INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Fourth Edition
Upgrade 2.1

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The International Amateur Radio Union Region I

Founded 1925. Representing the radiocommunication services as defined by the Radio Regulations of the International Telecommunication Union: The Amateur Service and the Amateur Satellite Service. Member of the International Special Committee on Radio Interference CISPR.

Europe, Africa and part of Asia.
Founded 1950

Hilversum October 1999

DR OM

The files in this archive contain the text of the IARU Region 1 VHF Managers' Handbook, 4th Edition, *second update*.

All relevant decisions of the Region 1Conference in Lillehammer 1999 have been taken into account.Moreover the address lists and the records table have been brought up to date. Section VIIa (Satellites) has been completely updated by Graham Ratcliff, VK5AGR.
All sections which have been updated can be easily found in the “contents”as they have the indication **oct99**

All files have been re-edited (i.e. the lay-out) using the Windows Word-perfect 8 program with the Arial Font as a basis. In order to keep them still readable by DOS based WP51 the files have finally been converted into this format, still keeping the full compatibility with WP8. DOS users will have to choose the basic font. In most cases Helvetica, Universe or related fonts will print well, but the final result might not be like the originals.
The WP files have been converted into MSWord6 as well. As far as possible the original lay-out has been kept but slight differences are possible. If you have the choice use WP for Windows for printing.

In order to make double-sided printing easier all files have an even number of pages with often a "blank" as the last (even numbered) page. Moreover the printer is instructed to leave a "binding offset" of 10 mm free for punching holes.
In case you are not planning to print on both sides of the sheets you have to suppress this "binding off-set" instruction for each file separately as this instruction is embedded in each file. Otherwise you would get a wider margin at the left of each odd numbered page and at the right of each even numbered page.

Please let me know in case you have difficulties in printing or any suggestions concerning the lay-out.
By default updates of this Handbook will be distributed to all VHF-Managers, Microwave Managers and official coordinators as well as the Member Societies
Others can order a diskette at the IARU Region 1 Office. The copy will be send after reception of the amount of SFR 10.

Changes in the address lists will generally not result in the distribution of an updated disk. Those changes will be published in the VHF Newsletter and you will have to make corrections in your own copy of the Handbook.

73 de PaoEZ

IARU REGION 1 VHF MANAGER'S HANDBOOK
CONTENTS

(version 4.2, October 1999)

Each section, e.g. Ia, as well as the Appendices to a section, e.g. Ia - Appendix 1, has its own page numbering. Sections and Appendices can be easily found by looking at the indications at the top righthand side of the Handbook pages.

Part I

IARU Information

CONSTITUTION AND TERMS OF REFERENCE OF THE IARU REGION 1 VHF/UHF/Microwaves COMMITTEE

At the IARU Region 1 Conference in Opatija (1966) the VHF Committee (Committee B) submitted recommendations to the final Plenary Session concerning the constitution and terms of reference for a IARU Region 1 VHF Committee and for an IARU Region 1 VHF Working Group which would continue the work in the intervals between successive Conferences. The Plenary Session decided to refer these recommendations (H and I) to the IARU Region 1 Executive Committee for further consideration.

At the meeting of the Executive Committee of IARU Region 1, held on 28 October 1967, the above recommendations were approved with minor alterations.

At the IARU Region 1 Conference in Noordwijkerhout (1987) a completely re-written IARU Region 1 Constitution was adopted. As a consequence the VHF Committee and the VHF Working Group were transformed into a so-called Specialised (Permanent) Body, the IARU Region 1 VHF/UHF/Microwaves Committee, with the same terms of reference as the previously existing VHF Committee c.q. Working Group.

For reference purposes the IARU Region 1 Constitution and its Bye-laws are attached to this section Ia as Appendix 1, and the IARU Constitution and Bye-laws as Appendix 2. In these basic documents the whole structure as well as the working procedures of IARU Region 1 and the IARU can be found. Consequently, this is **recommended reading**!

Constitution of the IARU Region 1 VHF/UHF/Microwaves Committee

The following articles in the IARU Region 1 Constitution and Bye-laws relate to the permanent IARU Region 1 VHF/UHF/Microwaves Committee:

In the Constitution:

A.1.4.7 Definition of specialised bodies
A.5 Nomination, period of office etc. of specialised bodies

N.B. Article A4.11 allows the IARU Region 1 Executive Committee to invite the Chairmen of the permanent HF and VHF/UHF/Microwaves Committees to their meetings - as has been the custom since 1975.

In the Bye-laws:

B.1.14 Steering Committee at Conferences: membership Chairmen Permanent Committees B.1.18Function of Permanent VHF/UHF/Microwaves Committee
B.3.10-29 Procedures for set-up and work of Permanent Specialised Bodies

N.B. *Section B.1. of the Bye-laws deals with the procedures for organising a General Conference. Especially the articles dealing with the submission of papers containing proposals and of papers only containing information merit attention!*

Delegates to the IARU Region 1 VHF/UHF/Microwaves Committee should be national VHF Managers and/or members of their national VHF Committee or equivalent body.

For the office of Chairman of the IARU Region 1 VHF/UHF/Microwaves Committee an amateur who is not a national VHF Manager nor a member of a national VHF Committee or equivalent body is eligible, provided he has previously been a member of the IARU Region 1 VHF/UHF/Microwaves Committee, but only for a period of six years from the time he is no longer the VHF Manager or member of the VHF

Committee or equivalent body of his society [1].

At the IARU Region 1 Conference in Noordwijkerhout (1987) the following recommendation was adopted:

> In view of the heavy work pressure and many items to be discussed the IARU Region 1 VHF/UHF/Microwaves Committee should have annual meetings (i.e. two meetings between successive IARU Region 1 General Conferences) ([1]).

A list of members of the IARU Region 1 VHF/UHF/Microwaves Committee is given in section Ig.

Terms of reference of the IARU Region 1 VHF/UHF/Microwaves Committee

The tasks of the IARU Region 1 VHF/UHF/Microwaves Committee are:

1. To co-ordinate the activities of amateurs in IARU Region 1 with respect to frequency allocations above 30 MHz.

2. To ensure that adequate use is made of existing allocations and to consider possible new allocations.

3. To co-ordinate and promote scientific investigations by member societies of IARU Region 1 on all frequencies above 30 MHz.

4. To recommend IARU Region 1 individual bandplans aimed at promoting greater effectiveness both for local and long distance communications.

5. To encourage special projects on the frequency allocations above 30 MHz aimed at advancing amateur radio communication techniques, e.g.amateur satellite projects.

6. To assist in the protection of the amateur allocations above 30 MHz from possible loss by stimulating activity and demonstrating the effective use by amateurs (see note below).

7. To plan and conduct IARU Region 1 VHF/UHF/Microwaves contests and to coordinate sub-regional contests on these bands.

8. To advise on interference problems especially relating to the VHF/UHF/Microwaves bands.

Exchange of information will be provided by :

a) complimentary exchange of society journals between VHF Managers, already decided upon at the IARU Region 1 Conference in Lausanne (1953);

b) the Region 1 News bulletin produced by the Secretary of IARU Region 1;

c) a Newsletter by the Chairman of the IARU Region 1 VHF/UHF/Microwaves Committee for urgent items.

[1] Wording brought in accordance with the IARU Region 1 Constitution adopted at the IARU Region 1 Conference in Noordwijkerhout (1987).

The International Amateur Radio Union

Since 1925, the Federation of National Amateur Radio Societies
Representing the Interests of Two-Way Amateur Radio Communication

IARU Region 1 Constitution and Bye-Laws

as adopted Nordwijkerhout 17. April 1997
and
as amended October 1992 (Constitution)
and
as amended September 1995 (Bye-Laws)

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Section B.6 Financial Rules

Section B.7 Miscellaneous Rules

A. CONSTITUTION

Article A.1 ***- Name, Objectives, Definitions and Structure***

A.1.1. The name of the organisation shall be the International Amateur Radio Union, Region 1, also referred to as IARU Region 1.

A.1.2 IARU Region 1 shall operate autonomously under this Constitution and its Bye-Laws but in accordance with the IARU Constitution.

A.1.3 The objectives of IARU Region 1 shall be the protection, promotion, and advancement of the Amateur Service and Amateur - Satellite Service, especially within the framework of regulations established by the International Telecommunication Union, and to provide support to Member Societies in the pursuit of these objectives at the national level, with specific reference to the following:

A.1.3.1. - representation of the interests of amateur radio at and between conferences and at and between meetings of international telecommunication organisation as well as other organisations.

A.1.3.2. - encouragement of agreements between national amateur radio societies on matters of common interests;

A.1.3.3 - enhancement of amateur radio as a means of technical self-training, particularly for young people;

A.1.3.4 - promotion of technical and scientific investigations and innovations in the field of radiocommunication;

A.1.3.5 - promotion of amateur radio as a means of providing relief in the event of natural disasters;

A.1.3.6 - encouragement of international goodwill and friendship regardless of political, ethnic or religious considerations;

A.1.3.7 - support of Member Societies in developing amateur radio as a valuable national resource, particularly in developing countries;

A.1.3.8 - development of Amateur services in those countries not represented by Member Societies.

A.1.3.9 - encouragement of national and international efforts to result in an amateur radio licence which is recognised internationally;

A.1.3.10 - encouragement of amateur radio sport activities.

A.1.4 Within this Constitution, the following terms shall have the meanings defined below:

A.1.4.1. AMATEUR SERVICE

A radio communication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

A.1.4.2. AMATEUR-SATELLITE SERVICE

A radio communication service using space stations on earth satellites for the same purpose as those of the amateur service.

A.1.4.3. BYE-LAWS

The rules of the IARU Region 1, adopted under the provisions of the Constitution for the governance of its affairs.

A.1.4.4. GENERAL CONFERENCE

The IARU, Region 1 General, normally held every three years.

A.1.4.5. MEMBER SOCIETIES

A national amateur radio society within Region 1 that has been accepted for membership in the IARU.

A.1.4.6 REGION 1

A geographical area, the boundaries of which are defined in number 14 of the IARU Bye-Laws. Unless otherwise specified in those Bye-Laws, the Region 1 shall correspond to the boundaries into which, for frequency allocation purposes the world has been divided by the International Telecommunication Union (ITU).

A.1.4.7 SPECIALISED BODIES

Committees,Working Groups and Coordinators, set up and/or appointed by the General Conference.

A.1.4.8 In this Constitution and in its Bye-Laws, words importing only the masculine gender include the feminine gender. Marginal notes, and numbering of Articles, Sections and Paragraphs are inserted for ease of reference only and do not form part of this Constitution, nor shall they affect its interpretation.

A.1.5 The IARU Region 1 consists of the following:

A.1.5.1 The Member Societies

A.1.5.2 The Executive Committee

A.1.5.3 The Specialised Bodies

A.1.6 The official language of the IARU, Region 1 is English.

A.1.7. The ultimate authority of the IARU, Region 1 is vested in the Member Societies.

A.1.8 The structure and operation of the IARU Region 1 shall be as stated in this Constitution and its Bye-Laws.

Article A.2 - **Member Societies**

A.2.1 Membership of IARU Region 1 is only open to national amateur radio societies representing the countries or separate territories within Region 1.

A.2.2 There shall be only one Member Society representing a country or separate territory.

A.2.3 The Member Societies shall have the rights and obligations stated in the IARU Constitution and in the IARU |Bye-Laws.

A.2.4 The Member Societies shall pay their annual contribution in accordance with Article A.6 of this Constitution and the financial section of the Bye-Laws.

A.2.5 The Member Societies are entitled to appoint delegates, proxies and observers to attend IARU Region 1 Conferences and meetings of specialised bodies. Each such Member Society has one vote.

Article A.3 ***- The General Conference***

A.3.1 The IARU Region 1 General Conference shall be convened by the Executive Committee in accordance with Article A.3 of this Constitution and shall be held in the country of the Member Society of Region 1. Its venue shall be decided by the preceding General Conference. However, if circumstances make it necessary, the Executive Committee may change the venue of the General Conference.

A.3.2 The participants of the General Conference are:

A.3.2.1 - Delegates, Proxies and Observers duly appointed by the Member Societies;
A.3.2.2 - Members of the Executive Committee;
A.3.2.3 - Chairmen or Coordinators of Specialised Bodies;
A.3.2.4 - Observers invited by the Executive Committee;
A.3.2.5 - Guest observers from non-radio amateur bodies invited by the host society after approval of the Executive Committee;
A.3.2.6 - Guests of honour invited by the Executive Committee;
A.3.2.7 - Guests of honour invited by the host society after informing the Executive Committee.

A.3.3 - Decisions taken at General Conference may be by votes as defined in this Constitution and its Bye-Laws.

A.3.4 - The highest authority of the General Conference is the Plenary Meeting.

A.3.5 - Convening, holding and reporting on General Conferences are subject to procedures described in the Bye-Laws.

Article A.4 ***- The Executive Committee***

A.4.1 The Executive Committee is the general executive and managing body and it shall have full executive powers between General Conferences.

A.4.2 The Executive Committee consists of a Chairman, a Vice-Chairman, a Secretary, a Treasurer and five Ordinary Members.

A.4.3 The Executive Committee shall:

A.4.3.1 - be responsible for examining all recommendations and resolutions adopted at General Conferences and meetings of specialised bodies and deciding upon the best method of implementing them;

A.4.3.2 - meet together as required between General Conferences to examine the overall amateur radio situation in IARU Region 1 and worldwide and to take such action, in accordance with the Constitution and Bye-Laws, as may be considered necessary and desirable;
A.4.3.3 - appoint to the IARU Administrative Council the two members of the Executive Committee as well as their deputies;
A.4.3.4 - maintain liaison with the Member Societies, the specialised bodies, the IARU Administrative Council, the IARU International Secretariat and the other IARU Regions in order to achieve efficient coordination;
A.4.3.5 - maintain liaison with the International Telecommunications Union and other international organisations dealing with radio communication or related matters;
A.4.3.6 - where appropriate and possible, arrange amateur radio events and issue relevant publications in support of the Amateur Service and Amateur-Satellite Service.

A.4.4 The Chairman of the Executive Committee shall have supervision over the policy and business of IARU, Region 1. He shall preside at meetings of the Executive Committee. At General Conferences he acts as the Chairman of the Conference and presides at the Plenary Meetings.

A.4.5 The Vice-Chairman shall preside at the Executive Committee meetings in the absence of the Chairman. At a General Conference he acts as Conference Vice-Chairman.

A.4.6 The Secretary shall be responsible for conducting all the routine business of IARU, Region 1 as well as for the supervision of the IARU, Region 1 Office. He shall maintain a record of all actions taken and keep proper Minutes of Meetings of the Executive Committee. He shall act as Conference Secretary at a General Conference and shall act as Secretary at meetings of permanent Committees held in between General Conferences. The Secretary is entitled to delegate the actual minute taking to the Office Manager and/or other assistants when this is deemed necessary by the Executive Committee. He shall maintain close relationship with Member Societies, Specialised Bodies, the IARU Administrative Council, the IARU International Secretariat, the other

IARU Regions and the ITU.

A.4.7 The Treasurer shall be responsible for all funds belonging to IARU, Region 1. He shall maintain proper accounts and shall submit to each Executive Committee meeting and to each General Conference, a comprehensive financial statement covering the preceding period and his recommendations regarding the future financial policy. He is responsible for collecting the financial contributions from the Member Societies.

A.4.8 At the Final Plenary Meeting of each General Conference the Member Societies shall elect the Executive Committee.

A.4.8.1 Its members shall be licensed radio amateurs and from different Member Societies.
A.4.8.2 The election procedure is described in the Bye-Laws.

A.4.9 The Executive Committee shall have power to fill a casual vacancy provided it occurs more than one year before the date fixed for the next General Conference. This person must be a licensed radio amateur belonging to a different Member Society from those already represented on the Executive Committee.

A.4.10 If the Chairman is absent from a General Conference,s the Vice-Chairman will take his place as Conference Chairman.

A.4.10.1 If both the Chairman and Vice-Chairman are absent, the first Plenary Meeting shall elect a Conference Chairman for the duration of the General Conference.

A.4.11 The Executive Committee shall have the power to invite the attendance of any person with special knowledge of a particular subject to attend a meeting of the Committee.

A.4.12 The presence of four members of the Executive Committee including the Chairman or the Vice-Chairman at a properly convened meeting shall constitute a quorum.

A.4.13 The period of office of the Executive Committee shall be from the last day of the calendar month following the end of the General Conference at which it is appointed until the penultimate day of the calendar month following the next Conference.

Article A.5 - **Specialised Bodies**

A.5.1 The General Conference may set up specialised bodies to work either for the duration of the General Conference or to work between General Conferences on specialised subject. They may be established as Committees, Working Groups and Coordinators for short-term or long-term according to needs.

A.5.2 The period of office of specialised bodies shall be the same or less than that of the Executive Committee.

A.5.3 The terms of reference, structure and work of the specialised bodies are

defined in the Bye-Laws.

Article A.6 - **Finances**

A.6.1 The annual contribution to be paid by each Member Society is based on an equal amount for each licensed radio amateur who is a member of that Society.

A.6.2 The amount of the annual contribution shall be decided upon at the General Conference.

A.6.3 The funds so obtained can be used only for the objectives of IARU, Region 1.

A.6.4 Special funds may also be created from contributions and/or donations. Such funds can only be used for the purposes for which they have been established.

A.6.5 Financial matters are subject to the procedures stated in the Bye-Laws.

Article A.7 - **Amendments**

A.7.1 This Constitution shall only be amended by a decision of a least a two-thirds majority of the total number of the IARU, Region 1 Member Societies, by voting procedures as stated in the Bye-Laws.

A.7.2. The Bye-Laws shall only be amended by a decision of a simple majority of the total number of the IARU Region 1 Member Societies, by voting procedures as stated in the Bye-Laws.

B. BYE-LAWS

Section B.1 ***- IARU Region 1 General Conference***

B.1.1 An advance announcement about the General Conference, including a call for papers must be distributed by the Executive Committee at least 18 months before the scheduled date of the General Conference.

B.1.2. The Secretariat must be notified by the Member Societies about the number of participants not later than 9 months before the scheduled date of the General Conference.

B.1.2.1 Six months before the scheduled date of the General Conference the Secretariat shall distribute the final attendance forms which shall be returned by the Member Societies, duly filled-in and signed by a Member Society official, to the Secretariat not later than four months before the scheduled date of the General Conference.

B.1.3 Delegates, Proxies and Observers are accredited provisionally until their credentials have been examined by the Credentials and Finance Committee and are approved by the Plenary Meeting.

B.1.4 Documents for the work of the General Conference may be submitted by the Member Societies, the Executive Committee, the Specialised Bodies, the Administrative Council, the International Secretariat and the other IARU Regions.

B.1.4.1 Such documents should reach the Secretariat not later than 9 months prior to the scheduled date of the General Conference.

B.1.5 Only official papers and proposals for the work of the General Conference shall be considered as conference documents and will be so numbered and included into the Agenda of the General Conference. They must be written in English and bear the official signature of the Member Society or official IARU body sending in the document and they may be signed by the author. The paper should show its origin, subject and suggested processing route (eg which Committee).

B.1.6 Papers of a general informative nature which do not contain proposals may be distributed by their originators directly to the General Conference participants, after informing the Conference Secretariat. They are not numbered and they do not appear on the official list of conference documents nor on the conference agenda. Originators of such papers must themselves supply sufficient copies for distribution.

B.1.7 In case of dispute on the status of any paper presented to the General Conference, the decision of the Plenary Meeting shall be final.

B.1.8 The Secretariat shall distribute at least 6 months before the scheduled date of the General Conference at least one set of conference documents to all Member Societies, the Executive Committee and Chairmen or Coordinators of Specialised Bodies.

B.1.9 The Secretariat shall distribute an additional set of conference documents at least 3 months before the scheduled date of the General Conference for delegates and observers whose participation has been finally confirmed by the Member Societies and other bodies.

B.1.10 No proposals generated after the 9 months deadline may be accepted for the conference work, except incases where the delay was caused by evident external circumstance es and provided this proposal is of significant importance for the Amateur Service or the Amateur-Satellite Service. The decision whether such papers will be accepted will be taken by the Executive Committee.

B.1.11 No new document containing proposals can be made once the General Conference has been opened and the agenda has been approved. However, originators may at any time amend or withdraw their own proposals and other participants may issue documents providing for amendments to the already presented official conference documents at any stage. Such documents must be written in English and delivered to the Conference Secretary as early as possible.

B.1.11.1 If the amendment to an existing document differs from such an extent to

the original topic that it falls under another working body, it may be rejected, unless the Conference decides otherwise.

B.1.12 Plenary meetings are chaired by the Conference Chairman and at least three Plenary Meetings are mandatory.

B.1.12.1 - on the first day to open the General Conference and approve the agenda, to establish conference committees and other specialised bodies and to elect their Chairmen and/or Secretaries;

B.1.12.2 - on the second day of the General Conference to receive and consider the report of the Credentials and Finance Committee on credentials;

B.1.12.3 - on the last day of the General Conference to receive and to consider the reports, recommendations and/or resolutions from the conference committees, to elect the Executive Committee and Chairmen, Coordinators of Specialised Bodies working in between General Conferences and at the following General Conference; to decide upon the venue for the next General Conference and to close the present one.

B.1.12.4 Other Plenary Meetings may be convened by the Conference Chairman, if required.

TABLE 1. - TIMETABLE FOR CONVENING A GENERAL CONFERENCE

Month **prior to the scheduled date**	**Procedure**	**Action by**
12	Advance note of the convening of a Gerneral Conference	Secretariat
12	Call for working papaers	Secretariat
9	Notification of number(s) of participants from each member society	Member Societies
7	All documents qualified for inclusion in the agenda of the General Conference must have been received by the Secretariat	Rule B.1.4.1 of the Bye-Laws
6	Distribution of the final attendance forms	Secretariat
5	Distribution of a minimum of 1 set of Conference documents to each Member Society and to the E.C. and Chairmen or Coordinators of Specialist Bodies	Secretariat
4	Final Attendance forms, duly completed and returned to the Secretariat	Members Societies
3	Distribution of a set of Conference documents to each Delegate & Observer confirmed by the Member Societies	Secretariat

B.1.13 The General Conference comprises the following committees:

B.1.13.1 - the Steering Committee (IC.1)
B.1.13.2 - the Credentials and Finance Committee (C.2)
B.1.13.3 - the General Administrative and Organisational Committee (C.3)
B.1.13.4 - the permanent HF Committee (C.4)
B.1.13.5 - the permanent VHF/UHF/MICROWAVE Committee (C.5)

B.1.13.6 - the Election and Ballot Committee (C.6)

B.1.13.7 - other committees or working groups, set up for the duration of the General Conference only.

B.1.14 The Steering Committee consists of the Executive Committee and (in an advisory capacity) Chairmen of the Conference Committees. It coordinates the work of all conference bodies. The committee is chaired by the Conference Chairman and meets as often as necessary.

B.1.15 The Credentials and Finance Committee shall be elected at the first Plenary Meeting. It shall consist of an elected Chairman and not more than one delegate from each of six different Member Societies. The Chairman, Treasurer and Secretary of the Executive Committee shall be ex-officio members of this committee to provide information.

B.1.15.1 Delegates elected to this Committee shall not be replaced. Other heads of delegations shall be entitled to participate as observers as far as the examination of the IARU Region 1 financial situation is concerned. Other Conference participants are not entitled to attend the meetings of this Committee.

B.1.15.2 The purpose of this Committee is:

(a) to examine and to verify credentials to the General Conference, to establish the rights to vote and to give a report to the Plenary Meeting on the second day of the General Conference.

(b) to examine the financial situation of IARU Region 1 and give a report on the last day of the General Conference.

B.1.15.3 This Committee shall act only for the duration of the General Conference.

B.1.16 The General Administrative and Organisational Committee Meetings may be attended by any conference participants; participants' rights shall depend upon their status at the General Conference.

B.1.16.1 This Committee is chaired by a Chairman elected at the first Plenary Meeting.

B.1.16.2 This Committee shall discuss matters and proposals related to;

(a) Administration and Organisation;

(b) Conferences and Meetings;

© Cooperation with other organisations;

(d) All other matters, except those that belong to the Terms of Reference of other Committees.

B.1.16.3 This Committee reports to the Final Plenary Meeting and shall only act for the duration of the General Conference.

B.1.17 The permanent HF Committee meetings may be attended by each conference participant; participants' rights shall depend upon their status at the General Conference.

B.1.17.1 This Committee is chaired by its Chairman elected at the Final Plenary of the previous General Conference. His term of office shall be the same as for the Members of the Executive Committee.

B.1.17.2 The purpose of this Committee is to examine matters and proposals related to the use of the part of the radio frequency spectrum below 30 MHz.

B.1.17.3 This Committee reports to the Final Plenary Meeting of the General Conference and to the Executive Committee between General Conferences.

B.1.18 The permanent VHF/UHF/MICROWAVE Committee. The purposes and functions of this Committee are similar to those mentioned in Section B.1.17 for the permanent HF Committee, except that this Committee deals with matters and proposals related to the radio frequency spectrum above 30 MHz.

B.1.19 The Election and Ballot Committee shall be elected at the first Plenary Meeting and shall consist of a Chairman and two members which shall be duly accredited delegates from different Member Societies. None of them shall be a member of the Executive Committee, Chairmen of Specialised Bodies or a candidate for election.

B.1.19.1. The purpose of this Committee is to arrange the Elections as per Section B.5 and all other secret ballots throughout the course of the work of the General Conference. This Committee reports to the Final Plenary Meeting and shall only act for the duration of the General Conference.

B.1.20 The General Conference may set up further committees and/or ad-hoc working groups, in accordance with the IARU Region 1 Constitution and its Bye-Laws, if the work of the General Conference so requires.

B.1.20.1 The General Conference Committees C.3 and C.4 shall not be convened at the same time.

B.1.21 A Member Society which for financial reasons is unable to send a delegate to the General Conference may apply for financial assistance from IARU, Region 1 funds. The application for such assistance must reach the Executive Committee at least 12 months

before the scheduled date of the General Conference. Later applications shall only be considered in a case of emergency at the discretion of the Executive Committee. The financial assistance given out of IARU, Region 1 funds shall be limited in each case to one single delegate from a Member Society.The amount shall depend on available financial resources and the total number of applications received and shall be determined by the Executive Committee.

B.1.22 Minutes of the Final Plenary Meeting shall be distributed to the participants of the General Conference within 30 days after the date of closing the General Conference. Comments and/or corrections on the Minutes shall reach the Conference Secretary not later than 60 days after the General Conference.

B.1.22.1 A Report of the General Conference, including all decisions, resolutions, recommendations, and other information essential to reflect the course of the General Conference, should be distributed to all Member Societies and Conference participants within 120 days after the closing date of the General Conference.

B.1.23 At the request of at least two-thirds of the total number of the IARU Region 1 Member Societies or of the Executive Committee, an Extraordinary General Conference may be convened. Such a Conference shall have a limited range of interests and be for a special purpose only. This Extraordinary General Conference has its power limited to its purpose and is not entitled to change or suspend any part of the IARU Region 1 Constitution and its Bye-Laws.

Section B.2 ***- The Executive Committee***

B.2.1 All Members of the Executive Committee shall assume specific tasks and responsibilities. Each Member shall be prepared to report on the particular subject delegated to him, to propose relevant actions and to take part in implementing them. In connection with his responsibilities the Member of the Executive Committee shall be kept informed by the IARU, Region 1 Office on all events and actions. He shall be consulted before any action on the relevant subject is taken.

B.2.2. Meetings of the Executive Committee are convened by the Chairman. Their dates should be published well in advance to give IARU bodies and officers the opportunity to present their papers to be considered by the Meeting.

B.2.3 The Chairman is entitled to convene a special Meeting at short notice, but in any case not less than three weeks, if extraordinary circumstances so require.

B.2.4 Decisions at Executive Committee Meetings shall be on the basis of general consensus. However, if at least two Members wish a vote to be taken, open or secret, decisions will be by simple majority of votes. In the case of a tie the proposal or amendment is considered rejected.

B.2.5 Between Meetings decisions may also be made by correspondence or other means

B.2.6 Expenses incurred in connection with activities of the Executive Committee, as described in the IARU, Region 1 Constitution and its Bye-Laws and the expenses for

maintaining the IARU Region 1 Office, are charged to IARU Region 1 funds, according to Article 6 of the Constitution.

B.2.7 Members of the Executive Committee and those persons from IARU Region 1 who are invited for official reasons to attend meetings of the Executive Committee, shall be entitled to claim all reasonable out-of-pocket expenses, including the cost of economy air fare.

B.2.8 The Executive Committee may adopt procedures governing its internal activities in addition to those specified herein.

Section B.3 - **Specialised Bodies**

b.3.1 The IARU Region 1 may set up specialised bodies to act in an advisory capacity, with the aims of:

B.3.1.1 - exchange experience related to their subjects;

B.3.1.2 - processing specialised materials and answering questions received from other IARU bodies;

B.3.1.3 - providing specialised consultation

B.3.1.4 - submitting specialised opinions, proposals and recommendations;
B.3.1.5 - participating in the organisation of IARU specialised events;
B.3.1.6 - undertaking specialised actions on behalf of Region 1.

B.3.2 - The specialised bodies may make proposals and recommendations which have to be approved by a General Conference or by the Executive Committee in between General Conferences. Depending on the subject these Proposals or Recommendations may have to be ratified subsequently by the General Conference.

B.3.3 These specialised bodies are formed as:

B.3.3.1 - committees and their respective sub-committees;

B.3.3.2 - working groups and their respective sub-groups;

B.3.3.3 - one-man specialised coordinators, who for most purposes are considered to be equal to working groups.

B.3.4 These specialised bodies can be:

B.3.4.1 - short-term (eg conference committees, ad-hoc working groups etc) or

B.3.4.2 - long-term (permanent).

B.3.5 The short-term bodies are those which act entirely within the duration of the event for which they have been formed, eg conference committees and ad-hoc groups, or those whose term is
determined for a period of time expiring before the next conference.

B.3.6 The short-term committees may be formed only by the General Conference. Their tasks are determined by, and they report to the Plenary Meeting of the General

Conference. They may, if necessary, set up their own sub-committees and ad-hoc working groups, the existence of which cannot exceed the duration of their principal body.

B.3.7 The work of the short-term committees is direct by chairmen, who are elected by the General Conference.

B.3.8 The ad-hoc working groups may be called upon either by General Conference, or by any other body holding a meeting, aiming to consider a specific problem. Their tasks are determined by the body which calls upon them. The ad-hoc group reports to the body by which it has been appointed.

B.3.9 The work of the small ad-hoc groups is conducted by Chairmen appointed by the principal body.

B.3.10 The long-term specialised bodies are those whose term is not determined and which are intended to act between the General Conferences. These bodies are termed "permanent".

B.3.11 The permanent bodies can be set up only by the General Conference on a proposal made by a Member Society or by the Executive Committee. Such a proposal shall be accompanied by the opinion of the Executive Committee and, if necessary, and applicable, also by opinions of other already existing specialised bodies, interested in the subject.

B.3.12 Terms of Reference of the permanent specialised bodies are determined by the General Conference. In exceptional cases the Executive Committee may temporarily extend or restrict terms of reference of these bodies.

B.3.13 There are two permanent committees, which are acting in an advisory capacity with the aim of considering policies and coordinating activities in the relevant parts of the radio frequency spectrum. The permanent HF Committee deals with matters relating to frequencies below 30 MHz and the permanent VHF/UHF/MICROWAVE Committee deals with matters relating to frequencies above 30 MHz. They may set up sub-committees, if necessary.

B.3.14 All IARU Region 1 Member Societies are entitled to participate in the work of the permanent committees.

B.3.15 The permanent working groups are formed according to needs. They are acting in an advisory capacity with the aim of coordinating particular activities of the Amateur Service and Amateur Satellite Service.

B.3.16 The permanent working groups consist of persons appointed by the Member Societies interested in the relevant activity.

B.3.17 The permanent committees and working groups service in their relevant capacity at the General Conferences.

B.3.18 The work of the permanent specialised working bodies is directed by their Chairmen.

B.3.19 Chairmen of the permanent bodies are appointed by the General Conference, on

proposals coming from the respective and already existing bodies and/or from the Member Societies.

B.3.20 The term of office of the Chairmen of the permanent bodies is the same as that of the members of the Executive Committee.

B.3.21 A permanent working body should process questions and matters in the shortest possible time and inform interested parties about its opinion.

B.3.22 The Chairman of a permanent body shall report to the General Conferences and annually to the Executive Committee. The report should contain the future plan for at least one year.

B.3.23 Permanent specialised bodies may hold their working meetings not more often than once a year; in the year when the General Conference is held the meetings are to be held within the framework of the General Conference.

B.3.23.1 Decisions taken at such meetings held between Conferences, which obtain a two-thirds majority of the Member Societies at such meetings represented, will become interim IARU Region 1 policy only after approval by the Executive Committee. They must be presented to the subsequent Conference for ratification.

B.3.24 The Chairman must obtain agreement of the majority of the Member Societies of the permanent body represented at the meeting as to the venue and time of a planned meeting and the approval of the Executive Committee.

B.3.25 The Chairman of the permanent specialised body must present to the Executive Committee for approval a budget related to the planned meeting. IARU Region 1 meets expenses of these meetings only in relation to renting of the meeting rooms and travel, plus food and accommodation for the Chairman of the permanent body. Expenses of the members of the permanent body are met by their own Member Societies.

B.3.26 For some meetings of the permanent specialised bodies the Executive Committee may provide recording and/or secretarial assistance.

B.3.27 For some meetings of the permanent bodies the Executive Committee may send its member or members for the purpose of liaison and advice.

B.3.28 The Executive Committee budgets for the yearly limit of expenses of the Chairman of the permanent body or Coordinators'.Verified expenses are reimbursed by the Treasurer each year. This provision applies only to expenses directly related to postage, stationery, telecommunications, etc.

B.3.29 If the Chairman of a permanent working body or a Coordinator is participating in the General Conference in his capacity at the expense of the IARU Region 1, he cannot simultaneously act as a delegate of his Member Society.

Section B.4 - **Voting Procedures**

B.4.1 For a valid vote to be taken at any IARU Region 1 General Conference or a Meeting of a Specialised Body, more than half of the delegations accredited to the

particular General Conference or Meeting must be present, constituting the quorum, unless other provisions of these Bye-Laws state otherwise.

B.4.2 Each Member Society has one vote at General Conference and Specialised Bodies meetings. The voting shall be done only by duly authorised delegates, present in person.

B.4.2.1 If a delegate cannot attend a meeting of committees and working groups being held simultaneously, his Member Society may replace him by another delegate from the same delegation, or may upgrade the status of its official observers.

B.4.3 Delegations, which cannot attend a meeting of committees and working groups being held simultaneously, may authorise delegations of other Member Societies to speak and vote on their behalf at such meetings. The appropriate authorization shall be established in writing and duly signed by the head of the issuing delegation and handed over to the chairman of the meeting before its beginning.

B.4.4 Member Societies may appoint another Member Society, to vote by proxy on their behalf at General Conferences only.

B.4.5 No Member Society may hold more than one proxy vote.

B.4.6 Member Societies who wish to appoint another Member Society to vote by proxy on their behalf, must notify the Secretary at least 30 days before the opening of the General Conference,e which Member Society has been appointed as proxy holder

B.4.7 Member Societies intending to send a delegation tot he General Conference and having submitted the name(s) of their delegate(s), but due to circumstances beyond their control, are after all unable to send a delegation, may request another Member Society to accept their proxy.

B.4.7.1 The proxy as indicated in B.4.7. must be made known to the Conference Secretariat before the First Plenary meeting.

B.4.8 Member Societies leaving the General Conference before the beginning of the Final Plenary session may appoint another Member Society to vote on their behalf. This procedure shall not apply to the proxy they may hold. The appropriate authorization shall be established in writing and duly signed by the head of the issuing delegation and handed over to the chairman of the Plenary before its beginning.

B.4.8.1 However they may give to the Secretary their completed voting paper for the election of the IARU Region 1 Executive Committee to be delivered to the Chairman of the EBC at the appropriate time. This procedure applies also to the proxy they may hold.

B.4.8.2 As far as the election of the IARU Region 1 Executive Committee is concerned, Member Societies leaving the General Conference before the beginning of the Final Plenary session cannot appoint another Member Society to

vote on their behalf or use the proxy they may hold.

B.4.9 The delegation of a Member Society acting as proxy must hold a "Letter of Appointment" signed by an officer of the Member Society concerned.

B.4.10 For the purpose of voting:

B.4.10.1 - a simple majority shall consist of more than half of the Member Societies voting. Member Societies abstaining shall not be taken into account;

B.4.10.2 - a qualified majority shall consist of more than two-thirds of the voting Member Societies;

B.4.10.3 - in case of a tie, a proposal of amendment shall be considered as lost;

B.4.10.4 - when the number of abstentions exceeds half of the number of votes cast (for and against plus abstentions), the matter under discussion shall be put on the table for further consideration at a future meeting at which time abstentions shall not be taken into account, if the meeting so wishes the proposal or amendment may be withdrawn by the author for rewording.

B.4.11 Decisions taken at General Conferences ahll be by a simple majority of votes except that decisions regarding financial matters shall require a two-thirds majority.

B.4.12 According to Article A.2.3 voting shall be compulsory whenever so stated, or at General Conferences and Meetings of permanent specialised bodies when at least two Member Societies request a vote to be taken.

B.4.13 Voting shall take place in one of the following ways:

B.4.13.1 - in between General Conferences or Meetings of Specialised Bodies: by postal vote (or letter or telex);

B.4.13.2 - at General Conferences or Meetings of specialised bodies:

(a) by show of hands, as a usual way (ordinary open ballot), unless stated otherwise in these Bye-Laws or requested to be done otherwise by one Member Society and seconded by another Member Society.

