHz, 11.20 - 11.45 GHz and 12.75 - 13.25 GHz[1]

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[1] See also Resolution **108 (Orb-88)**.

ANNEXES

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ARTICLE 1

Objective of the Provisions and Associated Plan

1.1 The objective of the procedures prescribed in this Appendix is to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit in the frequency bands of the fixed-satellite service covered by this Appendix.

1.2 The procedures prescribed in this Appendix shall in no way prevent the implementation of assignments in conformity with Part A of the Plan.

ARTICLE 2

Definitions

2.1 *Conference:* World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, First Session, Geneva, 1985; Second Session, Geneva, 1988.

2.2 *Plan:* The Plan for the fixed-satellite service in the frequency bands contained in this Appendix, consisting of two parts:

a) Part A, containing the national allotments;

b) Part B, containing the networks of existing systems.

2.3 *Allotment:* For the purpose of this Appendix, an allotment comprises:

- a nominal orbital position;
- a bandwidth of 800 MHz (up-link and down-link) in the frequency bands listed in Article 3 of this Appendix;

- a service area for national coverage;
- generalized parameters as defined in Annex 1 to this Appendix;
- a predetermined arc (PDA).

2.4 *Existing systems:* Those satellite systems, in the frequency bands covered by this Appendix:

a) which are recorded in the Master International Frequency Register; *or*

b) for which the coordination procedure has been initiated; *or*

c) for which the information relating to advance publication was received by the Board before 8 August 1985,

and which in all cases are listed in Part B of the Plan.

2.5 *Subregional systems:* For the purpose of the application of the provisions of this Appendix, a subregional system is a satellite system created by agreement among neighbouring countries Members of the ITU or their authorized telecommunications operating agencies and intended to provide domestic or subregional services within the geographical areas of the countries concerned.

2.6 *Additional use:* For the application of the provisions of this Appendix, additional uses shall be those of an administration:

a) which has a requirement whose characteristics differ from those used in the preparation of Part A of the Plan; any such requirement shall be limited to the national coverage, taking into account technical constraints, of the administration concerned, unless otherwise agreed. Additionally, such requirement can be met only if the allotment of the interested administration, or part of this allotment, has been converted into an assignment, or if the requirement cannot be met by the conversion of the allotment into an assignment;

b) which requires the use of all or part of its national allotment that has been suspended in accordance with paragraph 6.54 of Article 6;

c) which intends to participate in a subregional system using the procedures of Section III of Article 6, instead of using the procedures of Section II thereof.

ARTICLE 3

Frequency Bands

3.1 The provisions of this Appendix shall apply to the fixed-satellite service in the frequency bands between:

- 4 500 and 4 800 MHz (space-to-Earth);
- 6 725 and 7 025 MHz (Earth-to-space);
- 10.70 and 10.95 GHz (space-to-Earth);
- 11.20 and 11.45 GHz (space-to-Earth);
- 12.75 and 13.25 GHz (Earth-to-space).

ARTICLE 4

Execution of the Provisions and Associated Plan

4.1 The Members of the Union shall adopt, for their fixed-satellite service stations operating in the frequency bands referred to in this Appendix, the characteristics consistent with those specified in the Plan and its associated provisions.

4.2 The Members of the Union shall not change the characteristics, or bring into use assignments to fixed-satellite service stations, or stations in the other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes of this Appendix.

ARTICLE 5

The Plan and the Associated List of Assignments

5.1 The Plan consists of:

a) Part A containing the allotments;

b) Part B containing the networks of existing systems.

5.2 A List of Assignments as described in paragraph 5.5 will be associated with the Plan.

5.3 The predetermined arc (PDA) is a segment of the geostationary-satellite orbit (GSO) about a nominal orbital position intended to provide flexibility in the Plan.

a) The size of the PDA depends on the stage of development of the satellite system:

- for a system in the *pre-design stage*, the PDA is the fixed portion of the GSO defined by the intersection between a segment of ± 10° about the nominal orbital position established at the Conference and the corresponding service arc. After twenty years from the date of entry into force of this Appendix, the PDA for a system in the pre-design stage is the fixed portion of the GSO defined by the intersection between a segment of ± 20° about the nominal orbital position established at the Conference and the corresponding service arc, provided that the minimum elevation angle after the application of this procedure is not less than 20° or than the value indicated for each climatic zone in Annex 1 to this Appendix, whichever is larger, for all allotments affected;

- for a system in the *design stage*, the PDA is the fixed portion of the GSO defined by the intersection between a segment of ± 5° about the nominal orbital position as may be modified by the application of this Appendix and the PDA defined for the pre-design stage;

- for a system in the *operational stage*, the PDA will be considered as being zero.

b) The stage of development to be associated with allotments in Part A and assignments in the List derived from allotments in Part A, with existing systems in Part B, with subregional systems or additional uses, is given in Table 1.

TABLE 1

Stage of development	Part A allotments, subregional systems or additional uses	Part B
Pre-design	Part A allotments	–
Design	Assignments for which the IFRB has received complete information under paragraph 6.2 of Section I or paragraph 6.43 of Section II of Article 6	Networks for which the IFRB has received complete information to start the application of Section I of Article **11** of the Radio Regulations
Operational	Assignments for which the IFRB has received complete information under paragraph 6.58 of Section III of Article 6 or for notification under Article 8	Networks for which the IFRB has received complete information, in order to start the application of Section II of Article **11** or for notification under Article **13** of the Radio Regulations

c) An administration will not be considered to be affected if the nominal orbital position associated with its allotment in the Plan or with its assignments in the List is moved within the corresponding PDA while keeping an aggregate $C/I \geqslant 26$ dB.

5.4 The PDA concept may be applied only:

- to provide an allotment to a new Member of the ITU;
- in the process of conversion of an allotment into an assignment;
- to accommodate a subregional system;
- to resolve incompatibilities with existing systems (except for the implementation of additional uses);
- to resolve incompatibilities with the assignments in the List (except for the implementation of additional uses).

5.5 The List of Assignments to be associated with the Plan will contain:

a) assignments derived from allotments in Part A of the Plan;

b) assignments relating to existing systems in Part B of the Plan;

c) assignments resulting from the introduction of subregional systems;

d) assignments relating to additional uses.

5.6 Whenever a new assignment is entered in this List, the Board shall inform administrations in its weekly circular, indicating the characteristics of the assignment concerned.

ARTICLE 6

Procedures for Implementation of the Plan and Regulation of the Fixed-Satellite Service in the Planned Bands

Section I. Procedure for Conversion of an Allotment into an Assignment

6.1 When an administration intends to convert an allotment into an assignment employing all or part of its allotment in Part A of the Plan, it shall, not earlier than five years and not later than one year before the planned date of bringing the network into use, send to the IFRB the information specified in Annex 2.

6.2 Upon receipt of a complete notice of a frequency assignment related to that allotment, the Board shall examine it with respect to its conformity with Part A of the Plan.

6.3 A notice of an assignment is considered to be in conformity with Part A of the Plan if:

a) the service area is not greater than the service area in Part A of the Plan;

b) it meets the criteria of Annex 3A;

c) the orbital position corresponds to the nominal orbital position in the Plan.

6.4 A notice shall be returned to the notifying administration whenever the service area is not within a geographical area for which the notifying administration is responsible.

6.5 When the Board finds that the proposed assignment is in conformity with paragraph 6.3, the Board shall apply the provisions of Annex 3B (Macrosegmentation Concept).

6.6 When Annex 3B has been applied successfully and the Board has found that the proposed assignment is compatible with Part B of the Plan in accordance with Annex 4, the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

6.7 When the Board finds that the proposed assignment is in conformity with Part A of the Plan after examination using Annexes 3A and 3B but it is incompatible with Part B of the Plan, the provisions of paragraph 6.10 shall apply.

6.8 If a notice is not in conformity with Part A of the Plan, the provisions in Section IA shall apply.

6.9 If under paragraph 6.5 after the application of Annex 3B coordination is required, then the provisions of Section IA beginning at paragraph 6.18 shall apply.

6.10 For the purpose of resolving the incompatibilities mentioned in paragraph 6.7:

a) an administration responsible for an existing system or an additional use shall, depending on the stage of development of its system, take all technically and operationally possible measures to remove incompatibilities at the pre-design, design and operational stages in order to accommodate the requirements of the administration seeking to convert its allotment into an assignment;

b) an administration whose allotment is being converted into an assignment shall assist in the resolution of incompatibilities;

c) both administrations, with the assistance of the Board if requested, shall cooperate in reaching an equitable agreement, taking into account the respective stages of development of their systems and recognizing that a means must be found to convert the allotment into an assignment which is acceptable to both parties.

6.11 After resolution of any incompatibilities through the application of paragraph 6.10, the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

Section IA. Procedure for Conversion of an Allotment into an Assignment that is not in Conformity with Part A of the Plan or that Does not Comply with Annex 3B

6.12 The Board shall use this Section to determine if the proposed assignment affects:

a) the allotments in the Plan;

b) the assignments which appear in the List;

c) the assignments with respect to which the Board has previously received information in accordance with this Article.

6.13 If the proposed assignment is not in conformity with Annex 3A, the Board shall return the notice to the notifying administration indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; *or*

b) select an alternative orbital position, preferably within its PDA; *or*

c) request the assistance of the Board in either course of action.

6.14 After the notice is returned to the administration following the application of paragraph 6.13, the administration may resubmit the notice and the Board shall apply again the provisions starting at paragraph 6.2, with the exception of paragraph 6.3 *c)* which is not applicable.

6.15 When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavour to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

6.16 If it is not possible to solve the problem mentioned in paragraph 6.13 after having considered the possibility of finding an alternative orbital position, the concept of PDA (Annex 5) shall be used by the notifying administration or by the Board, if its assistance is requested.

6.17 When paragraph 6.16 has been applied successfully, the provisions of paragraph 6.5 of Section I shall be applied.

6.18 If the provisions of Annex 3B are not met, the Board shall then identify affected administrations having assignments in the List by using the criteria of Annex 4.

6.19 If no administrations are affected under paragraph 6.18, the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

6.20 If administrations are affected under paragraph 6.18, the administration responsible for the proposed assignment shall seek the agreement of the affected administrations using the techniques described in Annex 6.

6.21 When agreement is reached, the administration responsible shall advise the Board which shall modify the orbital position and PDA in the Plan, if necessary, and shall record the assignment in the List with a special symbol. The administration shall then notify the assignment in accordance with Article 8.

6.22 The special symbol referred to in paragraph 6.21 shall represent an undertaking by the administration responsible for the proposed assignment that it will accommodate, if necessary, future conforming assignments made under paragraph 6.6.

6.23 When no agreement is reached under paragraph 6.20, the notice shall be returned.

Section IB. Procedure for Recording in the List of the Existing Systems Contained in Part B of the Plan

6.24 The Board shall use the method of Annex 4 to determine whether the proposed assignment affects:

a) the allotments in Part A;

b) the existing systems in Part B[1];

c) the assignments which appear in the List;

d) the assignments with respect to which the Board has previously received information in accordance with this Article.

6.25 Assignments for networks contained in Part B of the Plan for which notices for recording in the Master Register were received by the Board prior to 29 August 1988 and recorded subsequently in the MIFR will be entered in the List. However, for notices received after 29 August 1988, the assignments will be entered in the List if the notified characteristics are identical to those contained in Part B of the Plan.

6.26 If, under paragraph 6.24, no allotments or assignments are affected, the Board shall publish the results of its calculations in a special section of the weekly circular and shall enter the proposed assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

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[1] Administrations with networks in Part B shall continue to apply the provisions of Section II of Article **11** with respect to other networks listed in Part B.

6.27 If, under paragraph 6.24, allotments or assignments are affected[1], the Board shall return the notice to the notifying administration indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; *or*

b) select an alternative orbital position and proceed in accordance with paragraph 6.24; *or*

c) request the assistance of the Board in either course of action.

6.28 After the notice is returned to the administration following application of paragraph 6.24, the administration may resubmit the notice and the Board shall apply again paragraphs 6.24 to 6.27.

6.29 For existing systems in Part B of the Plan the provisions of No. **1056A** of the Radio Regulations shall be applied.

6.30 When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavour to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

6.31 If it is not possible to solve the problem of incompatibility mentioned in paragraph 6.27 after having considered the possibility of finding an alternative orbital position, the concept of PDA shall be used (see paragraph 5.3 of Article 5) by the notifying administration or by the Board, if its assistance is requested.

6.32 If paragraph 6.31 has been successfully applied, the Board shall use the method of Annex 4 as in paragraph 6.24.

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[1] Incompatibility between assignments in Part B shall be disregarded whenever an agreement under the provisions of Section II of Article **11** was obtained.

6.33 If paragraphs 6.31 and 6.32 have been successfully applied, the Board shall publish the results of its calculations and the modified orbital positions in a special section of the weekly circular.

6.34 If, within sixty days of the weekly circular mentioned in paragraph 6.33 the Board receives no comments, it shall be deemed that there are no objections to the proposed relocations and the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

6.35 Comments under paragraph 6.34, if any, shall be limited to the case of an administration believing that the agreed protection criteria have not been met or to the case in which the administration envisages problems in recoordinating any satellite network under consideration. If such comments are received the Board shall initiate the appropriate action to resolve the problem.

6.36 In the event of an unsuccessful application of paragraphs 6.31 and 6.32, the provisions of paragraph 6.37 shall apply (with respect to incompatibilities with allotments and assignments derived from allotments).

6.37 If it is necessary for the purpose of resolving the incompatibilities mentioned in paragraph 6.32:

a) the administration responsible for an existing system shall, depending on the stage of development of its system, take all technically and operationally possible measures to remove incompatibilities;

b) an administration whose allotment or assignment is being affected shall assist in the resolution of incompatibilities;

c) both administrations, with the assistance of the Board if requested, shall cooperate in reaching an equitable agreement, taking into account the respective stages of development of their systems.

Section II. Procedure for the Introduction of a Subregional System

6.38 When a group of administrations intends to bring into use a subregional system it shall select one or more orbital positions for the system, preferably from the national allotments concerned, and send details of the assignment of the proposed network to the Board, not earlier than five years and not later than one year before the planned date of bringing into use. For this purpose, the administrations shall designate one among them to act on their behalf in the application of the provisions of this Appendix. The selected administration shall be known as the notifying administration.

6.39 All or part of the national allotments used by the subregional system shall be suspended for the period of operation of this subregional system unless it can be used in a way that does not affect allotments in the Plan or assignments made in accordance with the procedures associated with the Plan.

6.40 Suspended national allotments (see paragraph 6.39) shall continue to enjoy the same protection as that afforded to other allotments in the Plan which are not suspended, for use in the event of cessation of the subregional system.

6.41 When determining which administrations are affected by subregional systems, the mutual interference between the subregional system and its members' suspended national allotments shall not be taken into account for the period of the life of the subregional system.

6.42 In determining which administrations are affected, the interference caused by either the subregional system or the suspended allotments as specified in paragraph 6.39 shall be taken into account, but not both at the same time in view of their respective implementation schedules.

6.43 Upon receipt of a complete (Annex 2) notice relating to the proposed assignment, the Board shall use the method of Annex 4 to determine whether the proposed assignment affects:

a) the allotments in the Plan;

b) the assignments which appear in the List;

c) the assignments for which the Board has previously received complete information in accordance with this Article.

6.44 In the event of a favourable finding with regard to compatibility, the Board shall enter the proposed assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

6.45 In the event of an unfavourable finding with regard to compatibility, the Board shall return the notice to the notifying administration, indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; *or*

b) select an alternative orbital position and proceed in accordance with paragraph 6.38; *or*

c) request the assistance of the Board in either course of action.

6.46 After the notice is returned to the administration following application of paragraph 6.43, the administration may resubmit the notice and the Board shall apply again paragraphs 6.43 to 6.45.

6.47 When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavour to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

6.48 If it is not possible to solve the problem of incompatibility mentioned in paragraph 6.45 after having considered the possibility of finding an alternative orbital position, the concept of PDA shall be used (see paragraph 5.3 of Article 5) by the notifying administration or by the Board, if its assistance is requested.

6.49 In the event of a successful application of paragraph 6.48, the Board shall publish the result of its calculations and the modified orbital locations in a special section of the weekly circular.

6.50 If, within sixty days from the date of the weekly circular mentioned in paragraph 6.49, the Board receives no comments, it shall be deemed that there are no objections to the proposed solution and the proposed assignment shall be recorded in the List. The administration shall then notify the assignment in accordance with Article 8. Comments, if any, shall be limited to the case of an administration believing that the agreed protection criteria have not been met. If it receives such comments, the Board shall initiate the appropriate action to resolve the matter.

6.51 In the event of an unsuccessful application of paragraphs 6.48, 6.49 and 6.50, the Board shall return the notice to the notifying administration.

6.52 If an administration withdraws from a subregional system, it shall inform the IFRB. The Board shall take account of this withdrawal when applying the provisions relating to the compatibility of new assignments.

6.53 If an administration which has withdrawn from a subregional system wishes to implement a national system, and is unable to satisfy the condition of paragraph 6.39 for the use of all or part of its allotment, it may proceed under the provisions of Section III of this Article relating to additional uses for the allotment or part of the allotment, as appropriate.

6.54 When a subregional system is terminated by the participating administrations, the notifying administration shall inform the Board as early as possible and the Board shall:

a) publish this information in a special section of its weekly circular;

b) cancel all frequency assignments in the List relating to that system;

c) modify Part A of the Plan to indicate that the corresponding national allotments are no longer suspended.

Section III. Supplementary Provisions Applicable to Additional Uses in the Planned Bands

6.55 These bands are used for the fixed-satellite service Plan and their use in accordance with this section should be avoided if possible. Administrations are urged to use other available bands.

6.56 An administration, or one acting on behalf of a group of administrations, may apply the procedure of this Section for an additional use as defined in Article 2, provided that the proposed assignments have a maximum period of validity of 15 years and will not, except if agreed to by the administrations affected, require any displacement of the orbital position of an allotment in Part A of the Plan or the orbital position of an assignment in the List, nor be incompatible with:

a) the allotments in the Plan;

b) the assignments in the List;

c) the assignments for which the Board has previously received information in accordance with this Article.

6.57 For this purpose it shall, not earlier than five years and not later than one year before the planned date of bringing the related assignment into use, send the information specified in Annex 2 to the IFRB.

6.58 Upon receipt of a complete notice, the Board shall examine it to ensure its compliance with paragraph 6.56 and in the event of non-compliance the notice shall be returned to the notifying administration.

6.59 If the Board finds that the notice complies with the provisions of paragragh 6.56 it shall enter the assignment in the List. The administration shall then notify the assignment in accordance with Article 8.

6.60 The provisions of this Section shall not be applied before one year from the date of entry into force of this Plan.

ARTICLE 7

Procedure for the Addition of a New Allotment to the Plan for a New Member of the Union

7.1 The administration of a country which has joined the Union as a new Member shall obtain a national allotment in Part A of the Plan by the following procedure.

7.2 The administration shall submit its request for an allotment to the Board, with the following information:

a) the geographical coordinates of not more than 10 test points for determining the minimal ellipse to cover its national territory;

b) the height above sea level of each of its test points and the rain zone or zones;

c) any special requirement, other than a fixed orbital position, which is to be taken into account to the extent practicable.

7.3 Upon receipt of the complete information (mentioned in paragraph 7.2 above), the Board shall find an appropriate orbital position, if necessary using the PDA concept, and shall enter the national allotment of the new Member of the Union in Part A of the Plan.

7.4 For this purpose the Board shall consult, and if necessary seek the agreement of, any administrations that may be affected.

ARTICLE 8

Procedure for Notification and Recording in the Master Register of Assignments in the Planned Bands for the Fixed-Satellite Service

8.1 Any assignment for which the relevant procedure of Article 6 has been successfully applied shall be notified to the Board in accordance with Article **13** of the Radio Regulations.

8.2 Upon reception by the Board of a complete notice under Article **13**, a PDA of zero degrees (operational stage) shall be associated with this assignment.

8.3 Such an assignment shall not be subject to the procedures for advance publication and coordination contained in Sections I and II of Article **11** of the Radio Regulations[1]. Consequently, the provisions of Article **13** of the Radio Regulations shall continue to be applicable except with regard to No. **1504** and related provisions (see Resolution **107**).

8.4 No provision of this Appendix shall be considered as modifying the requirements under Sections III and IV of Article **11** of the Radio Regulations relating to coordination between the fixed-satellite service and stations of terrestrial services sharing the planned bands on an equal primary basis.

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[1] For existing systems in Part B of the Plan, see Section IB of Article 6.

ARTICLE 9

General Provisions

9.1 Part A of the Plan is limited to national systems providing a domestic service. Administrations may, however, in accordance with the provisions of Section II of Article 6, use all or part of their allotments to form a subregional system.

9.2 The existing systems listed in Part B of the Plan may continue in operation for a maximum period of 20 years from the date of entry into force of this Appendix.

ARTICLE 10

Plan for the Fixed-Satellite Service in the Frequency Bands 4 500 - 4 800 MHz, 6 725 - 7 025 MHz, 10.70 - 10.95 GHz, 11.20 - 11.45 GHz and 12.75 - 13.25 GHz [1]

A.1 COLUMN HEADINGS OF PART A OF THE PLAN

Col. 1 *Beam identification* (Column 1 contains the symbol designating the country or the geographical area taken from Table B1 of the Preface to the International Frequency List)

Col. 2 *Nominal orbital position*, in degrees and tenths of a degree

Col. 3 *Service arc* (western and eastern limits in degrees and tenths of a degree) [2]

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[1] The Plan has been prepared with a view to assuring for each allotment an aggregate C/I ratio of at least 26 dB.

[2] The service arc indicated in column 3 of Part A of the Plan represents that segment of the geostationary-satellite orbit which is common to all individual service arcs of each test point for its minimum elevation angle as given in Annex 1, Section 1.3 of this Appendix.

Col. 4 *Predetermined arc* (western and eastern limits in degrees and tenths of a degree)

Col. 5 *Longitude of the boresight*, in degrees and tenths of a degree

Col. 6 *Latitude of the boresight*, in degrees and tenths of a degree

Col. 7 *Major axis of the elliptical cross-section half-power beam*, in degrees and tenths of a degree

Col. 8 *Minor axis of the elliptical cross-section half-power beam*, in degrees and tenths of a degree

Col. 9 *Orientation of the ellipse* determined as follows: in a plane normal to the beam axis, the direction of the major axis of the ellipse is defined by the angle measured anticlockwise from a line parallel to the equatorial plane to the major axis of the ellipse, to the nearest degree

Col. 10 Earth station *e.i.r.p.* density (dB(W/Hz))[1]

Col. 11 Satellite *e.i.r.p.* density (dB(W/Hz))[1]

Col. 12 *Remarks*

A.2 TEXT FOR SYMBOLS IN REMARKS COLUMN OF THE PLAN

1. Fast roll-off space station transmitting and receiving antenna.

2. This allotment will use an earth station receiving and transmitting antenna side-lobe pattern that will conform to $29 - 25 \log \theta$.

[1] The A, B, C, D parameters associated with these columns will be published in IFRB circular-letters.

3. This allotment will use an earth station receiving antenna side-lobe pattern that will conform to $29 - 25 \log \theta$.

4. The Administration of Luxembourg (LUX) agreed to protect the national allotment SYR0000 (SYR) to a single entry (C/I) ratio of 30 dB against the interference from the beam LUXGDL62.

5. Owing to the mountainous areas within the country, the minimum elevation angle shall not be reduced below 20° when applying the predetermined arc concept.

Note by the General Secretariat (applicable when an asterisk (*) appears in column 12): It is to be noted that this beam is intended to be implemented as part of a multi-beam network, operating from a single orbital location. Within any multi-beam network, the beams are the responsibility of a single administration, hence interference between them has not been taken into account during the Conference. The number which appears in the alphanumeric code that follows the asterisk serves to identify the multi-beam network concerned.

4 500 – 4 800 MHz, 6 725 – 7 025 MHz

1	2	3		4		5	6	7	8	9	10	11	12
ABW00000	−98.2	−119.4	−18.9	−108.2	−88.2	−69.1	12.4	1.6	1.6	90.0	−7.5	−41.4	
ADL00000	113.0	113.0	114.3	113.0	114.3	140.0	−66.7	1.6	1.6	90.0	−7.5	−41.3	*/MB1
AFG00000	48.0	42.3	95.8	42.3	58.0	66.4	33.9	2.2	1.6	15.0	−7.5	−39.4	
AFS00000	71.0	−25.8	84.2	61.0	81.0	27.2	−30.1	5.3	1.6	128.0	−5.7	−38.6	
AGL00000	−36.1	−37.2	74.1	−37.2	−26.1	15.9	−12.4	2.4	1.6	78.0	−7.5	−39.1	
ALB00000	2.6	−29.9	69.8	−7.4	12.6	20.0	41.1	1.6	1.6	90.0	−7.5	−41.4	
ALG00000	−33.5	−33.5	38.4	−33.5	−23.5	1.6	27.8	3.3	2.2	133.0	−6.5	−38.9	
ALS00000	−159.0	−169.8	−158.2	−169.0	−158.2	−158.6	57.5	6.3	1.6	1.0	−5.8	−38.8	*/MB2
AND00000	−41.0	−48.6	51.7	−48.6	−31.0	1.5	42.5	1.6	1.6	90.0	−7.5	−41.4	
ARG00000	−51.0	−58.4	−51.0	−58.4	−51.0	−62.0	−33.6	4.8	2.9	93.0	−0.4	−38.1	*/MB3
ARGINSUL	−51.0	−58.4	−51.0	−58.4	−51.0	−60.0	−57.5	3.6	1.6	154.0	−7.5	−38.5	*/MB3
ARS00000	52.0	20.1	60.0	42.0	60.0	45.7	23.1	3.7	2.6	153.0	−6.6	−39.3	
ASCSTHTC	−37.1	−38.5	−27.1	−38.5	−27.1	−11.8	−19.6	5.6	1.8	77.0	−5.9	−39.0	*/MB4
ATG00000	−77.7	−112.2	−11.4	−87.7	−67.7	−61.8	17.0	1.6	1.6	90.0	−7.5	−41.8	
ATN00000	−5.2	−50.1	1.9	−15.2	1.9	−65.6	15.1	1.6	1.6	90.0	−7.5	−38.9	*/MB5
AUS00001	144.1	122.4	148.1	134.1	148.1	134.3	−24.5	6.6	5.3	146.0	4.0	−38.2	*/MB6
AUS00002	144.1	122.4	148.1	134.1	148.1	163.6	−30.5	1.6	1.6	90.0	−7.5	−39.5	*/MB6
AUS00003	144.1	122.4	148.1	134.1	148.1	101.5	−11.1	1.6	1.6	90.0	−7.5	−40.5	*/MB6
AUS00004	144.1	122.4	148.1	134.1	148.1	159.0	−54.5	1.6	1.6	90.0	−7.5	−41.6	*/MB6
AUS00005	144.1	122.4	148.1	134.1	148.1	110.4	−66.3	1.6	1.6	90.0	−7.5	−41.3	*/MB6
AUT00000	−2.6	−18.6	46.4	−12.6	7.4	13.2	47.5	1.6	1.6	90.0	−7.5	−40.8	2
AZR00000	−7.9	−41.9	6.7	−17.9	2.1	−28.0	38.7	1.6	1.6	90.0	−7.5	−41.1	*/MB7
B 00001	−65.0	−70.0	−60.1	−70.0	−60.1	−62.6	−6.0	4.1	4.0	43.0	−0.4	−38.7	
B 00002	−61.1	−70.0	−60.1	−70.0	−60.1	−45.4	−6.3	4.6	4.1	152.0	0.2	−38.6	
B 00003	−68.7	−70.0	−60.1	−70.0	−60.1	−50.0	−20.9	4.3	3.0	60.0	−1.3	−38.5	

1	2	3		4		5	6	7	8	9	10	11	12
BAH00000	−74.3	−121.1	−32.2	−84 3	−64.3	−75.8	24.0	1.6	1.6	133.0	−7.5	−39.4	
BDI00000	−2.2	−30.5	90.4	−12.2	7.8	29.9	−3.4	1.6	1.6	90.0	−7.5	−41.6	
BEL00000	52.7	−53.6	62.0	42.7	62.0	5.2	50.6	1.6	1.6	90.0	−7.5	−41.2	
BEN00000	−30.6	−40.2	44.7	−40.2	−20.6	2.3	9.3	1.6	1.6	90.0	−7.5	−39.9	
BERCAYMS	−37.1	−38.5	−27.1	−38.5	−27.1	−68 6	22.5	3.7	2.3	41.0	−3.5	−38.2	*/MB4
BFA00000	10.2	−54.6	46.2	0.2	20.2	−1.4	12.2	1.7	1.6	24.0	−7.5	−39.5	
BGD00000	133.0	44.6	135.5	123.0	135.5	90.2	24.0	1.6	1.6	90.0	−7.5	−40.3	
BHR00000	20.4	−18.6	119.8	10 4	30.4	50.6	26.1	1.6	1.6	90.0	−7.5	−41.9	
BLZ00000	−90.8	−138.4	−38.7	−100.8	−80.8	−88.6	17.2	1.6	1.6	90.0	−7.5	−41.6	
BOL00000	−35.0	−97.3	−23.2	−45.0	−25.0	−64.4	−17.1	2.7	1.7	129.0	−5.4	−38.6	
BOT00000	19.9	−41.7	89.9	9.9	29.9	24.0	−21.8	1.6	1.6	90.0	−7.5	−40 0	
BRB00000	−29.8	−110.8	−8 4	−39.8	−19.8	−59.6	13.2	1.6	1.6	90.0	−7.5	−41.6	
BRM00000	110.8	57.6	131 0	100.8	120.8	97.0	18.9	3.2	1.6	88.0	−5.1	−38.7	
BRU00000	157.3	71.5	157.7	147.3	157.7	114.6	4.5	1.6	1.6	90.0	−7.5	−40.9	
BTN00000	63.0	34.3	146.6	53.0	73.0	90.4	27.0	1.6	1.6	90.0	−7.5	−41.5	
BUL00000	50.4	−20.6	71.5	40 4	60 4	25 6	42.8	1.6	1.6	90.0	−7.5	−40.8	
CAF00000	14.8	−24 8	57.6	4.8	24.8	21.5	6.5	2.7	1.7	14 0	−6.3	−39.1	
CAN0EAST	−107 3	−108.0	−90.1	−108.0	−97.3	−76.6	50 1	5.0	1.7	154.0	−4.9	−38.3	
CAN0CENT	−111.1	−115.1	−101.0	−115.1	−101.1	−96.1	51.4	4.3	2.0	155.0	−5.5	−38.4	
CAN0WEST	−114 9	−119.0	−113.7	−119.0	−113.7	−120.1	57.4	3.1	1.9	173.0	−7.5	−38.7	
CAR00000	−159 0	−169.8	−158.2	−169.0	−158.2	173 4	4.6	10.2	2.4	175.0	6.6	−35.6	*/MB2
CBG00000	96.1	61.2	144.2	86.1	106.1	105.1	12.9	1.6	1.6	90.0	−7.5	−40.4	
CHL00000	−74.9	−96.4	−53 6	−84.9	−64.9	−82.6	−32.8	8.1	6.1	155.0	1.4	−38.4	
CHN00001	101.4	90.4	139.4	91.4	111.4	103.7	35.0	8.1	4.3	2.0	2.0	−38.3	
CHN00002	135.5	75.0	151 3	125.5	145.5	114.8	16.4	4.9	2.4	65.0	−1.5	−38.7	