(b) by roll-call in alphabetical order of the English names of Member Societies is so requested by at least two Member Societies

(c) by secret ballot as per Section of these Bye-Laws, and if so requested by at least ten Member Societies.

B.4.13.4 Postal voting shall be acceptable only when the General Conference and the Executive Committee considers it necessary to settle a specific matter.

B.4.14 Voting over an amendment takes priority over voting over the proposal itself.

B.4.14.1 If there are two or more proposals on the same matter they shall be put to the vote in the order in which they were presented unless the meeting decides otherwise. After each vote, the meeting shall decide whether or not the remaining proposals shall be voted on.

B.14.2 Once a valid vote has been taken on any matter at a meeting of any IARU Region 1 body, the proposal or amendment cannot be put to a vote again at the same meeting, irrespective of the voting procedure chosen.

Section B.5 - **Rules for the Election of the Executive Committee**

TABLE 2 - TIMETABLE FOR THE ELECTION OF THE E.C

Day and Time	**Procedure**	**Action by**
2nd Conference day	distribution of nomination forms	Conference Secretariat
3rd Conference day before 18.00 hrs	Curriculum Vitae of candidates to be delivered to Conference Secretariat	Candidate(s)
4th Conference day	Publication of list of candidates together with CV´s (preparation of voting papers)	Election & Ballot Comm. EBC and Conference Secretariat
5th Conference Day	Collecting of voting forms from Conference Secretariat	Heads of Delegations
6th Conference Day Final Plenary	Collecting of voting forms from the heads of Delegations by roll-call; counting of votes; announcement of results	Election & Ballot Committee

x Note - The lst Conference day is, as per B.1.12.1,the day on! which the first Plenary (Opening) Meeting is held.

B.5.1 The Executive Committee is elected at the Final Plenary Meeting of the General Conference. The procedures of election are conducted by the Election and Ballot Committee, hereinafter called the "EBC".

B.5.1.1 - The members of the Executive Committee shall be licensed radio amateurs and from different Member Societies. **)

Note: see Constitution Art.A..4.8.1.

B.5.2 On the second ay of the General Conference the Secretariat shall send to each head of delegation the single standard form on which nominations for the Executive Committee are to be made.

B.5.3 The Nomination Form will include:

B.5.3.1 - the nominee’s name, callsign and the name of the nominating Member Society;

B.5.3.2 - the nominee’s signature, indicating his willingness to stand;

B.5.3.3 - the office he is being nominated for;

B.5.3.4 - the signature and callsign of the Proposer, who must be a head of delegation; the Proposer must not be the nominee;

B.5.3.5 - the signature and callsign of the Seconder, who must be a head of delegation; the Seconder must not be the nominee;

B.5.3.6 - the signature and callsign of the nominee's head ofdelegation, or a written statement from the nominee's Member Society.

B.5.4 No later than 1800 hours of the third day of the Conference each candidate who agrees to accept nomination shall fill in and deliver to the Secretariat the form containing: full name, amateur radio callsign, permanent address, and "curriculum vitae restricted only to particulars of his amateur radio activities. This "curriculum vitae" must not exceed 200 words in length and if longer it will be stopped at the 200th word (it will not be abridged).

B.5.5 On the fourth day of the General Conference the EBC shall publish the final list of candidates together with their form containing their curriculum vitae. The EBC shall prepare voting papers in a number equal to the number of Member Societies participating in the General Conference plus the approved proxies.The voting papers shall contain names and callsigns of candidates who accepted nominations for any particular capacity. These uniform voting forms in uniform envelopes are to be collected from the Conference Secretariat by each Head of Delegation between 1800 and 1900 hours on the fifth day, the day before the Final Plenary of the General Conference.

B.5.6 The voting is done by placing the "X" mark against the name of the chosen candidate.

B.5 7 The voting paper is taken as invalid if:

B.5.7.1 - there are more candidates chosen for election than there are seats available in the Executive Committee;

B.5.7.2 - it is signed or marked so that its source can be identified;

B.5.7.3 - it contains names of persons not officially standing as candidates.

B.5.8 During the Final Plenary Meeting the EBC collects all voting papers, including any proxies, in envelopes from the heads of delegations invited by roll-call as well as those delivered to the Secretary (as to .4.8.1).

B.5.8.1 After this procedure is finished the EBC will count the votes in a separate room and shall announce the results immediately after.

B.5.9 If an equal number of votes is cast for two or more candidates there shall be a fresh ballot for these candidates.

B.5.10 Any serious objections regarding the ballot procedure should be immediately presented at the same Final Plenary Meeting as a motion of order, which must be supported by suitable evidence and seconded. If the meeting considers it justified it elects two additional persons to the EBC and the ballot has to be repeated.

B.5.11 Once the ballot is finished and considered valid, the nomination and voting papers shall be destroyed by the EBC and this fact reported to the Meeting.

Section B.6 - **Financial Rules**

B.6.1 The IARU Region 1 financial year shall be from the first of January until the 31st of December of every year.

B.6.2 IARU Region 1 accounts shall be maintained in one common convertible currency of good long-term stability. They shall be kept in a bank of good international reputation.

B.6.3 The long-term IARU Region 1 general budget shall be proposed by the Executive Committee and approved by the General Conference. The Executive Committee is entitled to specify and modify various items of budget according to needs.

B.6.4 The newly elected Executive Committee shall, within three months of its election, adopt its internal interim financial rules:

B.6.4.1 - how to account and to approve the money spent on travelling by the members of the Executive Committee, delegates to the Administrative Council and other IARU Region 1 officials, representatives and delegates;

B.6.4.2 - how to account and how to approve the money spent to carry on operations of the IARU Region 1 Secretariat and offices, including the office expenses of EC members and Chairmen of the permanent bodies.

B.6.4.3 - how to decide on and to handle bank operations.

B.6.4.4 These internal rules are valid only for the term of office of this Executive Committee and they shall not at any point contravene the IARU Region 1 Constitution and its Bye-Laws.

B.6.4.5 All expenses from the IARU Region 1 funds shall be in accordance with the IARU Region 1 Constitution and its Bye-Laws.

B.6.6 The annual membership financial contributions shall be established by the General Conference,e which may delegate part of this authority to the Executive Committee.

B.6.7 Membership financial contributions for the current year are invoiced by the Treasurer well in advance and shall be paid by each Member Society before the 30th June of each calendar year.

B.6.7.1 A Member Society that has failed to fulfil all its financial obligations before the start of the first meeting of the Credentials and Finance Committee (C.2) at a General Conference, shall not be granted the right to vote or the right to appoint and hold proxies

at that General Conference.

B.6.8 Any Member Society not paying its financial contribution shall be reminded by the Treasurer. If the reminder is not successful and the Member Society has failed to pay its membership contributions for the total time amounting to two years or more, the Executive Committee will report that fact to the IARU Administrative Council for appropriate action.

B.6.9 On a duly justified application presented by a Member Society, payment of its financial contributions may be postponed by the Executive Committee for a period not exceeding two years.

B.6.10 IARU Region 1 accounts must be audited yearly by a qualified Auditor whose report shall be made available to all IARU Region 1 Member Societies.

Section B.7 - **Miscellaneous Rules**

B.7.1 Member Societies shall appoint a member responsible for the IARU Region 1 matters, to be called "IARU REGION 1 Liaison Officer".

B.7.2 A regular IARU REGION 1 NEWS bulletin shall be issued under the responsibility to all IARU Region 1 Member Societies.

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Constitution of the International Amateur Radio Union

The International Amateur Radio Union
P.O. Box 310905
Newington Connecticut 06131-0905
U.S.A.

As Amended May 9, 1989

ARTICLE I -- NAME, OBJECTIVES, DEFINITIONS, AND STRUCTURE

1. The name of this organization is the International Amateur Radio Union (IARU), hereinafter also referred to as the IARU.

2. Its objectives shall be the protection, promotion, and advancement of the Amateur and Amateur-Satellite Services within the framework of regulations established by the International Telecommunication Union, and to provide support to Member-Societies in the pursuit of these objectives at the national level, with special reference to the following:

a) representation of the interests of amateur radio at and between conferences and meetings of international telecommunications organizations;

b) encouragement of agreements between national amateur radio societies on matters of common interest;

c) enhancement of amateur radio as a means of technical self-training for young people;

d) promotion of technical and scientific investigations in the field of radiocommunication;

e) promotion of amateur radio as a means of providing relief in the event of natural disasters;

f) encouragement of international goodwill and friendship;

g) support of Member-Societies in developing amateur radio as a valuable national resource, particularly in developing countries; and

h) development of amateur radio in those countries not represented by Member-Societies.

3. Within this Constitution, the following terms shall have the meanings defined below.

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

Amateur Satellite Service: A radiocommunication service using space stations on earth satellites for the same purposes as those of the amateur service.

National Amateur Radio Society: A noncommercial association of radio amateurs, devoted to the objectives set forth in the preceding section of this Constitution and substantially covering by influence and recognition the country and/or territories which it represents.

Member-Society: A national amateur radio society that has been accepted for membership in the IARU

Region: A geographical area, the boundaries of which are defined in the Bylaws. Unless otherwise specified in the Bylaws, the Regions shall correspond to those into which, for frequency allocation purposes, the world has been divided by the International Telecommunication Union.

International Secretariat: The Member-Society elected to discharge the responsibilities enumerated in Article V.

Bylaws: The operative procedures of the IARU adopted under the provisions of this Constitution for the governance of its affairs.

4. In this Constitution and in the Bylaws of the IARU, words importing only the masculine gender include the feminine gender and the neutral gender; words importing only the singular number include the plural number, and vice versa; and words importing persons shall include corporations. Headings, marginal notes, and numbering of Articles and Paragraphs are inserted for ease of reference only and do not form part of this Constitution, nor shall they affect its interpretation.

5. The official language of the IARU is English.

6. The IARU is composed of the following:

a) the Member-Societies (Article II);

b) the Administrative Council (Article III);

c) The Regional Organizations (Article IV).

7. The authority of the IARU resides collectively in the Member-Societies, who exercise this authority by voting as set forth in Articles VI and VII.

8. The structure and operation of the IARU shall be set forth in this Constitution and Bylaws.

9. No mutual financial obligations or responsibilities exist between entities or the IARU except as set forth in this Constitution; however, special arrangements may be made.

ARTICLE II -- MEMBER-SOCIETIES

1. The membership of the IARU shall consist of its Member-Societies.

2. There shall be only one Member-Society representing a country or separate territory.

The Constitution and Bylaws of the IARU , and proposals adopted by vote of the Member-Societies in accordance with Article VI of this Constitution, shall be binding upon Member-Societies.
Member-Societies shall also adhere to the Constitution, Bylaws and Rules of their regional organizations.

4. Member-Societies retain their complete autonomy with respect to their internal affairs.

5. A Member-Society has the right to:

a) cast its vote on all IARU proposals published in the Calendar;

b) present proposals in accordance with Article VI, paragraph 2 for vote by Member-Societies;

c) represent IARU in its country and/or territory; and

d) participate in the activities and conferences of its own regional organization in accordance with the Constitution, Bylaws, and Rules of its own regional organization.

6. Member-Societies shall have the rights, duties, and obligations as defined in the Bylaws of the IARU.

7. No Member Society shall, by virtue or its membership, be required to act in a manner that is contrary to the laws of its country.

8. Member-Societies shall have no financial obligations to the IARU; however, there may be financial obligations between a Member-Society and its regional organization.

9. Applications for membership shall be reviewed by the appropriate regional organization, and then processed by the Administrative Council in accordance with procedures set out in the Bylaws.

10. A Member-Society may resign its membership in the IARU by submitting written notice to the Secretary of the appropriate regional organization. The resignation shall become effective upon publication in the Calendar.

11. The rights of a Member-Society may not be suspended, nor may membership in the IARU be terminated, unless:

a) The Member-Society has failed to fulfill its duties under this Constitution;

b) The Member-Society has acted contrary to the interests of Amateur Radio or the IARU; or

c) The Member-Society no longer adequately represents the interests of radio amateurs throughout its country and/or separate territory.

12. Procedures for temporary suspension of rights, and for termination of membership, shall be established in the Bylaws. 'Termination shall be by vote of the Member-Societies as described in Article VI.

ARTICLE III -- ADMINISTRATIVE COUNCIL

1. The policy and management of The IARU shall be carried out by the Administrative Council. The Administrative Council shall:

a) coordinate the representation or the interests of amateur radio at international telecommunications conferences with the regional organizations, under the direction of the President;

b) establish long-range planning in close cooperation with the regional organizations to preserve the basic purposes of amateur radio;

c) serve as coordinator between the regional organizations on all matters of mutual interest;

d) formulate such proposals for consideration by the Member-Societies as may be necessary to further the objectives of the IARU; and

c) adopt such resolutions and recommendations as will facilitate the functioning of the IARU.

2. The members of the Administrative Council shall be the President, the Vice President, the Secretary, and two members from each of the regional organizations. No member may have a professional interest which conflicts with the objectives of the IARU.

3. President.

a) The President shall be a Radio Amateur, and a member of a Member-Society.

b) The term of office of the President shall be for a period of five years from the date of ratification of his nomination, and he shall remain in office until the nomination of his successor has been ratified.

c) No later than 12 months prior to the expiration of the term or office of the President then in office, the International Secretariat shall initiate discussions with the Administrative Council to identify suitably qualified candidates available to serve as President. The nomination of a single candidate shall be made by the International Secretariat, but not until agreement has been reached between the International Secretariat and the Administrative Council that the candidate is suitably qualified.

d) A President shall be eligible for re-election.

e) The nomination of a President by the International Secretariat shall be subject to ratification by a vote of the Member-Societies in accordance with Article VI.

f) The office of President shall become vacant if the President:

1)dies,

2) gives notice in writing of his resignation to the Secretary, or

3) is removed by the adoption of a joint proposal put forward by at least 10% of the Member-Societies in accordance with the procedure described in Article VI.

4. The president shall have general supervision of the affairs of the IARU in accordance with formulated policies, and shall serve as chairman of the Administrative Council.

5. The qualifications, method of election, and term of office for the Vice President shall be identical with that of the President.

6. The Vice President shall serve in the absence of the President and shall be responsible for such matters of general supervision as may be delegated to him by the President.

7. In the event of a vacancy in the office of President, the Vice President shall succeed him. In the event of a vacancy in the office of the Vice President, the office shall be filled in accordance with the procedure described in Article III, paragraph 3.

8. The Secretary shall be designated by the International Secretariat and shall serve for a term determined by that Member-Society.

9. The Secretary shall manage the routine affairs of the IARU under the direction of the President.

10. The members of the Administrative Council from the regional organizations shall be Radio Amateurs and members of Member-Societies of their respective regional organizations. They shall be elected according to the rules of, and serve for a term determined by, their respective regional organizations. From each regional organization at least one, and wherever possible both, of the members shall be members of their regional executive committee.

11. The expenses of participation in the work of the Administrative Council by the President, Vice President, and Secretary, together with the administrative expenses associated with the holding of a meeting, shall be borne by The International Secretariat; the expenses of the members from the regional organizations shall be borne by their respective regional organizations.

12. Five members, including at least one from each regional organization and either the President or the Vice President, shall constitute a quorum.

13. Each member of the Administrative Council shall have one vote, except that the President shall vote only in the event of a tie.

14. Normally, the Administrative Council shall meet annually at a time and place to be determined at the previous meeting. Additional meetings of the Administrative Council may he called by the President or at the joint request of the regional organizations. In the event of a member of the Administrative Council not being able to attend a meeting of the Administrative Council, the executive committee of the regional organization shall provide a suitably qualified alternate.

15. Between meetings, decisions may be made by correspondence or other means.

16. The Administrative Council may adopt rules governing its operations in addition to those specified herein.

ARTICLE IV -- REGIONAL ORGANIZATIONS

1. The regional organizations are formed by Member-Societies representing the countries or separate territories in the respective Regions. The boundaries of the regional organizations correspond to those of the Regions. The regional organizations shall be referred to as "IARU, Region [ ]."

2. There shall be only one regional organization in each Region.

3. The objectives of the regional organizations shall be in accordance with Article I, paragraph 2 of this Constitution.

4. Each regional organization shall operate autonomously under its own regional constitution, and in accordance with the IARU Constitution.

5. Each regional organization shall have its own management and finances.

6. The management of a regional organization is carried out by an executive committee, the members of which are elected by the Member-Societies of the regional organization under the regional constitution.

7. Each regional organization shall ensure that its Member-Societies are actively supporting, in the countries or separate territories that they represent, the objectives of the IARU as set forth in Article I, paragraph 2.

8. Each regional organization shall participate actively in the work of the Administrative Council and shall inform the Administrative Council of significant activities within its Region.

ARTICLE V -- THE INTERNATIONAL SECRETARIAT

1. The Member-Societies shall elect one of their number willing to and capable of serving as the International Secretariat of the IARU.

2. The term of service of a Member-Society as International Secretariat shall continue until the election of a successor.

3. The operating expenses of the IARU shall be borne by the International Secretariat: however, it shall be under no obligation to bear expenses on behalf of the IARU beyond those that are incidental to its discharging the responsibilities enumerated in this Constitution.

4. The International Secretariat shall maintain the official records of the IARU and shall be the custodian of any property and funds belonging to the IARU. In the event of a transfer of the International Secretariat, all records, and control of all property and funds of the IARU shall be transmitted promptly to the successor.

5. The Administrative Council may establish bank accounts in the name of the IARU.

6. At least twice a year, the International Secretariat shall issue a periodical bulletin named The Calendar to all Member-Societies and to the members of the regional executive committees. The Calendar shall contain all proposals to be considered by the Member-Societies and other information as directed by the Administrative Council.

ARTICLE VI -- VOTING BY MEMBER-SOCIETIES

1. In the consideration of proposals brought before the IARU in accordance with this Constitution, each Member-Society shall have one vote.

2. A Proposal may be made by any Member-Society through its regional organization, which shall transmit it to the Administrative Council for publication in the next issue of the Calendar. Publication

shall be accompanied by explanatory comment. Proposals also may be made by the regional organizations and the Administrative Council.

3. A Member-Society shall cast its vote in writing so that it is received by the International Secretariat not later than five months after publication of the Calendar containing the proposal. Votes received late shall not be counted.

4. After voting is completed, the Administrative Council shall publish the results in the next issue of the Calendar, including a list of Member-Societies voting in favor, those voting against, those recording an abstention, and all explanatory statements submitted for publication by Member-Societies.

5. Except for amendments to the Constitution and the termination of membership of a Member-Society, proposals shall be deemed adopted upon the casting of affirmative votes by a simple majority of the Member-Societies who have submitted, within the specified time, a vote or abstention, either on that proposal or in response to one of the three preceding issues of the Calendar which contained proposals for consideration by the Member-Societies.

6. The termination of membership of a Member-Society shall require a vote in accordance with the procedure described in Article VI, paragraph 5, except that a two-thirds majority shall be required.

ARTICLE VII -- AMENDMENTS

1. This Constitution may be amended by proposal in the Calendar, subject to a vote in accordance with the procedure described in Article VI, paragraph 5, except that a two-thirds majority shall be required.

2. Bylaws may be adopted or amended by proposal in the Calendar, subject to a vote in accordance with the procedure described in Article VI, paragraph 5, of the Constitution.

BYLAWS OF THE INTERNATIONAL AMATEUR RADIO UNION

Applications for Membership

1. Applications for membership in IARU shall be forwarded by the applicant society to the secretariat of the appropriate regional organization. As soon as practical, the regional organization shall forward to the Administrative Council any complete application that it has received, along with either a favorable or unfavorable finding with respect to the qualifications of the applicant, and any additional comments which it may wish to make. In the event an incomplete application is received or additional information is desired, the regional secretariat shall endeavor to obtain the information from the applicant.

2. An applicant for membership shall include the following in its application:

a) a copy of its constitution or other governing document;

b) a list of its officers, the total number of its members, the number of members who are licensed to transmit in the Amateur Service, and the number of licensed operators in its country and/or separate territory;

c) satisfactory evidence that it:

1) adequately represents the interests of amateurs throughout the country and/or separate territory which

it proposes to represent:

2) has the ability to meet its financial obligations as a member of the Union; and

3) is legally able to act in the furtherance of IARU objectives within its country and/or separate territory; and

d) a declaration that the applicant society will adhere to the Constitutions of both the IARU and the respective regional organization.

3. Within three months of receiving an application for membership on which a regional organization made a favorable finding, the Administrative Council shall publish in the Calendar a proposal that the applicant be admitted to membership, with sufficient information to permit Member-Societies to make an informed decision.

4. The Administrative Council shall review applications on which a regional organization has made an unfavorable finding. If in the opinion of the Administrative Council there is insufficient basis for the unfavorable finding, the application shall be returned to the regional organization with the request either that it be given further consideration, or that the basis for the finding be further explained.

Duties and Obligations of Member-Societies

5. Member-Societies shall seek to promote and defend the objectives and principles established in the Constitution and Bylaws of the IARU and the Constitution, Bylaws and Rules of their own regional organization.

6. A Member-Society has the obligation to represent and promote IARU in its country and/or territory and shall ensure that the principles, resolutions and recommendations of the IARU are made known to all amateurs within its area of influence.

7. A Member-Society shall attend or be represented at its own regional conference in accordance with the Constitution, Bylaws, and Rules of its regional organization.

8. A Member-Society shall respond to all inquiries originating from the Regional and/or International Secretariat. It shall provide the Regional Secretariat with an annual report, notices of changes of addresses and/or officers, copies of substantive correspondence sent to the International Secretariat, and such other information that is relevant to its activities within the IARU.

9. Every Member-Society shall advise the Secretary of any conflicts that may exist between the Constitution or the Bylaws of IARU, or any proposals adopted by the IARU. and the laws and policies of its country.

Temporary Suspension of Rights of a Member-Society

10. At the request of a regional organization, the Administrative Council may place the rights of a Member-Society temporarily in abeyance if in its opinion there exist sufficient grounds for doing so in accordance with Article II, paragraph 11 of the Constitution.

Termination of Membership

11. If it appears to the Administrative Council, whether from a report from the Secretary, regional

organization, or otherwise, that a Member-Society's breach of the conditions enumerated in Article II, paragraph 11 of the Constitution is not of a temporary nature, the Administrative Council may:

a) take no further action in the matter;

b) reconsider the matter at a later date;

c) obtain further information including a report from the relevant regional organization and such other information by such means and in such time as it decides;

d) direct the Secretary to advise the Member-Society of the charge against it and require the Member-Society to provide an answer thereto in such time as the Administrative Council shall specify; or

e) take such other action as it considers appropriate.

12. If it appears to the Administrative Council that it is proper to do so, it may make a proposal for the termination of the membership of a Member-Society, provided that no such proposal shall be made unless the action referred to in Bylaw 11(d) has been taken and the Administrative Council has considered any answer given in response thereto.

13. A proposal for the termination of the membership of a Member-Society shall be accompanied by a suitable explanation therefor and a copy of the answer, if any, made by the Member-Society.

Regions

14. The Regions shall be defined as follows:

Region 1

Includes the area limited on the east by line A (lines A, B and C are defined below) and on the west by line B, excluding any of the territory of Iran which lies between these limits. It also includes that part of the territory of Turkey and the Union of Soviet Socialist Republics lying outside of these limits, the territory of the Mongolian People's Republic, and the area to the north of the USSR which lies between lines A and C.

Region 2

Region 2 includes the area limited on the east by line B and on the west by line C.

Region 3

Region 3 includes the area limited on the east by line C and on the west by line A, except the territories of the Mongolian People's Republic, Turkey, the territory of the USSR and the area to the north of the USSR. It also includes that part of the territory of Iran lying outside of those limits.

The lines A, B and C are defined as follows:

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

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

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

Correspondence Procedure

15. A copy of all correspondence from a Member-Society to the Administrative Council, or from the International Secretariat to a Member-Society, including correspondence on behalf of the Administrative Council to a Member-Society, shall be sent to the Secretary of the appropriate regional organization.

Selection, Resignation, and Replacement of the International Secretariat

16. Nomination of an IARU Member-Society to serve as the International Secretariat may be made either by a Member-Society, a regional organization or the Administrative Council and shall be accompanied by a supporting rationale. In addition, the nominated Member-Society must attest to its willingness to serve and its ability to fulfill the requirements and obligations as described in Article V of the Constitution.

17. If the Member-Society serving as the International Secretariat wishes to resign, it shall submit its resignation in writing to the Administrative Council. The resignation shall be published in the next issue of the Calendar together with an invitation for nomination of a successor.

18. A proposal to replace a Member-Society serving as the International Secretariat shall include a nomination of a successor.

NOTES ON TASKS IARU REGION 1 AND ITS VHF/UHF/MICROWAVES COMMITTEE

The IARU and their regional organisations are the officially accredited representative of the Amateur Service and the Amateur Satellite Service at the International Telecommunications Union (ITU) and all their organisations and Conferences, like, for instance, the WARC's.

Apart from the contributions IARU Region 1 and its officers make to the above work, IARU Region 1 specifically represents the amateur interests at, amongst others, the Conference of European Post and Telecommunications Administrations (CEPT) and their European Radiocommunications Office (ERO) in Copenhagen, as well as at the European Union (EU) in Brussels.

The coordination of the representative work done by the IARU Region 1 is in the hands of the Vice-President of the IARU Region 1 Executive Committee, Wojciech Nietyksza, SP5FM.

The most important tasks of the IARU and their regional organisations are:

1) to defend, extend and upgrade the status of the frequency segments allocated by the ITU to the Amateur Service and the Amateur Satellite Service;

2) to coordinate the orderly use of the frequency bands allocated to the Amateur service and the Amateur Satellite Service by the ITU and the national Administrations by careful bandplanning.

The supporting role of the IARU Region 1 VHF/UHF/Microwaves Committee with respect to the above tasks is clearly set out in the Terms of Reference of this Committee, given in section Ia.

The defence, extension and management of the allocations above 30 MHz has been the subject of the following recommendations adopted by the IARU Region 1 on the basis of proposals brought forward by the IARU Region 1 VHF/UHF/Microwaves Committee.

At the IARU Region 1 Conference in Scheveningen (1972) the following recommendation was adopted :

> Member societies are strongly recommended to establish and maintain contact with their national Administrations at a policy level to ensure that the case for amateur radio in the VHF/UHF/Microwaves bands is properly known and can effectively be presented by each Administration at future frequency allocation Conferences. VHF Managers are to see that the Councils of their societies pursue this policy and will ensure that the Secretary of IARU Region 1 is kept informed of developments with national Administrations.

In view of the fact that the 435 MHz band is shared with the Radiolocation Service, and that difficulties have arisen regarding the frequencies allocated to the Syledis radiolocation system by some licensing authorities, the following recommendation was adopted at the IARU Region I Conference in Cefalu (1984):

> On short notice societies in countries bordering the North Sea will again approach their P & T authorities with an urgent request to reconsider, both nationally and in the appropriate international co-operative bodies, the frequency allocation for the Syledis system in view of its incompatibility with the long- established Amateur Service in the 435 MHz band.

Regarding the allocation of bands to the Amateur Services the following recommendation was adopted at the IARU Region I Conference in Cefalu (1984) :

> As a few authorities in the European part of Region I have allowed some amateur activity in the 50 MHz part of the spectrum, societies are urged to again approach their P & T authorities with the aim of obtaining an allocation or assignment preferably between 50 and 55 MHz. In view of

> the TV activity still present in this part of the spectrum, in the first instance permission may be sought for operation outside TV broadcast hours, e.g. for experimental purposes for a selected number of stations.

A further recommendation regarding the 50 MHz band was adopted at the meeting of the IARU Region 1 VHF/UHF/Microwaves Committee in Vienna, March 1992, and accepted as interim IARU Region 1 policy by the IARU Region 1 Executive Committee at their meeting in Budapest, April 1992. This recommendation was ratified at the IARU Region 1 Conference in De Haan (1993) and reads:

> All IARU Region 1 member societies in countries where the Amateur Service is currently not permitted to use the 50 MHz band shall endeavour to obtain such a permission in the 50 - 54 MHz band. This permission should preferably be permanent and under the same conditions as valid for the normal licences. In order to obtain a common IARU Region 1 band, the allocation band obtained should at least contain the frequency segment 50 - 50.5 MHz.

At the meeting of the IARU Region 1 VHF/UHF/Microwaves Committee in Düsseldorf (1989) the following recommendation regarding the shared microwave bands was adopted and a few weeks later approved as interim IARU Region 1 policy by the IARU Region 1 Executive Committee at their meeting in Torremolinos, April 1989. The IARU Region 1 Conference at Torremolinos, April 1990, ratified this recommendation:

> IARU and IARU Region 1 should maintain their basic policy of trying to retain all wideband secondary allocations in the Microwave bands.
>
> Note. This IARU policy is clearly set out in paper C3.35, submitted to the IARU Region 1 Conference at De Haan (1993) by the International Secretariat of IARU. At this Conference the paper[1] was adopted by IARU Region 1.

However, IARU and IARU Region 1 should also endeavour to convince Administrations that in all countries the same small region-wide common segments - in the order of 2 MHz wide - should be allocated to the Amateur Service, as commonality is a practical necessity for international amateur activities.

N.B. Already at the IARU Region 1 Conference in Noordwijkerhout (April 1987) IARU Region 1 nominated a VHF/UHF/Microwave Frequency Allocation Coordinator (see section Id). His terms of reference include carrying out the work mentioned above in behalf of IARU Region 1.

At the WARC in Torremolinos (1990) the status of the Mobile Service in the frequency segment 2300 - 2450 MHz was upgraded to Primary (see Frequency Allocation Tables). The Mobile Service and the Amateur Services must be considered to be practically incompatible, as far as the use of frequencies is concerned. Hence IARU Region 1 is making vigourous efforts - via approaches by member societies to Administrations, as well as indirect approaches to, for instance, the CEPT - to get a reasonable and common part of this frequency segment de facto or de jure exclusively allocated to the Amateur Service.

Within CEPT an large programme has been initiated from 1993 onwards to create a harmonised European frequency table. Detailed Spectrum Investigations (DSI) have been arranged and IARU Region 1 and its member societies have actively contributed to those studies. In the microwave bands this has led to retention of the existing allocations in the ITU table and in addition to a recommmendation that administrations should allocate spectrum in the 3400-3500 MHz band to their amateurs. Moreover the concept of virtually exclusive narrow segments in the microwave bands has been recognised by the CEPT.
Currently amateurs in LA, PA and OZ have got access to 3400-3410 MHz in addition to the (ITU footnote) allocations in Germany and Great Britain.

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[1] For reference purposes this paper is attached to this section as appendix **2**

The CEPT discussions about the spectrum 29.7 - 960 MHz have not yet finished in 1996 and in particular the 430-440 MHz amateur allocation, which in several Region 1 countries already is smaller or of a lower status, is under attack. At the IARU Region 1 VHF/UHF/Microwaves committe meeting in Vienmna 1995 the thread to the 435 MHz band was taken seriously and all member societies in the CEPT countries were urged to lobby for retention of the "full allocation".

At the IARU Administrative Council (AC) meeting in Bandung, October 1991, the misuse of amateur bands was discussed, i.e. the use of these bands for purposes which have nothing to do with the Amateur Services by, for instance, research institutes, groups of people interested in forwarding technical information in aid of developing countries etc. - sometimes with the permission of the pertaining Administration!

Resolution 91-1 was drafted, which set out procedures aimed at giving the regional IARU organisations more possibilities for taking action in defence of the interests of the Amateur Services.

At the meeting of the IARU Region 1 VHF/UHF/Microwaves Committee in Vienna (March 1992) the following recommendation was adopted, which in April 1992 was approved by the IARU Region 1 Executive Committee at their meeting in Budapest, and later ratified by the IARU Region 1 Conference in De Haan (1993):

> Resolution 91-1 of the IARU Administrative Council is recommended for immediate adoption as interim IARU Region 1 policy until ratification by the next Region 1 Conference.

The text of the IARU AC Resolution 91-1 can be found in Appendix 1 to this section.

RESOLUTION 91-1
CONCERNING THE IMPROPER USE OF THE AMATEUR BANDS

The IARU Administrative Council, Bandung, October 1991,

considering

a) the increasing number of reports received from the amateur community regarding improper use of the amateur bands,

b) that in accordance with the IARU Constitution, it is the obligation of the IARU and its member-societies to defend the interests of the Amateur Services,

c) that the ITU, having no enforcement authority, is unable to address such matters directly,

resolves

1) that member societies shall aggressively pursue the processing of their own administrations of documented complaints of improper use of the amateur bands,

2) that documented cases of improper use of the amateur bands that cannot be solved by the member society with its administration shall be forwarded by the member-society to its regional IARU organisation, and

3) that any cases of improper use of amateur bands processed through an IARU regional organisation shall be handled according to the following procedure:

   a) The cases shall be referred to the regional IARU MS coordinator in the region where the transmitting station is located.

   b) As soon as possible after receiving a case, the regional IARU MS coordinator will verify the report and ensure that all pertinent information is included.

   c) Upon verification, the IARU MS coordinator will ask the regional secretary to report the incident to the appropriate member-society in the region.

   d) The member-society will promptly submit the report to its administration.

   e) The member-society must advise the regional secretary within 30 days after receiving the report:

      1) the date the report was presented to its administration;

      2) to whom it was presented;

      3) any formal or informal response of the administration.

and further resolves

1) that the IARU MS regional coordinators are encouraged to keep a log by country in their region of cases of improper use of the amateur bands and to issue a summary report to the regional secretary once a year;

2) that regional conferences are encouraged to include in their conference agendas a review of cases of improper use of the amateur bands,

3) that member-societies are encouraged to seek, in their countries, restrictions on the sale of amateur transmitting equipment to persons who do not hold amateur licenses, and

4) that if a member-society is unable or unwilling to present a report of improper use of the amateur bands to its own administration, the member-society may request the regional organisation to present the report directly to its administration.

Extract from conference document 93/DHB/C3.35 (de Haan 1993)
With AC document dd March 1999 added

PREPARATION FOR FUTURE WORLD RADIOCOMMUNICATIONS CONFERENCES
International Secretariat

1. INTRODUCTION

At WARC-92 (Torremolinos), proposals for the realignment of amateur and broadcasting allocations around 7 MHz were briefly considered. .... In addition, future WRCs could offer other opportunities for additional allocations to the amateur service .....but conversely, future WRCs could threaten the loss of amateur services bands, or consider new sharing situations that may or may not be compatible with our operations.

2. SUPPORT AT FUTURE CONFERENCES

Whether the 7 MHz realignment or another agenda item affecting the amateur services is on the agenda of a future WRC, a successful outcome depends heavily upon the following :

- credible technical and operational bases for the proposal as reflected in the Radiocommunications Sector Recommendations and report to the conference
- country proposals to the conference
- favourable votes
- in the absence of voting, willingness of a sufficient number of delegation spokepersons to take the floor in support of the amateur services
- acquiescence of those delegations not opposed to the amateur services position.

Good relations with administration officials likely to serve on future national delegations is key to each of the items listed above. Development of such relations should not wait until it is time to prepare for the next WRC, especially with radio conferences scheduled every two years. Relationships should begin immediately upon the officials' appointment to a position that may lead to service on a WRC delegation. These should be long-term associations based on professionalism and cooperation.

3. THE OFFICIAL VIEWPOINT

It is unlikely that an administration will favour an amateur services proposal simply because we want it. It is important to view a proposal through the eyes of government officials.

Foremost, the official will consider whether a proposal for the amateur services is in the national interest for that country. Often, a proposal benefitting one service will be viewed as a loss to another service. Thus, it is necessary to show that the benefit to the amateur services and to the country outweighs the loss to the other service.

The official can be expected to consider the reputation of the amateur services, domestically and internationally. Everything matters : performance in disaster communications, contribution to the country's telecommunications development, experience in administration of the amateur services, good personal relations between the administration and the national society, willingness to cooperate, etc.

The existence of an active indigenous amateur service is no doubt important. It helps if there are credible statistics showing growing

numbers of licensed amateurs and documenting contributions to the public good. Nevertheless, it is possible to have good relations with officials in countries where the amateur service is not well developed.

The national society can facilitate the work of administration officials by drafting the necessary documentation and proposals. Where possible, it is desirable to participate in preparatory meetings and national delegations.

Acceptance of amateur proposals by administration officials will be improved if the proposals are likely to be approved by other administrations. Thus it is important to keep national proposals in harmony with the IARU objectives (Annex) and to seek the active support of the IARU and its member-societies.

In many least developed countries, telecommunications policy makers and spectrum managers lack the resources to be active in Radiocommunication,, Sector Study Groups, to attend seminars abroad or to participate in radio conferences. In some cases, it may be possible to find resources to underwrite travel expenses for delegates.

4. REGIONAL ORGANISATIONS

In recent years, regional telecommunications organisations have become increasingly important in preparation for radio conferences. Two such organisations are the European Conference of Postal and Telecommunications Administrations (CEPT) and the Pan African Telecommunications Union (PATU).

It is possible for the amateur services to participate in these regional organisations in two ways : as part of a national delegation, and as the IARU regional organisation.

The representatives to regional meetings are largely the same as those for world radio conferences. In addition, however, there are likely to be other individuals in leadership positions, both from your own country and from others in the region. It is desirable to build good relations with these officials.

5. DEVELOPMENT ACTIVITIES

In December 1992, at the Additional Plenipotentiary Conference in Geneva, Mr. A.Ph. Djiwatampu of Indonesia was elected as the first Director of the Telecommunications Development Bureau (BDT). The BDT, to be known as the Development Sector, is destined to become an important ITU resource for the least developed countries.

The Development Sector is to form Study Groups similar to those in the Radiocommunications and Standardisation Sectors. There may be opportunities for the IARU and its member-societies to participate in the work of these Study Groups.

Another activity of the Development Sector will be to hold World Development Conferences (RDCs) more frequently. RDCs will likely be held in conjunction with Regional TELECOMs. Each of these meetings offer possibilities for participation by the IARU and its member-societies.

6. CONCLUSIONS

The IARU and its member-societies must adjust to the new structures and accelerated schedules of the ITU and regional telecommunications organisations. Failure to keep pace could place our allocations in jeopardy. WAR-79 and WARC-92 have provided a foundation for retention of existing amateur allocations, and possibly seeking needed extensions to some band.

Emphasis should be placed on development of solid and long-term

relations with telecommunications officials of administrations and regional organisations.

Extract (only concerning the spectrum above 30 MHz) of the document :

Spectrum Requirements of the Amateur and Amateur-Satellite Services

Prepared by the IARU Administrative Council, Revised March 1999

Introduction

The present and anticipated future requirements for radio spectrum allocations to the Amateur and Amateur-Satellite Services have been identified from decisions taken at the conferences of the three regional organizations of the International Amateur Radio Union. The requirements are identified below, so that they may be taken into account in the formulation of national policies with respect to proposed and possible future international allocations conferences.

The position of the IARU on behalf of the worldwide Amateur and Amateur-Satellite Services takes into account the following factors, among others:

1. There are presently nearly three million licensed Amateur Radio stations, a number that has been increasing at an annual rate of approximately 7% for several decades. At this rate, in five years there will be approximately four million amateur stations.
2. The number and variety of modes of emission used by radio amateurs also are expanding greatly, creating internal pressures within the amateur services for their accommodation at the expense of users of established modes such as single-sideband telephony and manual Morse code (CW) operations. These new modes include digital voice, data and image. Their use improves the efficiency of amateur operations, but also increases the popularity of Amateur Radio and therefore the amount of congestion.
3. Spectrum-efficient modes such as single-sideband telephony, which has been in widespread use in the Amateur Service for more than forty years, already are employed almost universally in the amateur services. Opportunities for additional spectrum efficiency in amateur operation, at least at HF, are limited at present.
4. While sharing with some other services in some parts of the spectrum is a practical and viable solution for improved utilization of the spectrum, sharing with the amateur services as a solution to spectrum congestion in other services is limited by the following factors: the widespread geographic distribution of amateur stations, the variety of emissions used by amateur stations, and the relatively low signal levels that amateurs employ.

Spectrum Requirements

Where possible, country footnotes for additional or alternative allocations in bands that are listed in the international Table of Frequency Allocations as Amateur or Amateur-Satellite allocations, should be deleted. Efforts to add the names of countries to such footnotes should be opposed.

50-54 MHz

The Amateur Service requires retention of the exclusive 50-MHz allocation where it now exists, and provision of an allocation of at least 2 MHz in other geographic areas, with at least 500 kHz on an exclusive basis.

This band is used for local amateur communication on an around-the-clock basis, including radio control of objects. Tropospheric scatter and sky-wave propagation (principally sporadic-E and occasional F-layer propagation at sunspot maxima) are used for longer distances, as well as auroral propagation at the higher latitudes. Meteor scatter has been used for Morse code and voice communications primarily during meteor showers. Newer computer-based techniques promise to make meteor scatter a routine propagation mode for distances up to 2,000 km.

In Regions 2 and 3, and in some countries in Region 1, there is an alloca-

tion of 4 MHz to the Amateur Service. In some local areas, proximity to television broadcasting on frequencies adjacent to the band limits the usefulness of some portions of the band.

In the CEPT process of European harmonization, IARU Region 1 has achieved an amateur secondary allocation in the band 50 - 52 MHz in the CEPT European Common Allocation Table (ECA). It has also achieved a CEPT-ERC statement in support of global harmonization. Action by member-societies could be helpful in accelerating this process through achieving primary status nationally, as had already been accomplished in some countries.

144-148 MHz

The Amateur and Amateur-Satellite Service seek retention of 144-146 MHz as a worldwide exclusive allocation, with elimination of the existing footnotes that allow operation by other services in some countries; and retention of 146-148 MHz in Regions 2 and 3.

The 144-MHz allocation is very heavily used by amateur stations throughout the world, employing a variety of modes of emission. The band supports extensive terrestrial voice and data networks, as well as a number of low-Earth-orbit amateur satellites. In many of the more populous areas, occupancy is so heavy that additional stations and new uses of the band cannot be accommodated satisfactorily. Experimentation such as Earth-Moon-Earth (EME) communication is very popular in this band because of the relative absence of natural and man-made noise and the relative ease with which sensitive receiving equipment can be placed into service and maintained. Amateurs have observed propagation phenomena in this band that previously were unknown or were believed to be extremely rare at this order of frequency.

Once thought to be safe against commercial encroachment, except for some illegal use in certain countries, this band has been named a "candidate band" for possible allocation on a shared basis to commercial low-Earth-orbit (LEO) satellites in the mobile-satellite service (MSS). The IARU strongly opposes this and any other sharing, which would severely restrict opportunities for future amateur use of the band. The exclusivity of this band has also been confirmed by the 42 CEPT countries in the ECA.

220-225 MHz

Retention of 220-225 MHz as a primary, shared amateur band is vital to the amateurs in Region 2, and would be desirable in Regions 1 and 3 to alleviate congestion in other bands.

The characteristics of the band 220-225 MHz are similar to those of the band 144-148 MHz. However, because the band 144-148 MHz is overcrowded in many areas, the 220-MHz band provides the only opportunity for the use of relatively broadband emissions by the Amateur Service in a primary VHF allocation. Wide bandwidths are required for efficient transmission of data at rapid rates, and for efficient time sharing of channels. Where allocated, the band is the best solution for the overcrowding of the amateur band 144-148 MHz. Some characteristics of the band 220-225 MHz are unique; for example, radio amateurs have observed the only recorded instances of sporadic-E propagation at this frequency.

420-450 MHz

The amateur services require the establishment of the band 430-440 MHz as a worldwide exclusive band, with continued sharing of 420-430 MHz and 440-450 MHz where now permitted. In addition, the deletion from the Radio Regulations of footnotes for fixed and mobile operation in some countries in the band 430-440 MHz is sought.

This band is particularly important to the amateur services. It is the lowest frequency band in which amateurs can use conventional fast-scan television (6M00C3F emission), and other emissions with similar bandwidths. The band provides reliable local voice and data communication while at the same time affording opportunities for experimentation with various forms of tropospheric propagation and with Earth-Moon-Earth (EME) communication.

The Amateur-Satellite Service relies heavily on the subband 435-438 MHz, which presently is the only space-to-Earth amateur allocation between 146 MHz and 2.4 GHz. Because of the crowding of the existing band 435-438 MHz with unmanned amateur satellites and manned space stations, it is desirable to expand the band to 435-440 MHz when possible.

Because amateurs pursue so many different operating interests in this band,

they must observe voluntary sharing arrangements among themselves based on frequency, time, and geography. Highly directive antenna arrays are practical for many applications, and facilitate sharing. However, sharing with other services can impose additional constraints that may severely limit amateur operation, depending on the nature of the other service. To facilitate international communication and experimentation, it is extremely desirable for both the Amateur and the Amateur-Satellite Service in all countries to have access to common, exclusive frequency allocations, free of interference from other services and from constraints designed to protect other services from interference. The introduction of additional low-power (unlicensed) SRDS transmitters around 433 MHz should be opposed.
Parts of the band have already been studied as MSS candidate bands for allocation at several recent WRCs. Administrations have objected to such use as being incompatible with government radiolocation operations in the band 420-450 MHz.
In preparation for WRC-2000, even though the item is no longer on the agenda for this conference, the band 420-470 MHz is being studied in an attempt to accommodate the stated requirement of the earth exploration-satellite service (active) for up to 6 MHz of spectrum for spaceborne sensors capable of penetrating the canopy of forests. The IARU is participating in this work. Preliminary studies indicate that this use would be incompatible with existing and planned amateur and (particularly) amateur-satellite operations.

Frequencies between 450 MHz and 24 GHz

Between 450 MHz and 24 GHz, amateur allocations have evolved in the following manner. The 1947 Atlantic City Conference adopted worldwide, exclusive allocations for the Amateur Service in the bands 1215-1300 MHz, 2300-2450 MHz (shared in part with ISM), 5650-5850 MHz (shared with ISM), and 10-10.5 GHz, and exclusive allocations in Region 2 in the band 3300-3500 MHz and the band 5850-5925 MHz.
Subsequently, the radiolocation service was introduced into these bands and the Amateur Service was made secondary. Additional satellite and terrestrial sharing partners were introduced at subsequent WARCs. The band 1215-1300 MHz was narrowed to 1240-1300 MHz. The Amateur-Satellite Service gained access, on a non-interference or secondary basis, to portions of each of these bands. A new Region 2 secondary allocation in the band 902-928 MHz was added.
Thus, while radio amateurs continue to have access to this portion of the spectrum, the international Table of Frequency Allocations between 450 MHz and 24 GHz does not provide automatically for common worldwide allocations for amateur uses, unlike the frequencies below and above this range.

902-928 MHz

The Amateur Service seeks retention of the band 902-928 MHz in Region 2 and upgrading the sub-band 902-905 MHz to primary status.
This band is available only in Region 2. It is used for industrial, scientific and medical (ISM) applications and is shared with other services (FIXED, Mobile except aeronautical and Radiolocation). While there are sharing problems in some locations, the band is a valuable resource, where available.

1240-1300 MHz

The Amateur Service seeks retention of the band 1240-1300 MHz and upgrading the 1260-1300 MHz segment to primary status. The Amateur-Satellite Service seeks retention of the band 1260-1270 MHz and deletion of the "Earth-to-space only" restriction.
The global navigation-satellite service (GNSS) has expressed interest in the band 1240-1260 MHz, although the primary candidate for a new civil Global Positioning System (GPS) frequency is 1176.45 MHz. Another candidate frequency, 1250 MHz, could affect amateur use of the band 1240-1260 MHz.

2300-2450 MHz

The Amateur Service requires retention of access to the band 2300-2450 MHz and upgrading where possible the band 2390-2450 MHz to primary status, and the Amateur-Satellite Service requires retention of the band 2400-2450 MHz.
The band 2300-2450 MHz is allocated to the Amateur Service on a secondary basis in all three Regions. Actions by WARC-92 and certain administrations

in their domestic allocations have reduced the amount of spectrum within this band available to the Amateur Service. Also, some administrations have permitted (unlicensed) low-power devices to operate in this band. The band segment 2400-2450 is used for industrial, scientific and medical (ISM) applications.
The USA administration has upgraded the Amateur Service allocation to primary status in the bands 2390-2400 MHz and 2402-2417 MHz. The Radio Amateurs of Canada (RAC) is seeking similar upgrades.

3300-3500 MHz

The Amateur Service seeks the retention of the secondary allocations of the band 3300-3500 MHz in Regions 2 and 3, and a secondary allocation of the band 3400-3500 MHz throughout Region 1. Further, the Amateur Service seeks upgrading the allocation status of the sub-band 3400-3410 MHz to primary. The Amateur-Satellite Service seeks to retain its bi-directional (Earth-to-space and space-to-Earth) allocation of the band 3400-3410 MHz in Regions 2 and 3, and to expand this allocation to Region 1.
CEPT DSI Phase I established an Amateur Service secondary allocation at 3400-3500 MHz. In addition, the following footnote was adopted by the CEPT (numbering of CEPT footnotes is subject to change):
EU17: In the sub-bands 3400-3410 MHz, 5660-5670 MHz, 10.36-10.37 GHz and 10.45-10.46 GHz the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.
In effect, EU17 encourages administrations to afford some consideration to amateur weak-signal operations in the band sub-band 3400-3410 MHz, among others.
There is a major effort by the telecommunications industry to promote the band 3400-3650 MHz for fixed wireless access (FWA) applications, which could affect amateur uses of the band. Radiolocation interests oppose FWA applications of this band.

5650-5925 MHz

The Amateur Service seeks the retention of at least secondary allocations of the band 5650-5850 MHz in all Regions and upgrade to primary status in the bands 5650-5670 MHz and 5830-5850 MHz. The Amateur Service seeks the retention of the band 5850-5925 MHz on a secondary basis in Region 2.
The Amateur-Satellite Service seeks to retain access to the band 5650-5670 MHz in the Earth-to-space direction and 5830-5850 MHz in the space-to-Earth direction.
(See CEPT footnote EU17, above, as it applies to the band 5660-5670 MHz.)
An additional CEPT footnote applies:
EU23: In the sub-bands 5660-5670 MHz (Earth to space), 5830-5850 MHz (space to Earth) and 10.45-10.50 GHz the amateur-satellite service operates on a secondary and non interference basis to other services. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these allocations in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.
At the present time, 5760-5762 MHz is the segment used for amateur weak-signal work.

10-10.5 GHz

The Amateur Service seeks to retain at least secondary allocation status in the band 10-10.5 GHz and an upgrade to primary status the sub-band 10.35-10.45 GHz. The Amateur-Satellite Service seeks to retain access to the band 10.45-10.5 GHz and upgrade its status to primary.
(See CEPT footnotes EU17 and EU23, above.)

Frequencies between 24 and 275 GHz

In the range 24-275 GHz, the general pattern is for a narrow, exclusive allocation to the two Amateur Services to be adjacent to a wider allocation shared with other services. This pattern allows amateurs worldwide to pursue their experimental activities within a common frequency allocation, while providing administrations with the flexibility to tailor the width of the amateur allocation and the conditions of sharing in the light of national requirements.
Radio astronomers and other passive science services have developed new

spectrum requirements that take into account certain spectral lines (frequencies related to specific elements) and absorption windows (frequencies that are more transparent to radio signals than those above and below). WRC-2000 is scheduled to consider some reallocations to accommodate these requirements.

The Amateur Services seek to retain all primary and secondary allocations in the band 47-275 MHz and will consider shifting of allocations to meet the requirements of other services without disadvantaging the Amateur Services. The ratio of primary to secondary should remain at least the same. Atmospheric attenuation in any new bands should not be greater than in the existing allocations.

24-24.05 GHz

The Amateur Services seek to retain their primary allocations in the band 24-24.05 GHz.

24.05-24.25 GHz

The Amateur Service seeks to retain its secondary allocation in the band 24.05-24.25 GHz.

Consideration should be given to shifting the ISM center frequency from 24.125 to 24.15 and make the ISM band 200 MHz wide instead of 250 MHz, to clear the band 24-24.05 for amateur development.

47-47.2 GHz

The Amateur Services seek to retain their primary allocations in the band 47-47.2 GHz.

75.5-76 GHz

The Amateur Services seek to retain their primary allocations in the band 75.5-76 GHz.

76-81 GHz

The Amateur Services seek to retain at least their secondary allocations in the band 76-81 GHz and to upgrade these allocations to primary status.

Automotive collision-avoidance radars are now using the band 76-77 GHz. In recognition thereof, the USA administration has suspended authority for amateurs to use the band 76-77 GHz pending further study. To offset any potential impact on Amateur Service operations resulting from this suspension, the administration established a co-primary allocation in the band 77.5-78 GHz for the Amateur Services.

119.98-120.02 GHz

The Amateur Services seek to retain at least their secondary allocations in the band 119.98-120.02 GHz, upgrade these allocations to primary and expand the band if possible.

142-144 GHz

The Amateur Services seek to retain their primary allocations in the band 142-144 GHz.

144-149 GHz

The Amateur Services seek to retain at least their secondary allocations in the band 144-149 GHz and to upgrade them to primary status.

241-248 GHz

The Amateur Services seek to retain their secondary allocations in the band 241-248 GHz and upgrade them to primary status.

248-250 GHz

The Amateur Services seek to retain their secondary allocations in the band 248-250 GHz.

Frequencies above 275 GHz

The ITU has not allocated any frequency bands above 275 GHz but WRC-[2003] may consider allocations in the band 275-400 GHz or possibly as high as 1000 GHz.

In order to continue with their experimental activities, the Amateur Services will require a number of allocations (approximately 10.7% of the

spectrum) spaced throughout the range 275-1000 GHz.

MICROWAVE MANAGERS SUB-COMMITTEE

At the IARU Region I Conference in Warsaw (1975) the following recommendation was adopted :

> VHF managers will stimulate national interest in the 1 - 30 GHz microwave bands. In addition, DARC will direct special attention to the 2.3 GHz band and RSGB to the 10 GHz band by publishing information on the design of suitable equipment and on results achieved on these bands.

At the meeting of the VHF Working Group in Amsterdam (October 1976) it was agreed that all societies should nominate a person to act as focal point for the reception and distribution of microwave information and material.The names of the persons to act in this way should be sent to the Secretary of IARU Region I. Furthermore, any changes in focal points should immediately be advised to the Secretary of Region I. All focal points would investigate the possibility of starting microwave columns in the journal of their national society.

Since the above recommendations were adopted, in several societies these focal points have developed into full-fledged Microwave Managers running their own microwave column in their society's journal.

During sessions of the IARU Region 1 VHF/UHF/Microwaves Committee at Region 1 Conferences as well as meetings of the VHF/UHF/Microwaves Committee in the years between Conferences a sub-committee of Microwave Managers pre-advises (when requested by the meeting) on matters concerning microwave frequencies. For this purpose the frequency of 1 GHz has been adopted as the lower microwave boundary (Brighton, 1981).

A list of Microwave Managers can be found in section Ig.

Coordinators of the VHF/UHF/Microwaves Committee

1. FREQUENCY ALLOCATIONS COORDINATOR

At the IARU Region 1 Conference at Noordwijkerhout (April 1987) the final Plenary Session adopted a proposal from Committee B (now, under the new IARU Region 1 Constitution, the VHF/UHF/Microwaves Committee) to nominate a VHF/UHF/Microwaves Frequency Allocation Coordinator.

The task of the Coordinator can be summarized as follows:

- Collect information from Region 1 member societies about the specific VHF/UHF/Microwaves frequency allocations to the Amateur (Satellite) Service in their countries

- To use the information obtained for the creation of a survey of deviations from the allocations to the Amateur (Satellite) Service as found in the ITU frequency table, and to publish this information regularly in the VHF Newsletter and/or the Region 1 News.

- To make proposals for a coordinated approach of the licensing authorities in the various countries of Region 1 by member societies with the aim of obtaining common frequency allocations, especially in the shared Microwaves bands.

  N.B. In their recommendation to the Plenary Session Committee B considered this point to be most urgent in view of the fact that in various countries the authorities were already allocating segments of shared bands to the various Services without any form of co-ordination as far as the Amateur (Satellite) Service was concerned.

- To provide, in as far as possible, the Committees and Working Groups of the CEPT and the OIRT with background material on the IARU and IARU Region 1 standpoints with regard to UHF/Microwaves frequency allocations to the Amateur (Satellite) Service. In matters of policy the VHF/UHF/Microwaves Frequency Allocation Coordinator will work in close consultation with the Chairman of the IARU Region 1 VHF/UHF/Microwaves Committee and the Executive Committee of IARU Region 1.

The VHF/UHF/Microwaves Frequency Allocation Coordinator will submit reports on actions taken, results obtained and future plans to the IARU Region 1 VHF/UHF/Microwaves Committee for consideration at their meetings during IARU Region 1 Conferences or in between Conferences. At the final Plenary Session of the IARU Region 1 Conference at Noordwijkerhout (April 1987) Arie Dogterom, PA0EZ, was nominated as VHF/UHF/Microwaves Frequency Allocation Coordinator. At the meeting of the VHF/UHF/Microwaves Committee in Vienna (February 1995) John Morris, GM4ANB, was nominated as his successor.At the 1999 Conference in Lillehammer GM4ANB stepped down. PA0EZ temporarily took over.

All Region 1 member societies are urgently requested to send all relevant information such as

- (updates on) the national frequency allocations to the Amateur (Satellite) Service in the bands above 50 MHz
- approaches to the national authorities and results of discussions with the national authorities on the subject of frequency allocations above 50 MHz to the IARU Region 1 VHF/UHF/Microwaves Frequency Allocation Coordinator. His address is given on page If of this handbook.

Note. The recommendation of Committee B adopted by the final Plenary Session of the IARU Region 1 Conference in Noordwijkerhout (April 1987) contained the following statement:

> It is intended that copies of the results of the survey of Region 1 VHF/UHF/Microwaves frequency allocations be supplied to Regions 2 and 3 of IARU with a request for similar information, so that world-wide co-ordination can be obtained, especially with regard to satellite and EME communication.
>
> The Plenary Session agreed with this suggestion, stipulating that this should be done via the IARU Region 1 Secretariat.

At the IARU Region 1 Conference in Torremolinos (April 1990) Resolution 89-2, proposed by the Administrative Council and concerning the desirability of common frequency allocations on VHF/UHF/Microwaves in view of international working using modes such as moonbounce, meteor scatter etc., was adopted with a slight change in the wording. As ratified by Region 1 the recommendation reads as follows:

> Member societies should work to establish and/or maintain common frequency allocations for the Amateur Service and the Amateur Satellite Service to enable international working and facilitate band-planning. Resolution 89-2 was drafted by the Administrative Council at its meeting in Orlando, September 1989, and, obviously, fits in seamlessly with the work already started by IARU Region at the Noordwijkerhout Conference (April 1987).

2. SATELLITE COORDINATOR

Amateur Satellite activities are predominantly taking place in the VHF, UHF and Microwave bands. The Region 1 VHF/UHF/Microwave Committee. Therefore, has to take the Amateur Satellite Service into account in all aspects of its work.
In Region 1 (and in other Regions as well) specialist groups in many countries deal with amsat matters and the communication between the (representative of) the member societies and those groups is not always optimum.

Within the IARU there exists a Satellite Advisor function (see section VII of this Handbook) but his tasks are mostly oriented towards worldwide coordination. The VHF/UHF/Microwaves Committee, therefore, decided at its meeting in Lillehammer 1999 to create the function of Region 1 VHF/UHF/Microwaves Satellite Coordinator.

The tasks of the coordinator are:

1. To liaise with all groups which specialize in amateur satellite matters in the Region 1 countries,
   with the IARU Satellite Advisor and
   with all other relevant people/organizations.

2. To inform the committee about all satellite matters relevant to its work by
   Maintaining section VII of the VHF Managers Handbook,
   Contributing to the VHF Newsletter
   Contributing to meetings of the committee.

The coordinator, therefore, should preferably

- be an active and recognized operator in the amsat service

- have a good knowledge of English (speaking and writing)
- have the support of the IARU member society in his country (preferably being a member of his societies delegation to meetings of the committee)

3. **PROPAGATION COORDINATORS**

a. **Ionospheric Propagation Coordinator**

t.b.f.

b. **Auroral Propagation Coordinator**

t.b.f.

c. **Tropospheric Propagation coordinator**

t.b.f.

4. **DATABASE KEEPER**

The work of the propagation coordinators very much being dependant of the availability of data from amateur observations, the VHF/UHF/MW Committee at its meeting in Lillehammer 1999 decided that a common database, easily accessible for amateurs and organized in such a form that data analysis would be made relatively easy, should be set up.

The person responsible for setting up and maintaining this database will work in close cooperation with the propagation coordinators. The access to the database and the required information will be published in the Region 1 Newsletter, the Region 1 VHF Newsletter and the Internet

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The sections of the Handbook dealing with the subject matter are indicated in the left column.

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"Woo

UBA	Peter Pauwels, ON1BPS Elshoutbaan 17 2900 SCHOTEN België	tel : +32 3 6517451 e-mail: 101335.3554@compuserve.com
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Note. If a member society has not nominated a Microwave Manager, the VHF Manager may be assumed to be also responsible for microwave matters.

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ANDORRA: Unio de Radioaficionats Andorrans **[URA]**
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BAHRAIN: Amateur Radio Association Bahrain [**ARAB]**
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BELARUS: Belarussian Federation of Radioamateurs and Radiosportsmen **[BFRR]**
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E-mail: arabih@bih.net.ba <HQ

BOTSWANA: Botswana Amateur Radio Society **[BARS]**
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BULGARIA: Bulgarian Federation of Radio Amateurs **[BFRA]**
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EGYPT: Egyptian Radio Amateurs Assembly **[ERAA]**
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MOLDOVA: Asociatia Radioamatorilor din Republica Moldova **[ARM]**
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MOZAMBIQUE: Liga dos Radio Emissores de Mocambique [**LREM]**
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NAMIBIA: Namibian Amateur Radio League **[NARL]**
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NETHERLANDS: Vereniging voor Experimenteel RadioOnderzoek in Nederland [**VERON]**
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OMAN: Royal Omani Amateur Radio Society **[ROARS]**
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E-mail: hqpzk@pzk.org.pl <HQ>

PORTUGAL: Rede dos Emissores Portugueses **[REP]**
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QATAR: Qatar Amateur Radio Society **[QARS]**
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SAN MARINO: Associazione Radioamatori della Repubblica di San Marino **[ARRSM]**
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E-mail: jc-helou@ifrance.com <6W1QP>

SIERRA LEONE: Sierra Leone Amateur Radio Society **[SLARS]**
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SWEDEN: Foreningen Sveriges Sandareamatorer **[SSA]**
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TAJIKISTAN:Tajik Amateur Radio League **[TARL]**
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E-mail: ey8mm@tarl.td.silk.org <EY8MM>

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INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part II

Fourth Edition
2nd Upgrade

INTRODUCTION TO VHF/UHF/Microwaves BANDS AND BANDPLANS

1. Amateur and Amateur Satellite Service frequency allocations above 30 MHz

Current frequency allocations to the Amateur Service and the Amateur Satellite Service from 30 MHz upwards, as established at the WARCs 1979 and maintained at the WARC 1991 (Torremolinos), are set out in section IIb, which also gives some other useful information extracted from the ITU Radio Regulations.

ITU Regulations strongly recommend that Radio Services use their frequency allocations rationally and economically. With an eye to the retention of the frequencies allocated to the Amateur Service and the Amateur Satellite Service it follows that full use should be made of all amateur bands, including the shared bands (Recommendation adopted at the IARU Region I Conference in Stresa, 1956).

Particularly the use of the UHF/Microwaves bands should be encouraged by stressing UHF and Microwaves technique in amateur magazines and by organising contests, meetings, conferences etc. especially aimed at stimulating UHF and Microwaves activity (Recommendation adopted at the IARU Conference in Brussels, 1969).

2. IARU Region 1 bandplanning: Principles

At the meeting of the IARU Region 1 VHF/UHF/Microwaves Committee at Düsseldorf, April 1989, the following principles of bandplanning were adopted. In the same month these principles were accepted as (interim) Region 1 policy by the Executive Committee of IARU Region 1. They were definitely adopted at the IARU Region 1 Conference in Torremolinos, 1 - 6 April 1990.

PRINCIPLES OF BANDPLANNING

A. **Basis**

Many of the transmission modes and techniques currently used in the Amateur Service, such as ATV, RTTY, FAX, repeaters, satellites etc. are not or not fully compatible. To make orderly communication on and efficient use of the amateur bands possible, bandplanning is mandatory.

The basic philosophy behind bandplanning should be:

i) to assign frequencies for certain activities in such a way that all current users can practice the various modes of amateur radio with a minimum of mutual interference, provided they are using state-of-the-art equipment and communication techniques.

Possibilities for shifts and/or extensions in the plan, which undoubtedly will become necessary in view of future developments in techniques and communication modes should be carefully considered before adopting a bandplan.

ii) to avoid, through careful planning, the necessity of drastic changes in future, as this type of changes could lead to technical difficulties and/or large expenses for many amateurs (for instance, a complete change in repeater

channel frequencies).

With good anticipation only gradual changes, adaptations and additions should be required in the course of time.

All bandplanning should be in accordance with the I.T.U definitions of the Amateur Service and the Amateur Satellite Service as found in the I.T.U. Radio Regulations:

S1.56 Amateur Service: A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

S1.57 Amateur Satellite Service: A radiocommunication service using space stations on earth satellites for the same purposes as those of the Amateur Service

B. **Remarks on the practical implementation**

a. The definition of the Amateur Service implies that bandplanning should take into account all aspects of amateur radio - self-training, intercommunication and technical investigations.

Consequently, for any band the bandplan should aim to accommodate for the maximum number of amateur activities (modes, techniques), both now and in the future.

Clearly there are impossible situations: CCIR ATV cannot be carried out in the 144 MHz allocation etc.

No band should, however, be allocated mainly to one aspect of amateur radio.

When, due to its nature, an activity cannot be incorporated within the bandplan of a specific band, it should not be forgotten that we have many bands available above 30 MHz. The more activity we can generate on the higher bands the better for the defense of these bands against the claims of other services!

b. Technical investigations by amateurs, be it in the classical field of propagation research or on modern digital communication techniques etc. are a laudable and legitimate aspect of amateur activity.

However, when using amateur bands for experimenting with communication techniques, the transmitting techniques, the equipment and the frequencies used should never be taken as the closing entry in the chain of development. Within a bandplan the use of optimum bandwidths, transmitting equipment and techniques should be the normal aim for any amateur.

Any required standardisation should also be aimed at the optimum use of amateur frequencies, and be flexible enough to accommodate future improvements.

c. In view of the large number of (potential) amateur users who will only practice communication, the allocation of part of an amateur band to channelized work, be it FM repeaters or FM simplex, Packet Radio, etc. can often be considered as practi-

cally final. Care should be exercised to ensure that other aspects of amateur radio will find sufficient room and that room is available for future developments in the Amateur Service.

Techniques used in channelized amateur work should also be state-of-the art. For instance, accommodating more channels should, where possible, be sought within the existing allocation by using more modern techniques, smaller bandwidths etc. Other Radio Services have done this. In the spirit of the definition of the Amateur Service there should be progress in techniques, not just a claim for more spectrum, sticking to old techniques!

d. FM repeaters provide a communication service to mobile amateur-stations (including hand-held equipment). In some cases they may be installed to aid the accessibility of stations in mountainous areas.

They are not intended to make DX contacts possible, and hence their coverage under normal propagation conditions should be limited.
The number of repeater stations installed should be determined by

- the required regional coverage

- the expected number of intended users

FM repeaters should not regularly be used as local chat channels for fixed (home) stations. This interferes with their defined use.

Repeater frequency allocations in neighbouring countries within Region I should be coordinated in case their coverage pattern would overlap the border (see section VIII).

e. The primary purpose of beacons is the checking of propagation conditions, both for every day amateur use, and for special propagation research projects. When allocating exclusive segments of a band to beacons regard should be given to:

i) Reasonable frequency separation is needed to allow for, for instance, auroral spread;

ii) Guard bands at the edges of the segment are desirable to prevent de-sensitization of receivers used for beacon projects due to strong local traffic on adjacent frequencies.

C. SOME DEFINITIONS (see also section VIm)

At the IARU Region 1 Conference 1996 (Tel Aviv) it appeared useful when amending bandplans to use the following definitions :

- An unmanned station is a station in the Amateur(-Satellite) Service which transmits while the license holder of the station is not present.

- A network station is a station in the Amateur Service which has a permanent link to one or more network stations (see also Section VIm).

THE AMATEUR SERVICES: FREQUENCY ALLOCATIONS ABOVE 30 MHz

1. ITU definitions

The ITU Regulations define the Amateur Services as follows:

S1.56 Amateur Service:

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

S1.57 Amateur-Satellite Service:

A radiocommunication service using space stations on earth satellites for the same purposes as those of the amateur service.

Art. S1.30 of the Regulations, attached as Appendix 1, gives more detailed regulations on these Amateur Services.

The ITU has reserved the right for national Administrations to use some frequency bands allocated to the Amateur Services in the event of natural disasters. As set out in footnote S5.120 to the Table of frequency allocations this only refers to the 3.5 MHz, 7.0 MHz, 10.1 MHz, 14.0 MHz, 18.068 MHz, 21.0 MHz, 24.89 MHz and 145 MHz bands. Resolution no. 640 in the Radio Regulations gives details on this use.

2. ITU Radio Regulations: Frequency allocations above 30 MHz

a. Categories of services and allocations

S5.23 Primary and Secondary Services

S5.24 Where, in a box of the allocation Table, a band is indicated as allocated to more than one service, either on a worldwide or regional basis, such services are listed in the following order:

S5.25 a. services, the names of which are printed in "capitals" (example: FIXED); these are called "primary" services;

S5.26 b. services, the names of which are printed in "normal characters" (example: Mobile); these are called "secondary" services (see Nos. 420 to 423).

S5.27 Additional remarks shall be printed in normal characters (example: MOBILE except aeronautical mobile).

note : In this handbook the items directly related to the Amateur (Satellite) Service are printed using bold lettering

S5.28 Stations of secondary service:

S5.29 a. shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

S5.30 b. cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

S5.31 c. can claim protection, however, from harmful interference from stations of the same or other secondary serv-

ice(s) to which frequencies may be assigned at a later date.

S5.32 Where a band is indicated in a footnote of the Table as allocated to a service "on a secondary basis" in an area smaller than a Region, or in a particular country, this is a secondary service (see Nos. 420 - 423).

S5.33 Where a band is indicated in a footnote of the Table as allocated to a service on a "primary basis", in an area smaller than a Region, or in a particular country, this is a primary service only in that area or country .

S5.34 Additional Allocations

S5.35 Where a band is indicated in a footnote of the Table as "also allocated" to a service in an area smaller than a Region, or in a particular country, this is an "additional" allocation, i.e. an allocation which is added in this area or in this country to the service or services which are indicated in the Table (see No. 428).

S5.36 If the footnote does not include any restriction on the service or services concerned apart from the restriction to operate only in a particular area or country, stations of this service or these services shall have equality of right to operate with stations of the other primary service or services indicated in the Table.

S5.37 If restrictions are imposed on an additional allocation in addition to the restriction only to operate in a particular area or country, this is indicated in the footnote in the Table.

S5.38 Alternative Allocations

S5.39 Where a band is indicated in a footnote of the Table as "allocated" to one or more services in an area smaller than a Region, or in a particular country, this is an "alternative" allocation, i.e. an allocation which replaces, in this area or in this country, the allocation indicated in the Table (see No. 432).

S5.40 If the footnote does not include any restriction on stations of the service or services concerned, apart from the restriction to operate only in a particular area or country, these stations of such a service or services shall have an equality of right to operate with stations of the primary service or services, indicated in the Table, to which the band is allocated in other areas or countries.

S5.41 If restrictions are imposed on stations of a service to which an alternative allocation is made, in addition to the restriction to operate only in a particular country or area, this is indicated in the footnote.

S5.42 Miscellaneous Provisions

S5.43 Where it is indicated in these Regulations that a service may operate in a specific frequency band subject to not causing harmful interference, this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated according to the Table.

S5.44 Except if otherwise specified in a footnote, the term "fixed service", where appearing in the Table, does not include systems using ionospheric scatter propagation.

S5.45 Before bringing into use and notifying the Bureau of any assignment in a service which is subject to this regulation, the procedure of Aticle S9 shall be applied; such an assignment shall be considered to be in conformity with the Table of Frequency Allocations only after the successful application of Article S9

b. Description of the Table of Frequency Allocations

S5.46 The heading of the Table includes three columns, each of which corresponds to one of the Regions (see section c). Where an allocation occupies the whole of the width of the Table or only one or two of the three columns, this is a worldwide or a Regional allocation, respectively.

S5.47 The frequency band referred to in each allocation is indicated in the left-hand top corner of the part of the Table concerned.

S5.48 Within each of the categories specified in Nos. 415 to 417, services are listed in alphabetical order according to the French language. The order of listing does not indicate relative priority within each category.

S5.49 In the case where there is a parenthetical addition to an allocation in the Table, that service allocation is restricted to the type of operation so indicated.

S5.50 The footnote references which appear in the Table below the allocated service or services apply to the whole of the allocation concerned.

S5.51 The footnote references which appear to the right of the name of a service are applicable only to that particular service.

S5.52 In certain cases, the names of countries appearing in the footnotes have been simplified in order to shorten the text.

c. Regions and Areas

For the allocation of frequencies the world has been divided into three Regions, labelled Regions 1, 2 and 3. A chart showing these Regions is shown in Appendix 2.

d. Extract from the Table of frequency allocations above 30 MHz

The following pages contain an extract from the Table in the ITU Radio Regulations with the allocations of frequencies above 30 MHz to the Amateur Service and the Amateur-Satellite Service, with the footnotes relevant for the Amateur and Amateur-Satellite Service.

Note.

These tables and the accompanying relevant footnotes were taken from the Radio Regulations as found in the proposed simplified Radio Regulations tabled at WARC 1995 by the Voluntary Group of Experts.

General footnotes, not related to a single band:

S5.120 **For the use of the bands allocated to the amateur services at 3.5 MHz, 7.0 MHz, 10.1 MHz, 14.0 MHz, 18.068 MHz, 21.0 MHz, 24.89 MHz and 144 MHz in the event of natural disasters, see Resolution 640**

S5.138 The following bands:
6765 - 6796 kHz (centre frequency 6780 kHz)
433.05 - 434.79 MHz (centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in 662,
61 - 61.5 GHz (centre frequency 61.25 GHz),
122 - 123 GHz (centre frequency 122.5 GHz), and
244 - 246 GHz (centre frequency 245 GHz)
are designated for industrial, scientific, and medical (ISM) applications and shall be subject to special authorization by the administration concerned, in agreement with other administrations whose radiocommunications services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.

S5.149 (-note : in this handbook only the frequencies near to the amateur bands above 30 MHz are given)

In making assignments to stations of other services to which the bands
10.6 - 10.68 GHz, 23.07 - 23.12 GHz, 144.68 - 144.98 GHz*, 145.45 - 145.75 GHz*, 146.82 - 147.12 GHz*, 250 - 251 GHz*
are allocated(* indicates radio astronomy use for spec-

tral line observations), administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space- or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos.**S4.5** and **S4.6** and Article **S29**).