CLM00000	-70.9	-110.1	-39.9	-80.9	-60.9	-74.0	5.7	4.0	2.3	121.0	-3.0	-38.9	
CLN00000	121.5	28.1	131.9	111.5	131.5	80.1	7.7	1.6	1.6	90.0	-7.5	-41.2	
CME00000	21.4	-27.3	51.2	11.4	31.4	12.9	6.3	2.5	1.9	84.0	-6.2	-39.0	
CNR00000	12.2	-31.1	24.2	2.2	22.2	-15.9	28.5	1.6	1.6	90.0	-7.5	-41.3	*/MB8
COG00000	-16.0	-24.7	56.5	-24.7	-6.0	14.8	-0.6	2.0	1.6	63.0	-7.0	-38.8	
COM00000	94.5	-7.3	95.5	84.5	95.5	44.1	-12.2	1.6	1.6	90.0	-7.5	-41.0	
CPV00000	-85.7	-94.7	46.5	-94.7	-75.7	-24.1	16.0	1.6	1.6	90.0	-7.5	-41.3	
CTI00000	4.6	-15.0	27.1	-5.4	14.6	-5.9	7.8	1.6	1.6	90.0	-7.5	-40.0	
CTR00000	-96.0	-125.4	-44.0	-106.0	-86.0	-85.3	8.2	1.6	1.6	90.0	-7.5	-40.2	
CUB00000	-80.6	-123.5	-36.1	-90.6	-70.6	-79.5	21.0	2.0	1.6	172.0	-7.5	-39.3	
CVA00000	58.1	-38.1	63.1	48.1	63.1	12.5	41.9	1.6	1.6	90.0	-7.5	-41.3	
CYP00000	-1.8	-21.5	87.9	-11.8	8.2	33.2	35.1	1.6	1.6	90.0	-7.5	-41.6	
CYPSBA00	56.6	44.7	59.2	46.6	59.2	32.9	34.6	1.6	1.6	90.0	-7.5	-41.7	*/MB9
D 00000	26.4	-30.4	53.1	16.4	36.4	9.7	50.7	1.6	1.6	90.0	-7.5	-40.5	
DDR00000	37.0	-26.8	51.7	27.0	47.0	12.6	51.4	1.6	1.6	90.0	-7.5	-40.8	3
DJI00000	-18.3	-28.4	113.6	-28.3	-8.3	42.6	11.7	1.6	1.6	90.0	-7.5	-41.3	
DMA00000	-69.6	-112.1	-10.5	-79.6	-59.6	-61.3	15.3	1.6	1.6	90.0	-7.5	-41.8	
DNK00001	32.2	-40.8	62.2	22.2	42.2	11.6	56.0	1.6	1.6	90.0	-7.5	-40.9	
DNK00002	-49.0	-50.0	-43.1	-50.0	-43.1	12.5	56.3	1.6	1.6	90.0	-7.5	-40.6	*/MB10
DNK00FAR	-49.0	-50.0	-43.1	-50.0	-43.1	-7.2	61.7	1.6	1.6	90.0	-7.5	-41.1	*/MB10
DOM00000	-85.4	-120.3	-20.5	-95.4	-75.4	-70.4	18.7	1.6	1.6	90.0	-7.5	-41.7	
E 00002	12.2	-31.1	24.2	2.2	22.2	-3.0	39.9	2.1	1.6	8.0	-7.5	-39.3	*/MB8
EGY00000	68.5	-10.3	69.5	58.5	69.5	30.3	26.2	2.3	1.6	54.0	-7.5	-39.2	
EQA00000	-104.0	-104.0	-94.1	-104.0	-94.1	-83.1	-1.4	3.1	1.6	174.0	-5.7	-38.9	
ETH00000	57.5	-4.0	85.0	47.5	67.5	40.6	10.3	2.8	2.8	64.0	-7.3	-39.4	

1	2	3		4		5	6	7	8	9	10	11	12
F 00000	0.9	−13.9	5.7	−9.1	5.7	3.1	45.9	2.1	1.6	168.0	−7.5	−39.0	*/MB11
FJI00000	148.8	128.2	−131.1	138.8	158.8	178.5	−17.2	1.6	1.6	90.0	−7.5	−41.5	
FLKSTGGL	−37.1	−38.5	−27.1	−38.5	−27.1	−46.8	−59.6	3.7	1.6	170.0	−7.5	−38.8	*/MB4
FNL00000	46.8	7.1	46.8	36.8	46.8	23.8	64.3	1.6	1.6	90.0	−7.5	−39.3	
G 00000	−37.1	−38.5	−27.1	−38.5	−27.1	−4.1	53.9	1.6	1.6	151.0	−7.5	−39.0	*/MB4
GAB00000	38.8	−29.2	52.0	28.8	48.8	11.7	−0 7	1.6	1.6	90.0	−7.5	−39.8	
GDL00000	0.9	−13.9	5.7	−9.1	5.7	−61.9	16.3	1.6	1.6	90.0	−7.5	−40.0	*/MB11
GDL00002	−115.9	−123.2	−81.2	−123.2	−105.9	−61.8	16.4	1.6	1.6	90.0	−7.5	−40.3	*/MB13
GHA00000	16.0	−41.7	39.3	6.0	26.0	−1.3	7.7	1.6	1.6	90.0	−7.5	−39.7	
GIB00000	56.6	44.7	59.2	46.6	59.2	−5.4	36.1	1.6	1.6	90.0	−7.5	−40.9	*/MB9
GMB00000	−34.0	−77.3	44.5	−44.0	−24.0	−16.4	13 4	1.6	1 6	90.0	−7.5	−42.1	
GNB00000	40.0	−76.5	45.7	30.0	45.7	−15.4	12.0	1.6	1.6	90.0	−7.5	−41.3	
GNE00000	−32.3	−32.8	53.8	−32.8	−22.3	10.5	1.7	1.6	1.6	90.0	−7.5	−40.9	
GRC00000	16.6	−8.9	56.8	6.6	26.6	24.7	38.3	1.7	1.6	160.0	−7.5	−39.3	
GRD00000	−32.8	−113.0	−10.2	−42.8	−22.8	−61.6	12.0	1.6	1.6	90.0	−7.5	−41.6	
GRL00000	−49.0	−50.0	−43.1	−50.0	−43.1	−42.9	68.6	2.3	1.6	174.0	−7.5	−38.6	*/MB10
GTM00000	−135.7	−139.3	−41.4	−139.3	−125.7	−90.5	15.5	1.6	1.6	90.0	−7.5	−40.5	
GUF00000	0.9	−13.9	5.7	−9.1	5.7	−53.2	4.3	1.6	1.6	90.0	−7.2	−40.0	*/MB11
GUF00002	−115.9	−123.2	−81.2	−123.2	−105.9	−53.3	4.3	1.6	1.6	90.0	−6.5	−39.4	*/MB13
GUI00000	27.5	−51.8	33.8	17.5	33.8	−10.9	10.2	1.6	1.6	90.0	−7.5	−39.8	
GUMMRA00	−159.0	−169.8	−158.2	−169.0	−158.2	145.4	16.7	1.7	1.6	79.0	−7.3	−38.3	*/MB2
GUY00000	−24.1	−100.1	−18.3	−34.1	−18.3	−59.2	4.7	1.6	1.6	90.0	−7.5	−39.4	
HKG00000	56.6	44.7	59.2	46.6	59.2	114.5	22.4	1.6	1.6	90.0	−7.5	−40.6	*/MB9
HND00000	−76 2	−123.8	−48.1	−86.2	−66.2	−86.1	15.4	1.6	1.6	90.0	−7.5	−40.0	
HNG00000	−6.6	−22.2	62.4	−16 6	3.4	19.4	47.4	1.6	1.6	90.0	−7.5	−41.0	2

4 500 – 4 800 MHz, 6 725 – 7 025 MHz

HOL00000	–5.2	–50.1	1.9	–15.2	1.9	5.4	52.4	1.6	1.6	90.0	–7.5	–41.4	*/MB5
HTI00000	–92.0	–122.9	–23.1	–102.0	–82.0	–73.0	18.8	1.6	1.6	90.0	–7.5	–41.7	
HWA00000	–159.0	–169.8	–158.2	–169.0	–158.2	–157.6	20.7	1.6	1.6	90.0	–7.5	–40.2	*/MB2
HWL00000	–159.0	–169.8	–158.2	–169.0	–158.2	–176.6	0.1	1.6	1.6	90.0	–7.5	–41.8	*/MB2
I 00000	–28.1	–32.9	54.1	–32.9	–18.1	11.3	40.9	2.1	1.6	141.0	–7.5	–38.9	
IND00000	74.0	51.3	116.4	64.0	84.0	82.7	18.9	6.2	4.9	120.0	2.4	–38.5	
INS00000	115.4	101.1	135.0	105.4	125.4	117.6	–1.8	9.4	4.3	170.0	3.9	–38.6	
IRL00000	–31.0	–41.0	25.7	–41.0	–21.0	–8.2	53.2	1.6	1.6	90.0	–7.5	–41.1	
IRN00000	25.0	20.1	50.0	20.1	35.0	54.3	33.0	3.7	1.6	143.0	–7.5	–39.0	
IRQ00000	66.4	5.1	82.5	56.4	76.4	44.3	33.1	1.6	1.6	90.0	–7.5	–39.4	
ISL00000	–35.4	–53.0	14.8	–45.4	–25.4	–18.2	64.9	1.6	1.6	90.0	–7.5	–40.5	
ISR00000	73.0	–8.0	78.4	63.0	78.4	35.0	31.3	1.6	1.6	90.0	–7.5	–41.0	
J 00000	152.5	94.4	170.9	142.5	162.5	140.4	30.4	5.7	3.7	15.0	–0.2	–38.5	
JAR00000	–159.0	–169.8	–158.2	–169.0	–158.2	–160.0	–0.4	1.6	1.6	90.0	–7.5	–41.9	*/MB2
JMC00000	–108.6	–127.5	–27.8	–118.6	–98.6	–77.6	18.2	1.6	1.6	90.0	–7.5	–41.5	
JON00000	–159.0	–169.8	–158.2	–169.0	–158.2	–168.5	17.0	1.6	1.6	90.0	–7.5	–42.2	*/MB2
JOR00000	81.8	–28.8	102.9	71.8	91.8	36.7	31.3	1.6	1.6	90.0	–7.5	–40.9	
KEN00000	78.2	–10.4	86.3	68.2	86.3	38.4	0.8	2.1	1.6	95.0	–7.5	–39.3	
KER00000	113.0	113.0	114.3	113.0	114.3	69.3	–43.9	1.9	1.6	169.0	–7.5	–38.7	*/MB1
KIR00000	150.0	120.6	–134.6	140.0	160.0	173.0	1.0	1.6	1.6	90.0	–7.5	–41.8	
KOR00000	116.2	83.0	169.6	106.2	126.2	127.7	36.2	1.6	1.6	90.0	–7.5	–40.5	
KRE00000	145.0	110.1	150.0	135.0	150.0	127.8	39.8	1.6	1.6	90.0	–7.5	–39.6	
KWT00000	30.8	–20.2	115.3	20.8	40.8	47.7	29.1	1.6	1.6	90.0	–7.5	–41.9	1,2
LAO00000	142.0	56.6	149.9	132.0	149.9	104.1	18.1	1.6	1.6	90.0	–7.5	–39.1	
LBN00000	91.0	–31.6	103.2	81.0	101.0	35.8	33.8	1.6	1.6	90.0	–7.5	–41.3	

1	2	3		4		5	6	7	8	9	10	11	12
LBR00000	–41.8	–50.4	35.5	–50.4	–31.8	–8.9	6.5	1.6	1.6	90.0	–7.5	–40.4	
LBY00000	28.5	–19.2	54.9	18.5	38.5	19.0	25.9	3.0	2.7	165.0	–6.8	–39.2	
LIE00000	7.9	–30.0	15.0	–2.1	15.0	9.5	47.2	1.6	1.6	90.0	–7.5	–41.7	
LSO00000	–18.7	–40.1	96.9	–28.7	–8.7	28.4	–29.5	1.6	1.6	90.0	–7.5	–41.5	
LUX00000	19.2	–53.9	66.1	9.2	29.2	6.2	49.7	1.6	1.6	90.0	–7.5	–41.6	
MAC00000	117.0	64.7	162.4	107.0	127.0	113.6	22.2	1.6	1.6	90.0	–7.5	–41.8	
MAU00000	92.2	8.0	107.0	82.2	102.2	57.5	–20.2	1.6	1.6	90.0	–7.5	–41.4	
MCO00000	40.5	–41.8	56.6	30.5	50.5	7.4	43.7	1.6	1.6	90.0	–7.5	–41.3	
MDG00000	16.9	10.4	81.1	10.4	26.9	46.6	–18.7	2.6	1.6	66.0	–5.4	–38.6	
MDR00000	–7.9	–41.9	6.7	–17.9	2.1	–16.2	31.6	1.6	1.6	90.0	–7.5	–41.7	*/MB7
MDW00000	–159.0	–169.8	–158 2	–169.0	–158.2	–177.4	28.2	1.6	1.6	90.0	–7.5	–42.0	*/MB2
MEX00000	–113.0	–136.1	–61.0	–123.0	–103.0	–103.6	23.3	5.8	2.4	161.0	–2.6	–38.8	
MLA00000	78.5	76.4	143.2	76.4	88.5	108.2	4.7	3.2	1.6	0.0	–4.2	–38.4	
MLD00000	117.6	21.1	124.9	107.6	124.9	73.4	2.5	2.2	1.6	88.0	–7.5	–38.7	
MLI00000	–1.3	–59.9	43.3	–11.3	8.7	–3.9	17.6	3.3	2.5	21.0	–5.5	–39.2	
MLT00000	5.6	–39.8	68.5	–4.4	15.6	14.4	35.9	1.6	1.6	90.0	–7.5	–41.8	
MNG00000	113.6	60 4	148.9	103.6	123.6	103.8	46.8	3.6	1.6	3.0	–7.5	–38.9	
MOZ00000	88.6	–10.6	90.6	78.6	90.6	35.6	–17.2	3.1	1.6	98.0	–5.6	–38.3	
MRC00000	33.0	–50.5	37.5	23.0	37.5	–8.9	27.9	3.4	1.6	45.0	–7.5	–38.8	
MRL00000	–159.0	–169.8	–158.2	–169.0	–158.2	175.3	8.7	2.3	1.6	94.0	–6.5	–38.8	*/MB2
MTN00000	–22.8	–72.8	44.2	–32.8	–12.8	–10.3	19.8	2.5	2.4	76.0	–7.5	–39.4	
MWI00000	30.3	–25.0	93.7	20.3	40.3	34.1	–13.3	1.6	1.6	90.0	–7.5	–40.0	
MYT00000	0.9	–13.9	5.7	–9.1	5.7	45.2	–12.8	1.6	1.6	90.0	–7.5	–41.2	*/MB11
NCG00000	–84.4	–124.4	–45.9	–94.4	–74.4	–84.9	12.9	1.6	1.6	90.0	–7.5	–40.6	

4 500 – 4 800 MHz, 6 725 – 7 025 MHz

NCL00000	113.0	113.0	114.3	113.0	114.3	165.8	–21.4	1.6	1.6	90.0	–7.5	–40.6	*/MB1
NGR00000	–38.5	–54.5	64.6	–48.5	–28.5	7.5	17.2	2.1	1.7	100.0	–7.5	–38.9	
NIG00000	42.5	–29.6	49.6	32.5	49.6	8.0	9.9	2.5	1.6	47.0	–5.6	–38.5	
NMB00000	13.4	–45 4	82.5	3.4	23.4	18.5	–21.0	2.7	2.6	155.0	–7.5	–39.5	
NOR00000	3.9	2.9	29.1	2.9	13.9	11.7	64.6	2.0	1.6	17.0	–7.5	–38.7	
NPL00000	123.3	30.3	137.6	113.3	133.3	84.4	28.0	1.6	1.6	90.0	–7.5	–40.8	
NRU00000	146.0	114.5	–140.7	136.0	156.0	166.9	–0.5	1.6	1.6	90.0	–7.5	–41.8	
NZL00001	152.0	150.9	175.0	150.9	162.0	170.9	–44.8	5.4	1.6	49.0	–5.3	–38.1	*/MB14
NZL00002	152.0	150.9	175.0	150.9	162.0	–165.4	–13.2	2.7	2.0	82.0	–5.2	–38.3	*/MB14
OCE00000	–115.9	–123 2	–81.2	–123.2	–105.9	–141.9	–16.1	3.5	2.4	139.0	–5.0	–38.9	*/MB13
OMA00000	104.0	–9.8	122.2	94.0	114.0	55.1	21.6	1.9	1.6	61.0	–7.5	–39.2	5
PAK00000	56.0	34.1	62.0	46.0	62.0	69.9	29.8	3.0	2.0	22.0	–7.2	–39.0	
PHL00000	89 6	83.0	159.8	83.0	99.6	121.3	11.4	3.3	1.6	101.0	–4.2	–38.4	
PLM00000	–159.0	–169.8	–158.2	–169.0	–158.2	–161.4	7.0	1.6	1.6	90.0	–7.5	–41.9	*/MB2
PNG00000	154 1	114.2	–176.5	144.1	164.1	148.4	–6.6	3.3	2.3	167.0	–4.1	–39.0	
PNR00000	–79.2	–120.0	–40.4	–89.2	–69.2	–80.2	8.5	1.6	1.6	90.0	–7.5	–40.4	
POL00000	14 2	–14.8	56.4	4.2	24.2	19.3	52.0	1.6	1.6	90.0	–7.5	–40.2	
POR00000	–7.9	–41.9	6.7	–17.9	2.1	–8.0	39.7	1.6	1.6	90.0	–7.5	–41.2	*/MB7
PRG00000	–81.5	–90.4	–23.2	–90.4	–71.5	–58.7	–23.1	1.6	1.6	90.0	–7.5	–39.1	
PRU00000	–89.9	–120.4	–38.2	–99.9	–79.9	–74.2	–8.4	3.6	2.4	111.0	–3.3	–38.7	
PTC00000	–62.0	–62.6	–58.5	–62.6	–58.5	–130.1	–25.1	1.6	1.6	90.0	–7.5	–41.2	
QAT00000	8.3	–16.9	120 0	–1.7	18.3	51.6	25.4	1.6	1.6	90.0	–7 5	–41.6	
REU00000	0.9	–13.9	5.7	–9.1	5.7	55.6	–21.1	1.6	1.6	90.0	–7.5	–40.7	*/MB11
REU00002	113.0	113.0	114.3	113.0	114.3	55.6	–21.1	1.6	1.6	90.0	–7.5	–40.6	*/MB1
ROU00000	31.0	–1.0	51.0	21.0	41.0	25.0	46.3	1.6	1.6	90.0	–7.5	–39.6	
RRW00000	6.8	–30.9	90.8	–3.2	16.8	29.7	–1.9	1.6	1.6	90.0	–7.5	–41.9	

4 500 – 4 800 MHz, 6 725 – 7 025 MHz

1	2	3		4		5	6	7	8	9	10	11	12
S 00000	11.2	−7.0	47.1	1.2	21.2	16.7	60.9	1.6	1.6	90.0	−7.5	−40.2	
SCN00000	−88.8	−113.2	−12.6	−98.8	−78.8	−62.9	17.3	1.6	1.6	90.0	−7.5	−41.6	
SDN00001	1.4	−7.0	15.0	−7.0	11.4	29.3	10.3	3.0	1.9	131.0	−7.2	−39.0	*/MB15
SDN00002	1.4	−7.0	15.0	−7.0	11.4	29.4	16.7	2.6	2.4	171.0	−7.5	−39.3	*/MB15
SEN00000	−48.4	−64.4	34.3	−58.4	−38.4	−14.0	14.1	1.6	1.6	90.0	−7.5	−40.3	
SEY00000	96.5	3.1	107.7	86.5	106.5	55.4	−4.5	1.6	1.6	90.0	−7.5	−41.3	
SLM00000	147.5	120.4	−161.7	137.5	157.5	159.0	−9.1	1.6	1.6	90.0	−7.5	−39.5	
SLV00000	−130.5	−130.5	−47.5	−130.5	−120.5	−89.0	13.7	1.6	1.6	90.0	−7.5	−40.9	
SMA00000	−159.0	−169.8	−158.2	−169.0	−158.2	−170.7	−14.2	1.6	1.6	90.0	−7.5	−42.2	*/MB2
SMO00000	−125.5	137.5	−121.7	−135.5	−121.7	−172.1	−13.7	1.6	1.6	90.0	−7.5	−41.1	
SMR00000	23.0	−36.4	61.4	13.0	33.0	12.5	43.9	1.6	1.6	90.0	−7.5	−41.7	
SNG00000	98.1	60.6	147.1	88.1	108.1	103.9	1.3	1.6	1.6	90.0	−7.5	−41.6	
SOM00000	98.4	−20.0	102.7	88.4	102.7	46.0	6.3	3.1	1.6	72.0	−7.5	−38.8	
SPM00000	0.9	−13.9	5.7	−9.1	5.7	−56.4	47.0	1.6	1.6	90.0	−7.5	−40.9	*/MB11
SRL00000	−51.8	−63.8	40.0	−61.8	−41.8	−11.9	8.5	1.6	1.6	90.0	−7.5	−41.4	
STP00000	31.4	−45.4	59.4	21.4	41.4	7.0	1.0	1.6	1.6	90.0	−7.5	−41.7	
SUI00000	−9.2	−20.0	35.0	−19.2	0.8	8.2	46.5	1.6	1.6	90.0	−7.5	−41.3	2
SUR00000	−77.0	−97.0	−15.0	−87.0	−67.0	−55.6	3.9	1.6	1.6	90.0	−7.5	−40.7	
SWZ00000	29.0	−26.8	89.2	19.0	39.0	31.3	−26.4	1.6	1.6	90.0	−7.5	−42.0	
SYR00000	18.7	10.1	70.0	10.1	28.7	38.6	35.3	1.6	1.6	90.0	−7.5	−40.8	
TCD00000	−10.5	−36.5	67.5	−20.5	−0.5	18.4	15.6	3.5	1.6	97.0	−6.8	−39.0	
TCH00000	−12.7	−21.3	54.4	−21.3	−2.7	17.3	49.6	1.6	1.6	90.0	−7.5	−40.0	2
TGO00000	−21.1	−41.0	43.4	−31.1	−11.1	0.8	8.6	1.6	1.6	90.0	−7.5	−40.4	
THA00000	120.6	58.6	137.2	110.6	130.6	100.9	12.8	2.8	1.6	83.0	−5.6	−38.8	
TON00000	−128.0	135.7	−126.0	−138.0	−126.0	−175.2	−21.2	1.6	1.6	90.0	−7.5	−41.0	

4 500 – 4 800 MHz, 6 725 – 7 025 MHz

TRD00000	−73 4	−112.3	−9.9	−83.4	−63.4	−61.1	10.8	1.6	1.6	90 0	−7.5	−41.8	
TUN00000	−4 1	−29.0	48.4	−14.1	5.9	9 4	33.5	1.6	1.6	90.0	−7.5	−40.3	
TUR00000	9 4	7.1	61.6	7.1	19.4	34.1	38.9	2.8	1.6	171.0	−7.5	−38.9	
TUV00000	158 0	127.3	−129 0	148.0	168.0	179.2	−8.5	1.6	1.6	90.0	−7.5	−41.8	
TZA00000	69 5	−21.3	91.4	59 5	79.5	35.4	−5 9	2.4	1.6	117.0	−7.5	−39.3	
UAE00000	70 4	−12 7	120.3	60.4	80.4	53.8	24.9	1.6	1.6	90.0	−7.5	−41.1	
UGA00000	32 0	−27.2	91 6	22 0	42.0	32.2	0.9	1.6	1.6	90.0	−7.5	−40.3	
URG00000	−86.1	−108.9	−3.5	−96 1	−76.1	−56.3	−33.7	1.6	1.6	90.0	−7.5	−40.7	
URS00001	61.0	56 7	65.4	56 7	65.4	57.6	48.3	7.5	3.5	178.0	−1.1	−38.3	
URS00002	88 1	87.7	98 0	87.7	98.0	94.8	48.6	7.5	3.5	175.0	1.5	−38.3	
URS00003	138 5	138 5	140.6	138 5	140.6	134.9	52.6	7.5	3.5	5.0	−1.1	−38.3	
USA00000	−101 0	−130.3	−63 5	−111.0	−91.0	−93.9	36.8	8.2	3.6	172.0	1.2	−38.4	*/MB16
USAVIPRT	−101 0	−130 3	−63 5	−111 0	−91.0	−64 5	17.8	1.6	1.6	90.0	−7.5	−41.4	*/MB16
VCT00000	−93 1	−112.3	−9.9	−103.1	−83.1	−61.1	13.2	1.6	1.6	90.0	−7.5	−41.5	
VEN00001	−82 7	−102.5	−24.7	−92.7	−72.7	−66.4	6.8	2.8	2.1	142.0	−4.9	−38.9	*/MB17
VEN00002	−82 7	−102.5	−24.7	−92 7	−72.7	−63.6	15.7	1.6	1.6	90.0	−7 5	−41.7	*/MB17
VTN00000	107 0	85.1	125.0	97.0	117.0	108.5	14.2	3.6	2.6	139.0	−2.9	−38.8	
VUT00000	150 7	127.4	−152.4	140.7	160.7	168.4	−17.2	1.6	1.6	90.0	−7.5	−40.3	
WAK00000	−159.0	−169.8	−158.2	−169.0	−158.2	166.5	19.2	1.6	1.6	90.0	−7.5	−41.9	*/MB2
WAL00000	113 0	113 0	114.3	113.0	114.3	−177.1	−13.8	1.6	1.6	90.0	−6.9	−39.8	*/MB1
YEM00000	27.0	−24.3	113.2	17.0	37.0	44.2	15.1	1.6	1.6	90.0	−7.5	−41 4	
YMS00000	108.0	−16.4	114 4	98.0	114.4	49.9	14.8	1.6	1.6	90.0	−7.5	−39.7	
YUG00000	43.1	−25.8	60.2	33.1	53.1	18.7	44 4	1.6	1.6	90.0	−7.5	−40.5	2
ZAI00000	51.0	−23.6	62.6	41.0	61.0	24.4	−4.6	3.9	3.5	92.0	−0.5	−38.4	
ZMB00000	39.6	−27.9	82.5	29.6	49.6	27.9	−12.8	2.4	1.6	26.0	−7.5	−39.6	
ZWE00000	65 6	−27.0	85 5	55.6	75.6	30.0	−18.9	1.6	1.6	90.0	−7.5	−39.9	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

1	2	3		4		5	6	7	8	9	10	11	12
ABW00000	−98.2	−119.4	−18.9	−108.2	−88.2	−69.1	12.4	0.8	0.8	90.0	−5.5	−25.8	
ADL00000	113.0	113.0	114.3	113.0	114.3	140.0	−66.7	0.8	0.8	90.0	−9.3	−31.9	*/MB1
AFG00000	48.0	42.3	95.8	42.3	58.0	66.4	33.9	2.2	1.3	15.0	−3.2	−29.2	
AFS00000	71.0	−25.8	84.2	61.0	81.0	27.2	−30.1	5.3	1.4	128.0	4.2	−26.7	
AGL00000	−36.1	−37.2	74.1	−37.2	−26.1	15.9	−12.4	2.4	1.4	78.0	2.0	−25.9	
ALB00000	2.6	−29.9	69.8	−7.4	12.6	20.0	41.1	0.8	0 8	90.0	−7.7	−28.2	
ALG00000	−33.5	−33.5	38.4	−33.5	−23.5	1.6	27.8	3.3	2 2	133.0	4.3	−26.6	
ALS00000	−159.0	−169.8	−158.2	−169.0	−158.2	−158.6	57.5	6.3	1.5	1.0	2.5	−28.7	*/MB2
AND00000	−41.0	−48.6	51.7	−48.6	−31.0	1.5	42.5	0.8	0.8	90.0	−9.3	−30.0	
ARG00000	−51.0	−58.4	−51.0	−58.4	−51.0	−62.0	−33.6	4.8	2.9	93.0	10.3	−21.9	*/MB3
ARGINSUL	−51.0	−58 4	−51.0	−58.4	−51.0	−60.0	−57.5	3.6	1.3	154.0	−0.5	−28.6	*/MB3
ARS00000	52.0	20.1	60.0	42.0	60.0	45.7	23.1	3.7	2.6	153.0	1.7	−29.4	
ASCSTHTC	−37.1	−38.5	−27.1	−38.5	−27.1	−11.8	−19.6	5.6	1.8	77.0	3.0	−28.6	*/MB4
ATG00000	−77.7	−112.2	−11.4	−87.7	−67.7	−61.8	17.0	0.8	0.8	90.0	−6.3	−27.1	
ATN00000	−5.2	−50.1	1.9	−15.2	1.9	−65.6	15.1	1.3	1.0	58.0	−0.2	−22.3	*/MB5
AUS00001	144.1	122.4	148.1	134.1	148.1	134.3	−24.5	6.6	5.3	146.0	14.3	−22.1	*/MB6
AUS00002	144.1	122.4	148 1	134.1	148.1	163.6	−30.5	1.6	1.0	15.0	−2.0	−26.5	*/MB6
AUS00003	144.1	122.4	148.1	134.1	148.1	101.5	−11.1	1.1	1.0	15.0	−6.0	−28.5	*/MB6
AUS00004	144.1	122.4	148 1	134.1	148.1	159.0	−54.5	0.8	0.8	90.0	−9.3	−32.3	*/MB6
AUS00005	144.1	122.4	148.1	134.1	148.1	110.4	−66.3	0.8	0.8	90.0	−9.3	−31.8	*/MB6
AUT00000	−2.6	−18.6	46.4	−12.6	7.4	13.2	47.5	0.8	0.8	90.0	−7.2	−27.2	2
AZR00000	−7.9	−41.9	6.7	−17.9	2.1	−28.0	38.7	0.8	0.8	90.0	−7.8	−27.9	*/MB7
B 00001	−65.0	−70.0	−60.1	−70.0	−60.1	−62.6	−6.0	4.1	4.0	43.0	10.7	−22.4	
B 00002	−61.1	−70.0	−60.1	−70.0	−60.1	−45.4	−6.3	4.6	4.1	152.0	11.3	−22.4	
B 00003	−68.7	−70.0	−60.1	−70.0	−60.1	−50.0	−20.9	4.3	3.0	60.0	9.8	−22.2	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

BAH00000	−74.3	−121.1	−32.2	−84.3	−64.3	−75.8	24.0	1.6	1.0	133.0	0.1	−24.5	
BDI00000	−2.2	−30.5	90.4	−12.2	7.8	29.9	−3.4	0.8	0.8	90.0	−9.3	−29.9	
BEL00000	52.7	−53.6	62.0	42.7	62.0	5.2	50.6	0.8	0.8	90.0	−9.3	−30.2	
BEN00000	−30.6	−40.2	44.7	−40.2	−20.6	2.3	9.3	1.2	1.0	89.0	−1.2	−23.0	
BERCAYMS	−37.1	−38.5	−27.1	−38.5	−27.1	−68.6	22.5	3.7	2.3	41.0	8.3	−21.9	*/MB4
BFA00000	10.2	−54.6	46.2	0.2	20.2	−1.4	12.2	1.7	1.0	24.0	0.3	−25.0	
BGD00000	133.0	44.6	135.5	123.0	135.5	90.2	24.0	0.8	0.8	90.0	−3.0	−21.9	
BHR00000	20.4	−18.6	119.8	10.4	30.4	50.6	26.1	0.8	0.8	90.0	−9.3	−32.2	
BLZ00000	−90.8	−138.4	−38.7	−100.8	−80.8	−88.6	17.2	0.8	0.8	90.0	−5.6	−26.6	
BOL00000	−35.0	−97.3	−23.2	−45.0	−25.0	−64.4	−17.1	2.7	1.7	129.0	5.2	−22.5	
BOT00000	19.9	−41.7	89.9	9.9	29.9	24.0	−21.8	1.5	1.5	94.0	−5.1	−30.0	
BRB00000	−29.8	−110.8	−8.4	−39.8	−19.8	−59.6	13.2	0.8	0.8	90.0	−6.1	−26.4	
BRM00000	110.8	57.6	131.0	100.8	120.8	97.0	18.9	3.2	1.6	88.0	5.5	−22.5	
BRU00000	157.3	71.5	157.7	147.3	157.7	114.6	4.5	0.8	0.8	90.0	−6.0	−24.9	
BTN00000	63.0	34.3	146.6	53.0	73.0	90.4	27.0	0.8	0.8	90.0	−9.3	−29.3	
BUL00000	50.4	−20.6	71.5	40.4	60.4	25.6	42.8	0.8	0.8	90.0	−6.9	−27.0	
CAF00000	14.8	−24.8	57.6	4.8	24.8	21.5	6.5	2.7	1.7	14.0	4.7	−22.8	
CAN0EAST	−107.3	−108.0	−90.1	−108.0	−97.3	−76.6	50.1	5.0	1.7	154.0	7.1	−25.0	
CAN0CENT	−111.1	−115.1	−101.0	−115.1	−101.1	−96.1	51.4	4.3	2.0	155.0	4.8	−26.7	
CAN0WEST	−114.9	−119.0	−113.7	−119.0	−113.7	−120.1	57.4	3.1	1.9	173.0	0.3	−28.7	
CAR00000	−159.0	−169.8	−158.2	−169.0	−158.2	173.4	4.6	10.2	2.4	175.0	13.9	−21.0	*/MB2
CBG00000	96.1	61.2	144.2	86.1	106.1	105.1	12.9	1.2	1.0	35.0	−1.6	−23.2	
CHL00000	−74.9	−96.4	−53.6	−84.9	−64.9	−82.6	−32.8	8.1	6.1	155.0	9.9	−28.4	
CHN00001	101.4	90.4	139.4	91.4	111.4	103.7	35.0	8.1	4.3	2.0	14.5	−23.2	
CHN00002	135.5	75.0	151.3	125.5	145.5	114.8	16.4	4.9	2.4	65.0	9.1	−22.5	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