S5.150 The following bands:
13 533 - 13 567 kHz (centre frequency 13 560 kHz),
26 957 - 27 283 MHz (centre frequency 27 120 kHz),
40.66 - 40.70 MHz (centre frequency 40.68 MHz),
902 - 928 MHz in Region 2 (centre frequency 915 MHz),
2400 - 2500 MHz (centre frequency 2450 MHz),
5725 - 5875 MHz (centre frequency 5800 MHz), and
24 - 24.25 GHz (centre frequency 24.125 GHz)
are also designated for industrial, scientific, and medical (ISM) applications. Radiocommunication Services operating within these bands must accept harmful interference which may be caused by these applications. ISM equipment operating in these bands is subject to the provisions of No.**S15.13**.

MHz
47 - 68

Allocation to services		
Region 1	Region 2	Region 3
47 -68 BROADCASTING S5.164 S5.165 **S5.169**	**50 - 54** **AMATEUR** S5.166 S5.167 S5.168 S5.170	

S5.164 *Additional allocation* : in Albania, the Federal Republic of Germany, Austria, Belgium, Bulgaria, Denmark, Finland, France, Gabon, Greece, Israel, Italy, the Libanon, Liechtenstein, Luxembourg, Mali, Malta, Marocco, Nigeria, Norway, the Netherlands, Poland, the German Democratic Republic, the United Kingdom, Senegal, Sweden, Switzerland, Tunesia, Turkey and Yugoslavia, the band 47 - 68 MHz, and in Romania, the band 47 - 58 MHz, are also allocated to the land mobile service on a primary basis. However, stations of the land mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in connection with the band

S5.165 *Additional allocation* : in Angola, Cameroon, the Congo, Madagascar, Mozambique, Somalia, Sudan, Tanzania, Chad and Yemen (P.D.R. of) the band 47 - 68 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis

S5.166 *Alternative allocation* : in New Zealand, the band 50 -51 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis; the band 53 - 54 MHz is allocated to the fixed and mobile services on a primary basis

S5.167 *Alternative allocation* : in Afghanistan, Bangladesh, Brunei, India, Indonesia, Iran, Malaysia, Pakistan, Singapore and Thailand, the band 50 - 54 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis.

S5.168 *Additional allocation* : in Australia, China and the Democratic People's Republic of Korea, the band 50 - 54 MHz is also allocated to the broadcasting service on a primary basis.

S5.169 ***Alternative allocation* : in Botswana, Burundi, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Zaire, Zambia and Zimbabwe, the band 50 - 54 MHz is allocated to the amateur service on a primary basis.**

MHz
144 - 149.9

Allocation to services		
Region 1	Region 2	Region 3
144 - 146 **AMATEUR** **S5.120** **AMATEUR-SATELLITE** S5.215 .216		
146 - 149.9 FIXED MOBILE except aeronautical mobile(R)	**146 - 148** **AMATEUR** S5.217	**146 - 148** **AMATEUR** FIXED MOBILE S5.216 S5.217

S5.215 *Additional allocation* :in Singapore, the band 144 - 145 MHz is also allocated to the fixed and mobile services on a primary basis. Such use is limited to systems in operation before or on 1 January 1980, which in any case shall cease by 31 December 1995.

S5.216 *Additional allocation*:in China, the band 144 - 146 MHz is also allocated to the aeronautical mobile(OR) service on a secondary basis.

S5.217 *Alternative allocation* : in Afghanistan, Bangladesh, Cuba, Guyana and India, the band 146 - 148 MHz is allocated to the fixed and mobile services on a primary basis.

MHz
174 - 230

Allocation to services		
Region 1	Region 2	Region 3
174 - 223 BROADCASTING S5.235 S5.237 S5.243	**220 - 225** **AMATEUR** FIXED MOBILE Radiolocation S5.241	**174 - 223** FIXED MOBILE BROADCASTING

223 - 230 BROADCASTING Fixed Mobile S5.236 S5.243		**223 - 230** FIXED MOBILE BROADCASTING AERONAUTICAL RADIONAVIGATION Radiolocation

S5.235 *Additional allocation* :in Austria, the Federal Republic of Germany, Belgium, Denmark, France, Italy, Liechtenstein, Monaco, Norway, the Netherlands, the United Kingdom, Sweden, Switzerland and Yemen (P.D.R. of), the band 174 - 223 MHz is also allocated to the land mobile service on a primary basis. However, the stations of the land mobile service shall not cause harmful interference to, nor claim protection from, broadcasting stations,existing or planned, in countries other than those listed in this footnote.

S5.236 *Different category of service*: in Austria, the Federal Republic of Germany, Belgium, Denmark, Spain, Finland, Israel, Italy, Liechtenstein, Luxembourg, Monaco, Norway, the Netherlands, Portugal, the United Kingdom, Sweden, Switzerland and Yemen(P.D.R.of), the band 223 - 230 MHz is allocated to the land mobile service on a primary basis (see No. **S5.33**). However, the stations of the land mobile service shall not cause harmful interference to, nor claim protection from, broadcasting stations, existing or planned, in countries other than those listed in this footnote.

S5.237 *Additional allocation* : in the Congo, Ethiopia, Ganbia, Guinea, Kenya, Libya, Malawi, Mali, Uganda, Senegal, Sierra Leone, Somalia, Tanzania and Zimbabwe, the band 174 - 223 Mhz is also allocated to the fixed and mobile services on a secondary basis.

S5.241 In Region 2, the band 216 - 225 MHz is allocated to the radiolocation service on a primary basis until 1 January 1990. On and after 1 January 1990, no new stations in that service may be authorized. Stations authorized prior to 1 January 1990 may continue to operate on a secondary basis.

S5.243 *Additional allocation*: in Somalia, the band 216 - 225 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to not causing harmful interference to existing or planned broadcasting services in other countries.

MHz
420 - 450

<table>
<tr><td colspan="3">Allocation to services</td></tr>
<tr><td>Region 1</td><td>Region 2</td><td>Region 3</td></tr>
<tr><td colspan="3">420 - 430

FIXED

MOBILE except aeronautical mobile

Radiolocation

S5.268 S5.270 S5.271</td></tr>
<tr><td>430 -440

AMATEUR

RADIOLOCATION

S5.138 .271 .272 .273
S5.274 .275 .276 .277
S5.280 .281 .282 .283</td><td colspan="2">430 - 440

RADIOLOCATION

Amateur

S5271 .276 .277 .278 .279 .281 .282</td></tr>
<tr><td colspan="3">440 - 450

FIXED

MOBILE except aeronautical mobile

Radiolocation

S5.268 .270 .271 .274 .284 .285 .286</td></tr>
</table>

S5.268 *Different category of service* : in Australia, the United States, India, Japan and the United Kingdom, the allocation of the bands 420 - 430 MHz and 440 - 450 MHz to the radiolocation service is on a primary basis (see No. **S5.33**).

S5.270 ***Additional allocation* : in Australia, the United States, Jamaica and the Philippines, the bands 420 - 430 MHz and 440 - 450 MHz are also allocated to the amateur service on a secondary basis.**

S5.271 *Additional allocation* : in China, India, the German Democratic Republic, the United Kingdom and the U.S.S.R, the band 420 - 460 MHz is also allocated to the aeronautical navigation service (radio altimeters) on a secondary basis.

S5.272 ***Different category of service* : in France, the allocation of the band 430 - 434 MHz to the amateur service is on a secondary basis (see no.S5.32).**

S5.273 *Different category of service* : in Denmark, Libya, Norway and Sweden, the allocation of the bands 430 - 432 MHz and 438 - 440 MHz to the radiolocation service is on a secondary basis(see No.**S5.32**).

S5.274 *Alternative allocation* : in Denmark, Norway and Sweden, the bands 430 - 432 MHz and 438 - 440 MHz are allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

S5.275 *Additional allocation* : in Finland, Libya and Yugoslavia, the bands 430- 432 MHz and 438 - 440 MHz are also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

S5.276 *Additional allocation* : in Afghanistan, Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei, Burundi, Egypt, the United Arab Emirates, Ecuador, Ethiopia, Greece, Guinea, India, Indonesia, Iran, Iraq, Israel , Italy, Jordan, Kenya, Kuwait, the Libanon, Liechtenstein, Libya, Malaysia, Malta, Oman, Pakistan, the Philippines, Qatar, Syria, Singapore, Somalia, Switzer-

land, Tanzania, Thailand and Togo, the band 430 - 440 MHz is also allocated to the fixed service on a primary basis and the bands 430 - 435 MHz and 438 - 440 MHz are also allocated to the mobile, except aeronautical mobile, service on a primary basis.

S5.277 *Additional allocation* : in Angola, Bulgaria, Cameroon, the Congo, Gabon, Hungary, Mali, Mongolia, Niger, Poland, the German Democratic Republic, Rumania, Rwanda, Chad, Czechoslovakia and the U.S.S.R., the band 430 - 440 MHz is also allocated to the fixed service on a primary basis.

S5.278 ***Different category of service*** **:in Argentina, Colombia, Costa Rica, Cuba, Guyana, Honduras, Panama and Venezuela, the allocation of the band 430 - 440 MHz to the amateur service is on a primary basis (see No.425)**.

S5.279 *Additional allocation*: in Mexico, the bands 430 - 435 MHz and 438 - 440 MHz are also allocated to the land mobile service on a primary basis. No.**S5.45** shall apply.

S5.280 In the Federal Republic of Germany, Austria, Liechtenstein, Portugal, Switzerland and Yugoslavia, the band 433.05 - 434.79 MHz (centre frequency 433.92 MHz) is designated for industrial, scientific and medical (ISM) applications. Radiocommunications services of those countries operating within this band must accept harmful interference which may be caused by these applications. ISM equipment operating in this band is subject to the provisions of No. **S15.13**.

S5.281 *Additional allocation* : in the French Overseas Departments in Region 2, and India, the band 433.75 - 434.25 MHz is also allocated to the space operation service(Earth to Space) on a primary basis. In France and in Brazil, the band is allocated to the same service on a secondary basis.

S5.282 **In the bands 435 - 438 MHz, 1260 - 1270 MHz, 2400 - 2450 MHz, 3400 - 3410 MHz (in Regions 2 and 3) and 5650 - 5670 MHz, the amateur satellite service may operate subject to not causing harmful interference to other services operating in accordance with the table (see No.S5.43). Administrations authorizing such use shall ensure that any harmful interference caused by emissions from a station in the amateur-satellite service is immediately eliminated in accordance with the provisions of No.S25.11. The use of the bands 1260 - 1270 MHz and 5650 - 5670 MHz by the amateur-satellite service is limited to the Earth-to-space direction.**

S5.283 *Additional allocation* : in Austria the band 438 - 440 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

S5.284 ***Additional allocation*** **: in Canada, New Zealand and Papua New Guinea, the band 440 - 450 MHz is also allocated to the amateur service on a secondary basis.**

S5.285 *Different category of service* : in Canada, the allocation of the band 440 - 450 MHz to the radiolocation service is on a primary basis (see No.**S5.33**)

S5.286 The band 449.75 - 450.25 MHz may be used for the space operation service (Earth-to-space) and the space research service (Earth-to-space). No. **S5.45** shall apply.

MHz
890 - 942

Allocation to services		
Region 1	Region 2	Region 3
890 - 942 FIXED MOBILE except aeronautical mobile BROADCASTING Radiolocation	**902 - 928** FIXED **Amateur** Mobile except aeronautical mobile Radiolocation S5.325	**890 - 942** FIXED MOBILE BROADCASTING Radiolocation S5.326

S5.325 *Different category of service* : in the United States, the allocation of the band 890 - 942 MHz to the radiolocation service is on a primary basis (see No.**S5.33**). No. **S5.45** shall apply.

S5.326 *Different category of service* : in Australia, the allocation of the band 890 - 942 MHz to the radiolocation service is on a primary basis (see No.**S5.33**).

MHz
1240 - 1300

Allocation to services		
Region 1	Region 2	Region 3
1240 - 1260 RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-earth) **Amateur** S5.330 .331 .332 .333 .334		
1260 - 1300 RADIOLOCATION **Amateur** **S5.282** .330 .331 .332 .333 .334		

S5.330 *Additional allocation* : in Afghanistan, Angola, Saudi Arabia, Bahrain Bangladesh, Cameroon, China, the United Arab Emirates, Ethiopia, Guinea, Guyana, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kuwait, the Lebanon, Libya, Malawi, Morocco, Mozambique, Nepal, Nigeria, Oman, Pakistan, the Philippines, Qatar, Syria, Somalia, Sudan, Sri Lanka, Chad, Thailand, Togo and Yemen(P.D.R.of), the band 1215 - 1300 MHz is also allocated to the fixed and mobile services on a primary basis.

S5.331 *Additional allocation* : in Algeria, the Federal Republic of Germany, Austria, Bahrain, Belgium, Burundi, Cameroon, China, Denmark, the United Arab Emirates, France, Greece, India, Iran, Iraq, Kenya, Liechtenstein, Luxembourg, Mali, Mauritania, Norway, Oman, Pakistan, the Netherlands, Portugal, Qatar, Senegal, Somalia, Sudan, Sri Lanka, Sweden, Tanzania, Turkey and Yugoslavia, the band 1215 - 1300 MHz is also allocated to the radionavigation service on a primary basis.

S5.332 *Additional allocation*: in Cuba, the band 1215 - 1300 MHz is also allocated to the radionavigation service on a primary basis. No.**S5.45** shall apply.

S5.333 In the bands 1215 - 1300 MHz, 3100 - 3300 MHz, 5250 - 5350 MHz, 8550 - 8650 MHz, 9500 - 9800 MHz and 13.4 - 14.0 GHz, radiolocation stations installed on spacecraft may also be employed for earth exploration-satellite and space research services on a secondary basis.

S5.334 *Additional allocation* : in Canada and the United States, the bands 1240 - 1300 MHz and 1350 - 1370 MHz are also allocated to the aeronautical radionavigation service on a primary basis.

MHz
2300 - 2450

Allocation to Services		
Region 1	Region 2	Region 3

2300 - 2450 FIXED MOBILE **Amateur** Radiolocation S5.150 .282 .395	**2300 - 2450** FIXED MOBILE RADIOLOCATION **Amateur** S5.150 .282 .393 .394 .396

S5.393 *Additional allocation*:in the United States of America and India, the band 2310 - 2360 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial sound broadcasting service on a primary basis. Such use is limited to digital audio broadcasting and is subject to the provisions of Resolution COM4/W (WARC 92).

S5.394 In Australia, the United States and Papua New Guinea, the use of the band 2310 - 2390 MHz by the aeronautical mobile service for telemetry has priority over other uses by mobile services.

S5.395 In France the use of the band 2310 - 2360 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile service

S5.396 Space stations of the broadcasting-satellite service in the band 2310 - 2360 MHz operating in accordance with No.**S5.393** that may affect the services to which this band is allocated in other countries shall be coordinated and notified in accordance with Resolution **33**(WARC79). Complementary terrestrial broadcasting stations shall be subject to bilateral coordination with neighbouring countries prior to bringing into use.

MHz
3300 - 3600

Allocation to Services		
Region 1	Region 2	Region 3
3300 - 3400 RADIOLOCATION S5.149 .429 .430	**3300 - 3400** RADIOLOCATION **Amateur** Fixed Mobile S5.149 .430	**3300 - 3400** RADIOLOCATION **Amateur** S5.149 .429
3400 - 3600 FIXED FIXED-SATELLITE (space-to-earth) Mobile Radiolocation **S5.431** .434	**3400 - 3500** FIXED FIXED-SATELLITE (space-to-Earth) **Amateur** Mobile Radiolocation S5.433 S5.282 .432	

S5.429 *Additional allocation* : in Afghanistan, Saudi Arabia, Bahrain, Bangladesh, China, the Congo, the United Arab Emirates, India, Indonesia, Iran, Iraq, Israel, Japan, Kuwait, the Lebanon, Libya, Malaysia, Oman, Pakistan, Qatar, Syria, Singapore, Sri Lanka and Thailand, the band 3300 - 3400 MHz is also allocated to the fixed and mobile services on a primary basis. The countries bordering the Mediterranean shall not claim protection for their fixed and mobile services from the radiolocation service.

S5.430 *Additional allocation*: in Bulgaria, Cuba, Hungary, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 3300 - 3400 MHz is also allocated to the radionavigation service on a primary basis

S5.431 ***Additional allocation* : in the Federal Republic of Germany, Israel, Nigeria and the United Kingdom, the band 3400 - 3475 MHz is also allocated to the amateur service on a secondary basis.**

S5.432 *Different category of service* : in Indonesia, Japan, Pakistan and Thailand, the allocation of the band 3400 - 3500 MHz to the mobile, except aeronautical mobile, service is on a primary basis (see No.S5.33)

S5.433 In Regions **2** and **3** , in the band 3400 - 3600 MHz the radiolocation services is allocated on a primary basis. However, all administrations operating radiolocation systems in this band are urged to cease operations by 1985. Thereafter, administrations shall take all practicable steps to protect the fixed-satellite service and coordination requirements shall not be imposed on the fixed-satellite service.

MHz
5650 - 5850

<table>
<tr><td colspan="3">Allocation to Services</td></tr>
<tr><td>Region 1</td><td>Region 2</td><td>Region 3</td></tr>
<tr><td colspan="3">5650 - 5725

RADIOLOCATION

Amateur

Space Research (deep space)

S5.282 .451 .453 .454 .455</td></tr>
<tr><td>5725 - 5850

FIXED-SATELLITE
(Earth-to-space)

RADIOLOCATION

Amateur

S5.150 .451 .453
S5.455 .456 .457</td><td colspan="2">5725 - 5850

RADIOLOCATION

Amateur

S5.150 .453 .455 .457</td></tr>
<tr><td>5850 - 5925

FIXED

FIXED-SATELLITE
(Earth-to-space)

MOBILE

S5.150</td><td>5850 - 5925

FIXED

FIXED-SATELLITE
(Earth-to-space)

MOBILE

Amateur

Radiolocation

S5.150</td><td>5850 - 5925

FIXED

FIXED-SATELLITE
(Earth-to-space)

MOBILE

Radiolocation

S5.150</td></tr>
</table>

S5.451 *Additional allocation* : in the United Kingdom, the band 5470 - 550 MHz is also allocated to the land mobile service on a secondary basis. The power limits specified in Nos. **S21.2, S31.3, S21.4** and **S21.5** shall apply in the band 5725 - 5850 MHz.

S5.453 *Additional allocation* : in Afghanistan, Saudi Arabia, Bahrain, Bangladesh, Cameroon, the Central African Republic, China, the Congo, the Republic of Korea, Egypt, the United Arab Emirates, Gabon, Guinea, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kuwait, the Lebanon, Libya, Madagascar, Malaysia, Malawi, Malta, Niger, Nigeria, Pakistan, the Philippines, Qatar, Syria, Singapore, Sri Lanka, Tanzania, Chad, Thailand and Yemen(P.D.R.of), the band 5650 - 5850 MHz is also allocated to the fixed and mobile services on a primary basis.

S5.454 *Different category of service* : in Bulgaria, Cuba, Hungary, Mongolia, Poland, the German Democratic Republic, Czechoslovakia and the U.S.S.R., the allocation of the band 5670 - 5725 to the space research service is on a primary basis (see No.**S5.33**).

S5.455 *Additional allocation* : in Bulgaria, Cuba, Hungary, Mongolia, Poland, the German Democratic Republic and the U.S.S.R., the band 5670 - 5850 MHz is also allocated to the fixed service on a primary basis.

S5.456 *Additional allocation* : in the Federal Republic of Germany and in Cameroon, the band 5755 - 5850 MHz is also allocated to the fixed service on a primary basis.

S5.457 **The band 5830 - 5850 MHz is also allocated to the amateur-satellite service(space-to-Earth) on a secondary basis.**

GHz
10.0 - 10.5

Allocation to Services		
Region 1	Region 2	Region 3
10- 10.45 FIXED MOBILE RADIOLOCATION **Amateur** S5.479	**10 - 10.45** RADIOLOCATION **Amateur** S5.479 .480	**10 - 10.45** FIXED MOBILE RADIOLOCATION **Amateur** S5.479
10.45 - 10.5 RADIOLOCATION **Amateur** **Amateur-Satellite** S5.481		

S5.479 The band 9975 - 10025 MHz is also allocated to the meteorological-satellite service on a secondary basis for use by weather radars

S5.480 *Additional allocation* : in Costa Rica, Ecuador, Guatemala and Honduras, the band 10 - 10.45 GHz is also allocated to the fixed and mobile services on a primary basis.

S5.481 *Additional allocation* : in the Federal Republic of Germany, Angola, China, Ecuador, Spain, Japan, Kenya, Morocco, Nigeria, Sweden, Tanzania and Thailand, the band 10.45 - 10.5 GHz is also allocated to the fixed and mobile services on a primary basis.

GHz
24 - 24.25

Allocation to Services		
Region 1	Region 2	Region 3
24 - 24.05 **AMATEUR** **AMATEUR-SATELLITE** S5.150		
24.05 - 24.25 RADIOLOCATION **Amateur** Earth Exploration-Satellite (active) S5.150		

GHz
47 - 47.2

Allocation to Services		
Region 1	Region 2	Region 3
47 - 47.2 **AMATEUR** **AMATEUR-SATELLITE**		

GHz

75.5 - 81 GHz

Allocation to services		
Region 1	Region 2	Region 3
75.5 - 76 **AMATEUR** **AMATEUR-SATELLITE** Space Research (space-to-Earth)		
76 - 81 RADIOLOCATION **Amateur** **Amateur-Satellite** Space Research (space-to-Earth) S5.560		

S5.560 In the band 78 - 79 GHz radars located on space stations may be operated on a primary basis in the earth exploration-satellite service and in the space research service.

GHz
116 - 126

Allocation to Services		
Region 1	Region 2	Region 3
116 -126 EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE MOBILE (S5.558) SPACE RESEARCH (passive) **Amateur [119.98-120.02 GHz]** S5.138 .341		

GHz
142 - 149

Allocation to Services		
Region 1	Region 2	Region 3
142 - 144 **AMATEUR** **AMATEUR-SATELLITE**		
144 - 149 RADIOLOCATION **Amateur** **Amateur-satellite** S5.149 .555		

S5.555 *Additional allocation*: The bands 48.94 - 49.04 GHz, 97.88 - 98.08 GHz, 140.69 - 140.98 GHz, 144.68 - 144.98 GHz, 145.45 - 145.75 GHz ,146.82 - 147.12 GHz, 250 - 251 GHz and 262.24 - 262.76 GHz are also allocated to the radio astronomy service on a primary basis.

GHz
241 - 250

Allocation to Services		
Region 1	Region 2	Region 3
241 - 248 RADIOLOCATION **Amateur** **Amateur-satellite** S5.138		
248 - 250 **AMATEUR** **AMATEUR-SATELLITE**		

AMATEUR SERVICE

(Article S25 of the Radio Regulations)

Section I. Amateur Service

S25.1 \$1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

S25.2 \$2. (1) When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their un-importance, recourse to the public telecommunications service is not justified.

S25.3 (2) It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

S25.4 (3) The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

S25.5 \$3. (1) Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

S25.6 (2) Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station.

S25.7 \$4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to operate.

S25.8 \$5. (1) All the general rules of the Constitution, the Convention and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical developments for such stations permit.

S25.9 (2) During the course of their transmissions, amateur stations shall transmit their callsign at short intervals.

Section II. Amateur-Satellite Service

S25.10 The provisions of Section I of this article shall apply equally, as appropriate, to the amateur-satellite service.

S25.11 Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in art. **S15**. Administrations authorizing such space stations shall inform the Bureau[1]

[1] The office of the ITU dealing with administrative matters, such as frequency registration.

and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference which might be reported can be terminated by the authorizing administration.(see No. **S22.1**).

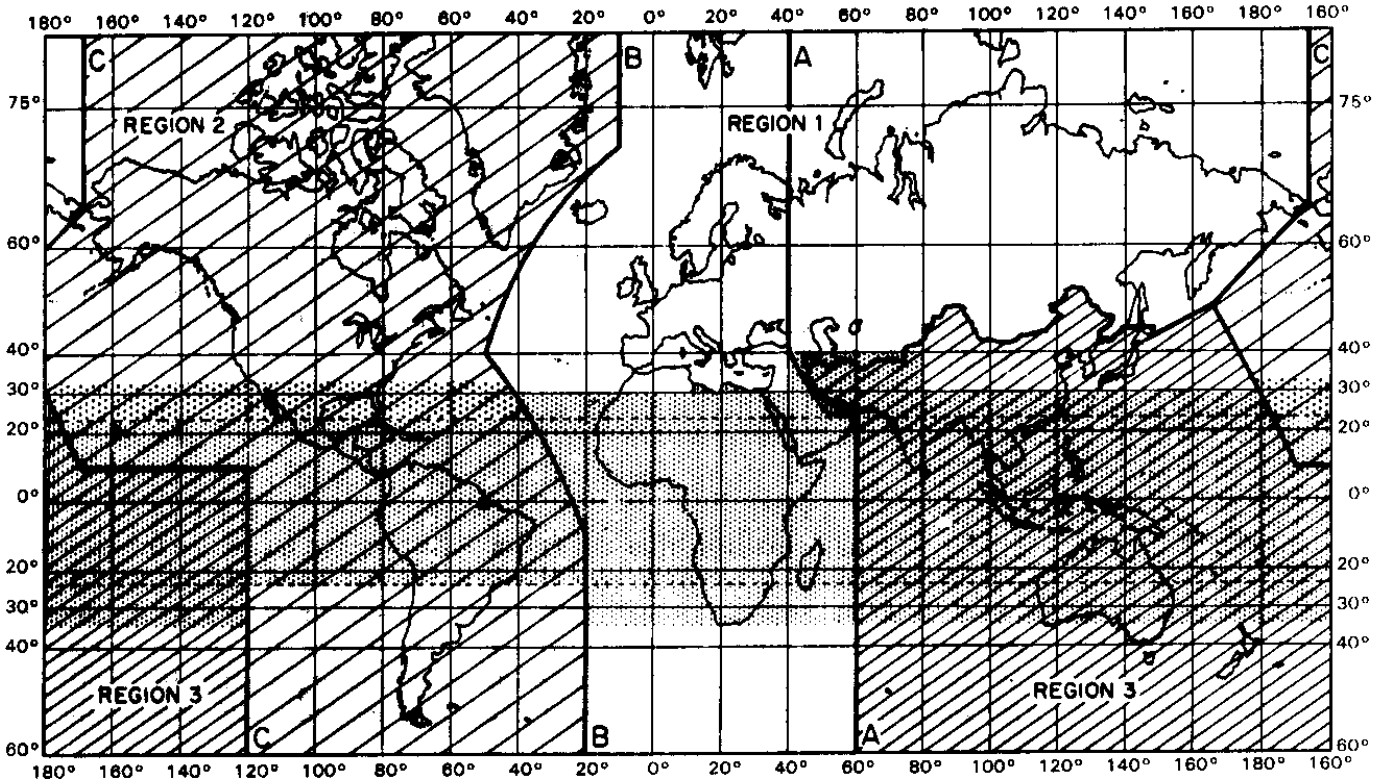
Note to : Resolution 642,
Relating to bringing into Use of Earth Stations in the Amateur-Satellite Service

As a general rule Administrations have to submit all data on satellite stations and on the earth stations making use of these satellites to the Bureau.

Resolution 642 recognizes that amateur satellites are intended for multiple access by amateurs in all countries and that, consequently, a description of all earth stations making use of these satellites cannot be given.

As the burden of terminating any harmful interference is placed upon the administration authorizing a station in the Amateur-Satellite Service (see S25.11 above), Resolution 642 specifies that the authorizing administration only has to provide data on the satellite station, and that the submission shall contain at least the characteristics of a typical amateur earth station in the amateur-satellite service having the facility to transmit signals to the space station to initiate, modify, or terminate the functions of the space station.

MAP OF ITU REGIONS



0 The shaded part represents the Tropical Zone as defined in Nos.**S5.16** to **S5.20** and **S5.21**

S5.3 *Region 1* : Region 1 includes the area limited on the east by line A (lines A, B and C are defined below) and on the west by line B, excluding any of the territory of Iran which lies between these limits. It also includes that part of the territory of Turkey and of the U.S.S.R. lying outside of these limits, the territory of the Mongolian People's Republic, and the area to the north of the U.S.S.R. which lies between lines A and C.

S5.4 *Region 2*: Region 2 includes the area limited on the east by line B and on the west by line C.

S5.5 *Region 3*: Region 3 includes the area limited on the east by line C and on the west by line A, except the territories of the Mongolian People's Republic, Turkey, the territory of the U.S.S.R. and the area to the north of the U.S.S.R. It also includes that part of the territory of Iran lying outside of those limits.

S5.7 *Line A* : Line A extends from the North Pole along meridian 40° East of Greenwich to parallel 40° North; thence by great circle arc to the intersection of meridian 60° East to the South Pole.

S5.8 *Line B* : Line B extends from the North Pole along meridian 10° West of Greenwich to its intersection with parallel 72° North; thence by great circle arc to the intersection of meridian 50° West and parallel 40° North; thence by great circle arc to the intersection of meridian 20° West and parallel 10° South; thence along meridian 20° West to the South Pole.

S5.9 *Line C* : Line C extends from the North Pole by great circle arc to the intersection of parallel 65° 30' North with the international boundary in Bering Strait; thence by great circle arc to the intersection of meridian 165° East of Greenwich and parallel 50° North; thence by great circle arc to the intersection of meridian 170° West and parallel 10° North; thence along parallel 10° North to its intersection with meridian 120° West; thence along meridian 120° West to the South Pole.

IARU REGION 1 VHF/UHF/Microwaves BANDPLANS

On the following pages the official IARU Region 1 bandplans currently valid for the 50 MHz, the 145 MHz, the 435 MHz and the Microwave bands are set out. In accordance with the policy outlined in section IIa, point 2, only carefully considered modifications and/or additions have been made during the tri-annual IARU Region 1 Conferences.

At the IARU Region 1 Conference in Cefalu (1984) a 50 MHz bandplan was adopted for use in countries within the European part of Region 1 where amateurs had obtained a frequency allocation or assignment in the 50 MHz band. As an appreciable number of countries within the European part of Region 1 had obtained or expected to obtain such an allocation by the end of 1989, at the IARU Region 1 Conference in Torremolinos (1990) the first version of an official IARU Region 1 bandplan for use in that part of Region 1 where the 50 MHz allocation does not exceed 52.000 MHz was adopted.
At the IARU Region 1 Conference in Tel Aviv (1996) the bandplan has been slightly amended in order to reflect practical experiences.

Regarding amateur-satellite bandplans, the following was decided at the IARU Region 1 Conference in Warsaw (1975):

> That IARU Region 1 adopts the bandplans recommended by the sponsors of each satellite system, e.g. by AMSAT for OSCAR-7, but also informs sponsors that such bandplans must be kept simple and that in the opinion of IARU Region 1 in each case provisions should be made to segregate Telegraphy from telephony.

The currently valid satellite bandplan(s), together with some data on amateur satellites, can be found in section VII.

The appearance of manned space stations with an amateur station on board has led to the allocation of NBFM channel frequencies. In Vienna 1995 the former 145.200/145.800 MHz frequency pair was allocated.

The following general recommendations regarding the promotion of bandplans have been adopted/re-affirmed at various IARU Region 1 Conferences:

a. VHF Managers should give maximum publicity to the adopted bandplans. In view of the many newcomers, regular repetition of the publication of the bandplans is advisable.

b. Member Societies, and particularly their VHF Managers or VHF Committees, should strongly promote adherence to the adopted bandplans by all VHF/UHF/Microwaves amateurs in their country.

It will be noted in the following bandplans that the accommodation of the narrow-band modes in several bands is quite similar and is modelled after the plans for the 145 MHz band which existed before the 1996 Tel Aviv conference. The narrow-band modes parts of the higher bands are respectively:

432	- 434	MHz	
1296	- 1298	MHz	
2320	- 2322	MHz	alternative 2304 - 2306 or 2308- 2310 MHz
3400	- 3402	MHz	
5668	- 5670	MHz	
5760	- 5762	MHz	
10368	- 10370	MHz	alternative 10450 - 10452 MHz
24048	- 24050	MHz	
24192	- 24194	MHz	

All bandplans show two columns:

IARU Region 1 bandplan	Usage

The left column designation is self-explanatory. The right column contains meeting/calling frequencies, agreed upon for the convenience of the VHF/UHF/Microwaves amateurs practising specific modes of communication. These frequencies are not part of the adopted IARU Region 1 bandplan and, though in the normal amateur spirit other operators should take notice of these agreements, no right on reserved frequencies can be derived from a mention in the right-hand column.

The allocation of frequency segments to the various modes of operation in the IARU Region 1 bandplans is subject to the following condition:

> The allocation of sub-bands in the IARU Region 1 bandplans allows the indicated category of users to employ any frequency within that sub-band, provided that no appreciable energy falls outside that sub-band. Users must therefore take into account the bandwidth of their sidebands when selecting an operating frequency.
>
> (de Haan, 1993)

Attention is drawn to the "Principles of Bandplanning", which are set out in section IIa, pages 2 - 4

N.B. For information purposes the UK bandplan for 70.0 - 70.5 MHz is attached to this section as Appendix 1.

50 - 52 MHz BANDPLAN (Tel Aviv 1996)

IARU Region 1 bandplan	Usage
50.000 TELEGRAPHY (**a**) **50.100**	50.020 - 50.080 Beacons 50.090 Telegraphy centre of activity
50.100 ALL NARROW-BAND MODES (TELEGRAPHY, SSB, AM, RTTY, SSTV, ETC.) (**b**) **50.500**	50.100 - 50.130 Intercontinental Telegraphy/SSB 50.110 DX Calling (**c**) 50.150 SSB Centre of activity 50.185 Crossband centre of activity 50.200 MS centre of activity
50.500 ALL MODES **52.000**	50.510 SSTV (AFSK) 50.550 FAX working frequency 50.600 RTTY (FSK) 50.620 - 50.750 Digital communications 51.210 - 51.390 FM repeaters input channels, 20 kHz spacing (**e**) 51.410 - 51.590 FM 51.510 FM calling frequency 51.810 - 51.990 FM repeaters output channels, 20 kHz spacing (**e**)

NOTES ON THE 50 - 52 MHz BANDPLAN

1. **IARU REGION 1 BANDPLAN**

This bandplan, first adopted at the IARU Region 1 Conference in Torremolinos (1990) and revised at the 1996 Tel Aviv conference, is recommended for use in those countries in the European part of Region 1 which allow amateurs to operate in this part of the radio spectrum. In many countries in the African part of Region 1 (see footnotes accompanying the ITU frequency allocation table) the 50 - 54 MHz band is allocated to the Amateur Service on a primary basis, and in some cases, like for instance in South Africa, an adaptation of the Region 2 bandplan is used.

1.1. Footnotes

a. Telegraphy is permitted over the whole band; Telegraphy exclusive between 50.000 - 50.100 MHz.

b. The designation "Narrow Band" refers to transmission modes occupying a bandwidth of not more than 6 kHz (De Haan, 1993).

2. **USAGE**

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

2.1. Footnotes

c. The intercontinental DX calling frequency 50.110 MHz should not be used for calling within the European part of Region 1 at any time.

d. Channelized equipment: On this band the NBFM channel spacing is 20/10 kHz.

e. For the specification of NBFM see section VIb

For the numbering of NBFM channels see appendix 2 to this section

In those countries within the European part of IARU Region 1 where it is allowed to set up NBFM repeaters on 50 MHz, the indicated channels are recommended in order to establish a commonality.

In those countries where the National Authorities do not permit repeaters to operate with output frequencies above 51MHz, repeater output frequencies may be 500kHz below the repeater input frequencies.(Tel Aviv 1996)

144 - 146 MHz BANDPLAN Lillehammer 1999)

IARU Region 1 bandplan	Usage
144.000 E.M.E. (SSB & Telegraphy) **144.035**	
144.035 TELEGRAPHY (**a**) **144.150**	144.050 Telegraphy calling 144.100 Random MS Telegraphy reference frequency (**m**) 144.140 - 144.150 EME and FAI activity telegraphy
144.150 SSB **144.400**	144.150 - 144.160 EME and FAI activity SSB 144.195 - 144.205 Random MS SSB (**m**) 144.300 SSB Calling 144.390 - 144.400 Random MS SSB (**m**)
144.400 BEACONS **144.490** Guard band **144.500**	
144.500 ALL MODE (**f**) **144.800**	144.500 SSTV calling 144.525 ATV SSB talkback centre of activity 144.600 RTTY calling (**n**) 144.610 Centre of PSK31 activity 144.700 FAX calling 144.750 ATV calling/talkback
144.800 DIGITAL COMMUNICATIONS (**g**,**h**) **144.990**	
144.994 NBFM REPEATER INPUT, 12.5 kHz spacing, (channel freqs 145.000 -- 145.1875 MHz) (**c**) **145.1935**	
145.194 NBFM SIMPLEX CHANNELS 12.5kHz spacing, (channel freqs 145.-200-- 145.5875 MHz) (**c**) **145.5935**	145.200 see note **p** 145.300 RTTY local 145.500 (Mobile) calling
145.594 NBFM REPEATER OUTPUT, 12.5kHz spacing, (channel freqs 145.600-- 145.7875 MHz) (**c**) (**d**) **145.7935**	
145.800 AMATEUR SATELLITE SERVICE (**e**) **146.000**	145.800 see note **p**

NOTES ON THE 144 - 146 MHz BANDPLAN

1. **IARU REGION 1 BANDPLAN**

The following notes are part of the officially adopted IARU Region 1 bandplan, and all member societies should strongly promote adherence to the recommendations made in these notes.

1.1. General

i. In Europe no input or output channels of NBFM repeaters shall be allowed to operate between 144 and 145 MHz.

ii. Except in the part of the band allocated to the Amateur Satellite Service it is not allowed to use input- or output frequencies in the 145 MHz band for repeaters with in- or output in other amateur bands (Miskolc-Tapolca 1978).

iii. No packet-radio networks will be set up in the 145 MHz band (revised Lillehammer 1999)

It is recognised that in some parts of Region 1 the introduction of packet-radio may require the use of access frequencies in the 144 - 146 MHz band for a limited time (Düsseldorf 1989).

Note. The parts of Region 1 meant are those parts with low amateur population and/or those at the periphery of the Region, where exceptions can be tolerated as these do not harm the orderly use of the band in the parts of Region 1 where there is a greater pressure on the available spectrum space. In the latter part of the Region the second paragraph of the footnote should **never** be used to justify ignoring the first part for a considerable time.

iv. Beacons, irrespective of their ERP, will have to be situated in the beacon part of the band.

1.2. Footnotes

a. Telegraphy is permitted over the whole band, but preferably not in the beacon band; Telegraphy exclusive between 144.035 - 144.150 MHz.

b. Within IARU Region 1 the frequencies for beacons with an ERP of more than 50 Watts are coordinated by the IARU Region 1 Beacon Coordinator; the frequencies for beacons with and ERP of 10 Watts olr more shall be communicated to the Beacon Coordinator. (see section IX).

c. For technical standards on NBFM and repeaters see section VIb

If there is a real need for more repeater channels (see section VIIIa !), it is recommended that Societies or Repeater Groups consider setting up a repeater system on the higher frequency band(s).

Further to this subject the following recommendation was adopted in De Haan, 1993:

For FM repeater and simplex operation in the 144 to 146 MHz band IARU Region 1 will change to a genuine 12.5 kHz channel spacing system. Furthermore in Tel Aviv, 1996 it was decided that societies shall promote the use of the 12.5 kHz channel spacing standard for NBFM channels in order to effectively implement the 12.5 kHz system .

For the numbering of NBFM channels, see annex 2 to this section.

d. Established simplex frequencies on repeater output channels may be retained.

e. In view of the important public relations aspect of amateur satellite activities, it was decided at the IARU Region 1 Conference in Miskolc-Tapolca (1978) that:

i) AMSAT will be allowed to use the band 145.8 - 146.0 MHz for amateur satellite activity.

This decision was re-confirmed at the IARU Region 1 Conference in Brighton (1981).

iii) see also footnote p

f. No unmanned stations shall use the all-mode segment (Tel Aviv 1996)

g. Attention is drawn to section 1.1. point iii of these Bandplan notes!

h. Network stations shall only operate in the part of the 145 MHz band allocated to Digital Communications and will be permitted only for a limited time. Such network stations should also have access ports on other VHF/UHF or Microwave bands and should not use the 145 MHz band to forward traffic to other network stations. In view of the time limitation the set-up of new network stations is not encouraged (De Haan, 1993).
Unmanned packet radio stations are only allowed in the segment 144.800 - 144.990 MHz. Outside of this segment the signal level produced by those stations shall be not larger than 60 dB below the carrier level (measured in a 12 kHz bandwidth). Any other unmanned packet radio and digital access points must cease operation not later than 31 December 1997.(Tel Aviv 1996).

2. USAGE

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

At the meeting of the VHF/UHF/Microwaves Committee in Vienna, March 1992, the following recommendation was adopted:

> Societies should publish the use of 144.140 - 144.160 MHz as an alternative for EME operation. The results of this test should be monitored with the aim of incorporating this segment as EME alternative into the Usage part of the bandplan if successful.

2.1. Footnotes

m. See procedures set out in section Vb.

n. Publicity should be given to the usage of frequencies around 144.600 MHz by RTTY stations , in order to keep these frequencies clear from other traffic and to avoid interference with those RTTY stations.

p. For NBFM voice communications with special stations like manned spacecraft it is recommended to use 145.200 MHz for simplex operation or 145.200/145.800 MHz for split-channel operation (Vienna 1995/Tel Aviv 1996).

430 - 440 MHz BANDPLAN

IARU Region 1 bandplan	Usage
430.000 SUB-REGIONAL (national bandplanning) (**d**) **431.981**	430.025 - 430.375 NBFM repeater output-channnel freqs (F/PA), 25 kHz spacing, 1.6 MHz shift (**f**) 430.400 - 430.575 Digital communication link channels (**g**) (**j**) 430.600 - 430.925 Digital communications repeater channels (**g**) (**j**) (**l**) 430.925 - 431.025 Multi mode channels (**j**) (**k**) (**l**) 431.050 - 431.825 Repeater input channel freqs (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift (**f**) 431.625-431.975 Repeater input channel freqs (F/PA), 25 kHz spacing, 1.6 MHz shift
432.000 TELEGRAPHY (**a**) **432.150**	432.000 - 432.025 Moonbounce 432.050 Telegraphy centre of activity
432.150 SSB/TELEGRAPHY **432.500**	432.200 SSB centre of activity 432.350 Microwave talkback centre of activity 432.500 Narrow-band SSTV
432.500 LINEAR TRANSPONDER INPUT (**e**) **432.600**	432.600 RTTY (FSK/PSK) 432.610 Centre of PSK31 activ-ities
432.600 LINEAR TRANSPONDER OUTPUT (**e**) **432.800**	432.700 FAX (FSK)
432.800 BEACONS (**b**) **432.990**	
432.994 REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 1.6 MHz shift (Channel freq 433.000-- 433.375MHz) **433.381**	

433.394 NBFM SIMPLEX CHANNELS, 25 kHz spacing, (Channel freq 433.400 -- 433.575 MHz) **433.581**	433.400 SSTV (FM/AFSK) 433.500 (Mobile) NBFM calling
433.600 ALL MODES **434.000**	433.600 RTTY (AFSK/FM) 433.625 - 433.775 Digital communications channels (**g**) (**h**) (**i**) 433.700 FAX channel (FM/AFSK) 434.000 Centre frequency of digital experiments as defined on note **m**
434.000 ATV (**c**) **434.594**	434.450 - 434.475 Digital communications channels (by exception !!) (**i**)
434.594 ATV (**c**) & REPEATER OUTPUT (region 1 system), 25 kHz spacing, 1.6 MHz shift, (Channel freq 434.-600) -- 434.975MHz) **435.981**	
435.981 ATV (**c**) & SATELLITE SERVICE **438.000**	
438.000 ATV (**c**) & SUB-REGIONAL (national bandplanning) (**d**) **440.000**	438.025 - 438.175 Digital communications channel freqs (**g**) 438.200 - 438.525 Digital communications repeater channels (**g**) (**j**) (**l**) 438.550 - 438.625 Multi-mode (**j**) (**k**) (**l**) 438.650 - 439.425 Repeater output channels (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift, (**f**) 439.800 -- 439.975 Digital communications link channels (**g**) (**j**)

NOTES ON THE 430 - 440 MHz BANDPLAN

1.**IARU REGION 1 BANDPLAN**

The following notes are part of the officially adopted IARU Region 1 bandplan, and all member societies should strongly promote adherence to the recommendations made in these notes.

1.1. General

i. In Europe no input or output channels of FM repeaters shall be allowed to operate between 432 and 433 MHz.

ii. Beacons, irrespective of their ERP, will have to be located in the exclusive

beacon part of the band.

iii. NBFM Channels and Repeaters are specified in section VIb

1.2. Footnotes

a. Telegraphy is permitted over the whole narrow-band DX part of the band; Telegraphy exclusive between 432.000 - 432.150 MHz.

b. Within IARU Region 1 the frequencies for beacons with an ERP of more than 50 Watts are coordinated by the IARU Region 1 Beacon Coordinator (see section IX).

c. i. ATV operators should be encouraged to use the microwave allocations where available, but may continue to use the 430 MHz band where permitted by the licensing authority. In case of interference between ATV and the Amateur Satellite Service the Satellite Service should have priority.

ii. ATV transmissions in the 435 MHz band should take place in the segment 434.000 - 440.000 MHz. The video carrier should be below 434.500 MHz or above 438.500 MHz. National societies should provide guidance to their members on the exact frequencies to be used, with due consideration of the interests of other users.
(Noordwijkerhout 1987)

d) The words "Sub-regional (national) bandplanning" appearing in IARU Region 1 VHF/UHF/Microwave bandplans mean the following:

In bands and sub-bands not available throughout Region 1, band-planning should be coordinated on a sub-regional basis between the countries where those bands and sub-bands are allocated to the Amateur Service. The words "national bandplanning" refer to bands/segments which are available only in a single country (such as the 70 MHz band allocation), or only in a few widely separated countries. (Torremolinos 1990)

e) At the IARU Region 1 Conference in Torremolinos (1990) the output band for linear transponders was extended from 432.700 to 432.800 MHz under the following condition:

The established use of 432.600 MHz for RTTY (FSK/PSK) and 432.700 MHz for FAX should be respected when installing linear transponders which use this allocation.

2. **USAGE**

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

2.1. General

During contests and bandopenings local traffic using narrow-band modes should operate between 432.500 - 432.800 MHz.

2.2. Footnotes

f. The HB/DL/OE wide-shift repeater system, already in use for a long time, is valuable with a view to a better utilisation of the whole band. Hence IARU Region 1 endorses the system.
This also applies for the French repeater channel system, also adopted by the Netherlands, which IARU Region 1 supports as a useful measure to fill a hitherto unused part of the band.
For the numbering of NBFM channels see appendix 2 to this section

g. In the Usage section of the 435 MHz bandplan the following frequency segments have been designated for digital communications:

i) 430.544 - 430.931 MHz Extension of the 7.6 MHz repeater system input for digital comm.
437.194 - 438.531 MHz Output channels for the above

ii) 433.619 - 433.781 MHz
438.019 - 438.181 MHz

iii) 430.394 - 430.581 MHz For digital communication links
439.794 - 439.981 MHz For digital communication links

With due regard to the band allocated to the Amateur Service by the national

Administration, the interests of other users, possible interference from e.g. ISM, the specific digital technique or system to be accommodated etc., a sub-regional, or national choice may be made within the above segments.

h. In those countries where 433.619 - 433.781 MHz is the only segment of the 435 MHz band available for digital communications, modulation techniques requiring a channel separation exceeding 25 kHz should not be used. If different or incompatible use of this part of the frequency spectrum in contemplated in neighbouring countries, this use should be coordinated between the countries concerned with the aim of avoiding harmful interference.

i. On a temporary basis, in those countries where 433.619 - 433.781 MHz is the only segment of the 435 MHz band available for Digital Communications:

   1. Channels with centre frequencies 433.700, 432.725, 432.750, 432.775, 434.450, 434.475, 434.500, 434.525, 434.550 and 434.575 may be used for digital communications.

   2. Use of these channels must nor interfere with linear transponders.

   3. Modulation techniques requiring a channel separation exceeding 25 kHz must not be used on these channels.

(De Haan, 1993)

j. At the IARU Region 1 Conference in Torremolinos (1990) the following recommendation was adopted regarding the segments for repeaters and links, shown in footnote g:

> For a repeater/link to be installed within 150 km of a national border, the member society should co-ordinate the frequency allocation and the technical (system) data with the member societies in neighbouring countries. Special attention should be paid to the common good practice of using directional antennas and the minimum power necessary.

As a matter of course this agreement is also valid for any link experiments carried out on the multi-mode channels in the segment 438.544--438.631 MHz. (De Haan, 1993).

k. These multi-mode channels are to be used for experimenting with new transmission technologies (De Haan, 1993)

l. In the United Kingdom the use of low-power speech repeaters on repeater channels in the segment 438.419--438.581 is allowed. Where necessary, frequencies will be coordinated with neighbouring countries (De Haan, 1993).

m. Experiments using wide band digital modes may take place in the 435 MHz band in those countries that have the full 10 MHz allocation. These experiments should be in the all modes section around a frequency of 434 MHz, use horizontal polarisation and the minimum power required.(Tel Aviv 1996)

1240 - 1300 MHz BANDPLAN

IARU REGION 1 bandplan	Usage
1240.000 ALL MODES **1243.250**	1240.000-1241.000 Digital communications 1242.025-1242.250 Repeater output, ch. RS1 -- RS10
1243.250 ATV **1260.000**	1242.250-1242.700 Repeater output, ch. RS11 -- RS28 1242.725-1243.250 Packet radio duplex, ch. RS29 -- RS50 1258.150-1259.350 Repeater output, ch. R20 -- R68
1260.000 SATELLITE SERVICE **1270.000**	
1270.000 ALL MODES **1272.000**	1270.025-1270.700 Repeater input, ch. RS1 -- RS28 1270.725-1271.250 Packet Radio duplex, ch. RS29 -- RS50
1272.000 ATV **1290.994**	
1290.994 NBFM REPEATER INPUT, 25 kHz spacing, ch. RM0 (1291.000) -- RM19 (1291.475) **1291.481**	
1291.494 ALL MODES **1296.000**	1293.150-1294.350 Repeater input, ch. R20 -- R68
1296.000 TELEGRAPHY (**a**) **1296.150**	1296.00-1296.025 Moonbounce
1296.150 TELEGRAPHY/SSB **1296.800**	1296.200 Narrow-band centre of activity 1296.400-1296.600 Linear transponder input 1296.500 SSTV 1296.600 RTTY 1296.700 FAX 1296.600-1296.800 Linear transponder output
1296.800 BEACONS EXCLUSIVE (**b**) **1296.994**	
1296.994 NBFM REPEATER OUTPUT, ch. RM0 -- RM19 **1297.481**	
1297.494 NBFM SIMPLEX, ch. SM20 -- SM39 (**c**) **1297.981**	1297.500 NBFM activity centre

1298.000 ALL MODES **1300.000**	1298.025-1298.500 Repeater output channelk freqs, ch. RS1 -- RS28 1298.500-1300.000 Digital communications 1298.725-1299.000 Packet-Radio duplex channel freqs, ch. RS29 -- RS40

NOTES ON THE 1240 - 1300 MHz BANDPLAN

1. **IARU REGION 1 BANDPLAN**

The following notes are part of the IARU Region 1 bandplan for this band, originally adopted during the IARU Region 1 Conference at Noordwijkerhout (1987), and all member societies should strongly promote adherence to the recommendations made in these notes.
For the specification of NBFM see section VIb

1.1. Footnotes

a. Telegraphy is permitted over the whole narrow-band DX part of the band; Telegraphy exclusive between 1296.000 - 1296.150 MHz.

b. Within IARU Region 1 the frequencies for beacons with an ERP of more than 50 Watts are coordinated by the IARU Region 1 Beacon Coordinator (see section IX).

c. In countries where 1298 - 1300 MHz is not allocated to the Amateur Service (e.g. Italy) the FM simplex segment may also be used for digital communications.

2. **USAGE**

The following note refers to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column.

2.1. General

During contests and bandopenings local traffic using narrow-band modes should operate between 1296.500 - 1296.800 MHz.

2300 -2450 MHz BANDPLAN (Vienna 1998)

IARU Region 1 bandplan	Usage
2300.000 SUB-REGIONAL (national) BANDPLANNING (**a**) **2320.000**	2304 - 2306 Narrow band segment in countries where the 2320-2322 segment is not available 2308 - 2310 Narrow band segment in HB
2320.000 TELEGRAPHY EXCLUSIVE (**c**) **2320.150**	2320.000-2320.025 Moonbounce
2320.150 TELEGRAPHY/ SSB (**c**) **2320.800**	2320.200 SSB centre of activity
2320.800 BEACONS EXCLUSIVE (**c**) **2321.000**	
2321.000 NBFM SIMPLEX & REPEATERS (**b**) **2322.000**	
2322.000 ALL MODES (**b**) **2400.000**	2322.000-2355.000 ATV 2355.000-2365.000 Digital communications 2365.000-2370.000 Repeaters 2370.000-2392.000 ATV 2392.000-2400.000 Digital communications
2400.000 AMATEUR SATELLITE SERVICE **2450.000**	2427.00 - 2443.00 ATV if no satellite uses this segment

NOTES ON THE 2300 - 2450 MHz BANDPLAN

a) The words "Sub-regional (national) bandplanning" appearing in IARU Region 1 VHF/UHF/-Microwave bandplans mean the following:

In bands and sub-bands not available throughout Region 1, band-planning should be coordinated on a sub-regional basis between the countries where those bands and sub-bands are allocated to the Amateur Service. The words "national bandplanning" refer to bands which are available only in a single country (such as the 70 MHz band allocation), or only in a few widely separated countries.

(Torremolinos 1990)

b) In countries where the ALL MODES segment 2322 - 2400 MHz is not allocated to the Amateur Service, the FM SIMPLEX & REPEATER segment 2321 - 2322 MHz may be used for digital data transmissions.
For the specification of NBFM see section VIb

c) In countries where the narrow-band segment 2320 - 2322 MHz is not available, the following alternative narrow-band segments can be used:

2304 - 2306 MHz
2308 - 2310 MHz

3400 -3475 MHz BANDPLAN

IARU Region 1 bandplan	Usage
3400.000 NARROW-BAND MODES **3402.000**	3400.100 Centre of activity
3402.000 ALL MODES **3475.000**	3420.000-3430.000 Digital 3450.000-3455.000 Digital

5650 - 5850 MHz BANDPLAN

IARU Region 1 bandplan	Usage
5650.000 AMATEUR SATELLITE SERVICE (up-link) **5668.000**	
5668.000 AMATEUR SATELLITE SERVICE (up-link) & NARROW BAND MODES (**a**) **5670.000**	5668.200 Narrow band centre of activity
5670.000 DIGITAL **5700.000**	
5700.000 ATV **5720.000**	
5720.000 ALL MODES **5760.000**	
5760.000 NARROW BAND MODES (**a**) **5762.000**	5760.200 Narrow band centre of activity
5762.000 ALL MODES **5790.000**	
5790.000 AMATEUR SATELLITE SERVICE (down-link) **5850.000**	

NOTES ON THE 5650 - 5850 MHz BANDPLAN

1. Footnotes

a. Societies are urged to inform their members that stations should preferably be able to operate in both narrow-band segments.

10.000 - 10.500 GHz BANDPLAN

IARU Region 1 bandplan	Usage
10.000 DIGITAL **10.150**	
10.150 ALL MODES **10.250**	
10.250 DIGITAL **10.350**	
10.350 ALL MODES **10.368**	
10.368 NARROW BAND MODES **10.370**	10.3682 Narrow band centre of activity
10.370 ALL MODES **10.450**	
10.450 AMATEUR SATELLITE SERVICE & ALL MODES **10.500**	10.450-10.452 Narrow band modes in countries where 10.368-10.370 is not available

NOTES ON THE 10.0 - 10.5 GHz BANDPLAN

1. Footnotes

a. In those countries where the narrow-band segment 10368 - 10370 MHz is not available, the segment 10450 - 10452 MHz is suggested as an alternative narrow-bandwidth segment.

24.000 - 24.250 GHz BANDPLAN(Vienna 1998)

IARU Region 1 bandplan	Usage
24.000 AMATEUR SATELLITE SERVICE **24.048**	
24.048 NARROW BAND MODES **24.050**	24.0482 Narrow band centre of activity
24.050 ALL MODES **24.192**	24.125 Preferred operating frequency for wide-band equipment
24.192 NARROW BAND MODES **24.194**	24.1922 Narrow band centre of activity
24.194 ALL MODES **24.250**	

47.000 - 47.200 GHz BANDPLAN

IARU Region 1 bandplan	Usage
47.000 ALL MODES **47.200**	47.088000 Narrow band modes centre of activity

RSGB 70.0 - 70.5 MHz BANDPLAN

The UK is the one of the very few countries within IARU Region 1 where amateur activity is allowed on 70 MHz. For the benefit of IARU Region 1 amateurs who would like to make cross-band QSO's with UK amateurs on 70 MHz the following information on the UK bandplan is included in the Handbook.

70.0 - 70.5 MHz BANDPLAN

UK Bandplan	Usage	
70.000 BEACONS **70.030**	70.030	Personal beacons
70.030 TELEGRAPHY/SSB **70.250**	70.150 70.185 centre 70.200	MS calling Crossband activity Telegraphy/SSB calling
70.250 ALL MODES **70.300**	70.260	AM/FM calling
70.300 NBFM CHANNELS, 12.5 kHz spacing **70.500**	70.3000 70.3125 70.3250 | | 70.4500 70.4625 70.4750 70.4875	RTTY/FAX Packet radio Packet radio FM calling Packet radio

A CHANNEL DESIGNATION SYSTEM FOR VHF/UHF NBFM CHANNELS

Although the NBFM channels can be referenced by their centre frequency, a numbering/naming system for NBFM channels in the 50 MHz, 145 MHz and 435 MHz is recommended (Tel Aviv 1996)

note : For the microwave bands the "old" numbering system as indicated in the bandplan still is recommended.

The system is based upon the following principles :

1) For each band, there should be a "designator letter":

   51 MHz : **F**

   145 MHz : **V**

   435 MHz : **U**

2) Each designator letter should be followed by two (for 50 and 145 MHz) or three (for 435 MHz) digits which indicate the channel.

3) If a channel is used as a repeater *output*, its designator should be preceded by the letter "**R**".

4) In the 50 MHz band the channel numbers start at „00„ for 51.000 MHz and increment by one for each 10 kHz.

5) In the 145 Mhz band the channel numbers start at „00„ for 145.000 MHz and increment by one for each 12.5 kHz.

6) In the 435 MHz bandz the channel numbers start at „000„ for 430 MHz and increment by one for each 12.5 kHz.

Examples

F51	Simplex frequency 51.510 MHz
RF79	Repeater with output frequency 51.790 MHz
V40	Simplex frequency 145.500 MHz (the old S20)
RV48	Repeater with output frequency 145.600 MHz (the old R0)
U280	Simplex frequency 433.500 MHz (the old SU20)
RU002	Repeater with output frequency 430.025 MHz (the old FRU1)
RU242	Repeater with output frequency 433.025 MHz (the old RB1)
RU368	Repeater with output frequency 434.600 MHz (the old RU0)
RU692	Repeater with output frequency 438.650 MHz (the old R70)

note : In the 50 Mhz band no NBFM channels are defined below 51 MHz. (See also footnote e to the 50 MHz bandplan.
In the 145 MHz band NBFM channels only exist for the segment with the channel frequencies 145.000 -- 145.800 Mhz (the latter channel may be used for a downlink by manned space stations)
In the 435 MHz band no NBFM channels are defined in the segment 432.000 MHz -- 433.000 MHz

INTERNATIONAL AMATEUR RADIO UNION REGION 1

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Part III

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2nd Upgrade

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OFFICIAL IARU REGION 1 VHF/UHF/MICROWAVES CONTESTS

IARU Region 1 has organised official international contests on the VHF/UHF/Microwaves bands since 1956, when an all-band contest during the first weekend of September was established.

In 1962 a separate UHF/Microwaves contest was added, which was initially held during the last weekend of May (decision Turin, 1961). From 1970 onwards this date was set at the first weekend of October (Brussels, 1969).

As of 1970 an SWL contest was established, to be run concurrently with the official Region 1 VHF and UHF/Microwaves contests.

During the IARU Region 1 Conference in Scheveningen (1972) it was decided that as of 1973 the September contest would only be held on 145 MHz.

At the IARU Region 1 Conference in Noordwijkerhout (1987) an IARU Region 1 ATV contest was added, to be held during the second weekend of September.

Finally, at the IARU Region 1 Conference in De Haan (1993) an official 50 MHz contest was established, to be held as from 1994 during the first weekend of June.

Hence currently six official IARU Region 1 contests are organised annually :

1. The VHF contest during the first weekend of September - only on 145 MHz;
2. The UHF/Microwaves contest during the first weekend of October on 435 MHz and higher bands;
3. The SWL contest run concurrently with the September VHF contest;
4. The SWL contest run concurrently with the October UHF/Microwaves contest.
5. The ATV contest during the second weekend of September;
6. The 50 MHz contest during the first weekend of June.

Member societies of IARU Region 1 organise and judge the results of the above contests.

The procedures for the organisation of the VHF and UHF/Microwaves contests are set out in Appendix 1. A list of IARU Region 1 member societies which have organised these contests or will do so in the near future can be found in Appendix 2.

The September IARU Region 1 ATV contest is organized and judged by a member society in a country where ATV transmissions are authorized.

The rules for the official Region 1 contests are set out in sections IIIb (145 MHz), IIIc (UHF/Microwaves), IIId (SWL), IIIe (ATV) and IIIf (50 MHz).

N.B. Attention is drawn to the fact that since 1974 during the first weekend of November the Italian member society ARI organises the Marconi-Memorial Telegraphy contest as an international contest for the whole of Region 1. This contest, run according to the rules of the official Region 1 contests, is judged by the ARI VHF Committee, and the results are distributed to all participating countries via the VHF Managers of the member societies. *This ARI contest replaces the former IARU Region 1 Telegraphy contest.*

PROCEDURE FOR ORGANISING IARU REGION 1 VHF/UHF/MICROWAVES CONTESTS

A. In January of each year the Chairman of the VHF/UHF/Microwaves Committee will send a letter to the society organising the VHF and UHF/Microwaves contests in that year, containing an up-to-date copy of the rules for these contests.

B. After receipt the organising societies will distribute these rules (e.g. in the form of a printed booklet) together with an invitation to participate in the contests to all IARU Region 1 member societies. The invitation should contain details on where to send the logs etc. This should be done before the end of March of that year.

C. Not later than the seventh Sunday after the contest the national VHF Manager or properly nominated Contest Committee will forward to the society organising the contest one copy of each entry, after having examined the logs and after having certified those to be acceptable to the best of their knowledge.

D. In order to obtain the most important results as quickly as possible the following checking procedure has to be followed:
The VHF Manager or properly nominated Contest Committee in each country will check a sufficient number of logs to establish the first three stations in each contest section by:

- Verifying the details of each participating station (section, having obeyed the rules, ...)
- checking all national contacts completely and applying the necessary penalties as given in the rules
- checking all distances of claimed contacts with foreign stations by measurement or calculation and making corrections where necessary. The resulting total score will also be checked.

After having been dealt with this way, the logs will be sent to the organising society, separated in sections (bands, where applicable) and accompanied by a list showing the details(Call sign, Name, Address, Bands used, Section) of all entrants and their claimed scores. This list has to be signed by the VHF Manager or the responsible of the National Contest Committee of the country.

E. Two weeks will be allowed for transit to the organising society and thus all national contributions should be in by the ninth Sunday after the contest weekend.

F. The organising society will allow a margin of three weeks for possible postal delays and will declare the entry closed on the twelfth Sunday after the contest weekend. Entries received after this date will be returned to sender or -if agreed by the sender by mail or fax- be destroyed.

G. The organising society will judge the contest and will send the results to all VHF Managers and/or Contest Committees of Societies who did send logs, **not later than by the end of the year in which the contests were held**. This can be in booklet form or any other form, as decided by the organising society. Each recipient society should receive several copies of the published results.A copy shall also be send to the chairman of the Region 1 VHF/UHF/Microwaves Committee. Optionally certificates for all participants may be provided for distribution by national societies.See also section IIIm

Preliminary Results

H• The national VHF-managers and/or national contest committees will as soon they have done the required checking (as in D. above) send (preferably by fax or e-mail) the national results to the editor of the IARU Region 1 VHF Newsletter (i.e. the chairman of the VHF/UHF/MW Committee). He will - using those data- compile the overall PROVISIONAL RESULT for each section and publish those results for the first 100 participants in the VHF Newsletter. Each member society can publish this information as PROVISIONAL RESULT in case the adjucating society has not distributed the official result within the required time scale.

PROCEDURE FOR ORGANISING THE IARU REGION I UHF/MICROWAVE ATV CONTEST

A. In January of each year the Chairman of the VHF/UHF/Microwaves Committee will send a letter to the society organising the ATV contest in that year, containing an up-to-date copy of the rules for this contest.

B. After receipt the organising societies will distribute these rules (e.g. in the form of a printed booklet) together with an invitation to participate in the contests to all IARU Region 1 member societies in those countries where ATV is allowed, respectively where participation may be expected. The invitation should contain details on where to send the logs etc.

This should be done before the end of March of that year.

C. Not later than the sixth Monday after the contest the national ATV Manager, VHF Manager or properly nominated Contest Committee will forward to the society organising the contest one copy of each entry, after having examined the logs and after having certified them to be acceptable to the best of their knowledge.

D. In order to obtain the most important results as quickly as possible the following checking procedure has to be followed:
The VHF Manager or properly nominated Contest Committee in each country will check a sufficient number of logs to establish the first three stations in each contest section by:

- Verifying the details of each participating station (section, having obeyed the rules, ...)
- checking all national contacts completely and applying the necessary penalties as given in the rules
- checking all distances of claimed contacts with foreign stations by measurement or calculation and making corrections where necessary. The resulting total score will also be checked.

After having been dealt with this way, the logs will be sent to the organising society, separated in sections (bands, where applicable) and accompanied by a list showing the details of all entrants and their claimed scores. This list has to be signed by the VHF Manager or the responsible of the National Contest Committee of the country.

E. Two weeks will be allowed for transit to the organising society and thus all national contributions should be in by the eighth Monday after the contest weekend.

F. The organising society will allow a margin of one week for possible postal delays and will declare the entry closed on the ninth Monday after the contest weekend. Entries received after this date will be returned to sender.

G. The organising society will judge the contest and will send the results to all societies (ATV and/or VHF Managers and/or Contest Committees) which did send logs as soon as possible. This can be in booklet form or any other form, as decided by the organising society. Each recipient should receive several copies of the published results. Optionally the organising society may provide certificates for all participants, to be distributed by the national societies.

LIST OF MEMBER SOCIETIES CHARGED WITH ORGANISING THE IARU REGION 1 145 MHz AND UHF/MICROWAVES CONTESTS

1956	DARC	2001	ARI	Lillehammer
1957	RSGB	2002	SRAL	1999
1958	VERON			
1959	ARI			
1960	SRJ			
1961	SSA			
1962	USKA			
1963	ÖVSV			
1964	UBA			
1965	EDR			
1966	REF			
1967	DARC			
1968	PZK			
1969	CRCC			
1970	SRAL			
1971	NRRL			
1972	RSGB			
1973	SSA			
1974	SRJ			
1975	ÖVSV			
1976	ARI			
1977	VERON			
1978	USKA			
1979	UBA			
1980	EDR Maidenhead			
1981	DARC			
1980				
1982	PZK			
1983	NRRL			
1984	RSGB			
1985	SSA			
1986	CRCC Brighton			
1987	VERON1981			
1988	SRAL			
1989	ARI (on invitation)			
1990	BFRA Düsseldorf			
1991	RSGB			
1989				
1992	DARC			
1993	ÖVSV			
1994	USKA			
1995	UBA			
1996	CRCC			
1997	FRR Tel Aviv			
1998	VERON1996			
1999	RSGB			
2000	DARC			

LIST OF MEMBERSOCIETIES CHARGED WITH ORGANISING THE IARU REGION 1 ATV CONTEST

1987	UBA	
1988	RSGB	
1990	VERON	
1991	RSGB	(Torremolinos,1990)
1992	UBA	
1993	DARC	
1994	VERON	
1995	REF	(De Haan,1993)
1996	UBA	
1997	RSGB	
1998	VERON	
1999	DARC	
2000	UBA	(Vienna 1998)
2001	REF	(Lillehammer 1999)
2002	RSGB	

LIST OF MEMBER SOCIETIES CHARGED WITH ORGANISING THE IARU REGION 1 50 MHz CONTEST

1994	EDR	(De Haan,1993)
1995	SSA	
1996	NRRL	
1997	RSGB	(Tel Aviv, 1996)
1998	FRR	
1999	PZK	
2000	HRS	
2001	ARI	(Vienna 1998)
2002	CRC	
2003	SSA	(Lillehammer 1999)

RULES IARU REGION 1 145 MHz SEPTEMBER CONTEST

1.Eligible entrants

All licensed radio amateurs in Region 1 can participate in the contest. Multiple operator entries will be accepted, provided only one callsign is used during the contest . The contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licenses of their country. Stations operating under special high power licenses do so "hors concours" and cannot be placed in the contest proper.

2. Contest sections

The contest will comprise the following sections :

i) Stations operated by a single operator, with no assistance during the contest, using privately owned equipment and antennas and operating from any location.

ii) All other entrants

No more than one transmitter may be in use at any one time.

A participating station must operate from the same location throughout the event.

3. Date of contest

The contest will start on the first Saturday of September.

4. Duration of contest

The contest will commence at 1400 hours UTC on the Saturday and will end at 1400 hours UTC on the Sunday.

5. Contacts

Each station can be worked only once, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contacts should be logged without claim for points and clearly marked as duplicates. Contacts made via active repeaters do not count for points. Any telephony contacts made with stations transmitting in the Telegraphy sub-band shall not count for points.

6. Type of emission

Contacts may be made in A1A, R3A, A3E or F3E(G3E).

7. Contest exchanges

Code numbers exchanged during each contact shall consist of the RS or RST report, followed by a serial number commencing with 001 for the first contact and increasing by one for each successive contact. This exchange must immediately be followed by the complete Locator of the sending station (examples : 59003 JO20DB or 579123 IN55CC).
(note: for the „T“ part of the report, see section VIb)

8. Scoring

Points will be scored on the basis of one point per kilometre, i.e. the calculated distance in kms will be truncated to an integer value and 1 km

will be added. The final claimed score must be shown on the top part of the first sheet.

In order to make contest scores comparable, for the conversion from degrees to kilometres a factor of 111.2 should be used when calculating distances with the aid of the spherical geometry equation (Noordwijkerhout, 1987).

9. Entries

The entries must be set out on log sheets fulfilling the requirements given under rule 12. Multi-operator stations shall be clearly marked as such. A copy of the logs must be sent to the national VHF Manager or the national Contest Committee postmarked not later than the second Monday following the contest weekend. Late entries will not be accepted. The submission of the logs implies that the entrant accepts the contest rules.

10. Judging of entries

The final judging of the entries shall be the responsibility of the organising society, whose decision shall be final. Entrants deliberately contravening any of these rules or flagrantly disregarding the IARU Region 1 bandplans shall be disqualified [1] (c) the national VHF Manager/Contest Committee is responsible for disqualification based upon the results obtained from a) and b) above.).
The claimed contact will be disqualified for an obviously wrongly stated Locator or a time error of more than 10 minutes.
Claiming points for a duplicate contact will be penalized by deducting ten times the number of points claimed for that duplicate contact from the score.
Any error in the information logged by a station will result in the loss by the receiving station of all points for that contact.
The contest entrants will not be penalized for the failure of non-entrants to comply with the rules.

11. Awards

The winner in each section will receive a certificate.

12. Logsheets

A. On paper.

The logsheets for use in the IARU Region 1 contest shall have an upright format not smaller than A4 and shall show the following columns in the order named :

- date
- time in UTC
- callsign of the station worked
- report sent
- report received
- Locator received
- number of points claimed

A standard cover sheet, containing the essential information required to judge the contest entry and with separate space for the comments of the national Contest Manager should be used.

A sample contest cover sheet is shown in Appendix 1.

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[1] At the Region 1 Conference in Scheveningen (1972) it was decided that to effect this :
a) each VHF Manager and/or national Contest Committee shall be responsible for monitoring during contests. Additional monitoring stations may be appointed but these stations may not take part in the contest.
b) telephony contacts made with stations operating in the CW subband shall not count for points.

The cover sheet should show the signature of the first operator certifying the correctness of the log submitted.

Paper logsheets prepared by the national societies and satisfying the above minimum requirements may be used.

B. *In digital form*

The logs shall be in the format defined in Section IIh.

See also section IIIaa1, item D

REMARKS

The following note is for the information of the participating societies. They may include them at their discretion in the rules published nationally.

Rule 9: The number of log copies to be submitted is left to the discretion of the national society, which may e.g. want a second copy for the judging of a simultaneously held national contest.

Sample cover sheet VHF/UHF/Microwaves contest logs

VHF/UHF/MICROWAVES CONTESTS

CONTEST MANAGER

Call ..... Locator .....

Section ..... Claimed score .....

QSO's ..... Correction .....

Final score .....

CONTEST PARTICIPANT

Contest date ..... Call used ..... Locator .....

QTH station .....

Section : i) single operator .... ii) other ....

Band : 144 MHz .... 2.4 GHz .... 10 GHz ....

432 MHz .... 3.4 GHz .... 24 GHz ....

1.3 GHz .... 5.7 GHz .... GHz ....

First operator: Name ..... Call .....

Address .....

Other operators .....

|.....

Station : TX ..... Output power ..... W

RX .....

Antenna ..... Height asl ..... m

Claimed score ..... Best DX .....

Number of contacts ..... Countries .....

Declaration

I hereby certify that this station was operated within the rules and spirit of the contest and within the terms of the license.

Date ..... Signed .....

(first operator)

RULES IARU REGION 1 UHF/MICROWAVES OCTOBER CONTEST

1. Eligible entrants

All licensed radio amateurs in Region 1 can participate in the contest. Multiple operator entries will be accepted, provided only one callsign is used during the contest [1]). The contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licenses of their country. Stations operating under special high power licenses do so "hors concours" and cannot be placed in the contest proper.

2. Contest sections

For 432 MHz and for the higher frequency amateur bands till 10 GHz inclusive there will be two sections, as defined under point 2 of the rules of the September contest. Furthermore, there will be two sections, as defined under point 2 of the rules for the September contest, for the combined group of amateur bands above 10 GHz , the so-called millimetre group [2]).

No more than one transmitter per band may be in use at any one time.

A participating station must operate from the same location throughout the event.

3. Date of contest

The contest will start on the first Saturday of October.