1	2	3		4		5	6	7	8	9	10	11	12
CLM00000	−70.9	−110.1	−39.9	−80.9	−60.9	−74.0	5.7	4.0	2.3	121.0	8.0	−22.6	
CLN00000	121.5	28.1	131.9	111.5	131.5	80.1	7.7	0.8	0.8	90.0	−5.6	−24.8	
CME00000	21.4	−27.3	51.2	11.4	31.4	12.9	6.3	2.5	1.9	84.0	4.8	−22.7	
CNR00000	12.2	−31.1	24.2	2.2	22.2	−15.9	28.5	0.8	0.8	90.0	−9.3	−29.2	*/MB8
COG00000	−16.0	−24.7	56.5	−24.7	−6.0	14.8	−0.6	2.0	1.1	63.0	1.6	−22.7	
COM00000	94.5	−7.3	95.5	84.5	95.5	44 1	−12.2	0.8	0.8	90.0	−5.8	−24.7	
CPV00000	−85 7	−94.7	46.5	−94.7	−75.7	−24.1	16.0	0.8	0.8	90.0	−9.3	−30.4	
CTI00000	4.6	−15.0	27.1	−5.4	14.6	−5.9	7.8	1.4	1.2	66.0	0.0	−23.1	
CTR00000	−96.0	−125.4	−44.0	−106.0	−86.0	−85.3	8.2	1.3	1.0	64.0	−1.2	−23.2	
CUB00000	−80.6	−123.5	−36.1	−90.6	−70.6	−79.5	21.0	2.0	1.0	172.0	1.0	−24.6	
CVA00000	58.1	−38.1	63.1	48.1	63.1	12.5	41.9	0.8	0.8	90.0	−8.4	−28.8	
CYP00000	−1.8	−21.5	87.9	−11.8	8.2	33.2	35.1	0.8	0.8	90.0	−9.3	−29.8	
CYPSBA00	56.6	44.7	59.2	46.6	59.2	32.9	34.6	0.8	0.8	90.0	−9.3	−30.2	*/MB9
D 00000	26.4	−30.4	53.1	16.4	36.4	9.7	50.7	1.1	1.0	41.0	−6.8	−28.7	
DDR00000	37.0	−26.8	51.7	27.0	47.0	12.6	51.4	0.8	0.8	90.0	−8.4	−28.2	
DJI00000	−18.3	−28.4	113.6	−28.3	−8.3	42.6	11.7	0.8	0.8	90.0	−9.3	−30.5	
DMA00000	−69.6	−112.1	−10.5	−79.6	−59.6	−61.3	15.3	0.8	0.8	90.0	−6.4	−27.3	
DNK00001	32.2	−40.8	62.2	22.2	42.2	11.6	56.0	0.8	0.8	90.0	−9.3	−29.0	
DNK00002	−49.0	−50.0	−43.1	−50.0	−43.1	12.5	56.3	0.8	0.8	90.0	−7.3	−27.7	*/MB10
DNK00FAR	−49.0	−50.0	−43.1	−50.0	−43.1	−7.2	61.7	0.8	0.8	90.0	−9.3	−29.5	*/MB10
DOM00000	−85.4	−120.3	−20.5	−95.4	−75.4	−70.4	18.7	0.8	0.8	90.0	−6.3	−27.1	
E 00002	12 2	−31.1	24.2	2.2	22.2	−3.0	39.9	2.1	1.2	8.0	−1.8	−27.8	*/MB8
EGY00000	68.5	−10.3	69.5	58.5	69.5	30.3	26.2	2.3	1.5	54.0	−1.8	−28.8	
EQA00000	−104.0	−104.0	−94.1	−104.0	−94.1	−83.1	−1.4	3.1	1.4	174.0	4.7	−22.7	
ETH00000	57.5	−4.0	85.0	47.5	67.5	40.6	10.3	2.8	2.8	64.0	2.0	−28.6	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

F 00000	0.9	−13.9	5.7	−9.1	5.7	3.1	45.9	2.1	1.1	168.0	−0.2	−26.3	*/MB11
FJI00000	148.8	128.2	−131.1	138.8	158.8	178.5	−17.2	0.8	0.8	90.0	−6.1	−26.2	
FLKSTGGL	−37.1	−38.5	−27.1	−38.5	−27.1	−46.8	−59.6	3.7	1.4	170.0	0.0	−28.7	*/MB4
FNL00000	46.8	7.1	46.8	36.8	46.8	23.8	64.3	1.5	1.0	23.0	−5.3	−28.6	
G 00000	−37.1	−38.5	−27.1	−38.5	−27.1	−4.1	53.9	1.6	1.0	151.0	−3.8	−27.8	*/MB4
GAB00000	38.8	−29.2	52.0	28.8	48.8	11.7	−0.7	1.4	1.1	79.0	−0.6	−23.0	
GDL00000	0.9	−13.9	5.7	−9.1	5.7	−61.9	16.3	0.8	0.8	90.0	−4.2	−23.1	*/MB11
GDL00002	−115.9	−123.2	−81.2	−123.2	−105.9	−61.8	16.4	0.8	0.8	90.0	−3.7	−22.7	*/MB13
GHA00000	16.0	−41.7	39.3	6.0	26.0	−1.3	7.7	1.5	1.1	90.0	−0.1	−23.0	
GIB00000	56.6	44.7	59.2	46.6	59.2	−5.4	36.1	0.8	0.8	90.0	−5.9	−27.0	*/MB9
GMB00000	−34.0	−77.3	44.5	−44.0	−24.0	−16.4	13.4	0.8	0.8	90.0	−9.3	−31.0	
GNB00000	40.0	−76.5	45.7	30.0	45.7	−15.4	12.0	0.8	0.8	90.0	−8.3	−28.8	
GNE00000	−32.3	−32.8	53.8	−32.8	−22.3	10.5	1.7	0.8	0.8	90.0	−5.9	−24.9	
GRC00000	16.6	−8.9	56.8	6.6	26.6	24.7	38.3	1.7	1.0	160.0	−1.8	−26.6	
GRD00000	−32.8	−113.0	−10.2	−42.8	−22.8	−61.6	12.0	0.8	0.8	90.0	−6.2	−26.5	
GRL00000	−49.0	−50.0	−43.1	−50.0	−43.1	−42.9	68.6	2.3	1.0	174.0	−2.4	−27.8	*/MB10
GTM00000	−135.7	−139.3	−41.4	−139.3	−125.7	−90.5	15.5	0.8	0.8	90.0	−3.3	−22.2	
GUF00000	0.9	−13.9	5.7	−9.1	5.7	−53.2	4.3	0.8	0.8	90.0	−4.6	−23.6	*/MB11
GUF00002	−115.9	−123.2	−81.2	−123.2	−105.9	−53.3	4.3	0.8	0.8	90.0	−4.4	−23.4	*/MB13
GUI00000	27.5	−51.8	33.8	17.5	33.8	−10.9	10.2	1.3	1.1	104.0	−0.6	−22.9	
GUMMRA00	−159.0	−169.8	−158.2	−169.0	−158.2	145.4	16.7	1.7	1.0	79.0	0.9	−22.2	*/MB2
GUY00000	−24.1	−100.1	−18.3	−34.1	−18.3	−59.2	4.7	1.4	1.0	94.0	−0.5	−22.8	
HKG00000	56.6	44.7	59.2	46.6	59.2	114.5	22.4	0.8	0.8	90.0	−5.6	−24.5	*/MB9
HND00000	−76.2	−123.8	−48.1	−86.2	−66.2	−86.1	15.4	1.4	1.0	26.0	−0.9	−23.1	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

1	2	3		4		5	6	7	8	9	10	11	12
HNG00000	−6.6	−22.2	62.4	−16.6	3.4	19.4	47.4	0.8	0.8	90.0	−7.9	−28.1	2
HOL00000	−5.2	−50.1	1.9	−15.2	1.9	5.4	52.4	0.8	0.8	90.0	−9.3	−30.8	*/MB5
HTI00000	−92.0	−122.9	−23.1	−102.0	−82.0	−73.0	18.8	0.8	0.8	90.0	−6.2	−26.9	
HWA00000	−159.0	−169.8	−158.2	−169.0	−158.2	−157.6	20.7	1.2	1.0	157.0	−1.3	−23.1	*/MB2
HWL00000	−159.0	−169.8	−158.2	−169.0	−158.2	−176.6	0.1	0.8	0.8	90.0	−6.4	−27.4	*/MB2
I 00000	−28.1	−32.9	54.1	−32.9	−18.1	11.3	40.9	2.1	1.0	141.0	−0.7	−26.4	
IND00000	74.0	51.3	116.4	64.0	84.0	82.7	18.9	6.2	4.9	120.0	13.5	−22.2	
INS00000	115.4	101.1	135.0	105.4	125.4	117.6	−1.8	9.4	4.3	170.0	14.6	−22.4	
IRL00000	−31.0	−41.0	25.7	−41.0	−21.0	−8.2	53.2	0.8	0.8	90.0	−9.3	−29.3	
IRN00000	25.0	20.1	50.0	20.1	35.0	54.3	33.0	3.7	1.5	143.0	2.0	−27.5	
IRQ00000	66.4	5.1	82.5	56.4	76.4	44.3	33.1	1.6	1.3	178.0	−3.1	−28.0	
ISL00000	−35.4	−53.0	14.8	−45.4	−25.4	−18.2	64.9	0.8	0.8	90.0	−7.6	−27.4	
ISR00000	73.0	−8.0	78.4	63.0	78.4	35.0	31.3	0.8	0.8	90.0	−5.5	−26.3	
J 00000	152.5	94.4	170.9	142.5	162.5	140.4	30.4	5.7	3.7	15.0	12.0	−22.8	
JAR00000	−159.0	−169.8	−158.2	−169.0	−158.2	−160.0	−0.4	0.8	0.8	90.0	−6.6	−27.5	*/MB2
JMC00000	−108.6	−127.5	−27.8	−118.6	−98.6	−77.6	18.2	0.8	0.8	90.0	−6.0	−25.9	
JON00000	−159.0	−169.8	−158.2	−169.0	−158.2	−168.5	17.0	0.8	0.8	90.0	−9.3	−32.5	*/MB2
JOR00000	81.8	−28.8	102.9	71.8	91.8	36.7	31.3	0.8	0.8	90.0	−8.8	−28.5	
KEN00000	78.2	−10.4	86.3	68.2	86.3	38.4	0.8	2.1	1.3	95.0	−1.2	−27.6	
KER00000	113.0	113.0	114.3	113.0	114.3	69.3	−43.9	1.9	1.6	169.0	−1.3	−27.8	*/MB1
KIR00000	150.0	120.6	−134.6	140.0	160.0	173.0	1.0	0.8	0.8	90.0	−6.3	−27.1	
KOR00000	116.2	83.0	169.6	106.2	126.2	127.7	36.2	1.3	1.0	4.0	−3.4	−26.7	
KRE00000	145.0	110.1	150.0	135.0	150.0	127.8	39.8	1.4	1.0	14.0	−0.3	−23.3	
KWT00000	30.8	−20.2	115.3	20.8	40.8	47.7	29.1	0.8	0.8	90.0	−9.3	−31.6	1,2
LAO00000	142.0	56.6	149.9	132.0	149.9	104.1	18.1	1.5	1.0	101.0	0.2	−22.6	
LBN00000	91.0	−31.6	103.2	81.0	101.0	35.8	33.8	0.8	0.8	90.0	−9.3	−30.5	

10.70 – 10.95, 11.20 – 11.45 GHz, 12.75 – 13.25 GHz

LBR00000	–41.8	–50.4	35.5	–50.4	–31.8	–8.9	6.5	0.8	0.8	90.0	–3.1	–22.1	
LBY00000	28.5	–19.2	54.9	18.5	38.5	19.0	25.9	3.0	2.7	165.0	3.1	–27.8	
LIE00000	7.9	–30.0	15.0	–2.1	15.0	9.5	47.2	0.8	0.8	90.0	–9.3	–31.2	
LSO00000	–18.7	–40.1	96.9	–28.7	–8.7	28.4	–29.5	0.8	0.8	90.0	–9.3	–31.1	
LUX00000	19.2	–53.9	66.1	9.2	29.2	6.2	49.7	0.8	0.8	90.0	–9.3	–31.6	
MAC00000	117.0	64.7	162.4	107.0	127.0	113.6	22.2	0.8	0.8	90.0	–6.3	–27.1	
MAU00000	92.2	8.0	107.0	82.2	102.2	57.5	–20.2	0.8	0.8	90.0	–6.0	–25.6	
MCO00000	40.5	–41.8	56.6	30.5	50.5	7.4	43.7	0.8	0.8	90.0	–7.1	–27.8	
MDG00000	16.9	10.4	81.1	10.4	26.9	46.6	–18.7	2.6	1.0	66.0	2.5	–22.5	
MDR00000	–7.9	–41.9	6.7	–17.9	2.1	–16.2	31.6	0.8	0.8	90.0	–9.3	–30.5	*/MB7
MDW00000	–159.0	–169.8	–158.2	–169.0	–158.2	–177.4	28.2	0.8	0.8	90.0	–9.3	–32.2	*/MB2
MEX00000	–113.0	–136.1	–61.0	–123.0	–103.0	–103.6	23.3	5.8	2.4	161.0	10.0	–23.7	
MLA00000	78.5	76.4	143.2	76.4	88.5	108.2	4.7	3.2	1.4	0.0	5.0	–22.3	
MLD00000	117.6	21.1	124.9	107.6	124.9	73.4	2.5	2.2	0.8	88.0	1.0	–22.4	
MLI00000	–1.3	–59.9	43.3	–11.3	8.7	–3.9	17.6	3.3	2.5	21.0	7.2	–24.8	
MLT00000	5.6	–39.8	68.5	–4.4	15.6	14.4	35.9	0.8	0.8	90.0	–9.3	–30.4	
MNG00000	113.6	60.4	148.9	103.6	123.6	103.8	46.8	3.6	1.1	3.0	0.6	–27.6	
MOZ00000	88.6	–10.6	90.6	78.6	90.6	35.6	–17.2	3.1	1.1	98.0	4.1	–22.0	
MRC00000	33.0	–50.5	37.5	23.0	37.5	–8.9	27.9	3.4	1.0	45.0	0.4	–27.0	
MRL00000	–159.0	–169.8	–158.2	–169.0	–158.2	175.3	8.7	2.3	1.4	94.0	3.6	–22.6	*/MB2
MTN00000	–22.8	–72.8	44.2	–32.8	–12.8	–10.3	19.8	2.5	2.4	76.0	1.0	–28.4	
MWI00000	30.3	–25.0	93.7	20.3	40.3	34.1	–13.3	1.6	1.0	101.0	–5.8	–29.3	
MYT00000	0.9	–13.9	5.7	–9.1	5.7	45.2	–12.8	0.8	0.8	90.0	–5.9	–24.9	*/MB11
NCG00000	–84.4	–124.4	–45.9	–94.4	–74.4	–84.9	12.9	1.1	1.0	16.0	–1.9	–23.1	
NCL00000	113.0	113.0	114.3	113.0	114.3	165.8	–21.4	0.8	0.8	90.0	–5.0	–23.9	*/MB1

1	2	3		4		5	6	7	8	9	10	11	12
NGR00000	–38.5	–54.5	64.6	–48.5	–28.5	7.5	17.2	2.1	1.7	100.0	0.3	–27.3	
NIG00000	42.5	–29.6	49.6	32.5	49.6	8.0	9.9	2.5	1.6	47.0	4.3	–22.4	
NMB00000	13.4	–45.4	82.5	3.4	23.4	18.5	–21.0	2.7	2.6	155.0	0.2	–29.6	
NOR00000	3.9	2.9	29.1	2.9	13.9	11.7	64.6	2.0	1.0	17.0	–2.9	–27.7	
NPL00000	123.3	30.3	137.6	113.3	133.3	84.4	28.0	0.8	0.8	90.0	–6.3	–26.6	
NRU00000	146.0	114.5	–140.7	136.0	156.0	166.9	–0.5	0.8	0.8	90.0	–6.3	–27.2	
NZL00001	152.0	150.9	175.0	150.9	162.0	170.9	–44.8	5.4	1.0	49.0	2.9	–26.5	*/MB14
NZL00002	152.0	150.9	175.0	150.9	162.0	–165.4	–13.2	2.7	2.0	82.0	6.3	–22.0	*/MB14
OCE00000	–115.9	–123.2	–81.2	–123.2	–105.9	–141.9	–16.1	3.5	2.4	139.0	7.7	–24.2	*/MB13
OMA00000	104.0	–9.8	122.2	94.0	114.0	55.1	21.6	1.9	1.0	61.0	–5.1	–29.3	5
PAK00000	56.0	34.1	62.0	46.0	62.0	69.9	29.8	3.0	2.0	22.0	4.6	–25.7	
PHL00000	89.6	83.0	159.8	83.0	99.6	121.3	11.4	3.3	1.5	101.0	5.7	–22.3	
PLM00000	–159.0	–169.8	–158.2	–169.0	–158.2	–161.4	7.0	0.8	0.8	90.0	–6.7	–27.6	*/MB2
PNG00000	154.1	114.2	–176.5	144.1	164.1	148.4	–6.6	3.3	2.3	167.0	6.9	–22.7	
PNR00000	–79.2	–120.0	–40.4	–89.2	–69.2	–80.2	8.5	1.2	1.0	177.0	–1.5	–23.2	
POL00000	14.2	–14.8	56.4	4.2	24.2	19.3	52.0	1.3	1.0	166.0	–6.1	–28.7	
POR00000	–7.9	–41.9	6.7	–17.9	2.1	–8.0	39.7	0.8	0.8	90.0	–8.1	–28.1	*/MB7
PRG00000	–81.5	–90.4	–23.2	–90.4	–71.5	–58.7	–23.1	1.5	1.3	116.0	1.0	–22.8	
PRU00000	–89.9	–120.4	–38.2	–99.9	–79.9	–74.2	–8.4	3.6	2.4	111.0	7.8	–22.5	
PTC00000	–62.0	–62.6	–58.5	–62.6	–58.5	–130.1	–25.1	0.8	0.8	90.0	–9.3	–31.5	
QAT00000	8.3	–16.9	120.0	–1.7	18.3	51.6	25.4	0.8	0.8	90.0	–9.3	–31.5	
REU00000	0.9	–13.9	5.7	–9.1	5.7	55.6	–21.1	0.8	0.8	90.0	–5.6	–24.6	*/MB11
REU00002	113.0	113.0	114.3	113.0	114.3	55.6	–21.1	0.8	0.8	90.0	–5.5	–24.5	*/MB1
ROU00000	31.0	–1.0	51.0	21.0	41.0	25.0	46.3	1.5	1.0	178.0	–4.3	–28.0	
RRW00000	6.8	–30.9	90.8	–3.2	16.8	29.7	–1.9	0.8	0.8	90.0	–9.3	–30.8	

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S 00000	11.2	–7.0	47.1	1.2	21.2	16.7	60.9	1.1	1.0	30.0	–6.4	–28.6	
SCN00000	–88.8	–113.2	–12.6	–98.8	–78.8	–62.9	17.3	0.8	0.8	90.0	–6.2	–26.5	
SDN00001	1.4	–7.0	15.0	–7.0	11.4	29.3	10.3	3.0	1.9	131.0	4.7	–25.5	*/MB15
SDN00002	1.4	–7.0	15.0	–7.0	11.4	29.4	16.7	2.6	2.4	171.0	0.5	–28.9	*/MB15
SEN00000	–48.4	–64.4	34.3	–58.4	–38.4	–14.0	14.1	1.1	1.0	148.0	–1.4	–23.8	
SEY00000	96.5	3.1	107.7	86.5	106.5	55.4	–4.5	0.8	0.8	90.0	–6.0	–25.2	
SLM00000	147.5	120.4	–161.7	137.5	157.5	159.0	–9.1	1.5	1.0	147.0	–0.3	–23.0	
SLV00000	–130.5	–130.5	–47.5	–130.5	–120.5	–89.0	13.7	0.8	0.8	90.0	–5.9	–24.9	
SMA00000	–159.0	–169.8	–158.2	–169.0	–158.2	–170.7	–14.2	0.8	0.8	90.0	–9.3	–32.5	*/MB2
SMO00000	–125.5	137.5	–121.7	–135.5	–121.7	–172.1	–13.7	0.8	0.8	90.0	–5.7	–24.6	
SMR00000	23.0	–36.4	61 4	13.0	33.0	12.5	43.9	0.8	0.8	90.0	–9.3	–30.3	
SNG00000	98.1	60.6	147 1	88.1	108.1	103.9	1.3	0.8	0.8	90.0	–6.4	–25.4	
SOM00000	98.4	–20.0	102.7	88.4	102.7	46.0	6.3	3.1	1.0	72.0	0.1	–26.9	
SPM00000	0.9	–13.9	5.7	–9.1	5.7	–56.4	47.0	0.8	0.8	90.0	–6.3	–27.3	*/MB11
SRL00000	–51.8	–63.8	40.0	–61.8	–41.8	–11.9	8.5	0.8	0.8	90.0	–6.0	–25.4	
STP00000	31.4	–45.4	59.4	21.4	41.4	7.0	1.0	0.8	0.8	90.0	–6.2	–27.0	
SUI00000	–9.2	–20.0	35.0	–19.2	0.8	8.2	46.5	0.8	0.8	90.0	–9.3	–29 4	2
SUR00000	–77.0	–97.0	–15.0	–87.0	–67.0	–55.6	3.9	1.0	0.9	37.0	–2.7	–23.2	
SWZ00000	29.0	–26.8	89.2	19.0	39.0	31.3	–26.4	0.8	0.8	90.0	–9.3	–30.9	
SYR00000	18.7	10.1	70.0	10.1	28.7	38.6	35.3	1.1	1.0	32.0	–6.2	–28.3	4
TCD00000	–10.5	–36.5	67.5	–20.5	–0.5	18.4	15.6	3.5	1.6	97.0	5.9	–24 1	
TCH00000	–12.7	–21.3	54.4	–21.3	–2.7	17.3	49.6	1.3	1.0	166.0	–4.2	–27.4	2
TGO00000	–21.1	–41.0	43.4	–31.1	–11.1	0.8	8.6	1.1	1.0	116.0	–1.8	–23.2	
THA00000	120.6	58.6	137.2	110.6	130.6	100.9	12.8	2 8	1.6	83.0	4.9	–22.6	
TON00000	–128.0	135.7	–126.0	–138.0	–126.0	–175.2	–21.2	0.8	0.8	90.0	–5.8	–24.7	

10.70 − 10.95, 11.20 − 11.45 GHz, 12.75 − 13.25 GHz

1	2	3		4		5	6	7	8	9	10	11	12
TRD00000	−73.4	−112.3	−9.9	−83.4	−63.4	−61.1	10.8	0.8	0.8	90.0	−6.3	−27.3	
TUN00000	−4.1	−29.0	48.4	−14.1	5.9	9.4	33.5	1.3	1.0	104.0	−5.0	−28.2	
TUR00000	9.4	7.1	61.6	7.1	19.4	34.1	38.9	2.8	1.0	171.0	0.9	−26.0	
TUV00000	158.0	127.3	−129.0	148.0	168.0	179.2	−8.5	0.8	0.8	90.0	−6.2	−27.1	
TZA00000	69.5	−21.3	91.4	59.5	79.5	35.4	−5.9	2.4	1.4	117.0	−0.4	−27.8	
UAE00000	70.4	−12.7	120.3	60.4	80.4	53.8	24.9	1.1	1.0	12.0	−8.8	−30.4	
UGA00000	32.0	−27.2	91.6	22.0	42.0	32.2	0.9	1.5	1.0	70.0	−5.4	−28.9	
URG00000	−86.1	−108.9	−3.5	−96.1	−76.1	−56.3	−33.7	1.1	1.0	58.0	−5.6	−27.7	
URS00001	61.0	56.7	65.4	56.7	65.4	57.6	48.3	7.5	3.5	178.0	8.8	−26.2	
URS00002	88.1	87.7	98.0	87.7	98.0	94.8	48.6	7.5	3.5	175.0	12.4	−26.2	
URS00003	138.5	138.5	140.6	138.5	140.6	134.9	52.6	7.5	3.5	5.0	8.7	−26.2	
USA00000	−101.0	−130.3	−63.5	−111 0	−91.0	−93.9	36.8	8.2	3.6	172.0	13.7	−23.2	*/MB16
USAVIPRT	−101.0	−130.3	−63.5	−111.0	−91.0	−64.5	17.8	0.8	0.8	90.0	−6.0	−25.5	*/MB16
VCT00000	−93.1	−112.3	−9.9	−103.1	−83.1	−61.1	13.2	0.8	0.8	90.0	−6.1	−26.2	
VEN00001	−82.7	−102.5	−24.7	−92.7	−72.7	−66.4	6.8	2.8	2.1	142.0	5.8	−22.7	*/MB17
VEN00002	−82.7	−102.5	−24.7	−92.7	−72.7	−63.6	15.7	0.8	0.8	90.0	−6.2	−27.0	*/MB17
VTN00000	107.0	85.1	125.0	97.0	117.0	108.5	14.2	3.6	2.6	139.0	8.2	−22.6	
VUT00000	150.7	127.4	−152.4	140.7	160.7	168.4	−17.2	1.2	1.0	122.0	−1.5	−23.1	
WAK00000	−159.0	−169.8	−158.2	−169.0	−158.2	166.5	19.2	0.8	0.8	90.0	−9.3	−32.0	*/MB2
WAL00000	113.0	113.0	114.3	113.0	114.3	−177.1	−13.8	0.8	0.8	90.0	−5.1	−24.1	*/MB1
YEM00000	27.0	−24.3	113.2	17.0	37.0	44.2	15.1	1.0	1.0	103.0	−8.9	−30.2	
YMS00000	108.0	−16.4	114.4	98.0	114.4	49.9	14.8	1.4	1.0	53.0	−4.8	−28.0	
YUG00000	43.1	−25.8	60.2	33.1	53.1	18.7	44.4	1.1	1.0	161.0	−4.7	−27.3	
ZAI00000	51.0	−23.6	62.6	41.0	61.0	24.4	−4.6	3.9	3.5	92.0	9.9	−22.3	
ZMB00000	39.6	−27.9	82.5	29.6	49.6	27.9	−12.8	2.4	1.6	26.0	−2.1	−29.2	
ZWE00000	65.6	−27.0	85.5	55.6	75.6	30.0	−18.9	1.5	1.1	140.0	−5.1	−28.9	

B. COLUMN HEADINGS OF PART B OF THE PLAN

Col. 1 *Beam identification*

Col. 2 *Administration*

Col. 3 *Space station name*

Col. 4 *Orbital position*, in degrees and hundredths of a degree East longitude

Col. 5 *Western limit of visible arc*, in degrees and tenths of a degree East longitude (if no visible arc is given, this value is that of the orbital position)

Col. 6 *Eastern limit of visible arc*, in degrees and tenths of a degree East longitude (if no visible arc is given, this value is that of the orbital position)

Col. 7 *Western limit of service arc*, in degrees and tenths of a degree East longitude

Col. 8 *Eastern limit of service arc*, in degrees and tenths of a degree East longitude

Col. 9 *Predetermined arc* (western and eastern limits in degrees and tenths of a degree)

Col. 10 *Use of 4 GHz band*
(0 = no, 1 = yes)

Col. 11 *Use of 6 GHz band*
(0 = no, 1 = yes)

Col. 12 *Use of 10 - 11 GHz band*
(0 = no, 1 = yes)

Col. 13 *Use of 13 GHz band*
(0 = no, 1 = yes)

Col. 14 *Satellite antenna boresight longitude*, in degrees and tenths of a degree East longitude

Col. 15 *Satellite antenna boresight latitude*, in degrees and tenths of a degree North latitude

Col. 16 *Satellite antenna major axis beamwidth* (this is the half-power beamwidth, expressed in degrees and tenths of a degree)

Col. 17 *Satellite antenna minor axis beamwidth* (this is the half-power beamwidth, expressed in degrees and tenths of a degree)

Col. 18 *Satellite antenna major axis orientation*, in degrees and tenths of a degree anticlockwise with respect to the equatorial plane

Col. 19 *Names of other beams on the same satellite*[1]

Col. 20 *Power density* fed to transmitting earth station antenna in dB(W/Hz) averaged over the necessary bandwidth (if the network does not operate in any of the up-link frequency bands of the Plan, no value is entered)

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[1] *Note by the General Secretariat (applicable when an asterisk (*) appears in column 19):* It is to be noted that this beam is intended to be implemented as part of a multi-beam network, operating from a single orbital location. Within any multi-beam network, the beams are the responsibility of a single administration, hence interference between them has not been taken into account during the Conference. The number which appears in the alphanumeric code that follows the asterisk serves to identify the multi-beam network concerned.

Col. 21 *Transmitting earth station antenna gain*, in dBi (if the network does not operate in either of the up-link frequency bands of the Plan, no value is entered)

Col. 22 *Earth station antenna side-lobe characteristic* (this is the value X to be used in the equation: G(h) = X – 25 log (h) dBi (if no value is given, it is set to 32.0 dBi))

Col. 23 *Satellite antenna gain*, in dBi (the value shown applies to both the transmitting and the receiving antennas)

Col. 24 *Satellite antenna pattern* (1 = Figure 1 of Annex 1; 2 = Figure 2 of Annex 1)

Col. 25 *Satellite receiving system noise temperature*, in kelvins (if the network does not operate in either of the up-link frequency bands of the Plan, no value is entered)

Col. 26 *Power density* fed to transmitting space station antenna, in dB(W/Hz) averaged over the necessary bandwidth (if the network does not operate in any of the down-link frequency bands of the Plan, no value is entered)

Col. 27 *Receiving earth station antenna gain*, in dBi (if the network does not operate in either of the down-link frequency bands of the Plan, no value is entered)

Col. 28 *Earth station receiving system noise temperature*, in kelvins (if the network does not operate in either of the down-link frequency bands of the Plan, no value is entered)

1	2	3	4	5	6	7	8	9		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CANMSAT0	CAN	MSAT	−106.50	−107.5	−105.4	−107.5	−105.4	−107.5	−105.4	0	0	0	1	−95.9	42.9	8.6	3.9	164		−42.0	50.7	29.0	30.0	1	725			
F EU1B1	F	EUTELSAT-1	10.00	−25.0	21.0	9.9	12.1	10.0	10.0	0	0	1	0	8.2	38.6	7.6	4.5	0				32.0	28.0	1		−68.5	63.5	200
F E12B1	F	EUTELSAT-1-2	13.00	−25.0	21.0	9.9	13.1	13.0	13.0	0	0	1	0	8.7	38.5	7.6	4.5	0				32.0	28.0	1		−68.5	63.5	200
F E13B1	F	EUTELSAT-1-3	7.00	−25.0	21.0	3.0	16.5	7.0	7.0	0	0	1	0	7.3	38.6	7.6	4.5	0				32.0	28.0	1		−68.5	63.5	200
F E14B1	F	EUTELSAT-1-4	16.00	−25.0	21.0	3.0	16.5	16.0	16.0	0	0	1	0	8.6	38.3	7.6	4.5	0				32.0	28.0	1		−68.5	63.5	200
F LSAT1	F	LSAT	−19.00	−19.1	−18.9	−19.1	−18.9	−19.0	−19.0	0	0	0	1	−4.0	50.8	1.5	1.5	90	*/MB20	−49.0	56.0	32.0	41.0	1	1000			
F LSAT2	F	LSAT	−19.00	−19.1	−18.9	−19.1	−18.9	−19.0	−19.0	0	0	0	1	5.0	47.4	1.5	1.5	90	*/MB20	−49.0	56.0	32.0	41.0	1	1000			
F LSAT3	F	LSAT	−19.00	−19.1	−18.9	−19.1	−18.9	−19.0	−19.0	0	0	0	1	14.0	44.5	1.5	1.5	90	*/MB20	−49.0	56.0	32.0	41.0	1	1000			
F LSAT4	F	LSAT	−19.00	−19.1	−18.9	−19.1	−18.9	−19.0	−19.0	0	0	0	1	15.7	62.6	1.5	1.5	90	*/MB20	−49.0	56.0	32.0	41.0	1	1000			
F LSAT5	F	LSAT	−19.00	−19.1	−18.9	−19.1	−18.9	−19.0	−19.0	0	0	0	1	−5.2	40.0	1.5	1.5	90	*/MB20	−49.0	56.0	32.0	41.0	1	1000			
INSAT-2A	IND	INSAT-IIA	83.00	20.0	140.0	70.0	95.0	83.0	83.0	1	1	0	0	81.8	23.2	5.6	4.0	54		−42.0	42.8	29.0	31.0	2	1580	−64.5	37.8	288
INSAT-2B	IND	INSAT-IIB	93.50	20.0	140.0	70.0	95.0	93.5	93.5	1	1	0	0	82.4	23.2	5.7	3.8	51		−42.0	42.8	29.0	31.0	2	1580	−64.5	37.8	288
INSAT-2C	IND	INSAT-IIC	74.00	20.0	140.0	70.0	95.0	74.0	74.0	1	1	0	0	81.3	23.3	5.3	4.1	62		−42.0	42.8	29.0	31.0	2	1580	−64.5	37.8	288
EIREB100	IRL	EIRESAT-1	−31.00	−100.0	40.0	−31.1	−30.9	−31.0	−31.0	0	0	1	1	−78.4	39.1	6.1	1.5	46	*/MB21	−49.5	42.9	29.0	39.0	2	1266	−59.8	41.4	346
EIREB200	IRL	EIRESAT-1	−31.00	−100.0	40.0	−31.1	−30.9	−31.0	−31.0	0	0	1	1	0.3	46.8	3.6	1.7	145	*/MB21	−49.5	42.9	29.0	36.7	2	1266	−59.8	41.4	346
LUXGDL41	LUX	GDL-4	−20.00	−34.0	49.0	−25.0	37.0	−20.0	−20.0	0	1	0	0	3.3	46.9	2.5	2.0	150		−52.0	54.5	29.0	36.5	2	800			
LUXGDL42	LUX	GDL-4	−20.00	−34.0	49.0	−25.0	37.0	−20.0	−20.0	0	0	1	0	2.0	46.5	3.8	2.2	172				29.0	37.5	2		−58.5	38.2	300
LUXGDL51	LUX	GDL-5	−24.40	−34.0	49.0	−25.0	37.0	−24.4	−24.4	0	1	0	0	3.2	47.2	3.1	1.6	26		−52.0	54.5	29.0	36.5	2	800			
LUXGDL52	LUX	GDL-5	−24.40	−34.0	49.0	−25.0	37.0	−24.4	−24.4	0	0	1	0	3.0	47.5	3.7	2.4	11				29.0	37.5	2		−59.5	38.2	300
LUXGDL61	LUX	GDL-6	19.20	−34.0	49.0	−25.0	37.0	19.2	19.2	0	1	0	0	3.6	45.9	3.1	1.6	30		−52.0	54.5	29.0	36.5	2	800			
LUXGDL62	LUX	GDL-6	19.20	−34.0	49.0	−25.0	37.0	19.2	19.2	0	0	1	1	4.3	47.7	4.1	2.1	21		−54.0	62.0	29.0	37.5	2	800	−58.5	38.2	300
PAKSAT01	PAK	PAKSAT I	38.00	38.0	38.0	38.0	38.0	33.0	43.0	0	0	1	0	69.3	29.8	3.2	2.1	30				32.0	40.0	1		−67.0	37.5	250
PAKSAT02	PAK	PAKSAT II	41.00	41.0	41.0	41.0	41.0	36.0	46.0	0	0	1	0	69.3	29.8	3.2	2.1	30				29.0	40.0	1		−67.0	37.5	250
PNGP1B01	PNG	PACSTAR-1	167.45			165.0	−175.0	167.5	167.5	0	1	0	0	157.0	−4.0	16.0	7.5	153	*/MB22	−55.0	51.7	29.0	26.0	2	630			
PNGP1B02	PNG	PACSTAR-1	167.45			165.0	−175.0	167.5	167.5	0	1	0	0	−162.0	18.0	2.8	2.8	90	*/MB22	−55.0	51.7	29.0	26.0	2	630			
PNGP2B01	PNG	PACSTAR-2	−175.00			159.9	−175.0	−175.0	−175.0	0	1	0	0	170.0	−6.0	16.0	7.5	172	*/MB23	−55.0	51.7	29.0	26.0	2	630			
PNGP2B02	PNG	PACSTAR-2	−175.00			159.9	−175.0	−175.0	−175.0	0	1	0	0	−155.0	24.0	2.8	2.8	90	*/MB23	−55.0	51.7	29.0	26.0	2	630			
URSEEDRN	URS	ESDRN	−160.00	−161.0	82.0	−161.0	−159.0	−160.0	−160.0	0	0	1	0	140.5	53.2	1.0	1.0	90				32.0	43.0	1		−70.0	62.0	160
URSCSDR1	URS	CSDRN	95.00	−15.0	96.0	94.0	96.0	95.0	95.0	0	0	1	0	40.6	56.2	1.0	1.0	90	*/MB24			32.0	43.0	1		−70.0	62.0	160
URSCSDR2	URS	CSDRN	95.00	−161.0	82.0	94.0	96.0	95.0	95.0	0	0	1	0	140.5	53.2	1.0	1.0	90	*/MB24			32.0	43.0	1		−70.0	62.0	160
URSWWDRN	URS	WSDRN	−16.00	−15.0	96.0	−15.0	−17.0	−16.0	−16.0	0	0	1	0	40.6	56.2	1.0	1.0	90	*/MB25			32.0	43.0	1		−70.0	62.0	160
URSCSRB1	URS	CSSRD-2	77.00	54.0	173.0	76.9	77.1	77.0	77.0	0	0	1	0	113.5	52.1	1.1	1.1	90	*/MB26			32.0	39.0	1		−70.0	62.0	160
URSCSRB2	URS	CSSRD-2	77.00	−15.0	96.0	76.9	77.1	77.0	77.0	0	0	1	0	40.8	55.7	1.1	1.1	90	*/MB26			32.0	39.0	1		−70.0	62.0	160
URSVVRB1	URS	VSSRD-2	167.00	54.0	173.0	166.9	167.1	167.0	167.0	0	0	1	0	113.5	52.1	1.1	1.1	90				32.0	39.0	1		−70.0	62.0	160
URSZZRB1	URS	ZSSRD-2	−16.00	−15.0	96.0	−16.1	−15.9	−16.0	−16.0	0	0	1	0	40.8	55.7	1.1	1.1	90	*/MB25			32.0	39.0	1		−70.0	62.0	160
URSSTAD1	URS	STATSIONAR-D1	−26.50	−28.5	−24.5	−28.5	−24.5	−26.5	−26.5	1	0	0	0	−26.5	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSSTAD2	URS	STATSIONAR-D2	−170.00	−172.0	−168.0	−172.0	−168.0	−170.0	−170.0	1	0	0	0	−170.0	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSSTAD3	URS	STATSIONAR-D3	35.00	33.0	37.0	33.0	37.0	35.0	35.0	1	0	0	0	35.0	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSSTAD4	URS	STATSIONAR-D4	45.00	43.0	47.0	43.0	47.0	45.0	45.0	1	0	0	0	45.0	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSSTAD5	URS	STATSIONAR-D5	85.40	83.0	87.0	83.0	87.0	85.4	85.4	1	0	0	0	85.0	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSSTAD6	URS	STATSIONAR-D6	128.00	126.0	130.0	126.0	130.0	128.0	128.0	1	0	0	0	128.0	0.0	17.3	17.3	90				40.4	25.0	1		−64.8	31.0	400
URSFOT-1	URS	FOTON-1	−13.50			−16.0	−12.5	−16.0	−12.5	1	0	0	0	−13.5	0.0	17.3	17.3	90				29.0	25.0	1		−72.2	49.0	500
URSFOT-2	URS	FOTON-2	80.00			79.0	82.5	80.0	80.0	1	0	0	0	80.0	0.0	17.3	17.3	90				29.0	25.0	1		−72.2	49.0	500
URSFOT-3	URS	FOTON-3	−168.00			−170.0	−167.0	−170.0	−167.0	1	0	0	0	−168.0	0.0	17.3	17.3	90				29.0	25.0	1		−72.2	49.0	500
USA13DB1	USA	USASAT-13D	−56.00			−59.0	−51.0	−56.0	−56.0	0	0	1	0	−3.0	47.0	3.7	1.0	143				29.0	39.0	2		−69.3	48.7	170
USA13EB1	USA	USASAT-13E	−58.00			−59.0	−51.0	−58.0	−58.0	0	0	1	0	−3.1	46.9	3.7	1.0	142				29.0	39.0	2		−69.3	48.7	170
USA13HB1	USA	USASAT-13H	−57.00	−69.0	−20.0	−69.0	−40.0	−62.0	−52.0	0	1	0	0	−61.5	−2.9	16.9	7.6	103	*/MB27	−48.4	49.5	29.0	25.9	2	800			
USA13HB2	USA	USASAT-13H	−57.00	−69.0	−20.0	−69.0	−57.0	−62.0	−52.0	0	1	0	0	−6.4	40.1	2.4	1.3	127	*/MB27	−48.4	49.5	29.0	25.9	2	800			
USA13HB3	USA	USASAT-13H	−57.00	−69.0	−20.0	−69.0	−57.0	−62.0	−52.0	0	0	1	0	−69.4	24.5	6.3	4.3	119	*/MB28			29.0	33.0	2		−67.4	53.0	200
USA13HB4	USA	USASAT-13H	−57.00	−69.0	−20.0	−69.0	−57.0	−62.0	−52.0	0	0	1	0	−59.4	−10.6	13.2	9.3	104	*/MB28			29.0	27.0	2		−60.4	53.0	200
USA13IB1	USA	USASAT-13I	−45.00	−69.0	−20.0	−69.0	−40.0	−45.0	−45.0	0	1	0	0	−59.6	−1.1	16.2	7.4	100	*/MB29	−48.4	49.5	29.0	25.9	2	800			
USA13IB2	USA	USASAT-13I	−45.00	−69.0	−20.0	−69.0	−40.0	−45.0	−45.0	0	1	0	0	−5.2	40.4	2.3	1.9	144	*/MB29	−48.4	49.5	29.0	25.9	2	800			
USA13IB3	USA	USASAT-13I	−45.00	−69.0	−20.0	−69.0	−40.0	−45.0	−45.0	0	0	1	0	−68.3	23.9	6.0	4.1	99	*/MB30			29.0	33.0	2		−64.4	53.0	200
USA13IB4	USA	USASAT-13I	−45.00	−69.0	−20.0	−69.0	−40.0	−45.0	−45.0	0	0	1	0	−56.2	−10.7	13.4	8.5	109	*/MB30			29.0	27.0	2		−57.4	53.0	200

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ARTICLE 11

Period of Validity of the Provisions and Associated Plan

11.1 These provisions and associated Plan have been prepared in order to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands contained in Article 3, to meet the requirements of the fixed-satellite service for a period of at least 20 years from the date of entry into force of this Appendix.

11.2 These provisions and associated Plan shall, in any event, remain in force until their revision by a competent world administrative radio conference, convened in accordance with the relevant provisions of the Convention in force.

ANNEX 1 *

Parameters Used in Characterizing the Fixed-Satellite Service Plan

Section A. Technical Data Used in Establishing the Allotment Plan and the Associated Provisions

1. *Basic technical characteristics*

The allotments in the Plan are based on a reference satellite network with the following assumptions:

1.1 *Type of modulation*

The Plan is independent of modulation characteristics and accessing techniques.

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* *Note by the General Secretariat:* Subsequent to WARC Orb-88, certain errors have been discovered in the technical information for fast roll-off antenna patterns as contained in Appendices **30A(Orb-88)** and **30B**. This technical information as corrected by the IFRB derives from other relevant Conference decisions and is given in the provisional IFRB Rule of Procedure No. H38, published in IFRB Circular-letter No. 790 of 12 July 1989. Copies of the latter may be obtained directly from the IFRB.

1.2 *Carrier-to-noise ratio*

The carrier-to-noise ratio (C/N) is as follows:

a) the up-link carrier-to-noise ratio is equal to 23 dB under rain fading conditions with a minimum earth station transmitter power density of -60 dB(W/Hz) averaged over the necessary bandwidth of the modulated carrier;

b) the down-link carrier-to-noise ratio is equal to 17 dB under rain fading conditions;

c) the total carrier-to-noise ratio is equal to 16 dB under rain fading conditions;

d) for the 6/4 GHz bands, the above C/Ns are exceeded for 99.95% of the year (*Note:* The rain attenuation margin is limited to a maximum of 8 dB);

e) for the 13/10-11 GHz bands, the above C/Ns are exceeded for 99.9% of the year (*Note:* The rain attenuation margin is limited to a maximum of 8 dB);

f) the rain attenuation model used is that described in CCIR Report 564-3 (1986).

1.3 *Earth station antenna elevation angle*

The minimum elevation angle for each test point defining the service area is based on the following:

10 degrees for climatic zones A to G;

20 degrees for climatic zones H to L;

30 degrees for climatic zones M and N;

40 degrees for climatic zone P.

Administrations may select lower elevation angles for their service areas. For countries at high latitudes or with dispersed territories, in the absence of such a request, if the above values for minimum elevation angle are unobtainable, then the highest elevation angle leading to a non-zero service arc applies. In mountainous areas, the elevation angles are specified by the administrations concerned.

1.4 *Interference criteria*

The Plan has been prepared with a view to assuring for each allotment an aggregate carrier-to-interference ratio under free-space conditions of 26 dB or higher.

1.5 *Polarization*

Polarization isolation between satellite networks was not used in the development of the Allotment Plan.

1.6 *Earth station characteristics*

1.6.1 The diameters of the earth station antennas are:

7 m for the 6/4 GHz band;

3 m for the 13/10-11 GHz band.

1.6.2 The earth station receiving system noise temperature referred to the output of the receiving antenna is:

140 K for the 4 GHz band;

200 K for the 10-11 GHz band.

1.6.3 The earth station antenna efficiency is 70%.

1.6.4 The earth station antenna reference pattern is shown in Table 1 below. If so desired by an administration, the improved side-lobe pattern of $29 - 25 \log \varphi$ may be used.

1.6.5 In cases where the C/I ratio of 26 dB cannot be obtained, it would be appropriate for the countries concerned to agree on the use of antennas with an improved side-lobe pattern of $29 - 25 \log \varphi$ or on other suitable means so as to obtain the above ratio (see Table 1 below).

1.7 *Space station characteristics*

1.7.1 The Allotment Plan is based on the use of space station antennas with beams of elliptical or circular cross-section.

1.7.2 The antenna radiation characteristics are as shown in Figure 1. The fast roll-off characteristics shown in Figure 2 may be used when so specified by administrations.

TABLE 1

	$G_{max} = 10 \log [\eta(\pi D/\lambda)^2]$	
	$G(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda}\varphi\right)^2$	for $0 < \varphi < \varphi_m$
	$G(\varphi) = G_1$	for $\varphi_m \leqslant \varphi < \varphi_r$
	$G(\varphi) = 32 - 25 \log \varphi$ $G(\varphi) = -10$	for $\varphi_r \leqslant \varphi < 48°$ for $48° \leqslant \varphi \leqslant 180°$
or	$G(\varphi) = 29 - 25 \log \varphi$ $G(\varphi) = -10$	for $\varphi_r \leqslant \varphi < 36.3°$ for $36.3° \leqslant \varphi < 180°$

where:

D = antenna diameter λ = wavelength	expressed in the same unit

φ = off-axis angle of the antenna, in degrees

G_1 = gain of the first side lobe =	$2 + 15 \log \frac{D}{\lambda}$ for $32 - 25 \log \varphi$ or $-1 + 15 \log \frac{D}{\lambda}$ for $29 - 25 \log \varphi$

$$\varphi_m = \frac{20\lambda}{D}\sqrt{G_{max} - G_1} \quad \text{(degrees)}$$

$$\varphi_r = 15.85\left(\frac{D}{\lambda}\right)^{-0.6} \quad \text{(degrees)}$$

η = antenna efficiency

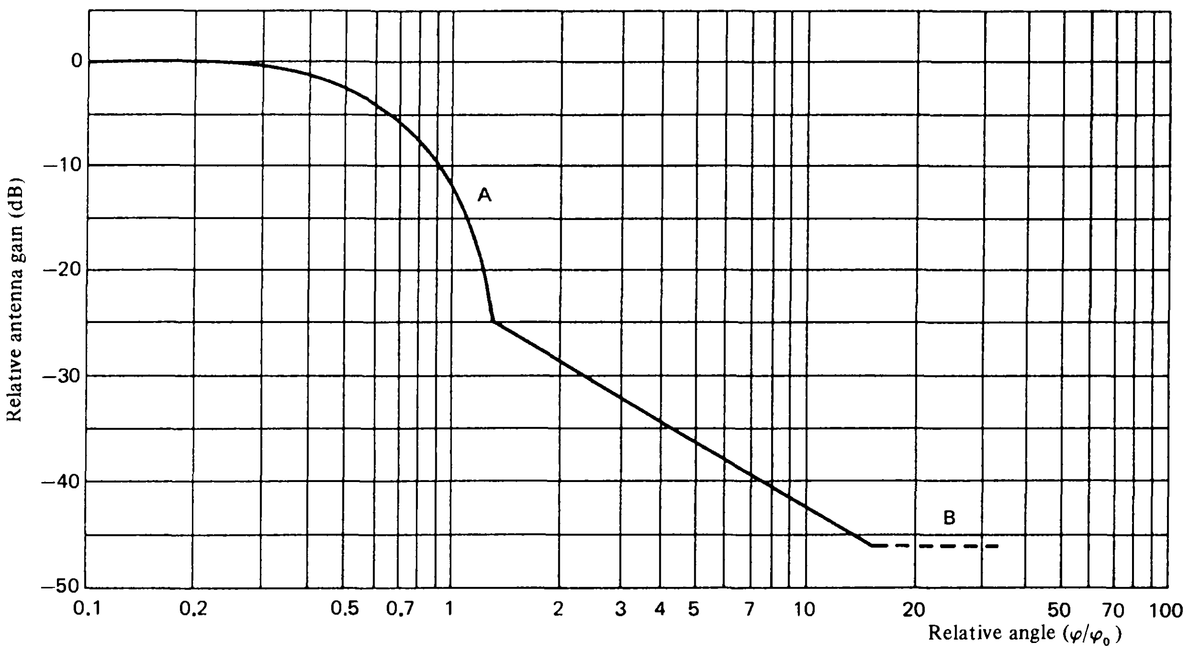

FIGURE 1

Reference patterns for satellite antennas

G_{max} = $44.45 - 10 \log (\varphi_{01} \cdot \varphi_{02})$ dBi

Curve A: dB relative to main beam gain

$-12 (\varphi/\varphi_0)^2$ for $0 \leqslant (\varphi/\varphi_0) \leqslant 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with curve B: curve B.

Curve B: Minus the on-axis gain (curve B in this figure illustrates the particular case of an antenna with an on-axis gain of 46 dBi).

φ_{01}, φ_{02}: Major and minor axis half-power beamwidth, respectively, of elliptical beam (degrees).

φ_0: Cross-sectional half-power beamwidth in the direction of interest (degrees).

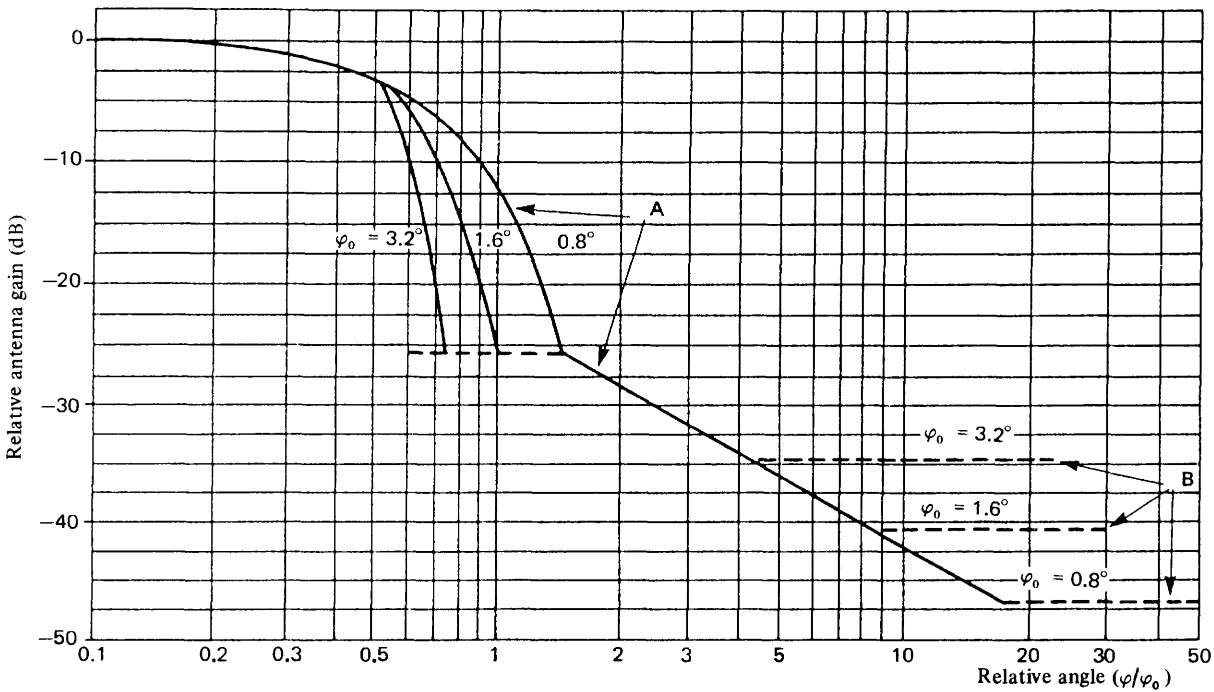

FIGURE 2

Reference patterns for satellite antennas with fast roll-off in the main beam

Curve A: dB relative to main beam gain

$-12\,(\varphi/\varphi_0)^2$ for $0 \leqslant (\varphi/\varphi_0) \leqslant 0.5$

$-18.75\,\varphi_0^2\,(\varphi/\varphi_0 - x)^2$ for $0.5 < (\varphi/\varphi_0) \leqslant \left(\frac{1.16}{\varphi_0} + x\right)$

-25.23 for $\left(\frac{1.16}{\varphi_0} + x\right) < (\varphi/\varphi_0) \leqslant 1.45$

$-(22 + 20\log(\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with curve B: curve B

Curve B: minus the on-axis gain (curves A and B represent examples of three antennas having different values of φ_0 as labelled in Figure 2. The on-axis gains of these antennas are approximately 34, 40, and 46 dBi, respectively).

where:

φ = off-axis angle (degrees)

φ_0 = cross-sectional half-power beamwidth in the direction of interest (degrees)

x = $0.5\left(1 - \frac{0.8}{\varphi_0}\right)$, for the 13/10-11 GHz bands

x = $0.5\left(1 - \frac{1.6}{\varphi_0}\right)$, for the 6/4 GHz bands

1.7.3 The space station receiving system noise temperature referred to the output of the receiving antenna is:

1000 K for the 6 GHz band;

1500 K for the 13 GHz band.

1.7.4 The minimum beamwidth size, in terms of the half-power beamwidth, is 1.6 degrees for the 6/4 GHz band and 0.8 degrees for the 13/10-11 GHz band.

1.7.5 The space station antenna efficiency is 55%.

1.7.6 The deviation of the space station antenna beam from its nominal pointing direction is limited to 0.1 degrees in any direction. The rotation accuracy of elliptical beams is ± 1.0 degree.

1.8 *Bandwidth*

The Allotment Plan is based on the carrier power averaged over the necessary bandwidth of the modulated carrier and referred to a 1 MHz bandwidth.

Section B. Generalized Parameters Used for Determining when the Assignments of a Proposed Satellite Network are in Conformity with the Plan

1. *Introduction*

1.1 The A, B, C, D generalized parameters specify the interference-producing capability (variables A and C) and the interference sensitivity (variables B and D) of a satellite network.

1.2 Since many different combinations of implementation parameters (such as antenna characteristics and transmitter powers) can result in a similar set of parametric values, it can be applied irrespective of the modulation characteristics and specific frequency used.

2. *Calculation of the A, B, C, D generalized parameters*

2.1 The following equations (see Section 2.3 below) describe the A, B, C, D generalized parameters where:

A = up-link off-axis e.i.r.p. density averaged over the necessary bandwidth of the modulated carrier;

B = up-link off-axis receiver sensitivity to interfering e.i.r.p. density averaged over the necessary bandwidth of the modulated carrier;

C = down-link off-axis e.i.r.p. density averaged over the necessary bandwidth of the modulated carrier;

D = down-link off-axis receiver sensitivity to interfering e.i.r.p. density averaged over the necessary bandwidth of the modulated carrier.

2.2 In the following equations, if measured data for the antenna gains are not available, the reference antenna radiation patterns chosen under Sections 1.6.4 and 1.7.2 of Annex 1, Section A should be used.

2.3 The generalized parameters A, B, C and D are calculated as follows:

$$A = p_1 \cdot g_1(\theta)$$

$$B = \frac{1}{p_1 \cdot g_1 \cdot \Delta g_2(\varphi)}$$

$$C = \frac{p_3 \cdot g_3}{\Delta g_3(\varphi)}$$

$$D = \frac{g_4(\theta)}{p_3 \cdot g_3 \cdot g_4}$$

where:

(In the following, all ratios are numerical power ratios and the antenna gains are referred to an isotropic antenna.)

p_1 : the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the transmitting earth station antenna (W/Hz);

g_1 : the maximum gain of the earth station transmitting antenna;

$g_1(\theta)$: the earth station transmitting antenna radiation pattern;

g_2 : the maximum gain of the space station receiving antenna;

$g_2(\varphi)$: the gain in the space station receiving antenna in the direction of the earth station;

$\Delta g_2(\varphi) = \dfrac{g_2}{g_2(\varphi)}$: discrimination of the space station receiving antenna in the direction of the earth station;

p_3 : the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the space station transmitting antenna (W/Hz);

g_3 : the maximum space station transmitting antenna gain;

$g_3(\varphi)$: the space station transmitting antenna gain in the direction of the earth station;

$\Delta g_3(\varphi) = \dfrac{g_3}{g_3(\varphi)}$: discrimination of the space station transmitting antenna in the direction of the desired earth station;

g_4 : the maximum gain of the earth station receiving antenna;

$g_4(\theta)$: the earth station receiving antenna radiation pattern.

Note: The parameters p_1, $p_1 \cdot g_1$, $p_3 \cdot g_3$ and $p_3 \cdot g_3 \cdot g_4$ will be calculated by the Board and will be published in an IFRB circular-letter. These calculations will be made using Figure 1, Figure 2 and Table 1, as appropriate.

ANNEX 2

Basic Data to be Furnished in Notices Relating to Stations in the Fixed-Satellite Service Entering the Design Stage Using Frequency Bands of the Plan

1. *Space station characteristics*

The following information shall be supplied for both the transmitting and receiving space stations.

1.1 *Country and identification of the allotment* (for a network not derived from the Allotment Plan, give the name of the network).

1.2 *Preferred or nominal orbital position* (xxx.xx degrees east or west from the Greenwich meridian. In addition, in the case of a network not derived from the Allotment Plan, give the service arc).

1.3 *Frequency bands*

1.4 *Dates* proposed for bringing into use.

1.5 *Identity of the space station*

1.6 *Service area* as defined by the allotment in the Plan. Alternatively, the service area may be defined by a number of geographical points.

1.7 *Power characteristics of the transmission*

a) Maximum value of power density, in dB(W/Hz), averaged over the necessary bandwidth of the modulated carrier, supplied to the input of the antenna. (This value will be used for calculation of the *C* and *D* parameters. See Annex 1, Section B.)

b) Maximum carrier power density, in dB(W/Hz), averaged over the worst 4 kHz band, supplied to the antenna input.

c) Frequency below which signals whose peak-to-average ratio is less than 5 dB will be located.

1.8 *Space station transmitting and receiving antenna characteristics*

a) gain of the antenna in the direction of maximum radiation referred to an isotropic antenna (dBi);

b) boresight coordinates (xx.xx degrees north or south, yyy.yy degrees east or west from the Greenwich meridian);

c) pointing accuracy (degrees);

d) shape of the beam (elliptical, circular, or other);

e) for circular beams indicate the following:

- half-power beamwidth in degrees;
- radiation pattern;

f) for elliptical beams indicate the following:

- radiation pattern;
- rotational accuracy in degrees;
- major axis orientation in degrees anticlockwise from the Equator;
- major axis beamwidth (degrees) at the half-power points;
- minor axis beamwidth (degrees) at the half-power points;

g) for beams of other than circular or elliptical shape, indicate the following:

- gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite on to a plane perpendicular to the axis from the centre of the Earth to the satellite. The gain contours shall be drawn as isolines of the isotropic gain, at least for −2, −4, −6, −10 and −20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain, when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite. The antenna gain contours shall include the effect of the planned pointing accuracy and rotational accuracy of the antenna;

- whenever practicable, a numerical equation providing the necessary information to allow the gain contours to be plotted.

1.9 *Space station receiving system noise temperature* (kelvins)

1.10 *Station-keeping accuracy* (degrees)

2. *Earth station characteristics*

The following information shall be supplied for both the transmit and receive earth stations.

2.1 *Identity of the space station with which communication is to be established*

2.2 *Power characteristics of the transmission*

a) Maximum value of power density, in dB(W/Hz), averaged over the necessary bandwidth of the modulated carrier, supplied to the input of the antenna. (This value will be used for calculation of the *A* and *B* parameters. See Annex 1, Section B.)

b) Maximum carrier power density, in dB(W/Hz), averaged over the worst 4 kHz band, supplied to the antenna input.

c) Frequency below which signals whose peak-to-average ratio is less than 5 dB will be located.

2.3 *Earth station antenna characteristics*

a) antenna gain in the direction of maximum radiation referred to an isotropic antenna (dBi);

b) half-power beamwidth in degrees (describe in detail if not symmetrical);

c) the radiation diagram(s) of the antenna (taking as a reference the direction of maximum radiation).

2.4 *Earth station receiving system noise temperature* (kelvins)

3. *Coordination/agreement*, if any

4. *Not used*

5. *Subregional systems*

Indicate the type of system and participating administrations. If applicable, indicate the part of the national allotment proposed to be used to form the subregional system, and the notifying administration.

6. *Required protection ratio*

Indicate the minimum acceptable aggregate carrier-to-interference ratio, if less than 26 dB. The carrier-to-interference ratio is to be expressed in terms of the power averaged over the necessary bandwidth of the modulated wanted and interfering signals.

7. *Other information*, if any

ANNEX 3A

Criteria for Determining when Proposed Assignments are Considered as Being in Conformity with the Plan

In this method, the generalized parameters are calculated (see Annex 1, Section B), and the results are compared with the corresponding reference set:

- If the calculated *A*, *B*, *C* and *D* values are less than or equal to the relevant reference set, then the use of the assignment is considered to be in conformity with the Plan.
- If the calculated values of *A* or *C* are greater than the relevant reference set, the use of the assignment is considered not to be in conformity with the Plan.
- If the calculated values of *B* or *D* are greater than the relevant reference set, the assignment is protected only to the level of the relevant reference set.

ANNEX 3B

Macrosegmentation Concept

In this method, an administration shall not be required to coordinate if, in addition to meeting the conditions of Annex 3A, the proposed frequency assignments are ordered in such a way that the upper 60% of each allotment band is used for high-density carriers and the lower 40% for low-density carriers.