4. - 7. As for September contest with the following additions and/or modifications :

rule 5	-	a station can only be worked once on each band
rule 6	-	F2A may be used above 1 GHz

[1] Multi-operator entries are accepted for participation. When such stations use a different call sign on each band, the logs of that Multi-operator entry shall for each band clearly bear an indication of the group. This will preferably be one of the call signs used, but a group name may be used instead. All stations belonging to such a group shall operate from the same location, i.e. shall not be more than 50 metres from each other. The result on each of the bands where the group participates will be combined for determination of the overall result.(Tel Aviv 1996)

[2]. The millimetre group was introduced during the meeting of the VHF Working Group in Vienna, March 1986, with the aim of promoting the use of these Amateur Service bands. In October 1987 this extended rule was applied for the first time.

rule 7 - Serial numbering of contacts commences with 001 for the first contact on each band, increasing by one for each successive contact on that band.

8. Scoring

For the amateur bands till 10 GHz inclusive, points will be scored on the basis of one point per kilometre, i.e. the calculated distance in kms will be truncated to an integer value and 1 km will be added

In order to make contest scores comparable, for the conversion from degrees to kilometres a factor of 111.2 should be used when calculating distances with the aid of the spherical geometry equation (Noordwijkerhout, 1987).

For the combined higher bands the score will be the sum of the points scored on each of the bands, using the following multiplication factors for the number of kilometres scored on each band :

24 Ghz	1 x	120 GHz	5 x
47 GHz	2 x	145 GHz	6 x
75/80 GHz	3 x	245 GHz	10 x

9. - 10. As for the September contest.

11. Awards

Section winners

Certificates will be issued by the organising society to the winners in the two sections on each band.

Overall winners

For each section an overall winner of the IARU Region 1 UHF/Microwaves contest will be declared. For this competition the scores of the entrants on the following bands [1]) will be combined, using an adaptive multiplier system:

432 MHz
1.3 GHz
2.4 GHz
5.7 GHz
10 GHz
millimetre group

The multipliers to be used for the determination of the overall scores in each sector are found as follows:

The multiplier is equal to the ratio between the highest number of points scored by any participating station on the 435 MHz band and the highest number of points scored by any participating station on the band for which the multiplier is being determined.

For the millimetre group the scores as determined according to rule 8 are used for the determination of this group's multiplier.

The entrants scoring highest in each section will be awarded the IARU REGION 1 CERTIFICATE. The organising society will receive the certificates from the chairman of the

[3] As the 3.4 GHz band is not available in all countries within Region 1, the 3.4 GHz results will not be taken into account when determining the overall winners of the sections in the October IARU Region 1 UHF/Microwaves contest (Noordwijkerhout 1987)

VHF/UHF/Microwaves committee (signed by the R1 secretary) and will send those after having filled in the relevant data and after signature to the winners in each of the two sections.

12. As for September contest

See also the notes for information of participating societies at the end of the September contest rules.

Sample cover sheet VHF/UHF/Microwaves contest logs

VHF/UHF/MICROWAVES CONTESTS

CONTEST PARTICIPANT

Contest date ..... Call used ..... Locator .....

QTH station .....

Section : i) single operator .... ii) other ....

Band : 145 MHz .... 2.4 GHz .... 10 GHz ....

435 MHz .... 3.4 GHz .... 24 GHz ....

1.3 GHz .... 5.7 GHz ....

First operator: Name ..... Call .....

Address .....

Other operators .....

.....

Station : TX ..... Output power ..... W

RX .....

Antenna ..... Height asl ..... m

Claimed score ..... Best DX .....

Number of contacts ..... Countries .....

Declaration

I hereby certify that this station was operated within the rules and spirit of the contest and within the terms of the license.

Date ..... Signed .....

(first operator)

CONTEST MANAGER

Call ..... Locator .....

Section ..... Claimed score .....

QSO's ..... Correction .....

Final score .....

RULES IARU REGION 1 VHF/UHF/MICROWAVES LISTENER CONTESTS

1. Eligible entrants

All listeners within Region 1 may take part. Licensed amateurs are not eligible to enter.

2. Contest sections

a) There will be one section, 144 MHz, in the September VHF contest

b) There will be a section for each UHF/Microwaves band in the October contest

3. Date and duration of contest

Dates and times coincide with those of the official IARU Region 1 contests in September and October.

4. Logging of contacts

Any station may be logged once on each band. CQ or test calls will not count for points and should not be logged.

5. Logsheets

A. Logs on paper:

The logsheets must show the following columns:

- date
- time in GMT of start of QSO logged
- callsign of station heard
- report, serial number and Locator given by station heard
- call sign of station contacted by station heard [1])
- report and serial number given by listener to station heard (note: for the „T“ part of the report, see section VIb)
- claimed score

B. Logs in electronic form

Although not yet completely made for listeners logs, the standard in Section IIIh may be followed

6. Scoring

[1] The callsign of the station contacted by the station heard may appear not more than five times in the log, or, if there are more than 100 QSOs logged, not more than once in every 20 logged contacts.

The scoring will be on the basis of one point per kilometre distance to the station heard
, i.e. the calculated distance in kms will be truncated to an integer value and 1 km will be added
In order to make contest scores comparable, for the conversion from degrees to kilometres a factor of 111.2 should be used when calculating distances with the aid of the spherical geometry equation (Noordwijkerhout, 1987).

7. Entries

A logsheet *on paper* accompanied by a cover sheet *or in digital form* must be sent to the national VHF Manager or Contest Committee.

A sample coversheet can be found in Appendix 1 to this section.

8. Closing date

Entries must be postmarked not later than the second Monday following the contest weekend. Late entries will not be accepted.

9. Judging of entries

The judging of the entries will be the responsibility of the organising society whose decision shall be final.

Entrants deliberately contravening any of these rules will be disqualified.

Errors in callsigns or serial number and Locator will result in loss of all points for that report

Claiming points for a duplicate contact will be penalized by deducting ten times the number of points claimed for that duplicate contact from the score.

10. Awards

The winner in each section will receive a certificate.

Sample cover sheet VHF/UHF/Microwaves SWL contest logs

VHF/UHF/Microwaves LISTENER CONTESTS

Contest .....Date .....Claimed score .....

Section .....SWL registration number .....

Name .....

Address .....

Location of station .....

Latitude .....Longitude .....Locator .....

Height above sea level, ... metres

Receiver(s) .....

Aerial(s) .....

DECLARATION

I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the ruling of the organising society shall be final in cases of dispute.

Date ..... Signed .....

(operator)

CONTEST MANAGER

Call ..... Locator .....

Section ..... Claimed score .....

QSO's ..... Correction .....

Final score .....

RULES IARU REGION I SEPTEMBER ATV CONTEST

1. Contest sections

The contest will comprise two sections on each UHF/Microwave band on which ATV transmissions are authorized:

Section 1 - Transmitting:

This section is entered by all those who use transmitting equipment to send pictures for the purpose of establishing two-way vision communication, or those transmitting any other mode for the purpose of establishing one-way vision communication with a transmitting television station.

Section 2 - Receiving:

This section is entered by all those who use receive-only television equipment and do not attempt to communicate in any way with other participating television stations in order to influence their operations.

2. Eligible entrants

Section 1:

All licensed radio amateurs in Region I can participate in the contest. Multiple operator entries will be accepted, provided only one callsign is used during the contest. The contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licenses of their country. Stations operating under special high power licenses do so "hors concours" and cannot be placed in the contest proper.

Section 2:

All amateurs within IARU Region I who possess ATV receiving equipment.

3. Date of contest

The contest will begin on the second Saturday of September.

4. Duration of contest

The contest will commence at 1800 UTC on the Saturday and will end at 1200 UTC on the Sunday.

5. Contacts

For contest scoring purposes a participating station may be worked or viewed only **once** on each band.

Contacts made via active repeaters or transponders do not count for points.

6. Types of emission

On each band on which ATV transmissions are allowed, contacts may be made using the mode(s) authorized for ATV on that band.

7. Contest exchanges

The following information shall be exchanged during a contact:

i) a codenumber

For each band used a transmitting station shall choose a four-figure code group that shall not change throughout the contest. The four figures shall neither be the same (e.g. 2222) nor consecutive (e.g. 4567 or 5432). Stations using such groups shall be disqualified.
THIS CODE GROUP SHALL BE EXCHANGED IN VIDEO ONLY AND SHALL NOT BE TRANSMITTED BY ANY OTHER MODE THAN VISION.
On different bands a different code group - obeying the above rules - must be used.

ii) - Call sign (also in video)
- Vision and sound report
- IARU Locator (also in video)
- Contact serial number, starting with 001 on each band used and increasing by one for each successive contact on that band

For the vision report the internationally recognized codes B0 to B5 shall be used:

B0 - No picture perceived
B1 - Synchronisation with very little picture contents
B2 - Only large images (callsign etc.) perceivable
B3 - Picture noisy but some detail resolved
B4 - Picture slightly noisy but with good detail and resolution
B5 - Noise-free picture

For the sound report the codes T0 to T5 shall be used:

T0 - No sound
T1 - Audible but unintelligible sound
T2 - Partly intelligible sound
T3 - Noisy, but intelligible sound
T4 - Slightly noisy sound
T5 - Perfect noiseless sound

The report (e.g. B4T4) is followed by the suffix 'C' if the transmission is received in colour.

8. Scoring

Section 1:

A two-way exchange of the four-digit code group by vision together with the exchange of the other information specified in rule 7 by vision or any other mode of transmission shall score:

for contacts on the 435 MHz band : 2 points/kilometre
for contacts on the 1.3 GHz band : 4 points/kilometre
for contacts on higher bands : 10 points/kilometre

If only one station received the four-digit code group, and the other information specified in rule 7 was exchanged, the scores for *both* stations shall be reduced by 50%.

Section 2:

Reception of the four-digit code group by vision and of the other information specified in rule 7 shall score:

for reception on the 435 MHz band : 1 points/kilometre
for reception on the 1.3 GHz band : 2 points/kilometre
for reception on higher bands : 5 points/kilometre

Notes.

i) For scoring purposes all valid contacts shall be deemed to have taken place over a distance of at least 5 kilometres, even if the two stations in contact have the same or adjacent IARU Locators.

ii) In order to make contest scores comparable, for the conversion from degrees to kilometres a factor of 111.2 should be used when calculating distances greater than the 5 kilometres mentioned under i) with the aid of the spherical geometry equation (Noordwijkerhout, 1987).

9. Entries

The entries must be set out on log sheets fulfilling the requirements given under rule 12. Multi-operator stations shall be clearly marked as such. A copy of the logs must be sent to the national ATV Manager, VHF Manager or the national Contest Committee postmarked not later than the third Monday following the contest weekend. Late entries will not be accepted. The submission of the logs implies that the entrant accepts the contest rules.

10. Judging of entries

The judging of the entries shall be the responsibility of the organising society, whose decision shall be final. Entrants deliberately contravening any of these rules or flagrantly disregarding the IARU Region I bandplans shall be disqualified. Minor errors may result in loss of points.

The claimed contact will be disqualified for an obviously wrongly stated Locator, callsign, codenumber, or a time error of more than 10 minutes.

11. Awards

The winner in each of the two sections on each band and the overall leading station shall receive a certificate. The organising society may also send certificates to all entrants if they so wish.

12. Logsheets

The logsheets used for the IARU Region I UHF/Microwaves ATV contest shall have an upright format not smaller than A4 and shall show the following columns in the order named:

- date
- time in UTC
- callsign of the station worked/seen
- report sent: B# report followed by serial number (section 1)
- report received: code number (vision!) followed by B# report and serial number (sections 1 and 2)
- IARU Locator received (sections 1 and 2)
- number of points claimed

Note. A contest entrant must clearly mark crossband QSO's on the logsheet for the band on which the transmission was made.

A standard cover sheet, containing the essential information required to judge the contest entry and with a separate space for the comments of the national Contest-manager should be used for each band. The following information should be submitted:

- name and address of the first operator
- station call sign
- contest section
- station IARU Locator
- bands used, with the four-digit code group used for each band
- multi- or single-operator
- call-signs of other operators, if any
- claimed score

The coversheet should show the signature of the first operator certifying the correctness of the log(s) submitted.

A sample coversheet is shown in Appendix 1.

Sample cover sheet for UHF/Microwaves ATV contest logs
UHF/MICROWAVES ATV CONTESTS

CONTEST PARTICIPANT

Contest date ..... Call used ..... Locator .....

QTH station .....

Section : 1. Transmitting .... 2. Receiving ....

Band : 432 MHz .... 3.4 GHz .... 10 GHz ....

4-digit code: 1.3 GHz .... 5.7 GHz .... 24 GHz ....

..... 2.4 GHz ....

First operator: Name ..... Call .....

Address .....

Other operators .....

.....

Station : TX ..... Output power ..... W

RX .....

Antenna ..... Height asl ..... m

Claimed score ..... Best DX .....

Number of contacts ..... Countries .....

Declaration

I hereby certify that this station was operated within the rules and spirit of the contest and within the terms of the license.

Date ..... Signed .....

(firstoperator)

CONTEST MANAGER

Call ..... Locator .....

Section ..... Claimed score .....

QSO's ..... Correction .....

Final score .....

RULES IARU REGION 1 50 MHz JUNE CONTEST

1. Eligible entrants

All radio amateurs in Region 1 who are authorized to use 50 MHz can participate in the contest. Multiple operator entries will be accepted, provided only one callsign is used during the contest. The contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licenses of their country. Stations operating under special high power licenses do so "hors concours" and cannot be placed in the contest proper.

2. Contest sections

The contest will comprise the following sections :

i) Stations operated by a single operator, with no assistance during the contest, using privately owned equipment and antennas and operating from any location.

ii) All other entrants

No more than one transmitter may be in use at any one time.

A participating station must operate from the same location throughout the event.

3. Date of contest

The contest will begin on the first Saturday of June.

4. Duration of contest

The contest will commence at 1400 hours UTC on the Saturday and will end at 1400 hours UTC on the Sunday.

5. Contacts

Each station can be worked only once, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contacts should be logged without claim for points and clearly marked as duplicates.
Contacts made via active repeaters do not count for points. Any telephony contacts made with stations transmitting in the telegraphy subband shall not count for points.

6. Type of emission

Contacts may be made in A1A, R3A, A3E or F3E(G3E).

7. Contest exchanges

Code numbers exchanged during each contact shall consist of the RS or RST report,(note: for the „T“ part of the report, see section Vib) followed by a serial number commencing with 001 for the first contact and increasing by one for each successive contact. This exchange must immediately be followed by the complete (6 character) or shortened (4 character) Locator of the sending station (examples : 59003 JO20DB or 579123 IN55).

8. Scoring

Points will be scored on the basis of one point per kilometre, i.e. the calculated distance in kms will be truncated to an integer value and 1 km will be added. In case the 4character Locator has been received, the distance calculated should be the shortest distance between the claiming station and the given Locator square.

The final claimed score must be shown on the top part of the first sheet.

In order to make contest scores comparable, for the conversion from degrees to kilometres a factor of 111.2 should be used when calculating distances with the aid of the spherical geometry equation (Noordwijkerhout, 1987).

9. Entries

The entries must be set out on log sheets fulfilling the requirements given under rule 12. Multioperator stations shall be clearly marked as such. A copy of the logs must be sent to the national VHF Manager or the national Contest Committee postmarked not later than the second Monday following the contest weekend. Late entries will not be accepted. The submission of the logs implies that the entrant accepts the contest rules.

10. Judging of entries

The judging of the entries shall be the responsibility of the organising society, whose decision shall be final. Entrants deliberately contravening any of these rules or flagrantly disregarding the IARU Region 1 bandplans shall be disqualified [1])
Errors in the logged information will result in the loss of all points for that contact by the receiving station

The claimed contact will be disqualified for an obviously wrongly stated Locator or a time error of more than 10 minutes.

Claiming points for a duplicate contact will be penalized by deducting ten times the number of points claimed for that duplicate contact from the score.

The contest entrants will not be penalized for the failure of nonentrants to comply with the rules.

11. Awards

The winner in ach section will receive a certificate.

12. Logsheets

A. On paper.

The logsheets for use in the IARU Region 1 contest shall have an upright format not smaller than A4 and shall show the following columns in the order named :

- date
- time in UTC
- callsign of the station worked
- report sent
- report received
- Locator received
- number of points claimed

A standard cover sheet, containing the essential information required to judge the contest entry and with separate space for the comments of the national Contest Manager should be used.

A sample contest cover sheet is shown in Appendix 1.

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1 At the IARU Region 1 Conference in Scheveningen (1972) it was decided that to effect this:
a) each VHF Manager and/or national Contest Committee shal be responsible for monitoring during contests. Additional monitoring stations may be appointed but these stations may not take part in the contest.
b) telephony contacts made with stations operating in the telegraphy subband shall not count for points.
c) the national VHF Manager/Contest Committee is responsible for disqualification based upon the results obtained from a) and b) above.

The cover sheet should show the signature of the first operator certifying the correctness of the log submitted.

Paper logsheets prepared by the national societies and satisfying the above minimum requirements may be used.

B. *In digital form*

The logs shall be in the format defined in Section IIh.

See also section IIIaa1, item D

Paper logsheets prepared by the national societies and satisfying the above minimum requirements may be used.

REMARKS

The following note is for the information of the participating societies. They may include them at their discretion in the rules published nationally.

Rule 9: The number of log copies to be submitted is left to the discretion of the national society, which may e.g. want a second copy for the judging of a simultaneously held national contest.

ELECTRONIC LOG EXCHANGE

At its meeting in Vienna 1998 the VHF/UHF/Microwaves Committee has recommended the use of the Electronic Contest Log distribution format for the exchange of log information concerning IARU Region 1 Contests. This recommendation has been endorsed by the IARU R1 EC at its 1998 meeting.

Participants to IARU Region 1 contests can still send their logs in a paper form.
However when using the digital format ,the cover sheets, signed by the participant, are still required for the moment and shall be received by the national VHF Managers together with the electronic information.

Introduction to the format

The aim of the common file format is to make contest log programmers able to deliver a standard output file from their programs, to enable contest managers to receive logs via data transfer system (e.g. diskettes, Internet) introduce electronic log processing and ease submission for participants.

The format does not specify when to use it. Generally speaking, the usage is up to the contest manager. Seen from a validation point of view it can be used for checking „big“ stations only. From an easy-submission point of view it can be used to ease the submission among contest participants as an alternative to traditional mail. What media to use is not specified, and is up to the contest manager. If Internet is a reliable medium it is a good choice, however, that does not solve yet the legal issue with the responsible operators signature yet required for IARU Region 1 contests.

When a contest manager invites to a contest she/he should state if electronic log submission is possible, in what way (e.g. diskette,INTERNET) and where (managers E-mail address), just like own mailing address. Contest managers must have a validation program to make a complete validation including cross checking etc.

Contest participants can use the electronic data file format to submit their logs to the contest manager in time. To be able to do this, participants must use a contest program capable of generating a REG1TEST file.

The details are given in annex IIIh-a1

Note : Many logging programmes do not yet accept a non-numeric character for the T part of the report. Users shall check this according to the recommendation in section VI

STANDARD FORMAT FOR ELECTRONIC CONTEST LOG EXCHANGE (VIENNA 1998)	Issue: 1,1

Subject
Electronic Data Interchange - EDI-file format for contests in Region 1 above 30 MHz

Scope
This document is the specification for the Region 1 above 30 MHz contest file formats . Examples for commonly known contests are shown in the appendix.

The aim is to make contest-log programmers able to deliver a standard (file) format from their programs, to enable contest managers to receive log data through various types of digital communication systems e.g. diskettes, e-mail, etc; for electronic evaluation purposes.

Original
Prepared by: Bo Hansen, OZ1FDJ, Søren Pedersen, OZ1FTU

Format

[REG1TEST;1]File identifier;file version
F TName=Contest name
TDate=Beginning;ending date of contest
PCall=Callsign used
PWWLo=WWL used
PExch=Exchange used
F PAdr1=Address line 1 from where the contest took place
F PAdr2=Address line 2 from where the contest took place
F PSect=Section in which station participates
PBand=Band used during the contest
PClub=Club station where points can be accumulated
F RName=Name of responsible operator
RCall=Callsign of responsible operator
F RAdr1=Address line 1 of responsible operator
F RAdr2=Address line 2 of responsible operator
F RPoCo=Postal code of responsible operator
F RCity=City of responsible operator
F RCoun=Country of responsible operator
F RPhon=Phone number of responsible operator
F RHBBS=Home BBS of responsible operator
MOpe1=Multi operator line 1
MOpe2=Multi operator line 2
F STXEq=TX equipment
F SPowe=TX power [W]
F SRXEq=RX equipment
F SAnte=Antenna
F SAntH=Antenna height above ground level [m];height above sea level [m]
CQSOs=Claimed number of valid QSOs;Band multiplier
CQSOP=Claimed number of QSO-points
CWWLs=Claimed number of WWLs;Bonus per each new WWL;WWL multiplier
CWWLB=Claimed number of WWL bonus points
CExcs=Claimed number of Exchanges;Bonus per each new Exchange;Exchange multiplier
CExcB=Claimed number of Exchange bonus points
CDXCs=Claimed number of DXCCs;Bonus per each new DXCC;DXCC multiplier
CDXCB=Claimed number DXCC bonus
CToSc=Claimed total score
CODXC=Call;WWL;distanceBest DX contact
[Remarks]Remarks identifier
F Remarks lines
[QSORecords;Number of QSO records following]QSO records identifier;number of QSO records following
Date;Time;Call;Mode code;Sent-RST;Sent QSO number;Received-RST;Received QSO number;Received exchange;Received-WWL; QSO-Points;New-Exchange-(N);New-WWL-(N);New-DXCC-(N);Duplicate-QSO- (D)

Explanation of keywords

Keywords are defines as the word in front of the actual argument. The keyword is separated from the argument with an equal sign (=).

[REG1TEST;1]
REG1TEST;1 is the file identifier and the file version. It serves as indicator for which format and version is being used and where data begins.

TName
Argument describes the name of the contest in which the station participated.

TDate
Arguments describe the beginning and ending dates of the contest. Arguments are separated with a semicolon (;). Arguments are written as YYYYMMDD.

PCall
Argument describes the callsign used during the contest.

PWWLo
Argument describes own World Wide Locator (WWL, Maidenhead, Universal Locator) used during the contest. Maximum length is six characters.

PExch
Argument describes own Exchange during the contest. This can be any type of information, e.g. Province, DOK, County, State, Power, Name. Maximum length is six characters.

PAdr1
Argument describes the address of the QTH used during the contest, line 1.

PAdr2
Argument describes the address of the QTH used during the contest, line 2.

PSect
Argument describes in which section the station is participating. Synonyms to the meaning „section“ are: class, category, group etc.

PBand
Argument describe which band was used during the contest. Please note the bands and which frequency range they represent in the table below:

Frequency		*PBand*
50 - 54 MHz	=	50 MHz
70 - 70,5 MHz	=	70 MHz
144 - 148 MHz	=	144 MHz
430 - 440 MHz	=	432 MHz
1240 - 1300 MHz	=	1,3 GHz
2300 - 2450 MHz	=	2,3 GHz
3400 - 3600 MHz	=	3,4 GHz
5650 - 5850 MHz	=	5,7 GHz
10,0 - 10,5 GHz	=	10 GHz
24,0 - 24,25 GHz	=	24 GHz
47,0 - 47,2 GHz	=	47 GHz
75,5 - 81 GHz	=	76 GHz
120 - 120 GHz	=	120 GHz
142 - 148 GHz	=	144 GHz
241 - 250 GHz	=	248 GHz

PClub
Argument describes the callsign of the radio club where operator(s) are member. Can be used if points are accumulated to the club etc.

RName
Argument describes the given- and surname of the responsible operator.

RCallArgument describes the callsign of the responsible operator.

Adr1
Argument describes the address of the responsible operator, line 1.

RAdr2
Argument describes the address of the responsible operator, line 2.

RPoCo
Argument describes the postal code of the responsible operator.

RCity
Argument describes the city of the responsible operator.

RCoun
Argument describes the country of the responsible operator.

RPhon
Argument describes the telephone number of the responsible operator.

RHBBS
Argument describes the Bulletin Board System or electronic mail address of the responsible operator.

MOpe1
Arguments describe the operators participating in the contest, line 1. All arguments separated with a semicolon (;). Responsible operator is not needed in this argument.

MOpe2
Arguments describe the operators participating in the contest, line 2. All arguments are separated with a semicolon (;).Responsible operator is not needed in this argument.

STXEq
Argument describes the transmitting equipment used during the contest.

SPowe
Argument describes the transmitting power used during the contest, unit is Watt.

SRXEq
Argument describes the receiving equipment used during the contest.

SAnte
Argument describes the antenna system used during the contest.

SAntH
Arguments describe the antenna height above ground level and sea level, unit is meter. All arguments separated with a semicolon (;).

CQSOs
Arguments describe the claimed number of valid QSOs and the band multiplier. All arguments are separated with a semicolon (;).

CQSOP
Argument describes the claimed total number of QSO-points. The format does not specify that QSO-points can only be based upon distances.

CWWLs
Arguments describe the claimed number of WWLs worked, the number of bonus points claimed for each new WWL and the WWL multiplier. All arguments are separated with a semicolon (;).
If no bonus points are claimed then bonus points per each new WWL are set to zero (0). If no multiplication is used for each new WWL the multiplier is set to one (1).

CWWLB
Argument describes the claimed total number of WWL bonus points.

CExcs
Arguments describe the claimed number of Exchanges worked, the number of bonus points claimed for each new Exchange and the Exchange multiplier. All arguments are separated with a semicolon (;).

If no bonus points are claimed then bonus points per each new Exchange are set to zero (0). If no multiplication is used for each new Exchange the multiplier is set to one (1).

CExcB
Argument describes the claimed total number of Exchange bonus points.

CDXCs
Arguments describe the claimed number of DXCCs worked, the number of bonus points claimed for each new DXCC and the DXCC multiplier. All arguments are separated with a semicolon (;).

If no bonus points are claimed then bonus points per each new DXCC are set to zero (0). If no multiplication is used for each new DXCC the multiplier is set to one (1).

CDXCB
Argument describes the claimed total number of DXCC bonus points.

CToSc
Argument describes the total claimed score. The format does not specify how the total score is calculated.

CODXC
Arguments describe the claimed ODX contact call, WWL and distance. All arguments are separated with a semicolon (;).

[Remarks]
The [Remarks] identifier is used to mark where the Remarks begins. All lines following, until [QSORecords;Number of QSO records following], are remarks. If no remarks are written identifier must still be present.

Remarks lines
Remarks lines are where the station may write comments to the test. The number of lines is variable. All lines in between [Remarks] and [QSORecords;Number of QSO records following] are remarks.

[QSORecords;Number of QSO records following]
The [QSORecords;Number of QSO records following] is the QSO record identifier used to mark where QSO records begins, and how many consecutive QSO records to follow.

QSO record definition
Date;Time;Call;Mode code;Sent-RST;Sent QSO number;Received RST;Received QSO number;Received Exchange;Received-WWL;QSO-Points;New-Exchange-(N);New-WWL-(N);New-DXCC-(N);Duplicate-QSO-(D)
All arguments are separated with a semicolon (;).

All fields in the QSO record is written on the same line, and ending with ASCII characters 13 and 10 (CR LF).

Field		*Maximum length*
Date	=	YYMMDD, 6 characters 6
Time	=	UTC, 4 characters, with leading zeros 4
Call	=	3 to 14 characters 14
Mode code	=	0 or 1 character 1
Sent-RST	=	0 or 2 or 3 characters 3
Sent QSO number	=	0 or 3 or 4 characters, with leading zeros 4
Received-RST	=	0 or 2 or 3 characters 3
Received QSO number	=	0 or 3 or 4 characters, with leading zeros 4
Received Exchange	=	0 or 1 to 6 characters (see also PExch) 6
Received WWL	=	0 or 4 or 6 characters, World Wide Locator 6
QSO points	=	1 to 6 characters, including bandmultiplier 6
New-Exchange	=	0 or 1 character, "N" if QSO is a new exchange 1
New-WWL	=	0 or 1 character, "N" if QSO is a new WWL 1
New-DXCC	=	0 or 1 character, "N" if QSO is a new DXCCL 1
Duplicate-QSO	=	0 or 1 character, "D" if contact is a duplicate QSO 1

61
+ field separators, 14
75

Mode code
The mode code is used to show which modes were used for the QSO. Below is a list of the code with corresponding modes.

Mode code	*TX mode*	*RX mode*
0	non of below	non of below
1	SSB	SSB
2	CW	CW
3	SSB	CW
4	CW	SSB
5	AM	AM
6	FM	FM
7	RTTY	RTTY
8	SSTV	SSTV
9	ATV	ATV

If the mode is not important it can be left blank, i.e. not stated in rules/invitation.

Characters
Used characters are in accordance with the 7-bit ASCII alphabet and only characters with the following decimal number are allowed 10, 13, 32-127.

Line length
If line length is already specified it must not be exceeded, other lines must not exceed a length of 75 characters. Length is limited due to Packet Radio transferral.
F
All lines, in the format description, with the "F" denote that entry is a *free format*. This means that any of the above characters in the 7-bit ASCII alphabet can be used.

All other entries are *forced format* and characters, as above, are in capital. All numbers in forced format are positive integers and non-exponential notation and entry can not be left empty, i.e. 0 (zero) or greater. All forced formats must be in accordance with SI-units (Système International).

Separator (;)
This separator semicolon (;) is written to separate multiple information on same line.
If the format is used for a contest which does not use some of the QSO exchanges, i.e. QSO no., WWL and Exchange, these fields are left blank. Proper interpretation must be ensured by manager program.

Faulty QSOs
A duplicate QSO is marked with a "D" in the Duplicate-QSO field, and the QSO-points field is set to 0 (zero). The format does not define when a QSO is a duplicate.

An incomplete QSO is written with the information received, and the QSO-points field is set to zero (0).

In case of a mistake, an error mark must be inserted in the Callsign field to keep a correct flow in the number of QSOs records. The error mark must be an "ERROR" and the other fields except Time and Sent QSO no., if used, can be left empty. In case the empty field is accumulated, e.g. QSO-points, it is set to 0 (zero).

QSO numbers
The format does not define in what order the QSO numbers must be listed. It is possible to use the format to submit logs for contests requiring consecutive numbers for all QSOs, even if they are on different bands.

Missing information
If a contest log program can not fill in all the information, the missing information can be left blank, except if information is needed for claiming/calculating scores, e.g. log program cannot identify WWLs, DXCCs etc. If the information is required for the scores this log program can not be used for this particular contest anyway.

The following section describes different EDI-files for various commonly known contest types.

Region 1 Contest, standard type

```
[REG1TEST;1]
TName=IARU Region 1, March contest VHF
TDate=19950304;19950305
PCall=OZ1FDJ
PWWLo=JO65FR
PExch=
PAdr1=Herlevgaardsvej 32 A, st. tv., DK-2730 Herlev
PAdr2=
PSect=Multi operator
PBand=144 MHz
PClub=OZ2AGR
RName=Bo Hansen
RCall=OZ1FDJ
RAdr1=Herlevgaardsvej 32 A, st. tv.
RAdr2=
RPoCo=DK-2730
RCity=Herlev
RCoun=DENMARK
RPhon=(+45) 42 91 53 98
RHBBS=OZ6BBS
MOpe1=OZ1FTU
MOpe2=
STXEq=FT-225RD+MRF247
SPowe=90
SRXEq=FT-225RD+MuTek+BF981 1,5 dB NF
SAnte=9 elements OZ5HF
SAntH=14;41
CQSOs=24;1
CQSOP=11579
CWWLs=19;0;1
CWWLB=0
CExcs=0;0;1
CExcB=0
CDXCs=7;0;1
CDXCB=0
CToSc=11579
CODXC=OY9JD;IP62OA;1302
[Remarks]
Nice with the Aurora, made it possible to work more than usual
in a 24 h contest. Nice to hear Jon (OY9JD) again, but, many
stations calling so no time for chat.
Besides the Aurora there was only little activity, as usual, in Scandanivia.
[QSORecords;26]
950304;1445;OZ9SIG;1;59;001;59;006;;JO65ER;6;;N;N;
950304;1446;DL5BBF;1;54;002;59;023;;JO42LT;396;;N;N;
950304;1449;OZ1HLB/P;1;59;003;59;015;;JO55US;48;;N;;
950304;1450;DL6FBL;1;53;004;51;092;;JO40XL;608;;N;;
950304;1454;DF0TAU;1;54;005;59;084;;JO40QO;606;;;;
950304;1508;DJ3QP;1;55;006;59;095;;JO42FB;485;;;;
950304;1510;DG5TR;1;53;007;53;006;;JO53QP;242;;N;;
950304;1519;DL0WU;1;55;008;53;108;;JO31OF;609;;N;;
950304;1528;DL3LAB;1;59;009;59;046;;JO44XS;191;;N;;
950304;1532;DL5XV;1;56;010;59;033;;JO53AO;283;;;;
950304;1544;OZ8RY/A;1;56;011;57;010;;JO66HB;39;;N;;
950304;1553;OZ1AOO;1;59;012;59;001;;JO65FR;1;;;;
950304;1603;ERROR;;;013;;;;;0;;;;
950304;1618;DL0WX;1;53;014;52;174;;JO30FQ;688;;N;;
950304;1626;SM4HFI;2;53A;015;54A;019;;JP70TO;573;;N;N;
950304;1631;GM4YXI;2;57A;016;55A;015;;IO87WI;911;;N;N;
950304;1636;OH2AAQ;2;52A;017;59A;015;;KO29FX;851;;N;N;
950304;1640;OH2BNH;2;55A;018;57A;024;;KP20LG;891;;N;;
950304;1641;LA2AB;1;59A;019;57A;027;;JO59FV;479;;N;N;
950304;1646;SM5BSZ;2;55A;020;57A;029;;JO89IJ;480;;N;;
950304;1700;SK5BN;2;51A;021;55A;026;;JP80UE;585;;N;;
950304;1720;DL9LBA;2;529;022;559;056;;JO44UP;213;;;;
950304;1730;SK6NP;2;559;023;539;029;;JO68MB;262;;N;;
950304;1736;OH1MDR;2;52A;024;57A;023;;KP01VJ;830;;N;;
950304;1739;OY9JD;2;51A;025;52A;011;;IP62OA;1302;;N;N;
950304;1826;OZ9SIG;1;59;026;59;006;;JO65ER;0;;;;D
```

AGCW DL VHF Contest (contest manager: DJ2QZ)

```
[REG1TEST;1]
TName=AGCW contest 2 m
TDate=19950318;19950318
PCall=OZ1FDJ
PWWLo=JO65FR
PExch=C
PAdr1=Herlevgaardsvej 32 A, st. tv., DK-2730 Herlev
PAdr2=
PSect=C
PBand=144 MHz
PClub=OZ2AGR
RName=Bo Hansen
RCall=OZ1FDJ
RAdr1=Herlevgaardsvej 32 A, st. tv.
RAdr2=
RPoCo=DK-2730
RCity=Herlev
RCoun=DENMARK
RPhon=(+45) 42 91 53 98
RHBBS=OZ6BBS
MOpe1=
MOpe2=
STXEq=FT-225RD+MRF247
SPowe=90
SRXEq=FT-225RD+MuTek+BF981 1,5 dB NF
SAnte=9 elements OZ5HF
SAntH=14;41
CQSOs=24;1
CQSOP=11579
CWWLs=19;500;1
CWWLB=9500
CExcs=3;0;1
CExcB=0
CDXCs=7;0;1
CDXCB=0
CToSc=11579
CODXC=OY9JD;IP62OA;1302
[Remarks]
Nice with the Aurora, made it possible to work more than usual.
Nice to hear Jon (OY9JD) again, but, many stations calling so no time for
chat.
Besides the Aurora there was only little activity, as usual, in Scandanivia.
[QSORecords;26]
950318;1600;OZ9SIG;2;599;001;599;006;B;JO65ER;6;N;N;N;
950318;1602;DL5BBF;2;549;002;599;023;C;JO42LT;396;N;N;N;
950318;1607;OZ1HLB/P;2;599;003;599;015;C;JO55US;48;;N;;
950318;1609;DL6FBL;2;539;004;519;092;C;JO40XL;608;;N;;
950318;1614;DF0TAU;2;549;005;599;084;B;JO40QO;606;;;;
950318;1618;DJ3QP;2;559;006;599;095;C;JO42FB;485;;;;
950318;1625;DG5TR;2;539;007;539;006;A;JO53QP;242;N;N;;
950318;1628;DL0WU;2;559;008;539;108;C;JO31OF;609;;N;;
950318;1630;DL3LAB;2;599;009;599;046;C;JO44XS;191;;N;;
950318;1632;DL5XV;2;569;010;599;033;C;JO53AO;283;;;;
950318;1644;OZ8RY/A;2;569;011;579;010;A;JO66HB;39;;N;;
950318;1653;OZ1AOO;2;599;012;599;001;A;JO65FR;1;;;;
950318;1703;ERROR;;;013;;;;;0;;;;
950318;1718;DL0WX;2;539;014;529;174;C;JO30FQ;688;;N;;
950318;1726;SM4HFI;2;53A;015;54A;019;C;JP70TO;573;;N;N;
950318;1731;GM4YXI;2;57A;016;55A;015;C;IO87WI;911;;N;N;
950318;1736;OH2AAQ;2;52A;017;59A;015;C;KO29FX;851;;N;N;
950318;1740;OH2BNH;2;55A;018;57A;024;C;KP20LG;891;;N;;
950318;1741;LA2AB;2;59A;019;57A;027;C;JO59FV;479;;N;N;
950318;1746;SM5BSZ;2;55A;020;57A;029;C;JO89IJ;480;;N;;
950318;1800;SK5BN;2;51A;021;55A;026;C;JP80UE;585;;N;;
950318;1820;DL9LBA;2;529;022;559;056;C;JO44UP;213;;;;
950318;1830;SK6NP;2;559;023;539;029;B;JO68MB;262;;N;;
950318;1836;OH1MDR;2;52A;024;57A;023;C;KP01VJ;830;;N;;
950318;1839;OY9JD;2;51A;025;52A;011;C;IP62OA;1302;;N;N;
950318;1846;OZ9SIG;2;599;026;599;006;B;JO65ER;0;;;;D
```

SUB-REGIONAL VHF/UHF/MICROWAVES CONTEST COORDINATION WITHIN REGION 1

To stimulate activity on all VHF/UHF/Microwave bands, sub-regional contests, organised and judged by national societies, have been held since 1956. In many countries these contests have developed into national annual Trophy competitions.