For the purposes of this annex, the term “high-density carriers” shall be used for those carriers whose ratio of power spectral density peak (averaged over the worst 4 kHz) to average (defined over the necessary bandwidth of the modulated carrier) is greater than 5 dB; and the term “low-density carriers” shall be used for those for which this ratio is less than 5 dB.

ANNEX 4

Limits for Determining Whether an Allotment or an Assignment Made in Accordance with the Provisions of Appendix 30B is Considered to be Affected

An allotment shall be considered as being affected by another administration if, at its nominal orbital position within the predetermined arc, the calculated single-entry carrier-to-interference ratio is less than or equal to 30 dB, or the calculated value, based on the Plan, due to that other administration (whichever is the lower), at any test point within the service area of the interfered-with satellite network. The single-entry carrier-to-interference ratio is calculated using the method in Appendix 1 to this Annex.

An assignment shall be considered affected by a signal whose peak-to-average ratio (k) exceeds 5 dB in that portion of the spectrum which has been defined for low-density carrier usage, as identified in Annex 3B, if the single-entry carrier-to-interference ratio, calculated on the basis of power density averaged over the necessary bandwidth of the desired carrier, falls below:

$$25 + k \text{ (dB)}$$

Even if the single-entry carrier-to-interference ratio is above 30 dB (or the calculated value based on the Plan due to that other administration, whichever value is lower), an allotment or an assignment shall be considered affected if the overall aggregate C/I, as calculated using Appendix 1 to this Annex, falls below 26 dB or the calculated value for the assignment, based on the Plan, whichever is lower.

APPENDIX 1 TO ANNEX 4

Method for determination of the single-entry and aggregate carrier-to-interference ratio averaged over the necessary bandwidth of the modulated carrier

1. *Single-entry*

This section describes the method for calculating the single-entry interference potential.

The method is based on the single-entry carrier-to-interference ratio (C/I) which a given allotment or assignment made in accordance with the provisions of Appendix **30B** might experience due to emission from the proposed modification. The single-entry C/I due to a single interfering satellite network is given by:

$$(C/I)_t = \left(\frac{p_1' \; g_1'(\theta) \; g_2(\rho) \; 1_{su}}{p_1 \; g_1 \; g_2(\varphi) \; 1_{su'}} + \frac{p_3' \; g_3'(\eta) \; g_4(\xi) \; 1_{sd}}{p_3 \; g_3(\varphi) \; g_4 \; 1_{sd'}} \right)^{-1}$$

or

$$(C/I)_t = \left(A'(\theta) \cdot B(\rho) \cdot \Delta g_2(\varphi) \; \frac{1_{su}}{1_{su'}} + C'(\eta) \cdot D(\xi) \cdot \Delta g_3(\varphi) \; \frac{1_{sd}}{1_{sd'}} \right)^{-1}$$

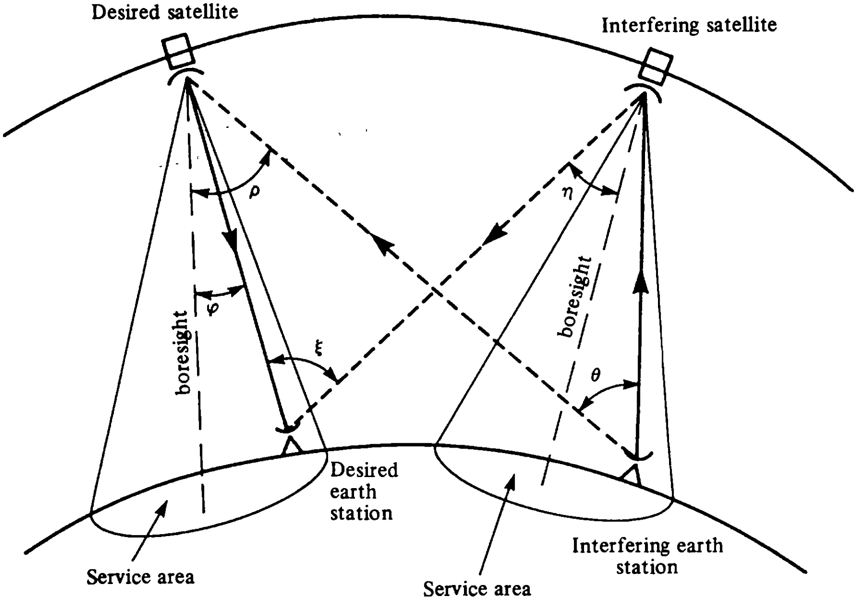

FIGURE 1

where:

θ, φ, ρ, η, ξ are angles as defined in Figure 1, above.

In the following, all ratios are numerical power ratios.

p_1 :	the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the desired earth station transmitting antenna (W/Hz)
g_1 :	the maximum gain of the desired transmitting earth station antenna
1_{su} :	the free-space path loss of the desired up-path signal
$1_{su'}$:	the free-space path loss of the interfering up-path signal

$g_2(\varphi)$: the gain of the desired space station receiving antenna in the direction of the desired earth station

$\Delta g_2(\varphi) = \dfrac{g_2}{g_2(\varphi)}$: discrimination of the desired space station receiving antenna in the direction of the desired earth station

g_2 : the maximum gain of the desired space station receiving antenna

p_1' : the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the interfering earth station transmitting antenna (W/Hz)

$g_1'(\theta)$: the interfering earth station antenna gain in the direction of the desired satellite

1_{sd} : the free-space path loss of the desired down-path signal

$1_{sd'}$: the free-space path loss of the interfering down-path signal

$g_2(\rho)$: the gain of the desired space station receiving antenna in the direction of the interfering earth station

p_3 : the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the desired space station transmitting antenna (W/Hz)

$g_3(\varphi)$: the desired space station transmitting antenna gain in the direction of the desired earth station

$\Delta g_3(\varphi) = \dfrac{g_3}{g_3(\varphi)}$: discrimination of the desired space station transmitting antenna in the direction of the desired earth station

g_3 :	the maximum gain of the desired space station transmitting antenna
g_4 :	the maximum gain of the desired receiving earth station antenna
p_3' :	the power density, averaged over the necessary bandwidth of the modulated carrier, fed into the interfering space station transmitting antenna (W/Hz)
$g_3'(\eta)$:	the interfering space station transmitting antenna gain in the direction of the desired earth station
$g_4(\xi)$:	the desired earth station receiving antenna gain in the direction of the interfering satellite
A', C' :	value of A, C of the interfering network in the direction of the desired network
B, D :	value of B, D of the desired network in the direction of the interfering network

A, B, C, D are defined in Annex 1, Section B.

2. *Aggregate carrier-to-interference ratio*

The aggregate carrier-to-interference ratio, is given by:

$$(C/I)_{agg} = \left(\Sigma_j \frac{1}{(c/i)_{ij}}\right)^{-1}$$

$$j = 1, 2, 3 \ldots n$$

where n is the total number of networks within the arc of the geostationary orbit visible to the desired network.

ANNEX 5

Application of the PDA (Predetermined Arc) Concept

1. The following method will be used in the application of the PDA Concept, which is based on the criteria set out in Section 1.1 below.

1.1 For the purposes of this Annex, an administration will be considered as being affected by another administration if, at its nominal orbital position within the predetermined arc, the calculated single-entry carrier-to-interference ratio is less than or equal to 30 dB, or the calculated value, based on the Plan, due to that other administration (whichever is lower), at any test point within the service area of the interfered-with satellite network. The single-entry C/I ratio is calculated by the method in Appendix 1, Annex 4.

Even if the single-entry C/I ratio is above 30 dB, or the calculated value, based on the Plan, due to that other administration (whichever is lower), an administration shall be considered as being affected if the overall aggregate C/I ratio, calculated by the method in Appendix 1, falls below 26 dB[1], or the value for the assignment (whichever is lower).

1.2 The PDA Concept shall be applied in the following steps:

a) the order of all satellites and also the position of satellites in the "design" or "operational" stages shall be fixed so as to minimize the impact on these systems. Next, the nominal positions of "pre-design" systems shall be adjusted so as to compensate for the degraded C/I ratio. The adjustments of nominal positions shall be limited to the range of their respective predetermined arcs;

[1] For allotments with an aggregate C/I ratio less than 26 dB, the calculated C/I ratio based on the Plan will be used. However, if through the use of the PDA Concept, this value is improved in the latter application of this procedure, the improved value will be used until it reaches 26 dB.

b) if compatibility is not obtained through 1.2 *a)*, the ordering of allotments of satellites in the "pre-design" stage shall be subject to change within their predetermined arcs, as defined in Article 5;

c) if the *C/I* objectives are not achieved, the affected administration may at this stage opt to select other measures than repositioning, as described in 1.2 *d)* below;

d) if compatibility is not achieved under 1.2 *b)*, and if the measures of 1.2 *c)* are unsuccessful, the allotment(s)/assignment(s) subject to repositioning shall include the systems in the "design" stage, for their predetermined arc as defined in Article 5.

1.3 Administrations for which the criteria of Section 1.1 are not met shall be identified for the purposes of this Annex.

ANNEX 6

Technical Means which May be Used to Avoid Incompatibilities Between Systems in the Fixed-Satellite Service at their Implementation Stage

1. Improved frequency modulated TV carrier dispersal techniques with up to 4 - 5 MHz peak-to-peak deviation.

2. Frequency separation between signals with high peak spectral density and narrow-band signals (bandwidth segmentation).

3. The use of transmitting and receiving antennas with special beams providing minimum gain in the direction to neighbouring satellites.

4. Shaped beams for transmitting satellite antennas.

5. Transmission (modulation) and reception techniques allowing for the *C/I* ratios less than 26 dB.

APPENDIX 31

Mob-83 Mob-87

Table of Frequencies to Be Used in the Bands Between 4 MHz and 27.5 MHz Allocated Exclusively to the Maritime Mobile Service

(See Article **60**)

In the table, where appropriate, the assignable frequencies in a given band for each usage are:

– indicated by the lowest and highest frequency, in heavy type, assigned in that band;

– regularly spaced, the number of assignable frequencies and the spacing in kHz being indicated in italics.

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**Table of Frequencies to Be Used in the Bands Between 4 000 kHz and 27 500 kHz
Allocated Exclusively to the Maritime Mobile Service (kHz)**

Band MHz	Limits kHz	Frequencies assignable to ship stations for oceanographic data transmission	Limits kHz	Frequencies assignable to ship stations for telephony, duplex operation	Limits kHz	Frequencies assignable to ship and coast stations for telephony, simplex operation	Limits kHz	Frequencies assignable to ship stations for wide-band telegraphy, facsimile and special transmission systems	Limits kHz	Frequencies assignable to ship stations for oceanographic data transmission	Limits kHz
		c)		*a)* *i)*		*a)*				*c)*	
4	4 063	**4 063.3 – 4 064.8** 6 f. 0.3 kHz	4 065	**4 066.4 – 4 144.4** 27 f. 3 kHz	4 146	**4 147.4 – 4 150.4** 2 f. 3 kHz	4 152	**4 154 – 4 170** 5 f. 4 kHz	4 172		4 172
6	6 200		6 200	**6 201.4 – 6 222.4** 8 f. 3 kHz	6 224	**6 225.4 – 6 231.4** 3 f. 3 kHz	6 233	**6 235 – 6 259** 7 f. 4 kHz	6 261	**6 261.3 – 6 262.5** 5 f. 0.3 kHz	6 262.75
8	8 195		8 195	**8 196.4 – 8 292.4** 33 f. 3 kHz	8 294	**8 295.4 – 8 298.4** 2 f. 3 kHz	8 300	**8 302 – 8 338** 10 f. 4 kHz	8 340	**8 340.3 – 8 341.5** 5 f. 0.3 kHz	8 341.75
12	12 230		12 230	**12 231.4 – 12 351.4** 41 f. 3 kHz	12 353	**12 354.4 – 12 366.4** 5 f. 3 kHz	12 368	**12 370 – 12 418** 13 f. 4 kHz	12 420	**12 420.3 – 12 421.5** 5 f. 0.3 kHz	12 421.75
16	16 360		16 360	**16 361.4 – 16 526.4** 56 f. 3 kHz	16 528	**16 529.4 – 16 547.4** 7 f. 3 kHz	16 549	**16 551 – 16 615** 17 f. 4 kHz	16 617	**16 617.3 – 16 618.5** 5 f. 0.3 kHz	16 618.75
18/19	18 780		18 780	**18 781.4 – 18 823.4** 15 f. 3 kHz	18 825	**18 826.4 – 18 844.4** 7 f. 3 kHz	18 846	**18 848 – 18 868** 6 f. 4 kHz	18 870		18 870
22	22 000		22 000	**22 001.4 – 22 157.4** 53 f. 3 kHz	22 159	**22 160.4 – 22 178.4** 7 f. 3 kHz	22 180	**22 182 – 22 238** 15 f. 4 kHz	22 240	**22 240.3 – 22 241.5** 5 f. 0.3 kHz	22 241.75
25/26	25 070		25 070	**25 071.4 – 25 098.4** 10 f. 3 kHz	25 100	**25 101.4 – 25 119.4** 7 f. 3 kHz	25 121	**25 123 – 25 159** 10 f. 4 kHz	25 161.25		25 161.25

f. = fréquences/frequencies/frecuencias

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Table of Frequencies to Be Used in the Bands Between 4 000 kHz and 27 500 kHz Allocated Exclusively to the Maritime Mobile Service (kHz)

(continued)

Band MHz	Limits kHz	Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK	Limits kHz	Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy	Limits kHz	Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK	Limits kHz	Working frequencies assignable to ship stations for A1A or A1B Morse telegraphy	Limits kHz	Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy	Limits kHz
		d) j) m)		*g)*		*d) m)*		*e) f) h)*		*g)*	
4	4 172	**4 172.5 – 4 181.5** 18 f. 0.5 kHz	4 181.75		4 186.75	X	4 186.75	**4 187 – 4 202** 31 f. 0.5 kHz	4 202.25	X	4 202.25
6	6 262.75	**6 263 – 6 275.5** 25 f. 0.5 kHz	6 275.75		6 280.75	**6 281 – 6 284.5** 8 f. 0.5 kHz	6 284.75	**6 285 – 6 300** 31 f. 0.5 kHz	6 300.25	X	6 300.25
8	8 341.75	X	8 341.75	X	8 341.75	X	8 341.75	**8 342 – 8 365.5** 48 f. 0.5 kHz	8 365.75		8 370.75
12	12 421.75	X	12 421.75	X	12 421.75	X	12 421.75	**12 422 – 12 476.5** 110 f. 0.5 kHz	12 476.75	X	12 476.75
16	16 618.75	X	16 618.75	X	16 618.75	X	16 618.75	**16 619 – 16 683** 129 f. 0.5 kHz	16 683.25	X	16 683.25
18/19	18 870	X	18 870	X	18 870	X	18 870	X	18 870	X	18 870
22	22 241.75	X	22 241.75	X	22 241.75	X	22 241.75	**22 242 – 22 279** 75 f. 0.5 kHz	22 279.25		22 284.25
25/26	25 161.25	X	25 161.25	X	25 161.25	X	25 161.25	**25 161.5 – 25 171** 20 f. 0.5 kHz	25 171.25		25 172.75

f. = fréquences/frequencies/frecuencias

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Table of Frequencies to Be Used in the Bands Between 4 000 kHz and 27 500 kHz Allocated Exclusively to the Maritime Mobile Service (kHz)

(continued)

Bands MHz	Limits kHz	Working frequencies assignable to ship stations for A1A or A1B Morse telegraphy	Limits kHz	Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK	Limits kHz	Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy	Limits kHz	Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK	Limits kHz	Frequencies (non-paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK and for A1A or A1B Morse telegraphy (working)	Limits kHz
		e) *f)*		*d)* *j)* *m)*		*g)*		*d)* *m)*		*b)*	
4	4 202.25	X	4 202.25	X	4 202.25	X	4 202.25	X	4 202.25	**4 202.5 – 4 207** 10 f. 0.5kHz	4 207.25
6	6 300.25	X	6 300.25	X	6 300.25	X	6 300.25	X	6 300.25	**6 300.5 – 6 311.5** 23 f. 0.5 kHz	6 311.75
8	8 370.75	**8 371 – 8 376** 11 f. 0.5 kHz	8 376.25	**8 376.5 – 8 396** 40 f. 0.5 kHz	8 396.25	X	8 396.25	X	8 396.25	**8 396.5 – 8 414** 36 f. 0.5 kHz	8 414,25
12	12 476.75	X	12 476.75	**12 477 – 12 549.5** 146 f. 0.5 kHz	12 549.75		12 554.75	**12 555 – 12 559.5** 10 f. 0.5 kHz	12 559.75	**12 560 – 12 576.5** 34 f. 0.5 kHz	12 576.75
16	16 683.25	X	16 683.25	**16 683.5 – 16 733.5** 101 f. 0.5 kHz	16 733.75		16 738.75	**16 739 –16 784.5** 92 f. 0.5 kHz	16 784.75	**16 785 – 16 804** 39 f. 0.5 kHz	16 804.25
18/19	18 870	X	18 870	**18 870.5 – 18 892.5** 45 f. 0.5 kHz	18 892.75	X	18 892.75	X	18 892.75	**18 893 – 18 898** 11 f. 0.5 kHz	18 898.25
22	22 284.25	X	22 284.25	**22 284.5 – 22 351.5** 135 f. 0.5 kHz	22 351.75	X	22 351.75	X	22 351.75	**22 352 – 22 374** 45 f. 0.5 kHz	22 374.25
25/26	25 172.75	X	25 172.75	**25 173 – 25 192.5** 40 f. 0.5 kHz	25 192.75	X	25 192.75	X	25 192.75	**25 193 – 25 208** 31 f. 0.5 kHz	25 208.25

f. = fréquences/frequencies/frecuencias

(continued)

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Table of Frequencies to Be Used in the Bands Between 4 000 kHz and 27 500 kHz
Allocated Exclusively to the Maritime Mobile Service (kHz)

(concluded)

Bands MHz	Limits kHz	Frequencies assignable to ship stations for Digital Selective Calling	Limits kHz	Limits kHz	Frequencies (paired) assignable to coast stations for NBDP and data transmission systems, at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK	Limits kHz	Frequencies assignable to coast stations for digital selective calling	Limits kHz	Frequencies assignable to coast stations for wide-band and A1A or A1B Morse telegraphy, facsimile, special and data transmission systems and direct-printing telegraphy systems	Limits kHz	Frequencies assignable to coast stations for telephony, duplex operation	Limits kHz
		k) l)			*d) n) o)*		*l)*				*a)*	
4	4 207.25	**4 207.5 – 4 209** 4 f. 0.5 kHz	4 209.25	4 209.25	**4 209.5 – 4 219** 20 f. 0.5 kHz	4 219.25	**4 219.5 – 4 220.5** 3 f. 0.5 kHz	4 221		4 351	**4 352.4 – 4 436.4** 29 f. 3 kHz	4 438
6	6 311.75	**6 312 – 6 313.5** 4 f. 0.5 kHz	6 313.75	6 313.75	**6 314 – 6 330.5** 34 f. 0.5 kHz	6 330.75	**6 331 – 6 332** 3 f. 0.5 kHz	6 332.5		6 501	**6 502.4 – 6 523.4** 8 f. 3 kHz	6 525
8	8 414,25	**8 414.5 – 8 416** 4 f. 0.5 kHz	8 416.25	8 416.25	**8 416.5 – 8 436** 40 f. 0.5 kHz	8 436.25	**8 436.5 – 8 437.5** 3 f. 0.5 kHz	8 438		8 707	**8 708.4 – 8 813.4** 36 f. 3 kHz	8 815
12	12 576.75	**12 577 – 12 578.5** 4 f. 0.5 kHz	12 578.75	12 578.75	**12 579 – 12 656.5** 156 f. 0.5 kHz	12 656.75	**12 657 – 12 658** 3 f. 0.5 kHz	12 658.5		13 077	**13 078.4 – 13 198.4** 41 f. 3 kHz	13 200
16	16 804.25	**16 804.5 – 16 806** 4 f. 0.5 kHz	16 806.25	16 806.25	**16 806.5 – 16 902.5** 193 f. 0.5 kHz	16 902.75	**16 903 – 16 904** 3 f. 0.5 kHz	16 904.5		17 242	**17 243.4 – 17 408.4** 56 f. 3 kHz	17 410
18/19	18 898.25	**18 898.5 – 18 899.5** 3 f. 0.5 kHz	18 899.75	19 680.25	**19 680.5 – 19 703** 46 f. 0.5 kHz	19 703.25	**19 703.5 – 19 704.5** 3 f. 0.5 kHz	19 705		19 755	**19 756.4 – 19 798.4** 15 f. 3 kHz	19 800
22	22 374.25	**22 374.5 – 22 375.5** 3 f. 0.5 kHz	22 375.75	22 375.75	**22 376 – 22 443.5** 136 f. 0.5 kHz	22 443.75	**22 444 – 22 445** 3 f. 0.5 kHz	22 445.5		22 696	**22 697.4 – 22 853.4** 53 f. 3 kHz	22 855
25/26	25 208.25	**25 208.5 – 25 209.5** 3 f. 0.5 kHz	25 210	26 100.25	**26 100.5 – 26 120.5** 41 f. 0.5 kHz	26 120.75	**26 121 – 26 122** 3 f. 0.5 kHz	26 122.5		26 145	**26 146.4 – 26 173.4** 10 f. 3 kHz	26 175

f. = fréquences/frequencies/frecuencias

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NOTES REFERRING TO THE TABLE

a) See Appendix **16**.

b) See Appendix **33**.

c) The frequency bands may also be used by buoy stations for oceanographic data tranmission and by stations interrogating these buoys, in accordance with the conditions set forth in Resolution **314 (Rev. Mob-87)**.

d) See Appendix **32**.

e) In the frequency bands to be used by ship stations for A1A Morse telegraphy working at speeds not exceeding 40 bauds, administrations may assign additional frequencies interleaved between the assignable frequencies. Any frequencies so assigned shall be multiples of 100 Hz. Administrations shall ensure a uniform distribution of such assignments within the bands.

f) See Appendix **35**.

g) See Appendix **34**.

h) For the conditions of use of the frequency 8 364 kHz, see No. **2988**.

i) For the use of the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz and 16 420 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by single-sideband radiotelephony, see Articles **38** and **N 38**.

j) For the use of the frequencies 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by narrow-band direct-printing telegraphy, see Article **N 38**.

k) For the use of the frequencies 4 207.5 kHz, 6 312 kHz, 8 414.5 kHz, 12 577 kHz and 16 804.5 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by digital selective calling, see Article **N 38**.

l) The following paired frequencies (for ship/coast stations) 4 208/4 219.5 kHz, 6 312.5/6 331 kHz, 8 415/8 436.5 kHz, 12 577.5/12 657 kHz, 16 805/16 903 kHz, 18 898.5/19 703.5 kHz, 22 374.5/22 444 kHz and 25 208.5/26 121 kHz are the first choice international frequencies for digital selective calling (see Article **62**).

m) Frequencies from these frequency bands may also be used for A1A or A1B Morse telegraphy (working); see Appendix **32**.

n) The frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz et 26 100.5 kHz are the exclusive international frequencies for the transmission of Maritime Safety Information (MSI) (see Articles N **38** and N **40** and Resolution **333 (Mob-87)**).

o) The frequency 4 209.5 kHz is an exclusive international frequency for the transmission of NAVTEX type information (see Articles N **38** and N **40** and Resolutions **329 (Mob-87)** and **332 (Mob-87)**).

APPENDIX 32
Mob-87

Channelling of the Maritime Mobile Bands Between 4 000 kHz and 27 500 kHz Used for Narrow-Band Direct-Printing Telegraphy and Data Systems (Paired Frequencies)

(See Article **60** and Resolution **300 (Rev. Mob-87)**)

1. Each coast station which uses paired frequencies is assigned one or more frequency pairs from the following series; each pair consists of a transmitting and a receiving frequency.

2. The speed of the narrow-band direct-printing telegraphy and data systems shall not exceed 100 bauds for FSK and 200 bauds for PSK.

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	4 MHz Band[1]		6 MHz Band[3]		8 MHz Band[4]	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
1	4 210.5	4 172.5	6 314.5	6 263	8 376.5[2]	8 376.5[2]
2	4 211	4 173	6 315	6 263.5	8 417	8 377
3	4 211.5	4 173.5	6 315.5	6 264	8 417.5	8 377.5
4	4 212	4 174	6 316	6 264.5	8 418	8 378
5	4 212.5	4 174.5	6 316.5	6 265	8 418.5	8 378.5
6	4 213	4 175	6 317	6 265.5	8 419	8 379
7	4 213.5	4 175.5	6 317.5	6 266	8 419.5	8 379.5
8	4 214	4 176	6 318	6 266.5	8 420	8 380
9	4 214.5	4 176.5	6 318.5	6 267	8 420.5	8 380.5
10	4 215	4 177	6 319	6 267.5	8 421	8 381
11	4 177.5[2]	4 177.5[2]	6 268[2]	6 268[2]	8 421.5	8 381.5
12	4 215.5	4 178	6 319.5	6 268.5	8 422	8 382
13	4 216	4 178.5	6 320	6 269	8 422.5	8 382.5
14	4 216.5	4 179	6 320.5	6 269.5	8 423	8 383
15	4 217	4 179.5	6 321	6 270	8 423.5	8 383.5
16	4 217.5	4 180	6 321.5	6 270.5	8 424	8 384
17	4 218	4 180.5	6 322	6 271	8 424.5	8 384.5
18	4 218.5	4 181	6 322.5	6 271.5	8 425	8 385
19	4 219	4 181.5	6 323	6 272	8 425.5	8 385.5
20			6 323.5	6 272.5	8 426	8 386
21			6 324	6 273	8 426.5	8 386.5
22			6 324.5	6 273.5	8 427	8 387
23			6 325	6 274	8 427.5	8 387.5
24			6 325.5	6 274.5	8 428	8 388
25			6 326	6 275	8 428.5	8 388.5

[1] Ship stations may use the coast station receiving frequencies for transmitting A1A or A1B Morse telegraphy (working), with the exception of channel No. 11 (see No. **N 2983**).

[2] For the conditions of use of this frequency, see Article **N 38**.

[3] Ship stations may use the coast station receiving frequencies of channels Nos. 25 up to and including 34 for transmitting A1A or A1B Morse telegraphy (working).

[4] Ship stations may use the coast station receiving frequencies of channels Nos. 29 up to and including 40 for transmitting A1A or A1B Morse telegraphy (working).

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	6 MHz Band[3] (cont.)		8 MHz Band[4] (cont.)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
26	6 326.5	6 275.5	8 429	8 389
27	6 327	6 281	8 429.5	8 389.5
28	6 327.5	6 281.5	8 430	8 390
29	6 328	6 282	8 430.5	8 390.5
30	6 328.5	6 282.5	8 431	8 391
31	6 329	6 283	8 431.5	8 391.5
32	6 329.5	6 283.5	8 432	8 392
33	6 330	6 284	8 432.5	8 392.5
34	6 330.5	6 284.5	8 433	8 393
35			8 433.5	8 393.5
36			8 434	8 394
37			8 434.5	8 394.5
38			8 435	8 395
39			8 435.5	8 395.5
40			8 436	8 396

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	12 MHz Band[5]		16 MHz Band[6]		18/19 MHz Band	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
1	12 579.5	12 477	16 807	16 683.5	19 681	18 870.5
2	12 580	12 477.5	16 807.5	16 684	19 681.5	18 871
3	12 580.5	12 478	16 808	16 684.5	19 682	18 871.5
4	12 581	12 478.5	16 808.5	16 685	19 682.5	18 872
5	12 581.5	12 479	16 809	16 685.5	19 683	18 872.5
6	12 582	12 479.5	16 809.5	16 686	19 683.5	18 873
7	12 582.5	12 480	16 810	16 686.5	19 684	18 873.5
8	12 583	12 480.5	16 810.5	16 687	19 684.5	18 874
9	12 583.5	12 481	16 811	16 687.5	19 685	18 874.5
10	12 584	12 481.5	16 811.5	16 688	19 685.5	18 875
11	12 584.5	12 482	16 812	16 688.5	19 686	18 875.5
12	12 585	12 482.5	16 812.5	16 689	19 686.5	18 876
13	12 585.5	12 483	16 813	16 689.5	19 687	18 876.5
14	12 586	12 483.5	16 813.5	16 690	19 687.5	18 877
15	12 586.5	12 484	16 814	16 690.5	19 688	18 877.5
16	12 587	12 484.5	16 814.5	16 691	19 688.5	18 878
17	12 587.5	12 485	16 815	16 691.5	19 689	18 878.5
18	12 588	12 485.5	16 815.5	16 692	19 689.5	18 879
19	12 588.5	12 486	16 816	16 692.5	19 690	18 879.5
20	12 589	12 486.5	16 816.5	16 693	19 690.5	18 880
21	12 589.5	12 487	16 817	16 693.5	19 691	18 880.5
22	12 590	12 487.5	16 817.5	16 694	19 691.5	18 881
23	12 590.5	12 488	16 818	16 694.5	19 692	18 881.5
24	12 591	12 488.5	16 695[2]	16 695[2]	19 692.5	18 882
25	12 591.5	12 489	16 818.5	16 695.5	19 693	18 882.5

[5] Ship stations may use the coast station receiving frequencies of channels Nos. 58 up to including 156 for transmitting A1A or A1B Morse telegraphy (working), with exception of channel No. 87 (see No. **N 3011**).

[6] Ship stations may use the coast station receiving frequencies of channels Nos. 71 up to and including 193 for transmitting A1A or A1B Morse telegraphy (working).

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	12 MHz Band[5] (cont.)		16 MHz Band[6] (cont.)		18/19 MHz Band (end)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
26	12 592	12 489.5	16 819	16 696	19 693.5	18 883
27	12 592.5	12 490	16 819.5	16 696.5	19 694	18 883.5
28	12 593	12 490.5	16 820	16 697	19 694.5	18 884
29	12 593.5	12 491	16 820.5	16 697.5	19 695	18 884.5
30	12 594	12 491.5	16 821	16 698	19 695.5	18 885
31	12 594.5	12 492	16 821.5	16 698.5	19 696	18 885.5
32	12 595	12 492.5	16 822	16 699	19 696.5	18 886
33	12 595.5	12 493	16 822.5	16 699.5	19 697	18 886.5
34	12 596	12 493.5	16 823	16 700	19 697.5	18 887
35	12 596.5	12 494	16 823.5	16 700.5	19 698	18 887.5
36	12 597	12 494.5	16 824	16 701	19 698.5	18 888
37	12 597.5	12 495	16 824.5	16 701.5	19 699	18 888.5
38	12 598	12 495.5	16 825	16 702	19 699.5	18 889
39	12 598.5	12 496	16 825.5	16 702.5	19 700	18 889.5
40	12 599	12 496.5	16 826	16 703	19 700.5	18 890
41	12 599.5	12 497	16 826.5	16 703.5	19 701	18 890.5
42	12 600	12 497.5	16 827	16 704	19 701.5	18 891
43	12 600.5	12 498	16 827.5	16 704.5	19 702	18 891.5
44	12 601	12 498.5	16 828	16 705	19 702.5	18 892
45	12 601.5	12 499	16 828.5	16 705.5	19 703	18 892.5
46	12 602	12 499.5	16 829	16 706		
47	12 602.5	12 500	16 829.5	16 706.5		
48	12 603	12 500.5	16 830	16 707		
49	12 603.5	12 501	16 830.5	16 707.5		
50	12 604	12 501.5	16 831	16 708		
51	12 604.5	12 502	16 831.5	16 708.5		
52	12 605	12 502.5	16 832	16 709		
53	12 605.5	12 503	16 832.5	16 709.5		
54	12 606	12 503.5	16 833	16 710		
55	12 606.5	12 504	16 833.5	16 710.5		
56	12 607	12 504.5	16 834	16 711		
57	12 607.5	12 505	16 834.5	16 711.5		
58	12 608	12 505.5	16 835	16 712		
59	12 608.5	12 506	16 835.5	16 712.5		
60	12 609	12 506.5	16 836	16 713		

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	12 MHz Band[5] (cont.)		16 MHz Band[6] (cont.)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
61	12 609.5	12 507	16 836.5	16 713.5
62	12 610	12 507.5	16 837	16 714
63	12 610.5	12 508	16 837.5	16 714.5
64	12 611	12 508.5	16 838	16 715
65	12 611.5	12 509	16 838.5	16 715.5
66	12 612	12 509.5	16 839	16 716
67	12 612.5	12 510	16 839.5	16 716.5
68	12 613	12 510.5	16 840	16 717
69	12 613.5	12 511	16 840.5	16 717.5
70	12 614	12 511.5	16 841	16 718
71	12 614.5	12 512	16 841.5	16 718.5
72	12 615	12 512.5	16 842	16 719
73	12 615.5	12 513	16 842.5	16 719.5
74	12 616	12 513.5	16 843	16 720
75	12 616.5	12 514	16 843.5	16 720.5
76	12 617	12 514.5	16 844	16 721
77	12 617.5	12 515	16 844.5	16 721.5
78	12 618	12 515.5	16 845	16 722
79	12 618.5	12 516	16 845.5	16 722.5
80	12 619	12 516.5	16 846	16 723
81	12 619.5	12 517	16 846.5	16 723,5
82	12 620	12 517.5	16 847	16 724
83	12 620.5	12 518	16 847.5	16 724.5
84	12 621	12 518.5	16 848	16 725
85	12 621.5	12 519	16 848.5	16 725.5
86	12 622	12 519.5	16 849	16 726
87	12 520[2]	12 520[2]	16 849.5	16 726.5
88	12 622.5	12 520.5	16 850	16 727
89	12 623	12 521	16 850.5	16 727.5
90	12 623.5	12 521.5	16 851	16 728
91	12 624	12 522	16 851.5	16 728.5
92	12 624.5	12 522.5	16 852	16 729
93	12 625	12 523	16 852.5	16 729.5
94	12 625.5	12 523.5	16 853	16 730
95	12 626	12 524	16 853.5	16 730.5

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	12 MHz Band[5] (cont.)		16 MHz Band[6] (cont.)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
96	12 626.5	12 524.5	16 854	16 731
97	12 627	12 525	16 854.5	16 731.5
98	12 627.5	12 525.5	16 855	16 732
99	12 628	12 526	16 855.5	16 732.5
100	12 628.5	12 526.5	16 856	16 733
101	12 629	12 527	16 856.5	16 733.5
102	12 629.5	12 527.5	16 857	16 739
103	12 630	12 528	16 857.5	16 739.5
104	12 630.5	12 528.5	16 858	16 740
105	12 631	12 529	16 858.5	16 740.5
106	12 631.5	12 529.5	16 859	16 741
107	12 632	12 530	16 859.5	16 741.5
108	12 632.5	12 530.5	16 860	16 742
109	12 633	12 531	16 860.5	16 742.5
110	12 633.5	12 531.5	16 861	16 743
111	12 634	12 532	16 861.5	16 743.5
112	12 634.5	12 532.5	16 862	16 744
113	12 635	12 533	16 862.5	16 744.5
114	12 635.5	12 533.5	16 863	16 745
115	12 636	12 534	16 863.5	16 745.5
116	12 636.5	12 534.5	16 864	16 746
117	12 637	12 535	16 864.5	16 746.5
118	12 637.5	12 535.5	16 865	16 747
119	12 638	12 536	16 865.5	16 747.5
120	12 638.5	12 536.5	16 866	16 748
121	12 639	12 537	16 866.5	16 748.5
122	12 639.5	12 537.5	16 867	16 749
123	12 640	12 538	16 867.5	16 749.5
124	12 640.5	12 538.5	16 868	16 750
125	12 641	12 539	16 868.5	16 750.5
126	12 641.5	12 539.5	16 869	16 751
127	12 642	12 540	16 869.5	16 751.5
128	12 642.5	12 540.5	16 870	16 752
129	12 643	12 541	16 870.5	16 752.5
130	12 643.5	12 541.5	16 871	16 753

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	12 MHz Band[5] (end)		16 MHz Band[6] (cont.)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
131	12 644	12 542	16 871.5	16 753.5
132	12 644.5	12 542.5	16 872	16 754
133	12 645	12 543	16 872.5	16 754.5
134	12 645.5	12 543.5	16 873	16 755
135	12 646	12 544	16 873.5	16 755.5
136	12 646.5	12 544.5	16 874	16 756
137	12 647	12 545	16 874.5	16 756.5
138	12 647.5	12 545.5	16 875	16 757
139	12 648	12 546	16 875.5	16 757.5
140	12 648.5	12 546.5	16 876	16 758
141	12 649	12 547	16 876.5	16 758.5
142	12 649.5	12 547.5	16 877	16 759
143	12 650	12 548	16 877.5	16 759.5
144	12 650.5	12 548.5	16 878	16 760
145	12 651	12 549	16 878.5	16 760.5
146	12 651.5	12 549.5	16 879	16 761
147	12 652	12 555	16 879.5	16 761.5
148	12 652.5	12 555.5	16 880	16 762
149	12 653	12 556	16 880.5	16 762.5
150	12 653.5	12 556.5	16 881	16 763
151	12 654	12 557	16 881.5	16 763.5
152	12 654.5	12 557.5	16 882	16 764
153	12 655	12 558	16 882.5	16 764.5
154	12 655.5	12 558.5	16 883	16 765
155	12 656	12 559	16 883.5	16 765.5
156	12 656.5	12 559.5	16 884	16 766
157			16 884.5	16 766.5
158			16 885	16 767
159			16 885.5	16 767.5
160			16 886	16 768
161			16 886.5	16 768.5
162			16 887	16 769
163			16 887.5	16 769.5
164			16 888	16 770
165			16 888.5	16 770.5

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	16 MHz Band[6] (end)	
	TRANSMIT	RECEIVE
166	16 889	16 771
167	16 889.5	16 771.5
168	16 890	16 772
169	16 890.5	16 772.5
170	16 891	16 773
171	16 891.5	16 773.5
172	16 892	16 774
173	16 892.5	16 774.5
174	16 893	16 775
175	16 893.5	16 775.5
176	16 894	16 776
177	16 894.5	16 776.5
178	16 895	16 777
179	16 895.5	16 777.5
180	16 896	16 778
181	16 896.5	16 778.5
182	16 897	16 779
183	16 897.5	16 779.5
184	16 898	16 780
185	16 898.5	16 780.5
186	16 899	16 781
187	16 899.5	16 781.5
188	16 900	16 782
189	16 900.5	16 782.5
190	16 901	16 783
191	16 901.5	16 783.5
192	16 902	16 784
193	16 902.5	16 784.5

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	22 MHz Band[7]		25/26 MHz Band	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
1	22 376.5	22 284.5	26 101	25 173
2	22 377	22 285	26 101.5	25 173.5
3	22 377.5	22 285.5	26 102	25 174
4	22 378	22 286	26 102.5	25 174.5
5	22 378.5	22 286.5	26 103	25 175
6	22 379	22 287	26 103.5	25 175.5
7	22 379.5	22 287.5	26 104	25 176
8	22 380	22 288	26 104.5	25 176.5
9	22 380.5	22 288.5	26 105	25 177
10	22 381	22 289	26 105.5	25 177.5
11	22 381.5	22 289.5	26 106	25 178
12	22 382	22 290	26 106.5	25 178.5
13	22 382.5	22 290.5	26 107	25 179
14	22 383	22 291	26 107.5	25 179.5
15	22 383.5	22 291.5	26 108	25 180
16	22 384	22 292	26 108.5	25 180.5
17	22 384.5	22 292.5	26 109	25 181
18	22 385	22 293	26 109.5	25 181.5
19	22 385.5	22 293.5	26 110	25 182
20	22 386	22 294	26 110.5	25 182.5
21	22 386.5	22 294.5	26 111	25 183
22	22 387	22 295	26 111.5	25 183.5
23	22 387.5	22 295.5	26 112	25 184
24	22 388	22 296	26 112.5	25 184.5
25	22 388.5	22 296.5	26 113	25 185
26	22 389	22 297	26 113.5	25 185.5
27	22 389.5	22 297.5	26 114	25 186
28	22 390	22 298	26 114.5	25 186.5
29	22 390.5	22 298.5	26 115	25 187
30	22 391	22 299	26 115.5	25 187.5

Ship stations may use the coast station receiving frequencies of channels Nos. 68 up to and including 135 for transmitting A1A or A1B Morse telegraphy (working).

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	22 MHz Band[7] (cont.)		25/26 MHz Band (end)	
	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE
31	22 391.5	22 299.5	26 116	25 188
32	22 392	22 300	26 116.5	25 188.5
33	22 392.5	22 300.5	26 117	25 189
34	22 393	22 301	26 117.5	25 189.5
35	22 393.5	22 301.5	26 118	25 190
36	22 394	22 302	26 118.5	25 190.5
37	22 394.5	22 302.5	26 119	25 191
38	22 395	22 303	26 119.5	25 191.5
39	22 395.5	22 303.5	26 120	25 192
40	22 396	22 304	26 120.5	25 192.5
41	22 396.5	22 304.5		
42	22 397	22 305		
43	22 397.5	22 305.5		
44	22 398	22 306		
45	22 398.5	22 306.5		
46	22 399	22 307		
47	22 399.5	22 307.5		
48	22 400	22 308		
49	22 400.5	22 308.5		
50	22 401	22 309		
51	22 401.5	22 309.5		
52	22 402	22 310		
53	22 402.5	22 310.5		
54	22 403	22 311		
55	22 403.5	22 311.5		
56	22 404	22 312		
57	22 404.5	22 312.5		
58	22 405	22 313		
59	22 405.5	22 313.5		
60	22 406	22 314		
61	22 406.5	22 314.5		
62	22 407	22 315		
63	22 407.5	22 315.5		
64	22 408	22 316		
65	22 408.5	22 316.5		

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	22 MHz Band[7] (cont.)	
	TRANSMIT	RECEIVE
66	22 409	22 317
67	22 409.5	22 317.5
68	22 410	22 318
69	22 410.5	22 318.5
70	22 411	22 319
71	22 411.5	22 319.5
72	22 412	22 320
73	22 412.5	22 320.5
74	22 413	22 321
75	22 413.5	22 321.5
76	22 414	22 322
77	22 414.5	22 322.5
78	22 415	22 323
79	22 415.5	22 323.5
80	22 416	22 324
81	22 416.5	22 324.5
82	22 417	22 325
83	22 417.5	22 325.5
84	22 418	22 326
85	22 418.5	22 326.5
86	22 419	22 327
87	22 419.5	22 327.5
88	22 420	22 328
89	22 420.5	22 328.5
90	22 421	22 329
91	22 421.5	22 329.5
92	22 422	22 330
93	22 422.5	22 330.5
94	22 423	22 331
95	22 423.5	22 331.5
96	22 424	22 332
97	22 424.5	22 332.5
98	22 425	22 333
99	22 425.5	22 333.5
100	22 426	22 334

Table of Frequencies for Two-Frequency Operation by Coast Stations (kHz)

Channel No.	22 MHz Band[7] (end)	
	TRANSMIT	RECEIVE
101	22 426.5	22 334.5
102	22 427	22 335
103	22 427.5	22 335.5
104	22 428	22 336
105	22 428.5	22 336.5
106	22 429	22 337
107	22 429.5	22 337.5
108	22 430	22 338
109	22 430.5	22 338.5
110	22 431	22 339
111	22 431.5	22 339.5
112	22 432	22 340
113	22 432.5	22 340.5
114	22 433	22 341
115	22 433.5	22 341.5
116	22 434	22 342
117	22 434.5	22 342.5
118	22 435	22 343
119	22 435.5	22 343.5
120	22 436	22 344
121	22 436.5	22 344.5
122	22 437	22 345
123	22 437.5	22 345.5
124	22 438	22 346
125	22 438.5	22 346.5
126	22 439	22 347
127	22 439.5	22 347.5
128	22 440	22 348
129	22 440.5	22 348.5
130	22 441	22 349
131	22 441.5	22 349.5
132	22 442	22 350
133	22 442.5	22 350.5
134	22 443	22 351
135	22 443.5	22 351.5

APPENDIX 33
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Channelling of the Maritime Mobile Bands Between 4 000 kHz and 27 500 kHz Used for Narrow-Band Direct-Printing Telegraphy and Data Transmission (Non-Paired Frequencies)

(See Article **60** and Resolution **335 (Mob-87)**)

1. One or more frequencies are assigned to each ship station as transmitting frequencies.

2. All frequencies in this Appendix may also be used by ship stations for transmitting A1A or A1B Morse telegraphy (working).

3. All frequencies appearing in this Appendix may be used for NBDP duplex operation.

The corresponding coast station frequencies should be selected by the administration concerned from the sub-bands for coast station wideband telegraphy, A1A or A1B Morse telegraphy, facsimile, special and data transmission systems and direct-printing telegraphy systems.

4. The speed of the narrow-band direct-printing telegraphy and data systems shall not exceed 100 bauds for FSK and 200 bauds for PSK.

Table of Ship Station Transmitting Frequencies
(kHz)

Frequency Bands									
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	18/19 MHz	22 MHz	25/26 MHz
1	4 202.5	6 300.5	8 396.5	12 560	16 785	18 893	22 352	25 193
2	4 203	6 301	8 397	12 560.5	16 785.5	18 893.5	22 352.5	25 193.5
3	4 203.5	6 301.5	8 397.5	12 561	16 786	18 894	22 353	25 194
4	4 204	6 302	8 398	12 561.5	16 786.5	18 894.5	22 353.5	25 194.5
5	4 204.5	6 302.5	8 398.5	12 562	16 787	18 895	22 354	25 195
6	4 205	6 303	8 399	12 562.5	16 787.5	18 895.5	22 354.5	25 195.5
7	4 205.5	6 303.5	8 399.5	12 563	16 788	18 896	22 355	25 196
8	4 206	6 304	8 400	12 563.5	16 788.5	18 896.5	22 355.5	25 196.5
9	4 206.5	6 304.5	8 400.5	12 564	16 789	18 897	22 356	25 197
10	4 207	6 305	8 401	12 564.5	16 789.5	18 897.5	22 356.5	25 197.5
11		6 305.5	8 401.5	12 565	16 790	18 898	22 357	25 198
12		6 306	8 402	12 565.5	16 790.5		22 357.5	25 198.5
13		6 306.5	8 402.5	12 566	16 791		22 358	25 199
14		6 307	8 403	12 566.5	16 791.5		22 358.5	25 199.5
15		6 307.5	8 403.5	12 567	16 792		22 359	25 200
16		6 308	8 404	12 567.5	16 792.5		22 359.5	25 200.5
17		6 308.5	8 404.5	12 568	16 793		22 360	25 201
18		6 309	8 405	12 568.5	16 793.5		22 360.5	25 201.5
19		6 309.5	8 405.5	12 569	16 794		22 361	25 202
20		6 310	8 406	12 569.5	16 794.5		22 361.5	25 202.5
21		6 310.5	8 406.5	12 570	16 795		22 362	25 203
22		6 311	8 407	12 570.5	16 795.5		22 362.5	25 203.5
23		6 311.5	8 407.5	12 571	16 796		22 363	25 204
24			8 408	12 571.5	16 796.5		22 363.5	25 204.5
25			8 408.5	12 572	16 797		22 364	25 205
26			8 409	12 572.5	16 797.5		22 364.5	25 205.5
27			8 409.5	12 573	16 798		22 365	25 206
28			8 410	12 573.5	16 798.5		22 365.5	25 206.5
29			8 410.5	12 574	16 799		22 366	25 207
30			8 411	12 574.5	16 799.5		22 366.5	25 207.5

Table of Ship Station Transmitting Frequencies
(kHz)

Frequency Bands								
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	18/19 MHz	22 MHz	25/26 MHz
31			8 411.5	12 575	16 800		22 367	25 208
32			8 412	12 575.5	16 800.5		22 367.5	
33			8 412.5	12 576	16 801		22 368	
34			8 413	12 576.5	16 801.5		22 368.5	
35			8 413.5		16 802		22 369	
36			8 414		16 802.5		22 369.5	
37					16 803		22 370	
38					16 803.5		22 370.5	
39					16 804		22 371	
40							22 371.5	
41							22 372	
42							22 372.5	
43							22 373	
44							22 373.5	
45							22 374	

APPENDIX 34

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Table of Calling Frequencies Assignable to Ship Stations for A1A or A1B Morse Telegraphy at Speeds Not Exceeding 40 Bauds*

(See Article **60** and Resolution **312 (Rev. Mob-87)**)

(kHz)

Group	Channel series	4 MHz Band	6 MHz Band	8 MHz Band	12 MHz Band	16 MHz Band	22 MHz Band	25/26 MHz Band
I	1 2	4 182 4 182.5	6 277 6 277.5	8 366 8 366.5	12 550 12 550.5	16 734 16 734.5	22 279.5 22 280	Channel A 25 171.5 Groups I and II
Common Channel Common Channel	3 4	4 184 4 184.5	6 276 6 276.5	8 368 8 369	12 552 12 553.5	16 736 16 738	22 280.5 22 281	Common Channel C 25 172
II	5 6	4 183 4 183.5	6 278 6 278.5	8 367 8 367.5	12 551 12 551.5	16 735 16 735.5	22 281.5 22 282	Channel A 25 171.5 Groups I and II
III	7 8	4 185 4 185.5	6 279 6 279.5	8 368.5 8 369.5	12 552.5 12 553	16 736.5 16 737	22 282.5 22 283	Channel B 25 172.5
IV	9 10	4 186 4 186.5	6 280 6 280.5	8 370 8 370.5	12 554 12 554.5	16 737.5 16 738.5	22 283.5 22 284	Groups III and IV

* Channel width in every band: 0.5 kHz

Notes

1. Only the common channels in the 4, 6, 8, 12 and 16 MHz for A1A Morse telegraphy are harmonically related.

2. Administrations should assign the frequencies as they appear in this Appendix only to ship stations equipped with crystal controlled oscillators.

3. However, administrations may subdivide each appropriate group channel and common channel into specific calling frequencies on every full 100 Hz in the channel and assign these discrete frequencies to ships with synthetized transmitters.

Examples of subdivision of channels (centre frequencies are underlined)

4 181.8	6 276.8	8 365.8	12 549.8	16 733.8	22 279.3	25 171.3
4 181.9	6 276.9	8 365.9	12 549.9	16 733.9	22 279.4	25 171.4
4 182	6 277	8 366	12 550	16 734	22 279.5	25 171.5
4 182.1	6 277.1	8 366.1	12 550.1	16 734.1	22 279.6	25 171.6
4 182.2	6 277.2	8 366.2	12 550.2	16 734.2	22 279.7	25 171.7

4. Administrations should avoid as far as possible, assigning the two frequencies at ± 100 Hz from the harmonically related common channel.

5. In the 22 MHz and 25/26 MHz bands the channels are not harmonically related to those in the 4 to 16 MHz bands. However, the principle of subdivision of channels into specific calling frequencies on 100 Hz applies.

APPENDIX 35
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Table of Working Frequencies, in kHz, Assignable to Ship Stations for A1A or A1B Morse Telegraphy at Speeds Not Exceeding 40 Bauds

(See also Note *e)* to Appendix **31**)

	Frequency Bands						
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	22 MHz	25/26 MHz
1	4 187	6 285	8 342	12 422	16 619	22 242	25 161.5
2	4 187.5	6 285.5	8 342.5	12 422.5	16 619.5	22 242.5	25 162
3	4 188	6 286	8 343	12 423	16 620	22 243	25 162.5
4	4 188.5	6 286.5	8 343.5	12 423.5	16 620.5	22 243.5	25 163
5	4 189	6 287	8 344	12 424	16 621	22 244	25 163.5
6	4 189.5	6 287.5	8 344.5	12 424.5	16 621.5	22 244.5	25 164
7	4 190	6 288	8 345	12 425	16 622	22 245	25 164.5
8	4 190.5	6 288.5	8 345.5	12 425.5	16 622.5	22 245.5	25 165
9	4 191	6 289	8 346	12 426	16 623	22 246	25 165.5
10	4 191.5	6 289.5	8 346.5	12 426.5	16 623.5	22 246.5	25 166
11	4 192	6 290	8 347	12 427	16 624	22 247	25 166.5
12	4 192.5	6 290.5	8 347.5	12 427.5	16 624.5	22 247.5	25 167
13	4 193	6 291	8 348	12 428	16 625	22 248	25 167.5
14	4 193.5	6 291.5	8 348.5	12 428.5	16 625.5	22 248.5	25 168
15	4 194	6 292	8 349	12 429	16 626	22 249	25 168.5
16	4 194.5	6 292.5	8 349.5	12 429.5	16 626.5	22 249.5	25 169
17	4 195	6 293	8 350	12 430	16 627	22 250	25 169.5
18	4 195.5	6 293.5	8 350.5	12 430.5	16 627.5	22 250.5	25 170
19	4 196	6 294	8 351	12 431	16 628	22 251	25 170.5
20	4 196.5	6 294.5	8 351.5	12 431.5	16 628.5	22 251.5	25 171
21	4 197	6 295	8 352	12 432	16 629	22 252	
22	4 197.5	6 295.5	8 352.5	12 432.5	16 629.5	22 252.5	
23	4 198	6 296	8 353	12 433	16 630	22 253	
24	4 198.5	6 296.5	8 353.5	12 433.5	16 630.5	22 253.5	
25	4 199	6 297	8 354	12 434	16 631	22 254	

Frequency Bands							
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	22 MHz	25/26 MHz
26	4 199.5	6 297.5	8 354.5	12 434.5	16 631.5	22 254.5	
27	4 200	6 298	8 355	12 435	16 632	22 255	
28	4 200.5	6 298.5	8 355.5	12 435.5	16 632.5	22 255.5	
29	4 201	6 299	8 356	12 436	16 633	22 256	
30	4 201.5	6 299.5	8 356.5	12 436.5	16 633.5	22 256.5	
31	4 202	6 300	8 357	12 437	16 634	22 257	
32			8 357.5	12 437.5	16 634.5	22 257.5	
33			8 358	12 438	16 635	22 258	
34			8 358.5	12 438.5	16 635.5	22 258.5	
35			8 359	12 439	16 636	22 259	
36			8 359.5	12 439.5	16 636.5	22 259.5	
37			8 360	12 440	16 637	22 260	
38			8 360.5	12 440.5	16 637.5	22 260.5	
39			8 361	12 441	16 638	22 261	
40			8 361.5	12 441.5	16 638.5	22 261.5	
41			8 362	12 442	16 639	22 262	
42			8 362.5	12 442.5	16 639.5	22 262.5	
43			8 363	12 443	16 640	22 263	
44			8 363.5	12 443.5	16 640.5	22 263.5	
45			8 364	12 444	16 641	22 264	
46			8 364.5	12 444.5	16 641.5	22 264.5	
47			8 365	12 445	16 642	22 265	
48			8 365.5	12 445.5	16 642.5	22 265.5	
49			8 371	12 446	16 643	22 266	
50			8 371.5	12 446.5	16 643.5	22 266.5	
51			8 372	12 447	16 644	22 267	
52			8 372.5	12 447.5	16 644.5	22 267.5	
53			8 373	12 448	16 645	22 268	
54			8 373.5	12 448.5	16 645.5	22 268.5	
55			8 374	12 449	16 646	22 269	
56			8 374.5	12 449.5	16 646.5	22 269.5	
57			8 375	12 450	16 647	22 270	
58			8 375.5	12 450.5	16 647.5	22 270.5	
59			8 376	12 451	16 648	22 271	
60				12 451.5	16 648.5	22 271.5	
61				12 452	16 649	22 272	
62				12 452.5	16 649.5	22 272.5	
63				12 453	16 650	22 273	
64				12 453.5	16 650.5	22 273.5	
65				12 454	16 651	22 274	

Frequency Bands							
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	22 MHz	25/26 MHz
66				12 454.5	16 651.5	22 274.5	
67				12 455	16 652	22 275	
68				12 455.5	16 652.5	22 275.5	
69				12 456	16 653	22 276	
70				12 456.5	16 653.5	22 276.5	
71				12 457	16 654	22 277	
72				12 457.5	16 654.5	22 277.5	
73				12 458	16 655	22 278	
74				12 458.5	16 655.5	22 278.5	
75				12 459	16 656	22 279	
76				12 459.5	16 656.5		
77				12 460	16 657		
78				12 460.5	16 657.5		
79				12 461	16 658		
80				12 461.5	16 658.5		
81				12 462	16 659		
82				12 462.5	16 659.5		
83				12 463	16 660		
84				12 463.5	16 660.5		
85				12 464	16 661		
86				12 464.5	16 661.5		
87				12 465	16 662		
88				12 465.5	16 662.5		
89				12 466	16 663		
90				12 466.5	16 663.5		
91				12 467	16 664		
92				12 467.5	16 664.5		
93				12 468	16 665		
94				12 468.5	16 665.5		
95				12 469	16 666		
96				12 469.5	16 666.5		
97				12 470	16 667		
98				12 470.5	16 667.5		
99				12 471	16 668		
100				12 471.5	16 668.5		
101				12 472	16 669		
102				12 472.5	16 669.5		
103				12 473	16 670		
104				12 473.5	16 670.5		
105				12 474	16 671		

Frequency Bands							
Channel No.	4 MHz	6 MHz	8 MHz	12 MHz	16 MHz	22 MHz	25/26 MHz
106				12 474.5	16 671.5		
107				12 475	16 672		
108				12 475.5	16 672.5		
109				12 476	16 673		
110				12 476.5	16 673.5		
111					16 674		
112					16 674.5		
113					16 675		
114					16 675.5		
115					16 676		
116					16 676.5		
117					16 677		
118					16 677.5		
119					16 678		
120					16 678.5		
121					16 679		
122					16 679.5		
123					16 680		
124					16 680.5		
125					16 681		
126					16 681.5		
127					16 682		
128					16 682.5		
129					16 683		

APPENDIX 36
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Automatic Receiving Equipment for Radiotelegraph and Radiotelephone Alarm Signals

(See Section II of Article **41**)

1. The automatic devices intended for the reception of the radiotelegraph alarm signal shall fulfil the following conditions:

a) the equipment shall respond to the alarm signal transmitted by the telegraphic emissions of at least class A2B and H2B (see No. **4216**);

b) the equipment shall respond to the alarm signal through interference (provided it is not continuous) caused by atmospherics and powerful signals other than the alarm signal, preferably without any manual adjustment being required during any period of watch maintained by the apparatus;

c) the equipment shall not be actuated by atmospherics or by strong signals other than the alarm signal;

d) the equipment shall possess a minimum sensitivity such that with negligible atmospheric interference, it is capable of being operated by the alarm signal transmitted by the emergency transmitter of a ship station at any distance from this station up to the normal range fixed for this transmitter by the International Convention for the Safety of Life at Sea, and preferably at greater distances;

e) the equipment should, as far as practicable, give warning of any faults that would prevent the apparatus from functioning normally during watch hours.

2. The automatic devices intended for the reception of the radiotelephone alarm signal shall fulfil the following conditions:

a) the equipment shall respond to the alarm signal through intermittent interference caused by atmospherics and powerful signals other than the alarm signal, preferably without any manual adjustment being required during any period of watch maintained by the equipment;

b) the equipment shall not be actuated by atmospherics or by strong signals other than the alarm signal;

c) the equipment shall be effective beyond the range at which speech transmission is satisfactory and it should, as far as practicable, give warning of faults that would prevent the apparatus from performing its normal function during watch hours.

APPENDIX 37
Mob-83

Technical Characteristics of Emergency Position-Indicating Radiobeacons Operating on the Carrier Frequency 2 182 kHz

(See Section I of Article **41**)

Emergency position-indicating radiobeacons operating on the carrier frequency 2 182 kHz shall fulfil the following conditions:

a) the emergency position-indicating radiobeacons shall be capable of class A2A (or A2B) or H2A (or H2B) emissions, with a depth of modulation between 30 and 90 per cent;

b) the audio-frequency tolerance of emissions used for emergency position-indicating radiobeacons (see Nos. **3256** to **3258**) are:

± 20 Hz for the frequency on 1 300 Hz

± 35 Hz for the frequency on 2 200 Hz;

c) equipment shall be designed to comply with relevant CCIR Recommendations.

APPENDIX 37A
Mob-83 Mob-87

Technical Characteristics of Emergency Position-Indicating Radiobeacons Operating on the Carrier Frequencies 121.5 MHz and 243 MHz

(See Section I of Article **41**)

Emergency position-indicating radiobeacons operating on the carrier frequencies 121.5 MHz and 243 MHz shall fulfil the following conditions: [1]

a) emission in normal antenna conditions and positions shall be vertically polarized and shall be essentially omnidirectional in the horizontal plane;

b) carrier frequencies shall be amplitude-modulated (minimum duty cycle of 33%), with a minimum depth of modulation of 0.85;

c) the emission shall consist of a characteristic audio-frequency signal obtained by amplitude modulation of the carrier frequencies with a downward audio-frequency sweep within a range of not less than 700 Hz between 1 600 Hz and 300 Hz and with a sweep repetition rate of 2 to 4 times per second;

[1] Additional characteristics for emergency position-indicating radiobeacons aboard aircraft are specified in the relevant annexes to the Convention on International Civil Aviation.

d) the emission should include a clearly defined carrier frequency distinct from the modulation sideband components; in particular, at least 30 per cent of the power should be contained at all times within:

$\pm$ 30 Hz of the carrier frequency on 121.5 MHz,

$\pm$ 60 Hz of the carrier frequency on 243 MHz; [2]

e) the class of emission shall be A3X; however, any type of modulation which satisfies the requirements laid down in *b), c)* and *d)* above may be used, provided it does not impair precise locating of the radiobeacon.

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[2] Early implementation of these characteristics for new equipment is strongly recommended (see also Recommendation **604 (Rev.Mob-87)**).

APPENDIX 38
Mob-87

Narrow-Band Direct-Printing Telegraph Equipment in the Maritime Mobile Service Using Error Detection and Correction Methods

(see Articles **59**, **60**, **63** and **64**)

The equipment for narrow-band direct-printing telegraph systems in the maritime mobile service using error detection and correction methods shall fulfil the following conditions:

a) the equipment shall accept signals conforming to International Telegraph Alphabet No. 2 at a modulation rate of at least 50 bauds and shall provide similar signals at its output suitable for extension to the public telegraph network;

b) the modulation rate over the radio path shall be 100 bauds for frequency shift keying, and 100 or 200 bauds for phase-shift keying;

c) the emissions to be used are (see *Note 1*):

- class F1B or J2B with a frequency shift of 170 Hz,
- or class G1B, J2B, G7B or J7B (narrow-band phase-shift keying telegraphy);

Note 1: When frequency shift or phase-shift keying is effected by applying audio signals to the input of a single-sideband transmitter, particular care should be taken to suppress adequately the residual carrier of the single-sideband modulation process. In addition a suitable choice of the centre audio frequency will minimize the possibility of the residual carrier causing interference to nearby channels. For frequency shift keying the CCIR recommends 1 700 Hz as the centre frequency.

d) the frequency of the transmitted signal shall be maintained within the tolerances specified in Appendix 7 (see *Note 2* below);

e) for frequency shift keying, the higher of the emitted frequencies shall correspond to "space" and the lower of the emitted frequencies shall correspond to "mark" in accordance with the relevant CCIR Recommendation;

f) a 7-unit ARQ system or a 7-unit forward acting, error-correcting and indicating time-diversity system, using the same code, shall be employed. The remaining technical characteristics of the error-detecting and correcting equipment should be in accordance with the relevant CCIR Recommendations;

g) a station equipped with a direct-printing system in accordance with the provisions of the present Appendix, using a two block call signal, shall be assigned a number in accordance with Nos. **2088**, **2134** and **2143** to **2146**;

h) a station equipped with a direct-printing system in accordance with the provisions of the present Appendix capable of using a three block call signal, shall employ the maritime identification digits required in accordance with Appendix **43** when communicating with stations also capable of using a three block call signal;

i) conversion from the numerical identification to the two or three block call signal pattern shall be performed according to the relevant CCIR Recommendations;

j) conversion from the numerical identification to the 28-bit (4-character) pattern shall be performed according to the relevant CCIR Recommendations.

Note 2: For operational purposes, the associated receiving equipment should conform to the frequency stability of the transmitters. Receiving equipment should also comply with the necessary bandwidth as specified in the relevant CCIR Recommendations.