The rules for the national contests are up to the national society which organises the contests. They may use the IARU Region 1 contest rules or design their own rules, deviating for instance in the manner of scoring etc.

However, experience has shown that a certain amount of international coordination is required, and hence the following rulings were adopted at various IARU Region 1 Conferences.

A. All-band sub-regional contests

At the IARU Conference in Folkestone (1961) it was agreed that during sub-regional contests code numbers and Locator should be exchanged according to the rules for IARU Region 1 VHF/UHF/Microwaves contests.

In view of the rather different contest conditions in the various parts of Region 1 the following minimum co-ordination, adopted at the Region 1 Conference in Malmö (1963) and later slightly amended at the Scheveningen Conference (1972) and the Brighton Conference (1981) has been agreed:

> All sub-regional contests will be held between 14.00 UTC on Saturday and 14.00 UTC on Sunday.
>
> All VHF/UHF/Microwaves Field Days, organised within Region 1, shall coincide as to dates and time limits with sub-regional or official IARU Region 1 contests.

At the IARU Region 1 Conference in Brussels (1969) it was agreed that the sub-regional contest during the first weekend of November shall be a Telegraphy contest, run according to the rules of the official Region 1 contests [1].

Furthermore, at the IARU Region 1 Conference in Cefalu (1984) it was agreed that

> Sub-regional contests on the coordinated dates shall be all-band events, 145 MHz through 240 GHz.

On this basis in many countries member societies of IARU Region 1 organise national contests during the first weekends of March, May, July, September, October and November, whereby the September and October national contests are run concurrently with the IARU Region 1 contests on these weekends.

In view of the fact that in an appreciable number of countries the 50 MHz band had become available to the Amateur Service, the meeting of the IARU Region 1 VHF/UHF/Microwaves Committee in Vienna, March 1992, adopted the following recommendation:

From 1993 national societies are encouraged to establish 50 MHz sections in the sub-regional contests.

This recommendation was approved by the Executive Committee of Region 1 at their meeting in April 1992, and ratified by the 1993 IARU Region 1 Conference.

At the same conference an IARU Region 1 50 MHz contest was established.

---

1 Since 1974 ARI has organised the Marconi Memorial Telegraphy contest during this weekend and has invited all Region 1 amateurs to participate (see also IIIa).

B. Microwave contest

At the IARU Region 1 Conference in Scheveningen (1972) it was agreed that National societies shall organise sub-regional contests on the microwave (1.3 GHz and higher) bands during the third weekend of June.

At the IARU Region 1 Conference in Noordwijkerhout (1987) it was decided that from 1988 onwards the sub-regional microwave contests will take place on the first weekend of June.

C. Experiment with scoring system: Locator bonuses

On the subject of scoring at the IARU Region 1 Conference in Noordwijkerhout the following recommendation was adopted:

> - Societies are encouraged to try out a system of locator bonuses, such as proposed by EDR, in their national VHF/UHF/Microwaves contests.

The EDR proposal can be found in Appendix 1 to this section.

D. Information exchange on contests

To ensure that participants in the various contests will know on which times or time intervals they may expect activity in other countries on the bands, at the Conference in Malmö (1963) and at later Conferences the importance of exchanging information on contests was stressed. At the IARU Region 1 Conference in Warsaw (1975) the following recommendation was adopted:

> In order to promote greater uniformity in the timing (and perhaps style) of Region 1 VHF/UHF/MICROWAVES contests, all member societies are invited to send well in advance of the contest dates, say annually, details of their contest calender - dates and times - in English to the Hon. Secretary of Region 1 for publication in Region 1 News and for forwarding to all VHF Managers for information.

The Hon. Secretary of Region 1 has requested to send this information to the Region 1 Secretariat not later than the 31st December of each year.

INTRODUCTION OF LOCATOR BONUS IN CONTESTS

From the EDR proposal, document NN 100 amended, submitted to the IARU Region 1 Conference at Noordwijkerhout (1987):

To encourage participants in the regional and sub-regional contests to turn their antenna towards less-populated areas, EDR proposes the introduction of a Locator-Bonus in the contest rules.

For several years this principle has, with success, been in use in Scandinavia.

If the Locator-Bonus is used, we expect top see growing activities in the "outskirts" of Europe, where it is low, dying or completely dead now. This is due to the fact that contest activity in central Europe is so high nowadays, that any good station can work "local" stations for most of the contest period. Only during the night there appears to be time to work "DX" to the remote areas.

Currently these remote stations, when participating in the contests, only work a limited number of stations during the first hours of a contest and thereafter quickly go QRT.

If the "remote" stations would get more attention by being more "attractive" (bonus points), they will, undoubtedly, also become more active and we may expect a positive development in the contest activity.

After discussion in Committee B it was decided to recommend that this system be tried out in national contests.

The following bonus system was mentioned as a starting point for the experiments:

- for each new locator square worked

  on the 145 MHz and 435 MHz bands: 1000 points
  on the microwave bands: 300 points

THE LOCATOR SYSTEM

1. History

The scoring in official IARU Region 1 contests as well as in most sub-regional contests is based upon the distance in kilometres between two stations making a complete QSO. To facilitate the measurement of this distance, at a meeting of the VHF Working Group in The Hague in October 1959 a code system was adopted for giving the location of a station. This was the QRA-Locator system, devised in Germany, originally based on a two-stage sub-division of geographical longitudes and latitudes starting from the Greenwich meridian and from 40 degrees North. At the Region 1 Conference in Malmö (1963) the system was refined by introducing a third sub-division, and in its final form the QRA-Locator consisted of a five-character code, viz. two capital letters, a two-digit number and a lower-case letter, for example CM72j.

Many Region 1 societies developed maps based on this system, either of their own country or of larger parts of Western Europe.

At a meeting of the Region 1 VHF Working Group in Brussels (1965) Dr. H.R.Lauber, HB9RG, VHF Manager of USKA, showed the first prints of the Region 1 QRA-Locator map, issued on four sheets and made through his good offices at the request of the VHF Working Group.

At the Region 1 Conference in Opatija (1966) this map was adopted as the official Region 1 QRA-Locator map, while at the Region 1 Conference in Scheveningen the system was re-baptised with the more appropriate name QTH-Locator. In the meantime it had become very popular and was used not only during contests but also for general amateur work on the VHF/UHF/SHF bands. For instance, collecting "squares" (the first two letters of the QTH-Locator indicating a square of 2 degrees longitude wide and 1 degree latitude high) became one of the most widely practised sports .

When amateurs outside Region I, especially in North America (Region II), became interested in using a form of QTH-Locator during their contacts, contests etc. and started investigating the system devised in Region I, they found this Locator system repeated itself several times around the globe. Hence they considered this ambiguous system not very suitable for exchanging QTH information, for instance during EME contacts.

Furthermore, the QTH- Locator system was not very consistent in the set-up of sub-divisions, particularly with regard to the fifth character (letter). A more consistent system, if introduced, would be of use to the many amateurs who employed computers - from PC's to programmable pocket calculators - to calculate distances and determine antenna directions from QTH-Locators.

For reasons like the ones outlined above, at a meeting of the IARU Region 1 VHF Working Group in Amsterdam (1976) SM5AGM, VHF Manager of SSA, proposed to start discussions on a better Locator system that could replace the existing one and would be usable world-wide.

As there would not be much sense in changing to a world-wide applicable Locator system in Region 1 if the other Regions would not adopt it, at the Region 1 Conference in Miskolc-Tapolca (1978) it was agreed that Region 1 would consult the other two Regions on this matter. This consultation resulted in an exchange of system proposals between the Regions, and at a certain moment more than 20 different systems and variations on systems, generated in the various Regions, were under consideration!

At the VHF Working Group meeting in Maidenhead (1980) it was felt that the time had come to make a choice, and it was agreed that the best choice would be the system devised by John Morris, G4ANB, be it with a modification concerning the starting point of the grid of the first sub-division. This system was widely published in amateur magazines of member societies in Region 1 as well as in the other Regions.
Thanks to the effort of Folke Rasvall, SM5AGM - aided, amongst others, by ZL2AMJ (Region III) and W1XX (Region II) - agreement between the Regions could be reached and all Regions have now accepted the so-called Maidenhead Locator which henceforth will simply be known as the Locator.

Region II adopted the Locator in 1982, Region III in 1983. At the IARU Region 1 Conference in Cefalu (1984) Region 1 adopted the Locator system, and the introduction date was set at January 1, 1986. As from this date all official Region 1 contests are run using the new Locator system.

2. Description of the Locator system

The Locator system is a grid system, allowing to give the location of a station by a code consisting of six characters, viz. two capital letters, a two-digit number and, again, two capital letters. For example : JO31DG.

The system is set up as follows. The globe is divided in 18 * 18 = 324 fields, each 20 degrees longitude wide and 10 degrees latitude high (for an overview see the map in Appendix 1). Each of these fields is divided in 10 * 10 = 100 squares, each 2 degrees longitude wide and 1 degree latitude high. Finally, each of the squares is divided in 24 * 24 = 576 sub-squares, each 5 minutes longitude wide and 2.5 minutes latitude wide. The coding/numbering is, as shown in Appendix 2, always from west to east and from south to north, and the origin of the system is at 180 degrees west, 90 degrees south.

As far as "squares" are concerned, the system is compatible with the old QTH-Locator system, both having squares of 2 degrees longitude, 1 degree latitude. The only difference, of course, is in the coding; for instance, square CM in the QTH-Locator system will in the Locator system be square JO22. Consequently, for the collectors of "squares" continuity is assured.

Appendix 3 gives a set of diagrams to determine in a simple way a station's Locator from its geographical position.

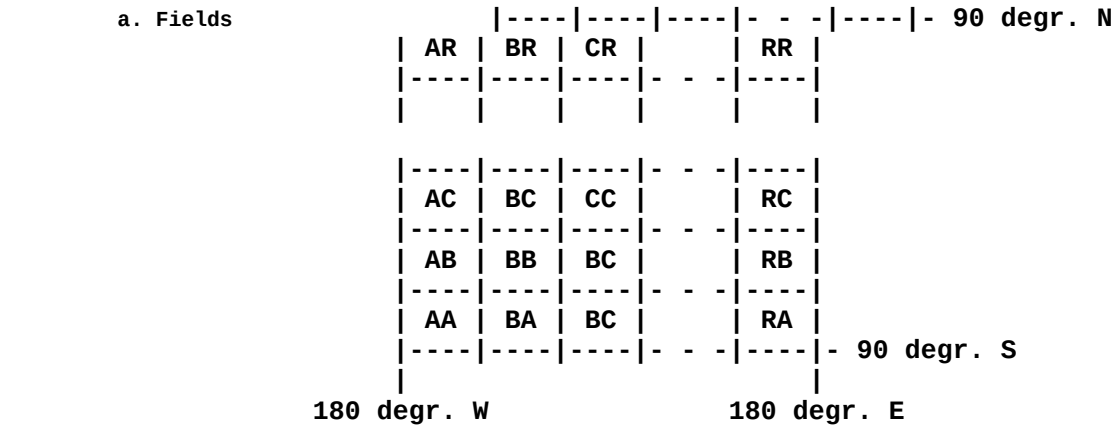
At the 1999 Conference in Lillehammer it was decided that a more precise definition of „longitude“ and „latitude“ was required. The conference decided that the latitude and longitude to be used as a reference for the determining of locators should be :

„THE WORLD GEODETIC SYSTEM 1984 (WGS-84) „

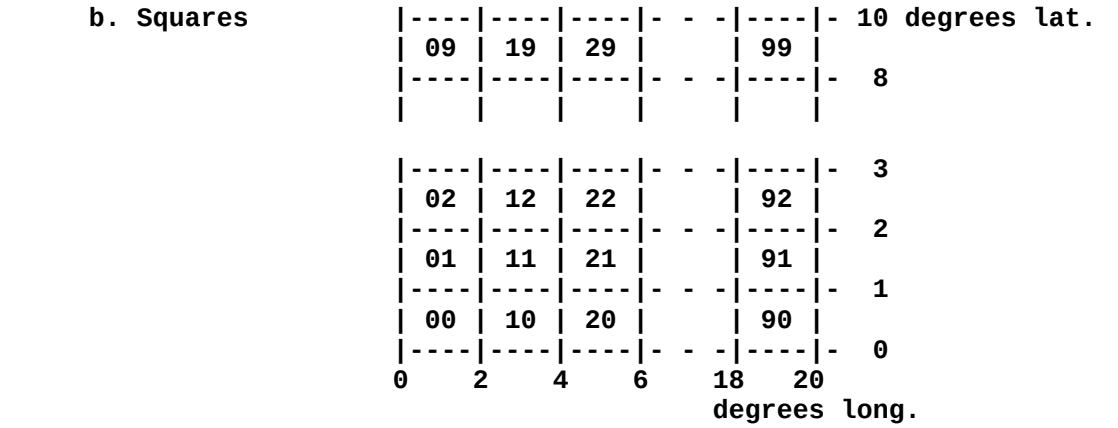
An information paper from NRRL on this subject has been annexed in appendix 5 to this
section

LOCATOR SUB-DIVISIONS

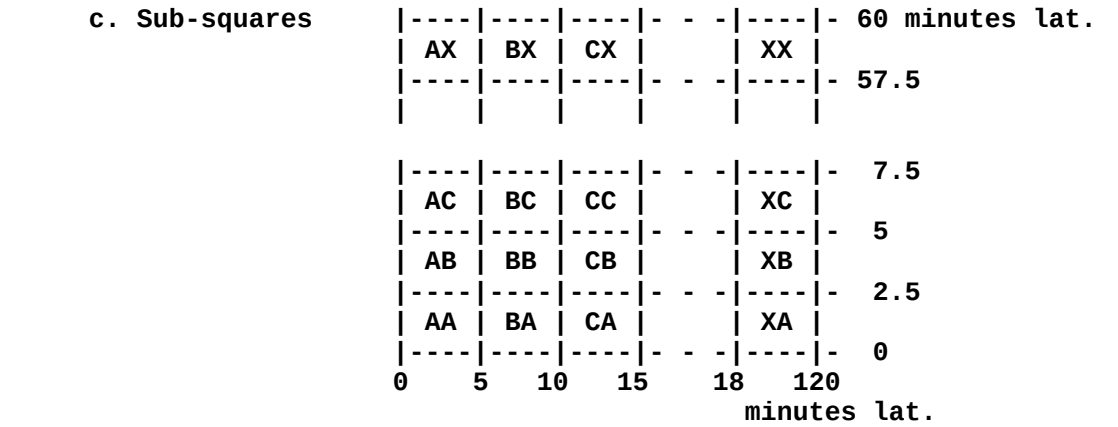
a. Fields



b. Squares



c. Sub-squares



DETERMINATION OF LOCATOR FROM LONGITUDE/LATITUDE

Determining a station's Locator from it's geographical position data is simple when the following diagrams are used.

The longitude of station is given by characters 1, 3 and 5 of the Locator.

1st character

```
        |A|B|C|D|E|F|G|H|I|J|K|L|M|N|N|P|Q|R|
        |       |       |       |       |       |
West   180    120    60      0      60    120    180       East
```

3rd character

```
        |0 |1 |2 |3 |4 |5 |6 |7 |8 |9 |
        |  |  |  |  |  |  |  |  |  |  |
        0  2  4  6  8 10 12 14 16 18 20        degrees East
       20 18 16 14 12 10  8  6  4  2  0        degrees West
```

5th character

```
        |A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|
        |   |   |   |   |   |   |   |   |   |   |   |   |   |
        0  10  20  30  40  50  60  70  80  90  100 110 120 min. East
       120 110 100 90  80  70  60  50  40  30  20  10   0    min. West
```

The latitude of a station is given by characters 2,4 and 6 of the Locator.

2nd character

```
        |A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|
        |       |       |       |       |       |
South  90     60     30      0      30     60     90       North
```

4th character

```
        |0|1|2|3|4|5|6|7|8|9|
        | | | | | | | | | | |
        0 1 2 3 4 5 6 7 8 9 10 degrees North
       10 9 8 7 6 5 4 3 2 1 0  degrees South
```

6th character

```
        |A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|
        |   |   |   |   |   |   |   |   |   |   |   |   |   |
        0   5  10  15  20  25  30  35  40  45  50  55  60    min. North
       60  55  50  45  40  35  30  25  20  15  10   5   0    min. South
```

Example : 76 degrees 58 minutes West, 39 degrees 6 minutes North

Longitude code

1st character: F remains 76.58 - 60 = 16.58

3rd character: 1 remains 16.58 - 16 = 0.58

5th character: M remains 0.58 - 0.55 = .03

Latitude code

2nd character: M remains 39.06 - 30 = 9.06

4th character: 9 remains 9.06 - 9 = 0.06

6th character: C remains 0.06 - 0.05 = .01

Result : FM19MC

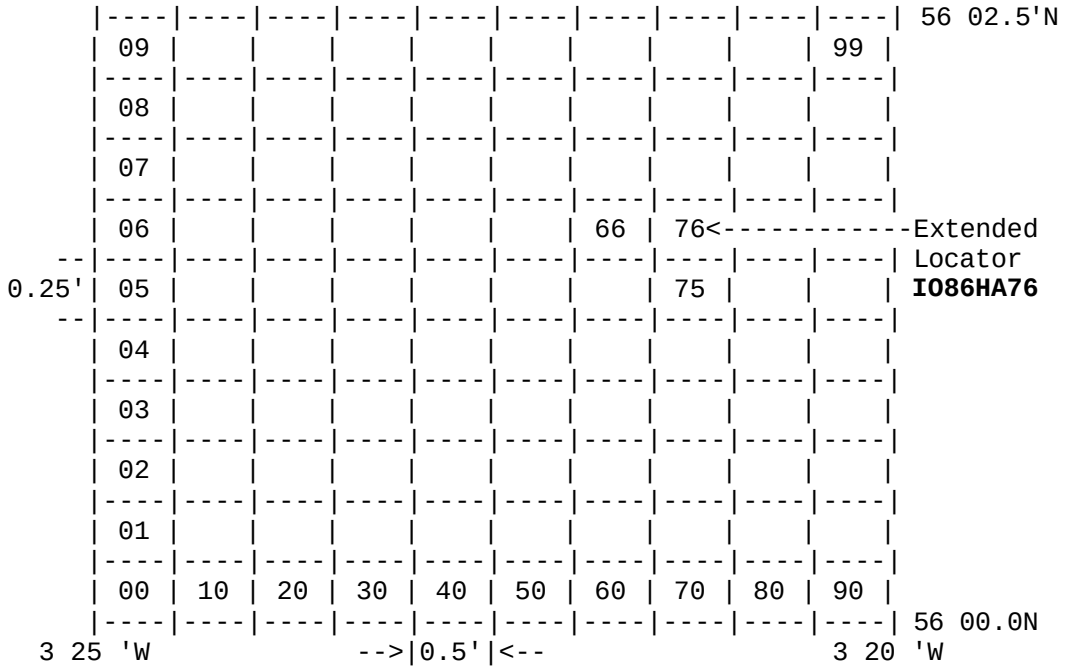
EXTENDED LOCATOR SYSTEM

The proposed extension follows the pattern of the Locator system by dividing each sub-square into a 10 by 10 grid of even smaller squares, each 0.5 ' from west to east and 0.25 ' from south to north. These sub-sub-squares are called "micro-squares".

Two digits are added to the Locator. The first gives the longitude co-ordinate of the "micro-square" and the second the latitude co-ordinate.

For example, the region covered by Locator "IO86HA" would be divided as follows:

IO86HA



Adopted at the IARU Region 1 Conference in De Haan (September 1993) on the proposal of the RSGB.

This extension is intended only for use by stations who require greater precision than obtainable with the Locator system. For normal VHF/UHF/Microwave work the existing six-character Locator is adequate.

This extension should be published within Region 1 and communicated to Regions 2 and 3 with a view to eventual world-wide agreement.

BASIS FOR DETERMINATION OF LOCATORS

The SRAL has proposed the WGS-84 geodetic system as a basis for converting latitude and longitude into a Maidenhead Locator.

This proposal is important, because it thereby establishes the necessary link of the World-Wide Maidenhead Locator system with an international geodetic system.

The latitude and longitude system of the Earth must be linked to a „zero point“ . This point may be called a geodetic center point. There are many such points in use; by cities, countries, continents, and for the whole world. These „zero points“ are usually not coincidental. Therefore it is important to establish which geodetic system the Maidenhead Locator System should be linked to.

When using a map or a GPS (Global Positioning Satellite) receiver to determine a Maidenhead Locator, it is possible to have the map or the GPS receiver calculate the locator on the basis of many different geodetic systems. In Europe the most commonly geodetic system used up to recent time has been the European Datum of 1950, called ED-50.

The few last years more and more maps use their latitude and longitude linked to the newer world-wide geodetic system World Geodetic System 1984, called WGS-84.

The difference between latitude/longitude on ED-50 versus WGS-84 is of the order of 300 meters. This has no practical consequence to radio amateurs calculating their Maidenhead Locator square other than the radio amateurs close to the square borders. Then it has consequence for contest square multipliers.

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VHF/UHF/Microwaves CHALLENGE TROPHIES AND MEDALS : HISTORY AND WINNERS

Till 1989 the rules for the official IARU Region 1 contests stated that the participants in the IARU Region VHF/UHF/Microwaves contests competed for four Challenge Trophies. These Trophies had come into existence and were awarded in the following manner.

IARU Region 1 contests have always been run with two categories of stations on each band. At the VHF Working Group meeting in The Hague in 1959 these two groups were defined as follows :

section 1	-	Home stations fixed Genuine alternative address stations
section 2	-	Portable stations fixed (using the mains) Portables and mobiles independent of the mains

At the same meeting in The Hague, through the good offices of VERON, the **IARU Region 1 VHF trophy** was donated by NEAL Crystals Ltd. At that time the only Region 1 contest was an all-band event held during the first weekend of September. It was decided that as of 1959 the Trophy would be awarded to the highest scorer on 145 MHz in this contest, irrespective of the category (section).

As could be expected, in most cases this was a station competing in the portable category, section 2. To remedy this situation, at the Region 1 Conference in Folkestone (1961) PZK donated the **PZK Trophy**, to be awarded to the station in the other category (section) on 145 MHz from 1961 onwards.

The awarding procedure could, of course, lead to a switching of the Trophies between sections, depending on whether a home or a portable station had scored highest. Hence, in order to simplify matters, as of 1966 the Region 1 VHF Trophy has been awarded to the winner in section 1 and the PZK Trophy to the winner in section 2 on 145 MHz.

When in 1973, at the VHF Working Group meeting in Baunatal, it was decided to organise the Region 1 September contest only on 145 MHz, nothing had to be changed in the awarding of the Trophies.

In 1962, for the first time a separate official Region 1 UHF/Microwaves contest was held, at that time during the first weekend in May. This was changed to the first weekend in October at the Region 1 Conference in Brussels (1969).

At the Region 1 Conference in Malmö (1963) I1XD, VHF Manager of ARI, offered the **Vittoria Alata Cup** to be awarded to the highest scorer in the Region 1 UHF/Microwaves contest, irrespective of the section the winner would compete in. In 1966, at the Conference in Opatija, I1XD donated a **second Vittoria Alata Cup**, and as of that year the **Vittoria Alata Cup I** has been awarded to the winner in section 1 on 435 MHz, and the **Vittoria Alata Cup II** to the winner in section 2 on 435 MHz.

At the Region 1 Conference in Scheveningen (1972) a recommendation was adopted to establish as of 1973 overall UHF/Microwaves contest winners in each station category (section) with the aid of a multiplier system for points made on the various bands. It was decided to maintain the system established for awarding the Challenge Trophies, and to award IARU Region 1 medals to the overall UHF/Microwaves contest winners. Later it appeared to be more practical to award a **IARU REGION 1 CERTIFICATE** to those winners. Those certificates will be provided by the chairman of the VHF/UHF/Microwaves committee to the adjucating society for signature and distribution to the winners.
At the IARU Region 1 Conference in Miskolc-Tapolca (1978) the station categories (sections) were changed to

section 1	-	stations operated by a single operator, with no assistance during the contest, using privately owned equipment and antennas and operating from any location

section 2 - all other entrants

The system for awarding the Trophies to the winners in the various sections in the 144 MHz and the 435 MHz bands was maintained.

Lists of winners of the various Trophies and certificates, as established in the manner described above, are given in Appendix 1.

At the IARU Region 1 Conference in Torremolinos (April 1990) the Chairman of the VHF/UHF/Microwaves Committee had to announce that diligent efforts to trace the whereabouts of these Trophies has met with no success.

During the last decades the Trophies had never been sent to the winners, as in the past difficulties had been experienced with custom duties etc., but the winners only received a special certificate. The IARU Region 1 Trophy and the PZK Trophy were probably retained by early winners, though this is by no means sure. The Vittoria Alata Cups have always been in the possession of I1XD, (who did send the winners a photograph of the cup with the call-sign engraved) but could not be found by his family after his demise.

At the IARU Region 1 Conference in Torremolinos (April 1990) it was decided to remove the Challenge Trophies from the contest rules. In case new Trophies would be donated, it was agreed that these would be retained at the IARU Region 1 Secretariat, and that only special certificates with pictures of the donated Trophies would be sent to the various winners.

The winners of the IARU certificates and of any newly donated Trophies will be mentioned in Appendix 1.

PLEASE NOTE THAT THE RESULTS OF SOME CONTESTS ARE NOT KNOWN. THE NAME OF THE ORGANISING SOCIETY IS PRINTED NEXT THE YEAR. PLEASE LET PAoEZ KNOW THE MISSING RESULTS.

WINNERS OF THE CHALLENGE TROPHIES

145 MHz

Year	Winner VHF Trophy	Points	Winner PZK Trophy	Points
1959	PA0YZ/A	36688		
1960	YU3APR/P	28120		
1961	PAoEZ	34378	PAoYZ/A	49889
1962	G2JF	69971	ON4AB/P	75249
1963	G2JF	42756	ON4ZN/P	58434
1964	OK1DE/P	36842	SM7ZN/7	25502
1965	I1ICK/P	39401	DL0ZW	38075
1966	G2JF	50116	ON4TQ/P	70920
1967	I1CZE	44563	GC3WMS/P	52340
1968	G2JF	89043	SM7BZX/7	67432
1969	OZ1OZ	100765	SK6AB/7	153497
1970	OE2OML	81969	F6ADZ/P	102575
1971	F9FT/A	122125	F6ADZ/P	122840
1972	F9FT/A	94857	OZ9OT/A	103040
1973	F9FT/A	157789	DL1GM/P	157920
1974	DC8RLA	127113	F1AUQ/P	150075
1975	DC8EEA	158839	F1AUQ/P	168703
1976	DC8RLA	178107	F6CVN/P	170061
1977	DC8RAA	197482	F6CTT/P	222869
1978 USKA				
1979	OK1OA/P		F9FT/P	
1980	F1ANH/P	340768	F6CJG	471778
1981	OK1OA/P	295730	OK1KHI/P	591193
1982PZK				
1983	OK1FM/P	213365	F6CTT/P	330018
1984	F6HMQ/P		F6CJG/P	
1985	GJ4ICD	409283	HB9SAX/p	416115
1986	F6CTT/p	299596	F6KBF/p	343997
1987	F6CTT	249573	GU4APA/p	408535
1988	F6HPP/p	249688	FF6KBF/p	391718
1989	F6HPP	219832	HB9/F1FHI/p	397930
1990 BFRA				
1991 RSGB				
1992	F6HPP/p	271383	HB9WW/p	433621
1993	F6HPP/p	358300	GU4APA/p	410582
1994	DK8SG	252552	F6HPP/p	424946
1995	DK8SG	278357	TM6P	419941
1996	TM1C	341209	TM6P	448111
1997	EA2LU/p	257437	TM6P	405617
1998	G4PIQ	236146	TM6P	405790
1999				

WINNERS OF THE CHALLENGE TROPHIES

435 MHz

Year	Winner Vitt.Alat. I	Points	Winner Vitt.Alat. II	Points
1963	OK1KCU/P	1996		
1964	OK1AHO/P	3215		
1965	OK1AHO/P	2895		
1966	I1SVS	4086	OK2ZB/P	2820
1967	G3MCS	4022	GC3VXK/P	12118
1968	ON4ZK	6149	G3LTF/P	12362
1969	PA0EZ	7478	GW3HAZ/P	11401
1970	PA0EZ	5482	PA0MJK/P	5566
1971	DJ9DL	11100	G3LTF/P	13555
1972	DK0FB	12929	GW3LTF/P	13243
1973	DC8EEA	21084	PA0JOU/P	15095
1974	DC8RLA	17922	ON4PB/P	18073
1975	DK3IKA	25149	F9FT/P	34525
1976	DC8RAA	46650	F9FT/P	52658
1977	DC8RLA	43296	PA0NYM/P	28022
1978 USKA				
1979	DL7QY		F6CVN/P	
1980	DL7YC/A	83744	F6CTT/P	133838
1981	DJ9DL	54551	DK8VR/A	99506
1982PZK				
1983	OK1CA/P	96954	DK8VR/A	168042
1984	DL8DAL		DK0BN/P	
1985	DK2GR	77883	DK8VR/A	146377
1986	OK1DIG/p	282314	OK1KHI/p	340069
1987	F6CTT/p	97439	PEoMAR/p	133192
1988	F6HPP/p	57439	DK8VR/A	128774
1989	DL2NBU/p	73123	DFoSAR/p	107833
1990 BFRA				
1991	DL2NBU	123085	TW1C/p	172495
1992	DL2NBU	110464	DKoBN/p	125439
1993	DG3FK	113916	DK8VR/A	148777
1994	DL6FBL	136968	DK8VR/A	224107
1995	DG3FK/p	196113	DK8VR/A	309903
1996	DL6NAA	129943	DKoBN/p	171278
1997 FRR				
1998	DL6NAA	140301	HB5OK/p	163711
1999				

WINNERS OF THE IARU REGION CERTICICATES

Overall winners of the October UHF/Microwaves contests

Year	Winner Section 1	Points	Winner Section 2	Points
1973 SSA				
1974 SRJ				
1975 ÖVSV				
1976	DC8RAA		OK1KIR/P	
1977	DC8RLA		PA0NYM/P	
1978 USKA				
1979	PAoEZ		Martlesham R.S.	
1980 EDR				
1981	PA0EZ	126217	G4BPO/P	109149
1982 PZK				
1983	PA0EZ	205042	OK1KIR/P	294358
1984	PA0EZ		G4DUB/P	
1985	PA0EZ	230544	PA3BPC/p	297404
1986	OK1AIY/p	576690	Parallel Lines	1257576
1987	PAoEZ	267138	PEoMAR/p	372627
1988	PAoEZ	211491	HB9AMH/p	419958
1989	PAoEZ	303809	PEoMAR/p	368737
1990 BFRA				
1991	PAoEZ	373946	DLoNN	584533
1992	PAoEZ	398803	HB9AMH/p	449028
1993	PAoEZ	482820	G4JAR/p	618621
1994	PAoEZ	394768	G4VIX/p	720744
1995	DL6NAQ/p	611422	GoVHF/p	1421193
1996	DL6NAQ/p	330616	OK1KIR/p	803390
1997 FRR				
1998	DK1VC	409444	PA6NL	721699
1999				

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part IV

Fourth Edition
2nd Upgrade

PROPAGATION RESEARCH BY AMATEURS: INTRODUCTION

Amateurs have always contributed to radio science, both in the technical field, e.g. with the development of new transmitting and receiving methods, and in the field of propagation research by showing the limits of distance and the variety of propagation phenomena that can be used over an ever increasing range of frequencies.

Regarding propagation, amateur contributions during the first years of radio in the 'world below 200 metres' are, of course, well-known, as are, for instance, the pioneering efforts of the "amateur" Grote Reber in the field of radio-astronomy. Those were the early days, but also in more recent times amateurs have made considerable contributions in the field of scientific investigations. To mention a few examples:

a) in the fifties several research institutes in Western Europe carried out tropo-scatter research in close co-operation with an extensive network of amateur observer stations;

b) fundamental work was and is done by amateurs in the definition and study of the TE (Trans-Equatorial) propagation mode of VHF radio-waves;

c) during the IGY (International Geophysical Year), amateurs supported various propagation research projects initiated by the Max Planck Institute in Darmstadt as well as by other scientific institutes.

The important facts which enable amateurs to make valuable contributions to propagation research are:

1) world-wide there are almost no regions which are not covered by amateurs. If effectively organised, amateurs constitute an extensive network of observation points that an official research institute could hardly afford to set up;

2) amateurs are enthusiastic in the disciplines they pursue, are often on the bands for extended periods of time - pushing the various propagation modes to their limits! - , and, in many cases, are in possession of high-performance, individually-calibrated pieces of transmitting/receiving equipment.

IARU Region I fully recognizes the importance of this type of work in the Amateur Service, and at the IARU Region 1 Conference in Warsaw (1975) the following general recommendation was adopted:

> Groups of amateurs shall be organised to carry out scientific observations regarding all forms of radio propagation, including
>
> 1) ionospheric
> 2) tropospheric
> 3) space.
>
> These groups are recommended to co-operate closely with RSGB, DARC, REF and any other societies which have a proper organisation for handling scientific data and co-operating with scientific institutes.
>
> It is also recommended that the results of such observations be published in the journals of member societies and/or scientific journals.

Currently, in the international field, amateurs are involved in long-term studies of tropospheric and auroral propagation modes, long range ionospheric high MUF studies and the study of the characteristics of moonbounce and meteor-scatter techniques.

On a national scale amateurs co-operate in the development of repeater systems for mobile station

use, together with studies of terrain and inner city problems associated with operating mobile stations. Furthermore, studies are carried out on the effects of micro (local) climate on space communications and, in particular, on microwave band communications during adverse weather conditions like e.g. heavy rain, which can enhance signals considerably.

The above is certainly not an exhaustive summary; on the contrary, the list of scientific activities in which amateurs participate is expanding all the time.

COORDINATION OF AMATEUR PARTICIPATION IN PROPAGATION RESEARCH

As set out in the introduction (section IVa), IARU as well as IARU Region 1 have always recognized the importance of scientific work carried out by amateurs, and IARU Region 1 are officially supporting various activities of member societies in the field of propagation research.
Currently the RSGB, via their RSGB Propagation Studies Committee, and the SARL are the member society which co-ordinate the amateur participation in propagation research.

1. Sporadic-E investigations

At the IARU region 1 Conference in Warsaw (1975) REF proposed to start on two projects:

i) a study of long distance VHF propagation with the aid of beacons to be set up in the southern part of Europe

ii) a study of sporadic-E activity over the North Atlantic area, particularly on the amateur bands 28 MHz and 50 MHz.

Both projects were accepted at the final Plenary Meeting of this Conference, and the work of supervising these projects was entrusted to Serge Canivenc, F8SH, who was nominated as IARU Region 1 Coordinator for sporadic-E investigations.

The following recommendations concerning the above projects were adopted at the IARU Region 1 Conference at Warsaw (1975):

> Sporadic-E investigations: that the proposal to establish beacon stations in southern Europe, as described in document WA58 (with the exception that the radiated power should preferably be limited to 50 W) be adopted. Proposals for beacons should be submitted through member societies to the IARU Region 1 Sporadic-E Coordinator Mr. Serge Canivenc, F8SH. In respect of beacon frequency allocations RSGB should be consulted [1].

Transatlantic Sporadic-E investigations: that the proposals set out in document WA59 be adopted in order to promote an investigation of Sporadic-E propagation in the North Atlantic area. It is also recommended that Region 2 be invited by Region 1 to encourage their member societies to set up, for the purpose of the investigation, beacon stations in the 50 Mhz band, e.g.in Canada and in the U.S.A. Region 1 societies should then establish an observation network in consultation with Mr. Serge Canivenc, F8SH, the IARU Region 1 Sporadic-E Coordinator. Region 2 is invited to join the programme and to publicise the contents of document WA59.

On the basis of the above recommendations, F8SH extended his activities and started a programme for the investigation of VHF wave propagation via Field Aligned Irregularities (FAI). This phenomenon was discovered by amateurs in southern Europe in the 70's. They noticed that stations contacted during sporadic-E openings were often on a quite different bearing from the one corresponding to the normal great-circle path.
F8SH fulfilled the function of IARU Region 1 Sporadic-E Coordinator till July 1988 when he suddenly passed away. His excellent work, his many publications and his highly appreciated representation of the Amateur Service in the CCIR Interim Working Party 6/8 dealing with anomalous VHF ionospheric propagation will be remembered with gratitude.

---

[1] see section IX which deals with the coordination of the allocation of beacon frequencies.

He was succeeded by **Jim Bacon, G3YLA** (address in section If)
who will continue and further develop the work started by F8SH.

2. Auroral propagation

At the IARU Region I Conference in Warsaw (1975) the RSGB, via their Propagation Studies Committee, proposed to standardize auroral reporting by amateurs throughout Region I, so that the greatest use can be made of these reports for scientific studies.

At the final Plenary Meeting of the Conference this proposal was adopted, and Charlie Newton, G2FKZ, was nominated as IARU Region 1 Coordinator for Auroral Studies.

The following recommendation relating to the auroral project was adopted at the IARU Region 1 Conference in Warsaw (1975):

> VHF Auroral Propagation: that the proposals set out in document WA32 (regarding the standardisation of auroral reporting) be adopted by member societies and that member societies publicise the reporting forms contained therein.