APPENDIX 39

Selective Calling System for Use in the International Maritime Mobile Service

(See Articles **25, 62, 63** and **65** and Appendix **9**)

1. Where there is a need to fulfil immediate requirements for selective calling, the system to be used shall have the following characteristics:

1.1 the selective call signal shall consist of five figures representing the code number assigned to a ship for selective calling;

1.2 the audio-frequency signal applied to the input of the coast station transmitter shall consist of consecutive audio-frequency pulses conforming to the following:

1.2.1 the audio frequencies used to identify the figures of the code number assigned to a ship shall conform to the following series:

Figure	1	2	3	4	5	6	7	8	9	0	Figure repetition
Audio frequency (Hz)	1124	1197	1275	1358	1446	1540	1640	1747	1860	1981	2110

For example, the series of audio-frequency pulses corresponding to the selective call 12133 would be 1124-1197-1124-1275-2110 Hz, and the series corresponding to the code number 22222 would be 1197-2110-1197-2110-1197 Hz;

1.2.2 if the series of numbers represented by the use of only two frequencies, chosen from those in paragraph 1.2.1. are reserved for calling predetermined groups of ships, then 100 different groups of numbers are available for allocation, according to the needs of administrations;

1.2.3 the waveforms of the audio-frequency generators shall be substantially sinusoidal, not exceeding 2% total harmonic distortion;

1.2.4 the audio-frequency pulses shall be transmitted sequentially;

1.2.5 the difference between the maximum amplitude of any audio-frequency pulses shall not exceed 1 dB;

1.2.6 the duration of each audio-frequency pulse, measured between the half-amplitude points, shall be 100 ms ± 10 ms;

1.2.7 the time interval between consecutive pulses, measured between the half-amplitude points, shall be 3 ms ± 2 ms;

1.2.8 the rise and the decay time of each audio-frequency pulse, measured between the 10% and 90% amplitude points, shall be 1·5 ms ± 1 ms;

1.2.9 the frequency tolerance of the audio frequencies given in paragraph 1.2.1 shall be ± 4 Hz;

1.2.10 the selective call signal (the selective call number assigned to the ship station) shall be transmitted twice with an interval of 900 ms ± 100 ms between the end of the first signal and the beginning of the second signal (Figure 1);

1.2.11 the interval between calls from a coast station to different ships shall be at least 1 second (Figure 1).

2. The additional information following the selective call signal shall be transmitted as follows:

2.1 to identify the calling coast station, four figures shall be transmitted;

2.2 to identify the VHF channel on which a reply is required, two "zeros" followed by two "figures" should be transmitted (see Appendix **18**);

2.3 the characteristics of the signals shall conform to paragraphs 1.2.1 and 1.2.3 to 1.2.9 inclusive;

2.4 the composition of the signal shall be as shown in the diagram (Figure 2), the tolerance on the 350 ms interval being $\pm$ 30 ms.

3. A special "all ships call" signal to actuate the receiving selectors on all ships, regardless of their individual code number, shall consist of a continuous sequential transmission of the eleven audio-frequencies given in paragraph 1.2.1. The parameters of the audio-frequency pulses shall be in accordance with paragraphs 1.2.3, 1.2.4, 1.2.5 and 1.2.9. The duration of each audio-frequency pulse, measured between the half-amplitude points, shall be 17 ms $\pm$1 ms and the interval between consecutive pulses, measured between half-amplitude points, shall not exceed 1 ms. The total duration of this "all ships call" signal should be at least five seconds.

4. Receiving selectors on ships should operate reliably in any radio conditions acceptable for satisfactory communication.

5. The receiving selector shall be designed to accept the signals as defined in paragraph 1. However, bearing in mind that coast stations may transmit additional signals (e.g. coast station identification), it is important that the reset time of the decoder should be 250 ms $\pm$ 40 ms.

6. The receiving selector should be so designed, constructed and maintained that it is resistant to atmospherics and other unwanted signals including selective calling signals other than that for which the decoder has been set up.

7. The receiving selector shall include an audible or visual means of indicating the receipt of a call and, if required, an additional facility allowing the determination of the identity of the calling station or the VHF channel on which to reply according to the needs of administrations.

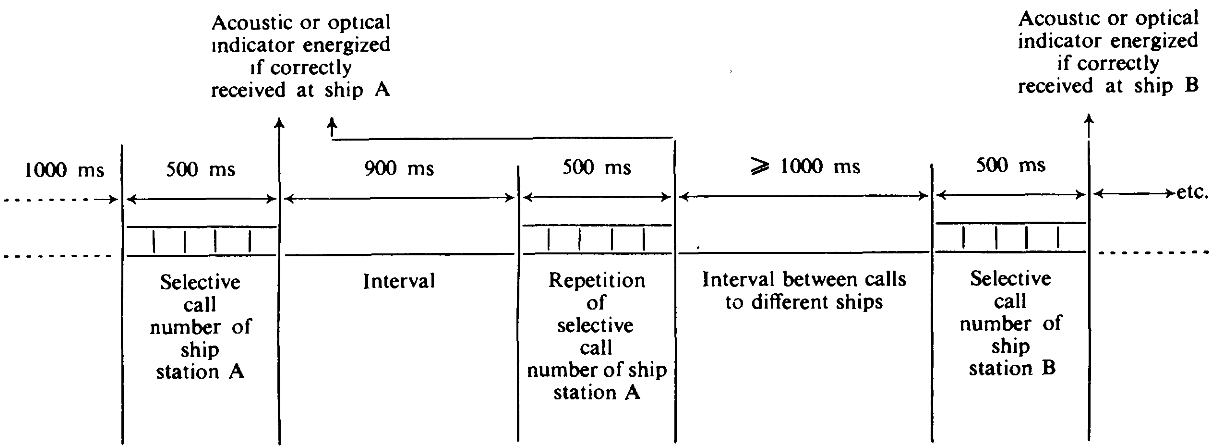
8. The indicating means shall be actuated on correct reception of the calling signal, no matter whether the correct registration has occurred on the first, or the second, or both parts of the calling signal transmitted by the coast stations.

9. The indicating means shall remain actuated until reset manually.

10. The receiving selector equipment should be as simple as is practicable, be capable of reliable operation over long periods with a minimum of maintenance, and could, with advantage, include facilities for self-testing.

FIGURE 1

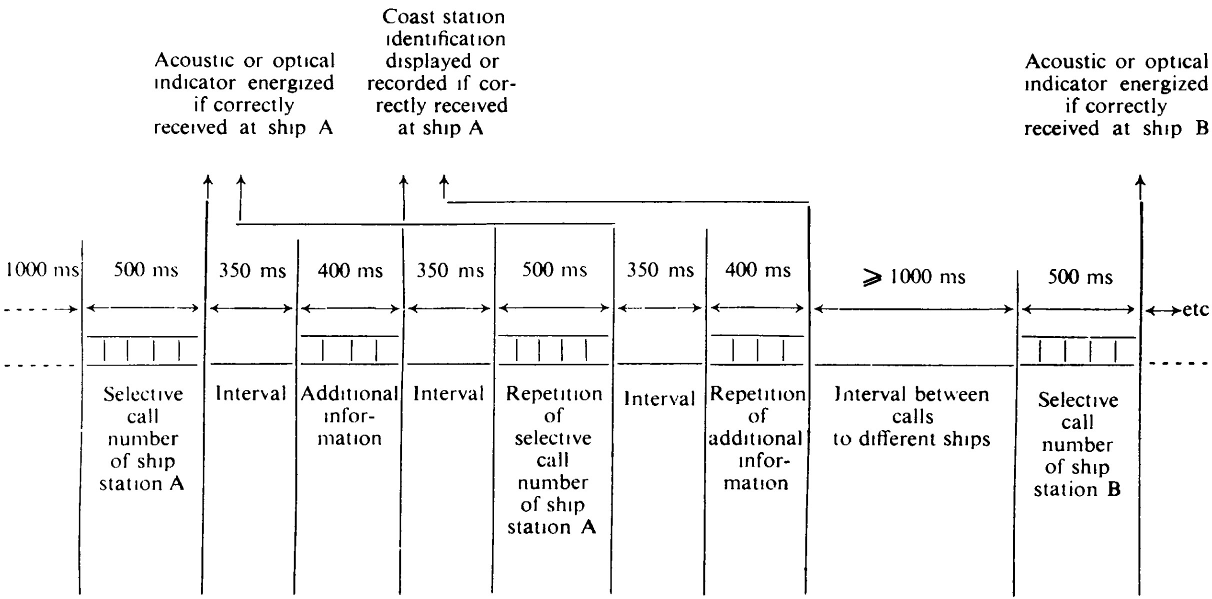
Composition of Selective Call Signals Without Additional Information



AP39-5

FIGURE 2

Composition of Selective Call Signals Without Additional Information



APPENDIX 40
Mob-87

Linked Compressor and Expander Systems

(deleted by **Mob-87**)

APPENDIX 41

Procedure for Obtaining Radio Direction-Finding Bearings and Positions

(See Article **35**)

Section I. General Instructions

1. Stations of the aeronautical mobile service shall use such special procedures as may be in force as a result of agreements concluded between administrations. However, if they have need to participate in direction-finding operations with stations of the maritime mobile service, the provisions of this Appendix shall be applicable.

2. Before calling one or more radio direction-finding stations for the purpose of asking for a bearing or position, a mobile station shall ascertain from the List of Radiodetermination and Special Service Stations:

a) the call signs of the stations to be called to obtain the desired bearings or position;

b) the frequency on which the radio direction-finding stations keep watch, and the frequency or frequencies on which they take bearings;

c) the radio direction-finding stations which, being linked by special circuits, can be grouped operationally with the radio direction-finding station to be called.

3. The procedure to be followed by the mobile station depends on varying circumstances. Generally, the following shall be taken into account:

a) if the radio direction-finding stations do not keep watch on the same frequency (whether it be the frequency on which bearings are taken or another frequency), a separate request for the bearings shall be made to each station or group of stations using a given frequency;

b) if all the radio direction-finding stations concerned keep watch on the same frequency, and if they are able to take bearings on a common frequency (which may be different from the listening frequency), the mobile station shall call all of them at the same time, in order that all these stations may take simultaneous bearings on the same transmission;

c) if several radio direction-finding stations are grouped by means of special circuits, only one of them, the radio direction-finding control station, shall be called even if all are furnished with transmitting apparatus. In that case, however, the mobile station shall, if appropriate, specify in the call, by means of call signs, the radio direction-finding stations from which it wishes to obtain bearings.

4. The List of Radiodetermination and Special Service Stations contains information relating to:

a) the type of signal and class of emission to be used for obtaining the bearings;

b) the duration of the transmission to be made by the mobile station;

c) the time used by the radio direction-finding station in question, if different from Coordinated Universal Time (UTC).

Section II. Rules of Procedure

5. The following rules of procedure applicable to radiotelegraphy and radiotelephony are based on the use of radiotelegraphy. When used for radiotelephony, appropriate phrases may replace the service abbreviations.

To obtain a bearing

6. (1) The mobile station shall call the radio direction-finding station or the radio direction-finding control station on the listening frequency indicated in the List of Radiodetermination and Special Service Stations. Depending on the type of information desired, the calling station shall transmit the appropriate service abbreviation followed, if the radio direction-finding station is a mobile station, by the service abbreviation QTH?. It shall indicate, if necessary, the frequency on which it is going to transmit to enable its bearing to be taken, and then await instructions.

(2) The radio direction-finding station called shall request the calling station, by means of the appropriate service abbreviation, to transmit for the bearing. If necessary, it shall indicate the frequency to be used for this purpose and the number of times the transmission is to be repeated.

(3) After having changed, if necessary, to its new transmitting frequency, the calling station shall transmit two dashes of approximately ten seconds each, followed by its call sign. It shall repeat this signal as often as the radio direction-finding station requires.

(4) The radio direction-finding station shall determine the direction and, if possible, the sense of the bearing, and its classification (see paragraph 7).

(5) If the radio direction-finding station is not satisfied with the operation, it shall request the calling station to repeat the transmission described in (3).

(6) The radio direction-finding station shall transmit the information to the calling station in the following order:

a) the appropriate service abbreviation;

b) three digits indicating the true bearing in degrees from the radio direction-finding station;

c) class of bearing;

d) time of observation;

e) if the radio direction-finding station is mobile, its own position in latitude and longitude, preceded by the service abbreviation QTH.

(7) As soon as the calling station has received the result of the observation, it shall repeat the message, if this is considered necessary to obtain confirmation. The radio direction-finding station then shall confirm that the repetition is correct or, if necessary, correct it by repeating the message. When the radio direction-finding station is sure that the calling station has received the message correctly, it shall transmit the signal "end of work". The calling station shall repeat this signal to indicate that the operation is finished.

(8) In the absence of information to the contrary, the calling station may assume that the sense of the bearing was determined. If the radio direction-finding station has not determined the sense, it shall indicate this in the information transmitted, or report the bearing and its reciprocal.

Classification of bearings

7. To estimate the accuracy and determine the corresponding class of a bearing:

a) an operator should generally, and particularly in the maritime mobile radio direction-finding service on frequencies below 3 000 kHz, use the observational characteristics of bearings shown in the following table;

b) the operators at a radio direction-finding station, when facilities and time permit, may take into account the probability of error in the bearing. A bearing is considered as belonging to a particular class if there is a probability of less than one in twenty that the bearing error would exceed the numerical values specified for that class shown in the following table. This probability should be determined from an analysis of the five components that make up the total variance of the bearing (instrumental, site, propagation, random-sampling and observational components).

To obtain a position determined by two or more radio direction-finding stations organized as a group

8. (1) If the calling station wishes to be informed of its position by a group of radio direction-finding stations, it shall call the control station as is indicated in (1) of paragraph 6 above, and request its position by means of the appropriate service abbreviation.

(2) The control station shall reply to the call and, when the radio direction-finding stations are ready, request, by means of the appropriate service abbreviation, that the calling station transmit. When the position has been determined, the control station shall transmit to the calling station:

a) the appropriate service abbreviation;

b) the position, in latitude and longitude or, if appropriate, in relation to a known geographical position;

c) the class of position as defined in the following sub-paragraph;

d) the time of observation.

(3) According to its estimate of the accuracy of the observations, the control station shall classify the position in one of the four following classes:

Class A: positions which the operator may reasonably expect to be accurate to within 5 nautical miles;

Class B: positions which the operator may reasonably expect to be accurate to within 20 nautical miles;

Class C: positions which the operator may reasonably expect to be accurate to within 50 nautical miles;

Class D: positions which the operator may not expect to be accurate to within 50 nautical miles.

(4) However, for frequencies above 3 000 kHz, where the distance limits specified in the preceding sub-paragraph may not be appropriate, the control station may classify the position in accordance with current CCIR Recommendations.

To obtain simultaneous bearings from two or more radio direction-finding stations organized as a group

9. On a request for bearings, the control station of a group of radio direction-finding stations shall proceed as indicated in paragraph 8 above. It then shall transmit the bearings observed by each station of the group, each bearing being preceded by the call sign of the station which observed it.

TABLE

Classification of Bearings

Class	Bearing Error (Degrees)	Observational Characteristics					
		Signal Strength	Bearing Indication	Fading	Interference	Bearing Swing (Degrees)	Duration of Observation
A	± 2	very good or good	definite (sharp null)	negligible	negligible	less than 3	adequate
B	± 5	fairly good	blurred	slight	slight	more than 3 less than 5	short
C	± 10	weak	severely blurred	severe	strong	more than 5 less than 10	very short
D	more than ± 10	scarcely perceptible	ill-defined	very severe	very strong	more than 10	inadequate

APPENDIX 42

Table of Allocation of International Call Sign Series[1]

(See Article **25**)

Call Sign Series	Allocated to
AAA-ALZ	United States of America
AMA-AOZ	Spain
APA-ASZ	Pakistan (Islamic Republic of)
ATA-AWZ	India (Republic of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
A2A-A2Z	Botswana (Republic of)
A3A-A3Z	Tonga (Kingdom of)
A4A-A4Z	Oman (Sultanate of)
A5A-A5Z	Bhutan (Kingdom of)
A6A-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
A8A-A8Z	Liberia (Republic of)
A9A-A9Z	Bahrain (State of)
BAA-BZZ	China (People's Republic of)
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CPA-CPZ	Bolivia (Republic of)
CQA-CUZ	Portugal
CVA-CXZ	Uruguay (Oriental Republic of)
CYA-CZZ	Canada
C2A-C2Z	Nauru (Republic of)
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Republic of)
C5A-C5Z	Gambia (Republic of the)
C6A-C6Z	Bahamas (Commonwealth of the)

[1] The series of call signs preceded by an asterisk are allocated to international organizations.

Call Sign Series	Allocated to
*C7A-C7Z	World Meteorological Organization
C8A-C9Z	Mozambique (People's Republic of)
DAA-DRZ	Germany (Federal Republic of)
DSA-DTZ	Republic of Korea
DUA-DZZ	Philippines (Republic of the)
D2A-D3Z	Angola (People's Republic of)
D4A-D4Z	Cape Verde (Republic of)
D5A-D5Z	Liberia (Republic of)
D6A-D6Z	Comoros (Federal and Islamic Republic of the)
D7A-D9Z	Republic of Korea
EAA-EHZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	Union of Soviet Socialist Republics
ELA-ELZ	Liberia (Republic of)
EMA-EOZ	Union of Soviet Socialist Republics
EPA-EQZ	Iran (Islamic Republic of)
ERA-ESZ	Union of Soviet Socialist Republics
ETA-ETZ	Ethiopia
EUA-EWZ	Byelorussian Soviet Socialist Republic
EXA-EZZ	Union of Soviet Socialist Republics
FAA-FZZ	France
GAA-GZZ	United Kingdom of Great Britain and Northern Ireland
HAA-HAZ	Hungarian People's Republic
HBA-HBZ	Switzerland (Confederation of)
HCA-HDZ	Ecuador
HEA-HEZ	Switzerland (Confederation of)
HFA-HFZ	Poland (People's Republic of)
HGA-HGZ	Hungarian People's Republic
HHA-HHZ	Haiti (Republic of)
HIA-HIZ	Dominican Republic
HJA-HKZ	Colombia (Republic of)
HLA-HLZ	Republic of Korea[1]
HMA-HMZ	Democratic People's Republic of Korea[1]
HNA-HNZ	Iraq (Republic of)

[1] The two Administrations concerned undertake to change their existing use of HLA-HLZ and HMA-HMZ call sign series to conform with the 1979 Table of Allocations as soon as practicable, in order to clarify their operational arrangements for other administrations. In this regard, the Administration of the Republic of Korea will take action to change the existing call signs registered with the ITU in the HMA-HMZ series as changes occur in the use of call signs in this series. The above-mentioned actions shall, in any case, be completed by 1 January 1984.

Call Sign Series	Allocated to
HOA-HPZ	Panama (Republic of)
HQA-HRZ	Honduras (Republic of)
HSA-HSZ	Thailand
HTA-HTZ	Nicaragua
HUA-HUZ	El Salvador (Republic of)
HVA-HVZ	Vatican City State
HWA-HYZ	France
HZA-HZZ	Saudi Arabia (Kingdom of)
H2A-H2Z	Cyprus (Republic of)
H3A-H3Z	Panama (Republic of)
H4A-H4Z	Solomon Islands
H6A-H7Z	Nicaragua
H8A-H9Z	Panama (Republic of)
IAA-IZZ	Italy
JAA-JSZ	Japan
JTA-JVZ	Mongolian People's Republic
JWA-JXZ	Norway
JYA-JYZ	Jordan (Hashemite Kingdom of)
JZA-JZZ	Indonesia (Republic of)
J2A-J2Z	Djibouti (Republic of)
J3A-J3Z	Grenada
J4A-J4Z	Greece
J5A-J5Z	Guinea-Bissau (Republic of)
J6A-J6Z	Saint Lucia
J7A-J7Z	Dominica
KAA-KZZ	United States of America
LAA-LNZ	Norway
LOA-LWZ	Argentine Republic
LXA-LXZ	Luxembourg
LYA-LYZ	Union of Soviet Socialist Republics
LZA-LZZ	Bulgaria (People's Republic of)
L2A-L9Z	Argentine Republic
MAA-MZZ	United Kingdom of Great Britain and Northern Ireland
NAA-NZZ	United States of America
OAA-OCZ	Peru
ODA-ODZ	Lebanon
OEA-OEZ	Austria
OFA-OJZ	Finland
OKA-OMZ	Czechoslovak Socialist Republic
ONA-OTZ	Belgium
OUA-OZZ	Denmark
PAA-PIZ	Netherlands (Kingdom of the)
PJA-PJZ	Netherlands Antilles
PKA-POZ	Indonesia (Republic of)
PPA-PYZ	Brazil (Federative Republic of)

Call Sign Series	Allocated to
PZA-PZZ	Suriname (Republic of)
P2A-P2Z	Papua New Guinea
P3A-P3Z	Cyprus (Republic of)
P4A-P4Z	* *
P5A-P9Z	Democratic People's Republic of Korea
QAA-QZZ	(Service abbreviations)
RAA-RZZ	Union of Soviet Socialist Republics
SAA-SMZ	Sweden
SNA-SRZ	Poland (People's Republic of)
SSA-SSM	Egypt (Arab Republic of)
SSN-STZ	Sudan (Democratic Republic of the)
SUA-SUZ	Egypt (Arab Republic of)
SVA-SZZ	Greece
S2A-S3Z	Bangladesh (People's Republic of)
S6A-S6Z	Singapore (Republic of)
S7A-S7Z	Seychelles (Republic of)
S9A-S9Z	Sao Tome and Principe (Democratic Republic of)
TAA-TCZ	Turkey
TDA-TDZ	Guatemala (Republic of)
TEA-TEZ	Costa Rica
TFA-TFZ	Iceland
TGA-TGZ	Guatemala (Republic of)
THA-THZ	France
TIA-TIZ	Costa Rica
TJA-TJZ	Cameroon (United Republic of)
TKA-TKZ	France
TLA-TLZ	Central African Republic
TMA-TMZ	France
TNA-TNZ	Congo (People's Republic of the)
TOA-TQZ	France
TRA-TRZ	Gabon Republic
TSA-TSZ	Tunisia
TTA-TTZ	Chad (Republic of the)
TUA-TUZ	Ivory Coast (Republic of the)
TVA-TXZ	France
TYA-TYZ	Benin (People's Republic of)
TZA-TZZ	Mali (Republic of)
T2A-T2Z	Tuvalu
T3A-T3Z	Kiribati Republic
T4A-T4Z	Cuba
T5A-T5Z	Somali Democratic Republic
T6A-T6Z	Afghanistan (Democratic Republic of)
UAA-UQZ	Union of Soviet Socialist Republics
URA-UTZ	Ukrainian Soviet Socialist Republic
UUA-UZZ	Union of Soviet Socialist Republics

** *Note by the General Secretariat:* The call sign series P4A-P4Z, previously allocated to Netherlands Antilles, has now been released for use by Aruba.

Call Sign Series	Allocated to
VAA-VGZ	Canada
VHA-VNZ	Australia
VOA-VOZ	Canada
VPA-VSZ	United Kingdom of Great Britain and Northern Ireland
VTA-VWZ	India (Republic of)
VXA-VYZ	Canada
VZA-VZZ	Australia
WAA-WZZ	United States of America
XAA-XIZ	Mexico
XJA-XOZ	Canada
XPA-XPZ	Denmark
XQA-XRZ	Chile
XSA-XSZ	China (People's Republic of)
XTA-XTZ	Upper Volta (Republic of)
XUA-XUZ	Democratic Kampuchea
XVA-XVZ	Viet Nam (Socialist Republic of)
XWA-XWZ	Lao People's Democratic Republic
XXA-XXZ	Portugal
XYA-XZZ	Burma (Socialist Republic of the Union of)
YAA-YAZ	Afghanistan (Democratic Republic of)
YBA-YHZ	Indonesia (Republic of)
YIA-YIZ	Iraq (Republic of)
YJA-YJZ	New Hebrides
YKA-YKZ	Syrian Arab Republic
YLA-YLZ	Union of Soviet Socialist Republics
YMA-YMZ	Turkey
YNA-YNZ	Nicaragua
YOA-YRZ	Roumania (Socialist Republic of)
YSA-YSZ	El Salvador (Republic of)
YTA-YUZ	Yugoslavia (Socialist Federal Republic of)
YVA-YYZ	Venezuela (Republic of)
YZA-YZZ	Yugoslavia (Socialist Federal Republic of)
Y2A-Y9Z	German Democratic Republic
ZAA-ZAZ	Albania (Socialist People's Republic of)
ZBA-ZJZ	United Kingdom of Great Britain and Northern Ireland
ZKA-ZMZ	New Zealand
ZNA-ZOZ	United Kingdom of Great Britain and Northern Ireland
ZPA-ZPZ	Paraguay (Republic of)
ZQA-ZQZ	United Kingdom of Great Britain and Northern Ireland
ZRA-ZUZ	South Africa (Republic of)
ZVA-ZZZ	Brazil (Federative Republic of)
2AA-2ZZ	United Kingdom of Great Britain and Northern Ireland
3AA-3AZ	Monaco
3BA-3BZ	Mauritius
3CA-3CZ	Equatorial Guinea (Republic of)

Call Sign Series	Allocated to
3DA-3DM	Swaziland (Kingdom of)
3DN-3DZ	Fiji
3EA-3FZ	Panama (Republic of)
3GA-3GZ	Chile
3HA-3UZ	China (People's Republic of)
3VA-3VZ	Tunisia
3WA-3WZ	Viet Nam (Socialist Republic of)
3XA-3XZ	Guinea (Revolutionary People's Republic of)
3YA-3YZ	Norway
3ZA-3ZZ	Poland (People's Republic of)
4AA-4CZ	Mexico
4DA-4IZ	Philippines (Republic of the)
4JA-4LZ	Union of Soviet Socialist Republics
4MA-4MZ	Venezuela (Republic of)
4NA-4OZ	Yugoslavia (Socialist Federal Republic of)
4PA-4SZ	Sri Lanka (Democratic Socialist Republic of)
4TA-4TZ	Peru
*4UA-4UZ	United Nations Organization
4VA-4VZ	Haiti (Republic of)
4WA-4WZ	Yemen Arab Republic
4XA-4XZ	Israel (State of)
*4YA-4YZ	International Civil Aviation Organization
4ZA-4ZZ	Israel (State of)
5AA-5AZ	Libya (Socialist People's Libyan Arab Jamahiriya)
5BA-5BZ	Cyprus (Republic of)
5CA-5GZ	Morocco (Kingdom of)
5HA-5IZ	Tanzania (United Republic of)
5JA-5KZ	Colombia (Republic of)
5LA-5MZ	Liberia (Republic of)
5NA-5OZ	Nigeria (Federal Republic of)
5PA-5QZ	Denmark
5RA-5SZ	Madagascar (Democratic Republic of)
5TA-5TZ	Mauritania (Islamic Republic of)
5UA-5UZ	Niger (Republic of the)
5VA-5VZ	Togolese Republic
5WA-5WZ	Western Samoa
5XA-5XZ	Uganda (Republic of)
5YA-5ZZ	Kenya (Republic of)
6AA-6BZ	Egypt (Arab Republic of)
6CA-6CZ	Syrian Arab Republic
6DA-6JZ	Mexico
6KA-6NZ	Republic of Korea
6OA-6OZ	Somali Democratic Republic
6PA-6SZ	Pakistan (Islamic Republic of)
6TA-6UZ	Sudan (Democratic Republic of the)

Call Sign Series	Allocated to
6VA-6WZ	Senegal (Republic of the)
6XA-6XZ	Madagascar (Democratic Republic of)
6YA-6YZ	Jamaica
6ZA-6ZZ	Liberia (Republic of)
7AA-7IZ	Indonesia (Republic of)
7JA-7NZ	Japan
7OA-7OZ	Yemen (People's Democratic Republic of)
7PA-7PZ	Lesotho (Kingdom of)
7QA-7QZ	Malawi (Republic of)
7RA-7RZ	Algeria (Algerian Democratic and Popular Republic)
7SA-7SZ	Sweden
7TA-7YZ	Algeria (Algerian Democratic and Popular Republic)
7ZA-7ZZ	Saudi Arabia (Kingdom of)
8AA-8IZ	Indonesia (Republic of)
8JA-8NZ	Japan
8OA-8OZ	Botswana (Republic of)
8PA-8PZ	Barbados
8QA-8QZ	Maldives (Republic of)
8RA-8RZ	Guyana
8SA-8SZ	Sweden
8TA-8YZ	India (Republic of)
8ZA-8ZZ	Saudi Arabia (Kingdom of)
9AA-9AZ	**
9BA-9DZ	Iran (Islamic Republic of)
9EA-9FZ	Ethiopia
9GA-9GZ	Ghana
9HA-9HZ	Malta (Republic of)
9IA-9JZ	Zambia (Republic of)
9KA-9KZ	Kuwait (State of)
9LA-9LZ	Sierra Leone
9MA-9MZ	Malaysia
9NA-9NZ	Nepal
9OA-9TZ	Zaire (Republic of)
9UA-9UZ	Burundi (Republic of)
9VA-9VZ	Singapore (Republic of)
9WA-9WZ	Malaysia
9XA-9XZ	Rwanda (Republic of)
9YA-9ZZ	Trinidad and Tobago

** *Note by the General Secretariat:* The call sign series 9AA-9AZ, previously allocated to the Republic of San Marino, has now been released.

Note by the General Secretariat

The following call sign series were allocated by the Secretary-General on a provisional basis between the end of the WARC-79 and 17 August 1990:

Call Sign Series	Allocated to
J8A-J8Z	Saint Vincent and the Grenadines
P4A-P4Z	Aruba
T7A-T7Z	San Marino (Republic of)
V2A-V2Z	Antigua and Barbuda
V3A-V3Z	Belize
V4A-V4Z	Saint Kitts and Nevis
V5A-V5Z	Namibia
V6A-V6Z	Marshall Islands (Republic of the)
V7A-V7Z	Micronesia (Federated States of)
V8A-V8Z	Brunei Darussalam
Z2A-Z2Z	Zimbabwe (Republic of)

APPENDIX 43

Mob-83 Mob-87

Maritime Mobile Service Identities [1]

1. *General*

1.1 Maritime mobile service identities are formed of a series of nine digits which are transmitted over the radio path in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations and group calls.

1.2 Ship station identities shall be in accordance with relevant CCIR and CCITT Recommendations.

1.3 These identities are formed in such a way that the identity or part thereof can be used by telephone and telex subscribers connected to the general telecommunications network principally to call ships automatically in the shore-to-ship direction.

1.4 There are four kinds of maritime mobile service identities:

i) ship station identities,

ii) group ship station call identities,

iii) coast station identities,

iv) group coast station call identities.

1.5 In this Appendix, the word "country" is used with the meaning attributed to it in No. **2246** of the Radio Regulations.

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[1] In this Appendix a reference to a ship station or a coast station may include the respective earth stations.

2. *Maritime Identification Digits (MID)*

2.1 Table 1 gives the Maritime Identification Digits (MID) allocated to each country. In accordance with No. **2087,** the Secretary-General is responsible for allocating Maritime Identification Digits to countries not included in this table. No. **2087A** authorizes the Secretary-General to allocate additional MIDs to countries in accordance with this appendix within the limits specified, [1] provided that he is satisfied that the possibilities offered by the MIDs allocated to an administration will soon be exhausted despite judicious ship station identity assignment as outlined in 3.1 below and in conformity with the guidelines contained in the relevant CCIR and CCITT Recommendations.

2.2 A single MID has been allocated to each country. A second MID should not be requested unless the MID first allocated is more than 80% exhausted in the basic category of three trailing zeros and the rate of assignments is such that 90% exhaustion is foreseen. The same criteria should be applied to subsequent requests for MIDs.

2.3 These guidelines do not require an administration to assign numerical identities until it determines that such identities are necessary. They do not concern the assignment of ship station identities without trailing zeros, since it is assumed that there is enough capacity inherent in the system to provide for the assignment of such identities to all ship stations which an administration may wish to identify in this manner.

3. *Ship Station Identities*

3.1 Administrations should:

3.1.1 follow the guidelines contained in the relevant CCIR and CCITT Recommendations for the assignment of ship station identities;

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[1] In no circumstances may a country claim more MIDs than the total number of its ship stations shown in the ITU List of Ship Stations (List V) divided by 1000.

3.1.2 make optimum use of the possibilities of forming identities from the single MID allocated to them;

3.1.3 take particular care in assigning ship station identities with six significant digits (three-trailing-zero identities), which should be assigned only to ship stations which can reasonably be expected to require such an identity for automatic access on a world-wide basis for public switched networks;

3.1.4 assign one-trailing-zero or two-trailing-zero identities to vessels when they require automatic access only on a national or regional level, as defined in the relevant CCITT Recommendations;

3.1.5 assign ship station identities without trailing zeros to all other vessels requiring a numerical identification.

3.2 The 9-digit code constituting a ship station identity is formed as follows:

$$M_1I_2D_3X_4X_5X_6X_7X_8X_9$$

wherein

$$M_1I_2\ D_3$$

represent the Maritime Identification Digits and X is any figure from 0 to 9.

4. *Group Ship Station Call Identities*

Group ship station call identities for calling simultaneously more than one ship are formed as follows:

$$0_1M_2I_3D_4X_5X_6X_7X_8X_9$$

where the first figure is zero and X is any figure from 0 to 9.

The particular MID represents only the country assigning the group ship station call identity and so does not prevent group calls to fleets containing more than one ship nationality.

5. *Coast Station Identities*

Coast station identities are formed as follows:

$$0_1 0_2 M_3 I_4 D_5 X_6 X_7 X_8 X_9$$

where the first two figures are zeros and X is any figure from 0 to 9.

The MID reflects the country in which the coast station or coast earth station is located.

6. *Group Coast Station Call Identities*

Group coast station call identities for calling simultaneously more than one coast station are formed as a subset of coast station identities, as follows:

$$0_1 0_2 M_3 I_4 D_5 X_6 X_7 X_8 X_9$$

where the first two figures are zeros and X is any figure from 0 to 9.

The particular MID represents only the country assigning the group coast station call identity. The identity may be assigned to stations of one administration which are located in only one geographical region as indicated in the relevant CCITT Recommendation.

TABLE 1

MARITIME IDENTIFICATION DIGITS

MID	Allocated to
100 – 200	***
201	Albania (Socialist People's Republic of)
202	Andorra (Principality of)
203	Austria
204	Azores
205	Belgium
206	Bielorussian Soviet Socialist Republic
207	Bulgaria (People's Republic of)
208	Vatican City State
209	Cyprus (Republic of)
210	*
211	Germany (Federal Republic of)
212 – 217	*
218	German Democratic Republic
219	Denmark
220 – 223	*
224	Spain
225 – 226	*
227	France
228 – 229	*
230	Finland
231	Faroe Islands
232	United Kingdom of Great Britain and Northern Ireland
233 – 235	*
236	Gibraltar
237	Greece
238 – 241	*
242	Morocco (Kingdom of)
243	Hungarian People's Republic
244	Netherlands (Kingdom of the)
245 – 246	*
247	Italy
248 – 249	*
250	Ireland
251	Iceland
252	Liechtenstein (Principality of)
253	Luxembourg
254	Monaco
255	Madeira
256	Malta (Republic of)
257	Norway

* Not allocated.
*** Not available for allocation at this stage.

MID	Allocated to
258 – 260	*
261	Poland (People's Republic of)
262	*
263	Portugal
264	Romania (Socialist Republic of)
265	Sweden
266 – 267	*
268	San Marino (Republic of)
269	Switzerland (Confederation of)
270	Czechoslovak Socialist Republic
271	Turkey
272	Ukrainian Soviet Socialist Republic
273	Union of Soviet Socialist Republics
274 – 278	*
279	Yugoslavia (Socialist Federal Republic of)
280 – 300	***
301	Anguilla
302	*
303	Alaska (State of)
304	Antigua and Barbuda
305	*
306	Netherlands Antilles
307	*
308	Bahamas (Commonwealth of the)
309	*
310	Bermuda
311	*
312	Belize
313	*
314	Barbados
315	*
316	Canada
317 – 318	*
319	Cayman Islands
320	*
321	Costa Rica
322	*
323	Cuba
324	*
325	Dominica (Commonwealth of)
326	*
327	Dominican Republic
328	*
329	Guadeloupe (French Department of)
330	Grenada
331	Greenland

* Not allocated.
*** Not available for allocation at this stage.

MID	Allocated to
332	Guatemala (Republic of)
333	*
334	Honduras (Republic of)
335	*
336	Haiti (Republic of)
337	*
338	Hawaii (State of)
339	Jamaica
340	*
341	St. Kitts-Nevis
342	*
343	Saint Lucia
344	*
345	Mexico
346	*
347	Martinique (French Department of)
348	Montserrat
349	*
350	Nicaragua
351	*
352	Panama (Republic of)
353 – 357	*
358	Puerto Rico
359	El Salvador (Republic of)
360	*
361	Saint Pierre and Miquelon (French Department of)
362	Trinidad and Tobago
363	*
364	Turks and Caicos Islands
365	*
366	United States of America
367 – 375	*
376	Saint Vincent and the Grenadines
377	*
378	British Virgin Islands
379	United States Virgin Islands
380 – 400	***
401	Afghanistan (Democratic Republic of)
402	*
403	Saudi Arabia (Kingdom of)
404	*
405	Bangladesh (People's Republic of)
406 – 407	*
408	Bahrain (State of)
409	*
410	Bhutan (Kingdom of)

* Not allocated.
*** Not available for allocation at this stage.

MID	Allocated to
411	*
412	China (People's Republic of)
413 – 416	*
417	Sri Lanka (Democratic Socialist Republic of)
418	*
419	India (Republic of)
420 – 421	*
422	Iran (Islamic Republic of)
423 – 424	*
425	Iraq (Republic of)
426 – 427	*
428	Israel (State of)
429 – 430	*
431	Japan
432 – 437	*
438	Jordan (Hashemite Kingdom of)
439	*
440	Korea (Republic of)
441 – 444	*
445	Democratic People's Republic of Korea
446	*
447	Kuwait (State of)
448 – 449	*
450	Lebanon
451 – 452	*
453	Macao
454	*
455	Maldives (Republic of)
456	*
457	Mongolian People's Republic
458	*
459	Nepal
460	*
461	Oman (Sultanate of)
462	*
463	Pakistan (Islamic Republic of)
464 – 465	*
466	Qatar (State of)
467	*
468	Syrian Arab Republic
469	*
470	United Arab Emirates
471 – 472	*
473	Yemen Arab Republic
474	*
475	Yemen (People's Democratic Republic of)

* Not allocated.

*** Not available for allocation at this stage.

MID	Allocated to
476	*
477	Hongkong
478 – 479	*
480 – 500	***
501	Adelie Land
502	*
503	Australia
504 – 505	*
506	Burma (Socialist Republic of the Union of)
507	*
508	Brunei
509	*
510	Caroline Islands
511	*
512	New Zealand
513	*
514	Democratic Kampuchea
515	*
516	Christmas Island (Indian Ocean)
517	*
518	Cook Islands
519	*
520	Fiji
521 – 522	*
523	Cocos Keeling Islands
524	*
525	Indonesia (Republic of)
526 – 528	*
529	Kiribati (Republic of)
530	*
531	Lao People's Democratic Republic
532	*
533	Malaysia
534 – 535	*
536	Mariana Islands
537	*
538	Marshall Islands
539	*
540	New Caledonia and Dependencies
541	*
542	Niue Island
543	*
544	Nauru (Republic of)
545	*
546	French Polynesia
547	*

* Not allocated.

*** Not available for allocation at this stage.

MID	Allocated to
548	Philippines (Republic of the)
549 – 552	*
553	Papua New Guinea
554	*
555	Pitcairn Island
556	*
557	Solomon Islands
558	*
559	American Samoa
560	*
561	Western Samoa (Independent State of)
562	*
563	Singapore (Republic of)
564 – 566	*
567	Thailand
568 – 569	*
570	Tonga (Kingdom of)
571	*
572	Tuvalu
573	*
574	Viet Nam (Socialist Republic of)
575	*
576	Vanuatu (Republic of)
577	*
578	Wallis and Futuna Islands
579	*
580 – 600	***
601	South Africa (Republic of)
602	*
603	Angola (People's Republic of)
604	*
605	Algeria (People's Democratic Republic of)
606	*
607	Saint Paul and Amsterdam Islands
608	Ascension
609	Burundi (Republic of)
610	Benin (People's Republic of)
611	Botswana (Republic of)
612	Central African Republic
613	Cameroon (United Republic of)
614	*
615	Congo (People's Republic of the)
616	Comoros (Islamic Federal Republic of the)
617	Cape Verde (Republic of)
618	Crozet Archipelago
619	Ivory Coast (Republic of the)

* Not allocated.
*** Not available for allocation at this stage.

MID	Allocated to
620	*
621	Djibouti (Republic of)
622	Egypt (Arab Republic of)
623	*
624	Ethiopia
625	*
626	Gabonese Republic
627	Ghana
628	*
629	Gambia (Republic of the)
630	Guinea-Bissau (Republic of)
631	Equatorial Guinea (Republic of)
632	Guinea (Revolutionary People's Republic of)
633	Upper Volta (Republic of the)
634	Kenya (Republic of)
635	Kerguelen Islands
636	Liberia (Republic of)
637 – 641	*
642	Libya (Socialist People's Libyan Arab Jamahiriya)
643	*
644	Lesotho (Kingdom of)
645	Mauritius
646	*
647	Madagascar (Democratic Republic of)
648	*
649	Mali (Republic of)
650	Mozambique (People's Republic of)
651 – 653	*
654	Mauritania (Islamic Republic of)
655	Malawi
656	Niger (Republic of the)
657	Nigeria (Federal Republic of)
658	*
659	Namibia
660	Reunion (French Department of)
661	Rwandese Republic
662	Sudan (Democratic Republic of the)
663	Senegal (Republic of)
664	Seychelles (Republic of)
665	Saint Helena
666	Somali Democratic Republic
667	Sierra Leone
668	Sao Tome and Principe (Democratic Republic of)
669	Swaziland (Kingdom of)
670	Chad (Republic of)
671	Togolese Republic

* Not allocated.
*** Not available for allocation at this stage.

MID	Allocated to
672	Tunisia
673	*
674	Tanzania (United Republic of)
675	Uganda (Republic of)
676	Zaire (Republic of)
677	Zanzibar
678	Zambia (Republic of)
679	Zimbabwe (Republic of)
680 – 700	***
701	Argentine Republic
702 – 709	*
710	Brazil (Federative Republic of)
711 – 719	*
720	Bolivia (Republic of)
721 – 724	*
725	Chile
726 – 729	*
730	Colombia (Republic of)
731 – 734	*
735	Ecuador
736 – 739	*
740	Falkland Islands (Malvinas)
741 – 744	*
745	Guiana (French Department of)
746 – 749	*
750	Guyana
751 – 754	*
755	Paraguay (Republic of)
756 – 759	*
760	Peru
761 – 764	*
765	Suriname (Republic of)
766 – 769	*
770	Uruguay (Eastern Republic of)
771 – 774	*
775	Venezuela (Republic of)
776 – 779	*
780 – 999	***

* Not allocated.
*** Not available for allocation at this stage.

APPENDIX 44

Ship Station Selective Call Numbers and Coast Station Identification Numbers

Part I. Table of Blocks of Selective Call Numbers for Ship Stations and Selective Call Numbers for Groups of Ship Stations Supplied to Administrations

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
00000*	Argentine Republic
00001 – 00499	Argentine Republic
00900 – 00999	Saudi Arabia (Kingdom of)
01010*	Australia
01100 – 01199	Australia
01800 – 01899	Singapore (Republic of)
01900 – 01999	Seychelles (Republic of)
02020*	Argentine Republic
03200 – 03299	Canada
04040*	Canada
05200 – 05399	Cyprus (Republic of)
05900 – 05999	Bulgaria (People's Republic of)
06300 – 07069	Denmark
07070*	Denmark
07071 – 07999	Denmark
08080*	Denmark
08400 – 08499	Spain
10400 – 11110	United States of America
11111*	United States of America
11112 – 11399	United States of America
14000 – 14140	Finland
14141*	Finland
14142 – 14199	Finland
14700 – 15150	France
15151*	France
15152 – 16099	France
16161*	France

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
16700 – 17170	Greece
17171*	Greece
17172 – 17699	Greece
18181*	China (People's Republic of)
19000 – 19099	Chile
19191*	China (People's Republic of)
19400 – 19499	Ghana
19700 – 20199	China (People's Republic of)
20202*	China (People's Republic of)
20300 – 20799	Italy
21212*	Italy
22222*	Italy
22300 – 22399	Iraq (Republic of)
22400 – 22599	Kuwait (State of)
22700 – 22899	Iraq (Republic of)
23500 – 23999	India (Republic of)
24300 – 25199	Liberia (Republic of)
26000 – 26261	Sweden
26262*	Sweden
26263 – 26999	Sweden
31900 – 31999	Malta (Republic of)
32000 – 32099	Cuba
32400 – 33332	Norway
33333*	Norway
33334 – 34342	Norway
34343*	Norway
34344 – 34499	Norway
36000 – 36099	Ireland
36200 – 36299	Luxembourg
36400 – 37372	Netherlands (Kingdom of the)
37373*	Netherlands (Kingdom of the)
37374 – 38382	Netherlands (Kingdom of the)
38383*	Netherlands (Kingdom of the)
38384 – 38399	Netherlands (Kingdom of the)
38400 – 39392	Germany (Federal Republic of)
39393*	Germany (Federal Republic of)
39394 – 40403	Germany (Federal Republic of)
40404*	Germany (Federal Republic of)
40405 – 41413	Germany (Federal Republic of)
41414*	Germany (Federal Republic of)
41415 – 41499	Germany (Federal Republic of)
41900 – 42199	Panama (Republic of)
42424*	Panama (Republic of)

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
43000 – 43433	Poland (People's Republic of)
43434*	Poland (People's Republic of)
43435 – 43499	Poland (People's Republic of)
43500 – 44099	Sweden
44444*	Panama (Republic of)
45500 – 46463	United Kingdom of Great Britain and Northern Ireland
46464*	United Kingdom of Great Britain and Northern Ireland
46465 – 46899	United Kingdom of Great Britain and Northern Ireland
47474*	United Kingdom of Great Britain and Northern Ireland
50400 – 50499	United Kingdom of Great Britain and Northern Ireland
50500 – 50504	Israel (State of)
50505*	Israel (State of)
50506 – 50699	Israel (State of)
51100 – 51499	Switzerland (Confederation of)
52600 – 53534	Union of Soviet Socialist Republics
53535*	Union of Soviet Socialist Republics
53536 – 54544	Union of Soviet Socialist Republics
54546 – 55554	Union of Soviet Socialist Republics
55556 – 56099	Union of Soviet Socialist Republics
56200 – 56299	Malaysia
56800 – 57099	Yugoslavia (Socialist Federal Republic of)
57800 – 57899	Venezuela (Republic of)
58100 – 58199	Algeria (Algerian Democratic and Popular Republic)
58200 – 58299	Austria
59400 – 59499	Libya (Socialist People's Libyan Arab Jamahiriya)
59700 – 59899	New Zealand
59900 – 59999	Monaco
60100 – 60599	German Democratic Republic
61000 – 61099	Netherlands Antilles
61100 – 61199	United Kingdom of Great Britain and Northern Ireland
61500 – 61599	Bahamas (Commonwealth of the)
62000 – 62099	Jordan (Hashemite Kingdom of)
63000 – 63099	Qatar (State of)
63200 – 63299	Bahrain (State of)
63400 – 63499	United Arab Emirates
64600 – 64645	South Africa (Republic of)
64646*	South Africa (Republic of)
64647 – 64799	South Africa (Republic of)
65700 – 65799	Turkey
66000 – 66665	Union of Soviet Socialist Republics
66667 – 67675	Union of Soviet Socialist Republics
67677 – 68685	Union of Soviet Socialist Republics
68686*	Union of Soviet Socialist Republics
68687 – 69695	Union of Soviet Socialist Republics

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
69697 – 70706	Union of Soviet Socialist Republics
70707*	Union of Soviet Socialist Republics
70708 – 71716	Union of Soviet Socialist Republics
71717*	Union of Soviet Socialist Republics
71718 – 72499	Union of Soviet Socialist Republics
72500 – 72726	Belgium
72727*	Belgium
72728 – 73736	Belgium
73737*	Belgium
73738 – 73999	Belgium
74700 – 74746	Sierra Leone
74747*	Sierra Leone
74748 – 74799	Sierra Leone
75500 – 75756	Iceland
75758 – 75999	Iceland
77500 – 77699	Yemen (People's Democratic Republic of)
77700 – 77776	Mexico
77777*	Mexico
77778 – 77799	Mexico
78000 – 78199	Egypt (Arab Republic of)
78700 – 78786	Mexico
78787*	Mexico
78788 – 78799	Mexico
79000 – 79099	Oman (Sultanate of)
79200 – 79399	Syrian Arab Republic
82828*	Malta (Republic of)
83838*	Malta (Republic of)
84848*	Netherlands (Kingdom of the)
86868*	Italy
87878*	Italy
88888*	Italy
89898*	Italy
90909*	Italy
91919*	Italy
92929*	Italy
93939*	Italy
94949*	Israel (State of)
95959*	Israel (State of)
96969*	Israel (State of)
97979*	German Democratic Republic
98989*	German Democratic Republic

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Note by the General Secretariat

The following blocks of selective call numbers for ship stations and selective call numbers for groups of ship stations were supplied to Administrations by the Secretary-General between the end of the WARC-79 and 17 August 1990:

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
00500-00699	Cyprus (Republic of)
00700-00799	Fiji (Republic of)
00800-00899	Hungary (Republic of)
01000-01009	Australia
01011-01099	Australia
01200-01399	Peru
01400-01499	Bolivia (Republic of)
01500-01599	Tanzania (United Republic of)
01600-01699	Myanmar (Union of)
01700-01799	Cyprus (Republic of)
02100-02199	Bangladesh (People's Republic of)
02200-02299	Cape Verde (Republic of)
02300-02399	Saint Vincent and the Grenadines
02400-02499	Cook Islands
02500-02599	Niue Island
02600-02699	Western Samoa (Independent State of)
02700-02799	Mauritius
02800-02999	Antigua and Barbuda
03000-03029	China (People's Republic of)
03030*	China (People's Republic of)
03031-03199	China (People's Republic of)
03300-04039	Denmark
04041-05049	Denmark
05050*	China (People's Republic of)
05051-05199	Denmark

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
05400-05899	Denmark
06000-06059	Denmark
06060*	China (People's Republic of)
06061-06299	Denmark
07000-07069	Denmark
07071-08079	Denmark
08081-08399	Denmark
08500-09089	Spain
09090*	Spain
09091-09499	Spain
09500-09699	Denmark
09700-09999	China (People's Republic of)
10000-10099	Denmark
10101*	Spain
10200-10399	Denmark
11400-12099	United States of America
12121*	United States of America
12200-12499	France
12500-13130	Sweden
13131*	China (People's Republic of)
13132-13599	Sweden
14200-14699	France
15600-16160	France
16162-16699	France
17700-18180	Germany (Federal Republic of)
18182-18699	Germany (Federal Republic of)
18700-18999	Honduras (Republic of)
19100-19190	Germany (Federal Republic of)
19192-19399	Germany (Federal Republic of)

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Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
19500-19599	Ethiopia (People's Democratic Republic of)
19600-19699	China (People's Republic of)
20200-20201	China (People's Republic of)
20203-20299	China (People's Republic of)
20800-21211	Italy
21213-21299	Italy
21300-22199	Norway
22600-22699	Kuwait (State of)
22900-22999	Indonesia (Republic of)
23232*	Chile
23233-23263	Chile
24100-24199	Colombia (Republic of)
24242*	China (People's Republic of)
25300-25999	Sweden
27000-27271	Japan
27272*	Japan
27273-27999	Japan
28000-28281	Norway
28282*	Japan
28283-29291	Norway
29292*	Japan
29293-30302	Norway
30303*	Japan
30304-31299	Norway
31300-31312	Morocco (Kingdom of)
31313*	Morocco (Kingdom of)
31314-31399	Morocco (Kingdom of)
31400-31899	France
32100-32322	Norway

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Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
32324-32399	Norway
34500-35352	Norway
35354-35999	Norway
36363*	Japan
41500-41899	Germany (Federal Republic of)
42200-42423	Panama (Republic of)
42425-42699	Panama (Republic of)
42700-42899	Norway
42900-42999	Panama (Republic of)
44100-44443	Sweden
44445-45453	Sweden
45455-45499	Sweden
46900-47473	United Kingdom of Great Britain and Northern Ireland
47475-48483	United Kingdom of Great Britain and Northern Ireland
48484*	United Kingdom of Great Britain and Northern Ireland
48485-49299	United Kingdom of Great Britain and Northern Ireland
49494*	United Kingdom of Great Britain and Northern Ireland
49700-50299	Denmark
50300-50399	United Kingdom of Great Britain and Northern Ireland
50700-51099	Norway
51500-51514	Switzerland (Confederation of)
51516-51599	Switzerland (Confederation of)
51600-51799	Norway
51800-51999	Portugal
52000-52199	Germany (Federal Republic of)

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Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
52200-52299	Vanuatu (Republic of)
52525*	United Kingdom of Great Britain and Northern Ireland
56400-56564	Turkey
56565*	Turkey
56566-56599	Turkey
56600-56699	Thailand
57100-57499	Norway
57575*	Yugoslavia (Socialist Federal Republic of)
57600-57699	Uruguay (Eastern Republic of)
57900-58099	Romania
58300-58399	Costa Rica
58400-58584	Brazil (Federative Republic of)
58585*	Brazil (Federative Republic of)
58586-58899	Brazil (Federative Republic of)
58900-58999	Sri Lanka (Democratic Socialist Republic of)
59000-59099	Ecuador
59100-59199	Brazil (Federative Republic of)
59200-59399	Iran (Islamic Republic of)
59500-59594	Brazil (Federative Republic of)
59595*	Brazil (Federative Republic of)
59596-59699	Brazil (Federative Republic of)
60000-60099	Brazil (Federative Republic of)
60700-60999	Pakistan (Islamic Republic of)
61200-61299	Brazil (Federative Republic of)
61400-61499	Bahamas (Commonwealth of the)
61600-61615	Bahamas (Commonwealth of the)
61616*	Bahamas (Commonwealth of the)
61617-61999	Bahamas (Commonwealth of the)

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Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
62100-62625	Germany (Federal Republic of)
62627-62999	Germany (Federal Republic of)
63500-63635	Germany (Federal Republic of)
63637-64599	Germany (Federal Republic of)
64800-65655	Germany (Federal Republic of)
65657-65699	Germany (Federal Republic of)
65800-65999	Turkey
74000-74299	Germany (Federal Republic of)
74300-74499	Austria
74500-74699	Germany (Federal Republic of)
74800-75499	Germany (Federal Republic of)
76000-76699	Germany (Federal Republic of)
76700-76766	Philippines (Republic of the)
76767*	Philippines (Republic of the)
76768-76799	Philippines (Republic of the)
76800-77499	Denmark
77800-77999	Denmark
78200-78399	Singapore (Republic of)
78400-78699	Denmark
78800-78999	Denmark
79500-79599	Senegal (Republic of)
79600-79796	Germany (Federal Republic of)
79797*	United Kingdom of Great Britain and Northern Ireland
79798-79899	Germany (Federal Republic of)
79900-80807	Netherlands (Kingdom of the)
80809-81799	Netherlands (Kingdom of the)
81800-81817	Czechoslovak Socialist Republic
81818*	Czechoslovak Socialist Republic
81819-81899	Czechoslovak Socialist Republic
81900-81999	Djibouti (Republic of)

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Blocks* of selective call numbers for ship stations and selective call numbers for groups of ship stations	Supplied to
82000-82827	Germany (Federal Republic of)
82829-82899	Germany (Federal Republic of)
82900-83837	France
83839-84799	France
84800-84847	Netherlands (Kingdom of the)
84849-84899	Netherlands (Kingdom of the)
84900-85857	Denmark
85859-86867	Denmark
86869-87799	Denmark
87800-87877	Germany (Federal Republic of)
87879-88887	Germany (Federal Republic of)
88889-89897	Germany (Federal Republic of)
89899-89999	Germany (Federal Republic of)
90000-90908	Norway
90910-91918	Norway
91920-92928	Norway
92930-93938	Norway
93940-94899	Norway
94900-94948	Sweden
94950-95958	Sweden
95960-96968	Sweden
96970-96999	Sweden
97000-97978	France
97980-98599	France
98600-98988	Germany (Federal Republic of)
98990-99998	Germany (Federal Republic of)

* The numbers formed by the same digit repeated five times, or by two different digits repeated alternately, are reserved for calling predetermined groups of ship stations, and are to be considered as not included in the blocks of call numbers for ship stations supplied to administrations.

Part II. Table of Blocks of Coast Station Identification Numbers Supplied to Administrations

Blocks of coast station identification numbers	Supplied to
0100 – 0119	Argentine Republic
0270 – 0279	Algeria (Algerian Democratic and Popular Republic)
0330 – 0339	Australia
0480 – 0489	Belgium
0580 – 0589	Canada
0810 – 0819	Bulgaria (People's Republic of)
0830 – 0899	Denmark
0990 – 1089	Spain
1090 – 1109	United States of America
1590 – 1609	Finland
1630 – 1669	France
1780 – 1789	Greece
1860 – 1889	Chile
1920 – 1929	Ghana
1980 – 1989	Ireland
2010 – 2019	China (People's Republic of)
2070 – 2109	Italy
2130 – 2149	Iraq (Republic of)
2180 – 2189	Kuwait (State of)
2280 – 2289	Libya (Socialist People's Libyan Arab Jamahiriya)
2300 – 2339	India (Republic of)
2480 – 2489	Malta (Republic of)
2500 – 2509	Monaco
2510 – 2519	Cuba
2550 – 2599	Norway
2740 – 2749	Iceland
2770 – 2779	Netherlands (Kingdom of the)
2830 – 2849	Germany (Federal Republic of)
2930 – 2949	Poland (People's Republic of)
2950 – 2959	Sweden
3200 – 3259	United Kingdom of Great Britain and Northern Ireland
3450 – 3459	Israel (State of)
3500 – 3509	Switzerland (Confederation of)
3620 – 3769	Union of Soviet Socialist Republics
3800 – 3809	Malaysia
3850 – 3859	Yugoslavia (Socialist Federal Republic of)
3910 – 3919	Venezuela (Republic of)
4330 – 4349	South Africa (Republic of)
4360 – 4369	Turkey
4400 – 4599	Union of Soviet Socialist Republics
4600 – 4619	German Democratic Republic
4620 – 4629	Singapore (Republic of)

Blocks of coast station identification numbers	Supplied to
4630-4639	United Kingdom of Great Britain and Northern Ireland
4640-4649	Sierra Leone
4650-4659	Bahrain (State of)
4660-4669	Seychelles (Republic of)
4690-4699	Qatar (State of)
4710-4719	United Arab Emirates
4810-4819	Yemen (People's Democratic Republic of)
4820-4829	Egypt (Arab Republic of)
4830-4839	Saudi Arabia (Kingdom of)
4900-4939	Mexico
4980-4999	Syrian Arab Republic
5010-5019	Oman (Sultanate of)

Note by the General Secretariat

The following blocks of coast station identification numbers were supplied to Administrations by the Secretary-General between the end of the WARC-79 and 17 August 1990:

Blocks of coast station identification numbers	Supplied to
0120-0129	Peru
0140-0149	Bolivia (Republic of)
0150-0159	Tanzania (United Republic of)
0180-0189	Cyprus (Republic of)
0210-0219	Bangladesh (People's Republic of)
0220-0229	Cape Verde (Republic of)
0570-0579	Romania
0700-0719	Brazil (Federative Republic of)
0770-0779	Colombia (Republic of)
1110-1119	United States of America
1820-1859	Chile
1950-1959	Ethiopia (People's Democratic Republic of)
2020-2039	China (People's Republic of)
2200-2209	Indonesia (Republic of)
2360-2409	Japan
2450-2459	Morocco (Kingdom of)
2890-2899	Panama (Republic of)
3170-3179	Maldives (Republic of)
3560-3579	Portugal
3810-3819	Malaysia
3830-3839	Thailand
3870-3879	Uruguay (Eastern Republic of)
3950-3959	Sudan (Republic of the)
4010-4029	New Zealand
4050-4069	Pakistan (Islamic Republic of)
4150-4159	Philippines (Republic of the)
4670-4679	Czechoslovak Socialist Republic
4680-4689	Djibouti (Republic of)
4750-4759	Ecuador
4800-4809	Zaire (Republic of)
4860-4869	Suriname (Republic of)
5100-5109	Senegal (Republic of)
5300-5309	Iran (Islamic Republic of)
6200-6209	Jordan (Hashemite Kingdom of)

APPENDIX 45
HFBC-87

Double-Sideband (DSB) and Single-Sideband (SSB) System Specifications in the HF Bands Allocated Exclusively to the Broadcasting Service

PART A

Double-sideband system (DSB)

1. *System parameters*

1.1 *Channel spacing*

The nominal spacing for DSB shall be 10 kHz. However, the interleaved channels with a separation of 5 kHz may be used in accordance with the relative protection criteria, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

2. *Emission characteristics*

2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

2.2 *Audio-frequency band*

The upper limit of the audio-frequency band (at -3 dB) of the transmitter shall not exceed 4.5 kHz and the lower limit shall be 150 Hz, with lower frequencies attenuated at a slope of 6 dB per octave.

2.3 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

2.4 *Necessary bandwidth*

The necessary bandwidth shall not exceed 9 kHz.

PART B

Single-sideband system (SSB)

1. *System parameters*

1.1 *Channel spacing*

During the transition period (see Resolution **517 (HFBC-87)**), the channel spacing shall be 10 kHz. In the interest of spectrum conservation, during the transition period, it is also permissible to interleave SSB emissions midway between two adjacent DSB channels, i.e., with 5 kHz separation between carrier frequencies, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

After the end of the transition period the channel spacing and carrier frequency separation shall be 5 kHz.

1.2 *Equivalent sideband power*

When the carrier reduction relative to peak envelope power is 6 dB, an equivalent SSB emission is one giving the same audio-frequency signal-to-noise ratio at the receiver output as the corresponding DSB emission, when it is received by a DSB receiver with envelope detection. This is achieved when the sideband power of the SSB emission is 3 dB larger than the total sideband power of the DSB emission. (The peak envelope power of the equivalent SSB emission and the carrier power are the same as that of the DSB emission.)

2. *Emission characteristics*

2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

2.2 *Frequency tolerance*

The frequency tolerance shall be 10 Hz.[1]

2.3 *Audio-frequency band*

The upper limit of the audio-frequency band (at -3 dB) of the transmitter shall not exceed 4.5 kHz with a further slope of attenuation of 35 dB/kHz and the lower limit shall be 150 Hz with lower frequencies attenuated at a slope of 6 dB per octave.

2.4 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

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[1] See Note *21)* of Appendix 7.

2.5 *Necessary bandwidth*

The necessary bandwidth shall not exceed 4.5 kHz.

2.6 *Carrier reduction (relative to peak envelope power)*

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

At the end of the transition period, the carrier reduction shall be 12 dB.

2.7 *Sideband to be emitted*

Only the upper sideband shall be used.

2.8 *Attenuation of the unwanted sideband*

The attenuation of the unwanted sideband (lower sideband) and of intermodulation products in that part of the emission spectrum shall be at least 35 dB relative to the wanted sideband signal level. However, since there is in practice a large difference between signal amplitudes in adjacent channels, a greater attenuation is recommended.

3. *Characteristics of the reference receiver*

The reference receiver has the main characteristics as given below. For more detailed characteristics see the relevant CCIR Recommendations.

3.1 *Noise limited sensitivity*

The value of the noise limited sensitivity is equal to or less than 40 dB(μV/m).

3.2 *Demodulator and carrier acquisition*

The reference receiver is equipped with a synchronous demodulator, using for the carrier acquisition a device which regenerates a carrier by means of a suitable control loop which locks the receiver to the incoming carrier. The reference receiver should work as well with DSB emissions as with SSB emissions having a carrier reduced to 6 or 12 dB below peak envelope power.

3.3 *Overall selectivity*

The reference receiver has an overall bandwidth (at −3 dB) of 4 kHz, with a slope of attenuation of 35 dB/kHz.

Note: Other combinations of bandwidth and slope of attenuation are possible, as given below, and will provide the same performance at 5 kHz carrier difference.

Slope of attenuation	Overall bandwidth (−3 dB)
25 dB/kHz	3 300 Hz
15 dB/kHz	2 700 Hz