In 1993 G2FKZ resigned, and the IARU Region 1 Conference in De Haan (September 1993) nominated as his successor **Vaino Lehtoranta, OH2LX** (address in section If)

3. Tropospheric propagation studies

At the IARU Region 1 Conference in Warsaw (1975), on the proposal of the RSGB Propagation Studies Committee IARU Region 1 nominated as Tropospheric Propagation Studies Coordinator
Mr. R.G.Flavell, G3LTP. He resigned from this post at the conference in Tel Aviv 1996.
At the moment a successor is sought for. He will have to look into progation effects on the microwaves (such as „rainscatter“)

4. Information exchange programme

The RSGB Propagation Studies Committee hold the official solar and ionospheric data back to the IGY, the International Geophysical Year (1967), and any information can be supplied upon application to RSGB Headquarters .

Tape/slides lecture material on auroral propagation is also available via the Hon. Secretrary of IARU Region I

5. Co-operation with CCIR study groups and publications

Co-operation has been established with the CCIR propagation study groups 5 for tropospheric propagation, and 6 for ionospheric propagation.

Five IARU Region 1 propagation reports were submitted to CCIR study groups via F8SH, the former IARU Region 1 Sporadic-E Studies Coordinator, and, where appropriate, the attention of CCIR study groups has been and is drawn to the results of amateur investigations/observations which could be used fruitfully in their studies.

Some scientific publications which have used amateur data are

Tropo	I.E.R.E. Conference Proceedings 40 (1978)	pp 265-280
	I.E.E. Conference Publication 169 (1978) Pt 2	pp 182-186
	I.E.E. Conference Publication 195 (1981) Pt 2	pp 163-167
	I.E.E. Conference Publication 219 (1983) Pt 2	pp 14- 18
	I.E.E. Conference Publication 248 (1985)	pp 498-501

Aurora	I.E.E. Conference Publication	219 (1983) Pt 2	pp 259-262
T.E.P.	I.E.E. Conference Publication	219 (1983) Pt 2	pp 325-328

6. Action/support required from IARU Region 1 member societies

IARU Region 1 consider it of the utmost importance that member societies stimulate and encourage the participation of amateurs in scientific and propagation studies. To this end wide publicity should be given to the projects already in progress, and possibilities for new projects and/or extensions of existing projects should be investigated.

In all this work close co-operation with the existing Coordinators and/or coordinating institutes is strongly recommended. As already indicated, for publications member societies can obtain information at the addresses given above.
This type of work can open a whole new field of extremely interesting activities for amateurs! To mention a few examples:

a) Now that in some European Region 1 countries the 50 MHz band has been opened for amateur use, every effort should be made to increase the number of beacons and observation stations on this band, where many propagation modes can be studied, including modes such as back-scatter meteor trails, and, at suitable solar times, high M.U.F. propagation. As this band is not yet universally available for the Amateur Service, listening stations can play an important role here!

b) VHF Managers/Contest Committees etc. should be aware of the possibility of using contest logs for the derivation of data useful for scientific studies. These logs often contain a wealth of data covering a wide geographical area, providing detailed information, particularly on tropospheric propagation, that could not be obtained in any other way. This is an excellent illustration of the main strength of the Amateur Service: the mass of observation stations!

Reporting forms (log sheets), used in the various projects and showing the data that preferably should be gathered by the participants, as well as the necessary information and instructions are obtainable from the addresses given above.

Some reporting forms already in use are appended to this section, together with some examples of information sheets accompanying these reporting forms.

7. Cooperation with the DUBUS magazine

In order to facilitate the flow of information from amateurs to the coordinators a cooperation with DUBUS has been arranged in 1995 whereby the relvant DUBUS editors will share the information received with the IARU Region 1 coordinators.

8. Propagation database

At the IARU Region 1 Conference 1999 in Lillehammer the offer of Michael Kastelic, OE1MCU, was accepted to create a easily accessable database for the collection and distribution of amateur reports.

THE INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF Sporadic E North Atlantic Observation Programme

50 MHz Propagation Report Sheet

Callsign:.....................	Aerial:..........................	Gain/dipole:..................dB	Rx front:.........................
Locator:.....................	Beamwidth:...........degr	Polarisation:...................	Noise fig.:....................dB
		Height:........................m asl	IF bandw.:.................kHz
Date:..............19..	Est. Time of Start of Opening : ....UT		Sheet nr ....
	Est. Time of End of Opening :...............UT		

Time UT		Callsign	QTH	Freq.	Work.	Aer.	Sign.	Fading			Remarks
Beg.	End			MHz	Mode	Heading	Level	Low	High	Freq	
01	02	03	04	05	06	07	08	09	10	11	12

Information sheet accompanying 50 MHz reporting form

HOW TO USE THE 50 MHZ PROPAGATION REPORT SHEET

1. Keep one sample of the report sheet unfilled to make photostatic copies;

2. Please use different sheets for different Es openings even if there are two or more openings during the same day;

3. Fill in your station description carefully. Please specify the noise figure of your receiver as well as the I.F. bandwidth. An indication of the type of tube or transistor used in the front-end of your receiver should be given if you do not have these data;

4. Do not forget to fill in your callsign if you are mailing more than one sheet;

5. Cross out the word "Estimated" if you are sure you know the exact time of beginning and/or end of the opening.

How to fill in columns 01 to 12

01,02 : Fill in the times as accurately as possible. Check your clock often (against a time standard, if possible);

03 : Fill in the call sign of the station you have heard;

04 : Fill in the state name. Add the location if you know it exactly, together with the state name;

05 : Please specify the frequency as exactly as possible, e.g. 50.15 MHz instead of "50 MHz band";

06 : Fill in the working mode of the station mentioned in column 03. Please use the following abbreviations: CW, AM, FM, SSB, RTTY (instead of A1, A3 etc.);

07 : Specify the aerial direction (aerial heading) as exactly as possible for maximum signal level. Fill in "SW" for southwest etc. If you want to specify the aerial direction in degrees, please use the following system: 0 degrees North, 270 degrees West etc.;

08 : Indicate in this column the received signal level either by using the S code or in dB/noise. If you are using the S code please check the calibration of your S-meter;

09,10 : Fill in the lowest value of signal level in column 09. Fill in the highest signal level observed in column 10;

11 : If you happen to observe periodic fading, please fill in the estimated frequency of fading (e.g. "10 seconds") if the signal level reaches its formwer value after a fading period, or fill in "flutter" in case of very fast changes in signal level;

12 : Fill in additional information ,e.g."station calling DX" or "station calling W1HDQ" etc.

Mailing procedure:

Please send your reporting sheet as soon as possible to the VHF Manager of your national society and ask him to pass your report on to the VHF Sporadic-E Propagation Co-ordinator of IARU Region 1. Alternatively, send your report directly to the Co-ordinator.

THE INTERNATIONAL AMATEUR RADIO UNION REGION 1VHF SPORADIC-E LONG -DISTANCE PROPAGATION REPORT SHEET

Callsign:..... Aerial:..... Gain/dipole:.....dB Receiver front-end:..... Noise figure:.....dB

Locator:..... Beamwidth:.....degr Height:.....masl IF Bandwidth:.....kHz

Date:.....19.. Estimated time of start of opening:.....UT Sheet nr.....

Estimated time of end of opening: .....UT

Time UT		Call	Loc	Hrd	Cld	Wkd	QRG MHz	Mode		Aerial azim.	Sign. level	Aer.Polar.		Fading			Remarks
Beg	End							rcvd	sent			rcvd	transm	low	high	est.frq	
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18

THE INTERNATIONAL AMATEUR RADIO UNION REGION 1
VHF SPORADIC-E LONG-DISTANCE PROPAGATION REPORT SHEET,
for FM, TV and Aeronautical Frequency Bands

Station : ..... Aerial: ..... Height a.s.l. : .....m

Location:..... Gain/dipole : .....dB Receiver:.....

Date: .....19.... Sheet no. : .....

Time UT		Station	Channel	Freq. MHz	Aer. Heading	Aer. Polar.	Sign. Level		Remarks
Beg.	End						Video	Audio	
01	02	03	04	05	06	07	08	09	10

Information sheet accompanying Sporadic-E reporting form

European VHF Sporadic-E Study

You are invited to take part in an international project, begun in Spring 1982 and planned to extend over many years, which is aimed at providing sufficient raw data in the form of reliable signal reports to establish the extent and movement of the areas of ionization responsible for long-range ionospheric propagation at VHF.

There is a long tradition among amateurs to refer to this mode as 'Sporadic E', but our professional colleagues, who are now taking a considerable interest in trying to establish the mechanism involved,have pointed out that the currently accepted theories cannot apply at frequencies such as 145 MHz and beyond. It is possible, then, that what we have been observing and reporting for well over a quarter of a century is evidence of a different propagation process than that which leads to Sporadic E at HF.

The results of our studies will be of value to the planners of commercial and broadcasting services, to whom long-range VHF propagation is a source of annoyance, because it brings interference from distant stations operating on the same frequency. Reliable statistics are urgently required by advisory bodies such as CCIR and our project is being organized with that need very much in mind.

We particularly need observations of the duration of long-range ionospheric 'Sporadic E' type signals from distant stationsthatare fairly close together - say, within 100 km of each other. The observed durationswilleventually contribute to a distribution chart showing the probability of such an event occurring within specified time scales. On the scale of reporting we hope to achieve, such information should be forthcoming from paths from the United States to most parts of Europe.

The study is being carried out in close cooperation with the International Radio Union and all reports received will be passed eventually to the IARU Region I Sporadic-E Studies Co-ordinator, who is a member of the RSGB Propagation Studies Committee. The project will also benefit from a two-way interchange of data with the German organisation DUBUS.

Reports relating to any transmission above 50 MHz will be welcomed, provided that positive locations can be given. Naturally,our principal interest is in the amateur bands. Completed forms should be sent to:

Jim Bacon, G3YLA
Highways,
East-Tuddenham
Dereham, Norfolk
NR20 3AH England

tph : +44 1603 880288
fax : +44 1603 766398

If these reports have news value,they may also be sent to the VHF Manager of any amateur national society,or to the VHF columnist of any major amateur magazine,who will forward them to us afterwards. G3YLA will supply further copies of blank reporting forms on request.

I hope you will take part in our project and assist us by making it as widely known as possible throughout Europe.

THE INTERNATIONAL AMATEUR RADIO UNION REGION 1
VHF FIELD-ALIGNED IRREGULARITIES SCATTER PROPAGATION REPORT SHEET

Callsign:..... Aerial:..... Gain/dipole:.....dB Receiver front-end:.....

Locator:..... Beamwidth:.....degr Height:.....masl IF Bandwidth:.....kHz

Date:.....19.. Estimated time of start of opening:.....UT Sheet no.:.....

Estimated time of end of opening: .....UT

Time UT		Call	Loc	Freq. MHz	Work Mode		Aerial		Aerial Polar.		Sign.Level	Fading			Remarks
Beg	End				rcvd	sent	azim	elev	rcvd	transm	dB/Noise	low	high	est.freq.	
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part V

Fourth Edition
2nd Upgrade

OPERATING STANDARDS: OBSERVER SERVICE

At the IARU Region I Conference in Miskolc-Tapolca (1978) the following recommendation was adopted:

> That the Councils of all national Societies look into the possibility of setting up a national observer service with the aim of maintaining high operating and technical standards on the amateur bands above 30 MHz.

OPERATING PROCEDURES FOR METEOR SCATTER QSO'S

1. Introduction

The goal of the procedures described is to enable contacts to be made by meteor scatter reflection (MS) as quickly and easily as possible. As the reflections are of very short duration the normal QSO procedure is not readily applicable, and special measures must be taken to ensure that a maximum of correct and unmistakeable information is received. The best meteor showers are mostly strong enough to make some of these measures unnecessary, but to encourage use of all generally listed showers there is no reason why the suggested procedures should not always be used.

2. Definitions

Two types of MS contacts, arranged in different ways, may be distinguished:

a. A scheduled contact, where two interested stations agree in advance on the mode (telegraphy or SSB), frequency, timing and period of the contact. This may be done by exchanging letters, or via the VHF net, which is active from 1100 to 1400 UT on each Sunday around 14.345 MHz, 28.345 MHz or 3.624 MHz, depending on the propagation conditions on the HF bands.

b. A non-scheduled contact, where a station calls CQ or responds to a CQ call. Such contacts are often called "random MS".

3. Timing

It is recommended that stations use 2.5 minute periods on telegraphy and 1 minute periods on SSB. This practice gives quite satisfactory results. However, growing technical standards make it possible to use much shorter periods and amateurs may wish to arrange 1 minute schedules for telegraphy and shorter periods for SSB, especially during major showers.

a. All MS operators living in the same area should, as far as possible, agree to transmit simultaneously in order to avoid mutual interference.

b. If possible, northbound and westbound transmissions should be made in periods 1, 3, 5 etc. counting from the full hour. Southbound and eastbound transmissions should be made in periods 2, 4, 6 etc.

c. When arranging schedules, one or two hours duration for the schedule may be used. Starting times should be on the hour (e.g.0000, 0100, 0200 UT etc.)

4. Scheduled duration

Every uninterrupted scheduled period must be considered as a separate trial. This means that it is not possible to break off and then continue the contact at a later time. The duration of scheduled periods is usually one hour or, in some cases, two hours.

5. Choice of frequency

a.Scheduled contacts

Scheduled contacts may be arranged on any frequency, taking into consideration the mode/bandplan, but should avoid using known popular frequencies and the random MS frequency segments 144.095 - 144.126 MHz

and 144.395 - 144.426 MHz.

b.Non-scheduled contacts

The frequency used for CQ calls for non-scheduled contacts should be 144.100 MHz for telegraphy and 144.400 MHz for SSB. QSO's resulting from the CQ calls should take place in the 144.101 - 144.126 MHz frequency segment (telegraphy) or 144.401 - 144.426 MHz frequency segment (SSB), so as to avoid interference on the calling frequencies.

The following procedure should be used by the caller to indicate during the CQ on which exact frequency he will listen for a reply and carry out any subsequent QSO:

i) Select the frequency to be used for a QSO by checking whether it is clear of traffic and QRM.

ii) In the call, immediately following the letters "CQ", a letter is inserted to indicate the frequency that will be used for reception when the CQ call finishes. This letter indicates the frequency offset from the actual calling frequency used. For instance, CQE CQE CQE would indicate that the operator would listen on the calling frequency + 5 kHz.

A = 1 kHz	Call would be CQA CQA CQA
E = 5 kHz	Call would be CQE CQE CQE
N = 14 kHz	Call would be CQN CQN CQN
Z = 26 kHz	Call would be CQZ CQZ CQZ

In all cases the letter used indicates a frequency higher than the CQ frequency.

iii) At the end of the transmitting period the receiver should be tuned to the frequency indicated by the letter used in the CQ call.

iv) If a signal is heard on this frequency it may well be a reply from a station who has heard the CQ call and replies on the frequency calculated from the letter used during this call.

v) When the caller receives a signal on the frequency indicated during the call and identifies the reply as an answer on **his** CQ, the transmitter is QSY'ed to the same frequency and the whole QSO procedure **takes place there.**

Example: DF7VXS wishes to try a random MS experiment on telegraphy, and wants to start with calling CQ. He first checks his receiver in the range 144.101 - 144.126 MHz and finds a clear frequency on 144.107 MHz. He decides to call CQ on 144.100 MHz, and he must now add a letter to his CQ call to indicate on which frequency he intends to listen. In this example he has chosen a frequency offset of 7 kHz, and therefore he will have to include the seventh letter of the alphabet, the letter "G", in his CQ call. Note that the station receiving the CQ call will reply on a frequency exactly 7 kHz above the one on which the CQ call is heard.

If an operator instead of calling CQ wishes to listen for a CQ call the following procedure should be used:

i) Listen on 144.100 MHz for telegraphy or 144.400 MHz for SSB CQ's. (Note that when there is considerable activity during major showers stations calling CQ may QSY lower than 144.100 or 144.400 MHz in order to be on a clearer frequency).

ii) When a CQ call is received, note the letter which follows the letters "CQ" in the call. From this letter calculate the

frequency offset which the calling station will use for receiving replies.

iii) QSY the transmitter higher in frequency by the number of kHz's found, and transmit a reply during the appropriate period. The format for the reply can be found in section 7.

iv) As the QSO will take place on this higher frequency, continue to transmit and to listen (during the appropriate periods) on this frequency. It may be that the station calling CQ will not hear your first reply, but may do so during one or more subsequent periods. Hence there is no need to return to the calling frequency.

Example: You receive SM3BIU who is calling CQH CQH CQH. This tells you that, regardless of the exact frequency SM3BIU is using for his CQ, he will be listening for a reply exactly 8 kHz higher, as H is the eighth letter of the alphabet. Having established that the CQ was "CQH" you will call him 8 kHz up.

N.B. The letter system should not be used for SSB contacts!

(De Haan, September 1993)

6. Telegraphy speeds

Speeds from 200 to 2000 letters/min. are now in use, but in non-scheduled MS work speeds between 400 - 700 letters/minute are recommended.

In scheduled work the speed should always be agreed before the QSO, especially if one station does not have a multi-speed taperecorder. Some operators cannot reach the higher speeds now in use.

Note that in some countries, including the UK, the licensing authorities require the callsigns to be sent at a lower speed at the start and finish of each transmission.

7. QSO procedure for scheduled contacts and random operation

a. Calling

The contact starts with one station calling the other, e.g. "DL7QY SM3BIU DL7QY ....". In telegraphy the letters "de" are not used.

b. Reporting system

The report consists of two numbers:

First number (burst duration)	Second number (signal strength)
2 : up to 5 sec.	6 : up to S3
3 : 5 - 20 sec.	7 : S4, S5
4 : 20 - 120 sec.	8 : S6, S7
5 : longer than 120 sec.	9 : S8 and stronger

c. Reporting procedure

A report is sent when the operator has positive evidence of having received the correspondent's or his own callsign or parts of them.

The report is given as follows: "UA1WW I1BEP 26 26 UA1WW I1BEP 26 26 ....". The report should be sent between each set of callsigns, three times for telegraphy, twice for SSB, and must not be changed during a contact even though signal strength might well justify it.

d. Confirmation procedure

i) As soon as either operator copies both callsigns and a report he may start sending a confirmation. This means that all letters and figures have been correctly received.

Confirmation is given by inserting an R before the report: "SM7FJE G3SEK R26 R26 SM7FJE ...". A station with an R at the end of the callsign could send "GW3ZTH I4BER RR27 RR27 ...".

ii) When either operator receives a confirmation message, such as "R27", and all required information is complete he must confirm with a string of R's, inserting his own callsign after each eighth R: "RRRRRRRR HG5AIR RRRR ....". When the other operator has received R's the contact is complete and he may respond in the same manner, usually for three periods.

e. Requirements for a complete QSO

Both operators must have copied both callsigns, the report and a confirmation that the other operator has done the same. This confirmation can either be an "R" preceding the report or a string of "RRRR..."'s as explained in paragraph 7.d.ii.

8. Missing information (telegraphy only)

If a confirmation report is received at an early stage in the contact, the other operator has all the information he needs. The following strings may then be used to ask for missing information:

BBB....	both callsigns missing
MMM....	ny callsign missing
YYY....	your callsign missing
SSS....	duration and signal strength missing
OOO....	all information complete
UUU....	faulty keying or unreadable

The other operator shall respond by sending only the required information. This approach must be used with graet caution to prevent confusion.

Note. These procedures were adopted at the IARU Region 1 Conference in Miskloc-Tapolca (1978), and later slightly amended at the IARU Region 1 Conference in Noordwijkerhout (1987), Toremolinos (1990) and de Haan (1993).

DEFINITION FOR PING AND BURST FOR SCIENTIFIC ANALYSIS OF AMATEUR RADIO METEOR SCATTER

SRAL Finland

For the analysis of scientific data the old way of defining a ping and a burst, which depended on information / no information, is not relevant.

Therefore for the correct analysis the following definitions should be used:

Ping: Reflection from an underdense meteor trail.
Burst: Reflection from an overdense meteor trail.

Background:

Radio Amateurs have used the term "ping" to describe a „short“ reflection. Most of the European operators define "ping" as a reflection too short to pass information. This definition was most likely evolved in the 1970's, when high speed CW (then < 600 LPM) gained popularity in Europe. With the less efficient equipment used those days, the shorter reflections were either too short to pass full characters due to slow speed and/or too weak to decode with the equipment available at that time.

Some operators define "ping" as a reflection from an underdense meteor trail and "burst" as a reflection from an overdense trail. This is also how „ping“ and „burst“ are described in The VHF/UHF DX Book (published by RSGB). Generally it can be said that most good reflections come from overdense trails and short/less usable reflections (pings) from underdense trails. Overdense and underdense reflections can be roughly separated by duration of the reflection (reference 1).

The principal difference of underdense and overdense trail is the mechanism that re-emits RF-energy. On underdense trails the RF-energy penetrates the trail and makes electrons oscillate and re-radiate energy, while on overdense trails, no penetration occurs and the trail is modeled as a metallic cylinder reflecting RF-energy. When receiving meteor reflections the audible differences are found in signal strength, duration and decaying shape.

CW speeds used in MS have increased since 1970's by about four times and new digital equipment (i.e. DTR) make copying useful information from a weak reflection now much more easier. The old way of defining a ping has thus become invalid and does have serious lack of logic by definition, while the underdense/overdense division is based on well known and studied physical facts, as described in scientific literature.

It would also be extremely useful, if MS working results published i.e. in DUBUS were of scientific use. Such working results could be used by people like OH5IY, who are doing scientific research on meteor scatter. QSO information in DUBUS contain the number of pings and bursts of every contact. This information is of little use, however, if ping is understood as a reflection with no information, thus depending on speed used. Instead, if ping is defined as an underdense reflection this kind of information would be of great value. The relative number of underdense and overdense reflections could be compared between different showers and between consecutive hours in the same shower. This would provide us new knowledge of meteor showers and sporadic meteors.

Aid for defining underdense and overdense trails:

Underdense and overdense reflections can be roughly separated by duration of the reflection (which varies by frequency). The threshold is not sharp, but a simple approximation can be made. On 50 MHz overdense trail durations are typically greater than 0.5 s (reference 1) and maximum underdense trail durations approximately 0.5-1 s (reference 2).

In the following table a 1 s reflection on 50 MHz has been taken as upper limit for the underdense trails. Durations for other frequencies have been derived from it according to following formula (reference 3):

where t = duration in seconds,
f = frequency in MHz

Maximum duration of an underdense reflection (ping):

Frequency	Duration	CW speed	Number of letters received
50 MHz	1 s	100 LPM	2
		1000 LPM	17
		2000 LPM	33
70 MHz	0.5 s	100 LPM	1
		1000 LPM	8
		2000 LPM	17
145 MHz	**0.1 s**	**100 LPM**	**0**
		1000 LPM	**2**
		2000 LPM	**4**
435 MHz	0.013 s	100 LPM	0
		1000 LPM	0
		2000 LPM	0

This table corresponds well with the situation as presently encountered on the popular 144 MHz band. For example, a reflection on 145 MHz with the speed of 1000 LPM containing up to two letters when decoded would be a ping. On the 435 MHz band pings are so short in duration (less than 0.013s) as to be almost impossible to detect.

References:

1. The evolution of meteor burst communications system, P.S. Cannon & A.P.C Reed, Journal of the Institution of Electronic and Radio Engineers, Vol. 57. No. 3, pp 101-112, May/June 1987.

2. J.A.Weitzen & al., An Estimate of the Capacity of the Meteor Burst Channel, IEEE Transactions on Communications, Vol.Com-32, No.8. August 1984.

3. W.T. Ralston & al. Distribution of underdense meteor trail durations and duty cycle and applications to meteor scatter communication system design. Radio Science, Volume 28, Number 5, pp 747-757, September-October 1993

AMATEUR-SATELLITE OPERATING PRACTICE

(Adopted at the IARU Region I Conference in Warsaw, 1975)

1. Region I member societies accept the instructions published by the sponsors of amateur -satellites like e.g. AMSAT as regards the times for operation, output powers that may be employed and the way of operating through the amateur-satellite, including adherence to the published satellite bandplan.

2. All possible publicity should be given to satellite bandplans, operating schedules, power limitations on ground stations etc., together with advice on the necessity of receiver improvement via low-noise pre-amplifiers and, where applicable, low-angle antennas, in order to enable operators to monitor their own and other downlink transmissions satisfactorily, thus ensuring that:

   a. no transmission is started on a frequency already in use

   b. interference due to doppler effect frequency shift is avoided

   c. blocking caused by own transmissions can be identified and output power can be reduced

   d. other stations calling can be heard and identified.

3. Amateur-satellite users should be encouraged to:

   a. refrain from transmitting unless they can monitor their own signals

   b. strictly adhere to the satellite bandplan with their modes of transmission

   c. avoid long calls and slow operation

d. refrain from operating during times reserved for specific purposes like scientific experiments, as published by the satellite sponsors.

4. National societies should supervise the implementation of the above recommendations, and take appropriate action against persistent offenders.

The above recommendations were re-confirmed and strengthened at the IARU Region I Conference in Miskolc-Tapolca (1978), where the following resolution was adopted:

> Publicity, preferably on an annual basis, should be given to the correct ethics and practices for satellite operation. National societies should investigate the possibility of setting up monitoring stations for the amateur-satellite service, in order to be able to take direct action against operators who do not observe the internationally agreed operating rules. It is recommended that national societies
>
> a) write to offending amateurs in their own country (society members as well as non-society members) pointing out the correct behaviour and operating practice expected from them;
>
> b) report directly to other member societies any infringements of the established rules occurring in their country.

At the IARU Region 1 Conference in Tel Aviv 1996 it wasw decided that for a trial period the IARU Region 1 Monitoring System coordinator should not limit his activities to the bands below 30 MHz but take care as well, together with the national monitoring system coordinators and national

satellite coordinators, of intruders in the input channels of satellite transponders. This activity might be rather complex as even the 145 MHz band is not exclusively for amateurs in some countries and the other satellite allocations have a secondary status in most countries.
But the **VHF Managers** shall pay a lot of attention to this activity as the growing problem of intruders in satellite inputs is becoming a serious nuisance.

PACKET-RADIO (MAILBOX) OPERATING PRACTICE

At the IARU Region 1 Conference in Torremolinos (1990) the following recommendation was adopted:

> The Conference endorses the views expressed in documents 90/TS/C3.50 and 90/TS/C.53 on the undesirability of spreading of inappropriate messages via Packet-Radio Bulletin Board Systems and would extend this view to any use of the amateur bands which contravenes the definitions of the Amateur Service and Amateur Satellite Service.

Document 90/TS/C3.53 contained the IARU Administrative Council Resolution 87-2 (revised in 1989), and is attached as Appendix 1 to this section.

Document 90/TS/C3.50 was a paper submitted by ARI, which with regard to messages having inappropriate content in essence expressed the same views as AC Resolution 87-2.

At its meeting in Bandung, October 1991, the IARU Administrative Council re-considered the matter of inappropriate traffic via Packet Radio, and drafted an additional Resolution 91-1. At its meeting in Vienna, March 1992, the IARU Region 1 VHF/UHF/Microwaves Committee decided to recommend the immediate introduction of this Resolution as interim Region 1 policy. This was accepted by the IARU Region 1 Executive Council at its meeting in Budapest, April 1992, and later ratified by the IARU Region 1 Conference in De Haan (1993). The AC Resolution 91-1 is attached as Appendix 2 to this section.

RESOLUTION 87-2
(Revised 1989)

CONCERNING THE RELAYING OF MESSAGES TO AMATEUR STATIONS

The IARU Administrative Council, Noordwijkerhout, April 1987,

recognising the problems caused by the handling by amateur stations of communications having inappropriate content, particularly with regard to business and commercial matters

recognising the impact on other users of the crowded spectrum from unattended store-and-forward ("mailbox") stations, and further recognising that the problem of controlling the content of amateur radiocommunication is made more difficult by the availability of such stations,

resolves that the Administrative Council affirms the action taken at its Buenos Aires meeting, in urging member societies to emphasize to their members the importance of adhering to the spirit and intentions of the ITU Radio Regulations, and of handling only that traffic which does conform; and

further resolves that member societies are hereby urged to acquaint their members as to the undesirable aspects of the uncontrolled proliferation of unattended store-and-forward ("mailbox") stations.

RESOLUTION 91-2
CONCERNING GUIDELINES FOR PACKET RADIO

The IARU Admninstrative Council, Bandung, October 1991,

considering the growing popularity of packet radio for the relaying of messages between radio amateurs,

recognizing that a medium as effective as packet radio can invite abuse through the introduction of traffic that is inappropriate to the Amateur Service internationally,

noting Resolution 87-2 (revised 1989) which urges adherence to the spirit and intentions of the ITU Radio Regulations in handling traffic, and calls attention to the undesirable aspects of the uncontrolled proliferation of unattended store-and-forward "mailbox" stations,

resolves that the attached "Guidelines for Packet Radio Operators" and "Guidelines for Packet Radio Bulletin Board Operators" first adopted at the Region 3 Conference, Bandung, October 1991, shall be distributed to IARU member-societies worldwide with the request that they be shared with the amateurs of each country, and

further resolves that future IARU regional conferences are invited to suggest improvements to these guidelines so they will continue to be representative of good amateur radio operating practices as these practices evolve over time.

Guidelines for Packet Radio Operators

1. Amateur Radio takes pride in being self-regulated. Packet Radio Operators should continue this tradition.

2. Packet Radio Operators, like all Amateur Radio Operators, should observe published Band Plans.

3. A Packet Radio Operator should not send the following traffic either direct or via mail boxes:

   a) All advertising for selling, buying or trading goods, including amateur equipment (except if permitted by local regulations).

   b) All statements and/or propaganda on political or religious subjects.

   c) All inappropriate language, as, for instance, the use of swear words, obscenities, defamatory or libellous language etc.

   d) All material which may infringe copyright.

   e) All material which infringes privacy, whether personal or corporate.

4. A Packet Radio Operator utilising a BBS should avoid transmitting unnecessary or redundant messages and documents in order to enhance network efficiency.

5. A Packet Radio Operator utilising a BBS should ensure that the callsign of the originating station, including the name of the

person responsible in the case of a club station, is clearly shown on every message so that the sender can be identified.

6. A Packet Radio Operator should avoid messages that are too long for efficient relay through the network.

7. A Packet Radio Operator utilising a BBS should ensure that all messages transmitted are addressed to the appropriate group of recipients and not addressed to inappropriate areas in order to ensure network efficiency.

Guidelines for Packet Radio Bulletin Board Operators

1. The Operator of a Packet Radio Bulletin Board is obliged to provide a reliable service, within a defined area for a defined purpose.

2. A Packet Radio Bulletin Board Operator is morally responsible for all messages forwarded by his system. He should make his best efforts to ensure that the traffic forwarded is appropriate to the Amateur Services and in accordance with the Guidelines for Packet Radio Operators.

3. HF Mail Boxes should only be used where there is a genuine need that cannot be provided by VHF and other means.

4. A Packet Radio Bulletin Board Operator may take action to exclude a User who persistently contravenes the Guidelines for Packet Radio Operators. Exclusion of a User should be done as a last resort after the User has been warned and where exclusion does not contravene local regulations.

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part VI

Fourth Edition
2nd Upgrade

Technical Recommendations of IARU Region 1

An introduction

In order to facilitate the operations of Amateur Radio Stations the IARU at its triennial conferences adopts Recommendations. Most of those are so-called "operational recommendations" (such as band-plans and contest-rules). But during the past 30 years several "technical recommendations" have been adopted as well.
This note deals with the content and background of those technical recommendations.

A.1. FREQUENCY MODULATED TELEPHONY

A.1.a. The basic NBFM standard (Recommendation FM.1.)

One of the longest standing IARU Region 1 technical recommendations, adopted at the Region 1 Conference in Brussels (1969) deals with the basic parameters of Narrow Band FM Telephony. It states :"*For NBFM within Region 1 a maximum modulation index of 1 and an audio band restricted to 3 kHz shall be used*"
Between 1963 and 1969 the gradual introduction of VFO controlled SSB, replacing AM(x-tal controlled), was taking place on VHF. At the same time, however, the problems with LF break-through in radio-, TV- and audio equipment became embarrassing. Using FM and PM appeared to be the right solution in this case. Of course the recently acquired habit of VFO control and co-channel working was used with NBFM as well.

In order for an efficient use of NBFM it appeared necessary to agree upon a few basic parameters which would determine the optimum filter to be used in the receiver. A 12 kHz receiver bandwidth was finally chosen. This appeared to be the minimum value giving distinctly better quality than 6 kHz AM without showing too much of a threshold effect (at least not much more than conventional AM). Soon after the recommendation had been adopted several manufacturers of crystal-filters marketed 12 kHz wide filters.

Almost 30 years later this basic recommendation still is in force, although VFO controlled NBFM has almost disappeared (it still is used with rain-scatter on the microwaves) and the majority of amateurs use crystal-controlled NBFM transceivers with filters wider than 12 kHz, thus loosing several dB's in communications efficiency.

It must be noted that the application of the recommendation is not limited to frequencies above 30 MHz. It equally well applies to the 29 MHz band, although it appears that NBFM on that band is often received with filters narrower than 12 kHz.

Three years later, at the 1972 Scheveningen conference, a more detailed standard, largely based upon the first was adapted, but this time VFO control appeared to be out of fashion and the standard dealt with "Fixed channel FM stations". The audio response was specified more in detail as *300-3000 Hz with a 12 dB/octave fall off outside this band and 6 dB/octave pre-emphasis*.
It appears sensible to combine those two recommendations into a single one at a future conference.

A.1.b. NBFM Repeaters (Recommendation FM.2.)

At the 1972 Conference in Scheveningen a recommendation was worded for the then appearing NBFM repeaters. Initially the recommendation only was meant for the 145 MHz band, but later the 435 MHz band was added.The recommendation -of course- was based upon the standing recommendation for the audio channel parameters (FM.1.). But in addition the antenna polarisation was recommended as being *vertical* which was a logical choice for a system meant to be used by mobile stations. Note that, although no recommendation on antenna polarisation existed at the time, consensus existed on the use of horizontal polarisation for all VHF and UHF activities and

that still is the case for all non-channelised activities on VHF/UHF.
In order to make the planning of repeaters using the same channel easier a *maximum ERP of 15 Watts* was recommended. As, however, the antenna height above the surroundings was not specified this ERP limit is not sufficient for the planning, but no additions have been made to this recommendation.
The major flaw of the recommendation is the lack of any explicit specification of the receiver bandwidth. Had the receiver parameters been defined compatible with the transmitter definition (some people think this is implicit) some difficulties in a few countries with the introduction of a 12.5 kHz channel spacing system would never have been arisen.

A.2. DIGITAL TRANSMISSION

A.2.1 Data-transmission (Recommendations D.1.1. and D.1.2.)

At the 1975 Conference in Warsaw standards for RTTY/AMTOR were adopted (Recommendation D.1.1.), based upon the practice in the amateur bands. At that time on the VHF/UHF bands NBFM was becoming widely used and the recommendation took that into account. Although the text speaks of "bandwidth efficiency" that efficiency was not yet deemed too important at VHF-UHF.

On the HF bands FSK/PSK is almost exclusively used and those methods were recommended for VHF and higher frequencies as well. FSK for speeds below 300 bit/s and PSK for higher signalling rates (which were not used at HF). In addition FM/AFSK was recommended although only for 300 and 1200 bit/s.The latter standard was not so much determined by considerations of bandwidth and communications efficiency, but almost exclusively by the ease of using telephone line modems connected to the audio in-and output of TX and RX.
In practice initially 45 or 50 bit/s RTTY was used with 170 Hz or 850 Hz shift and with FM/AFSK the space frequency was set at 1275 Hz, the mark frequency 170 or 850 Hz higher.
On VHF/UHF, however, RTTY activities declined and most stations began to use 300 or 1200 bit/s "packet-radio" via an NBFM channel.
In 1987, therefore, a more general recommendation (D.1.2.) was adopted were AMTOR/RTTY and PACKET applications were dealt with.The essentials of D.1.1. were not changed. Although many amateurs today use higher speed packet data transmission systems, it appears that the note of the recommendation stating that FM/AFSK should not used >1200 bit/s is often neglected . It appears that the interest for experimentation with high speed data transmission is rather low.
The FM/AFSK recommended modulation methods were intended to use the "radio-channel" between two stations just like a telephone channel, whereby the radio-channel in general has a much better group-delay characteristic. The bandwidth efficiency is very low.

A.2.2. Digital telephony (Recommendation D.2.)

Although analog transmission of telephony in public networks is generally replaced by transmission of digitalised speech , amateurs have not experimented much in this field. This may change once more "intelligent" coding/decoding systems/chips will become available. In order to stimulate experiment the 1984 conference in Cefalu recommended to start those experiments using Continuously Variable Slope Delta Modulation. This was at that time a relatively efficient coding schema and several companies distributed codec-chips. A signalling speed of 16 kbit/s over a ±10kHz shifted FSK channel seems a good compromise between bandwidth, quality and communications efficiency.

A.3. AMATEUR (wide band) TELEVISION

A.3.1. Vestigial Sideband AM (Recommendation V.1.1.)

After some initial experiments with fast-scan TV transmission in the 145 MHz band around 1955/60 the wider 435 MHz band seemed ideal for fast-scan broadcast quality ATV experiments. Although in several Region 1 countries the parameters were set by

the national administration, IARU Region 1 at its 1969 Conference in Brussels recommended "*CCIR-2, following the Gerber standard*". At a later conference (Warsaw 1975) it was recommended to use "*vestigial sideband techniques in the 435 MHz band*" and at the same time "medium band ATV or SATV" was brought forward in order to "conserve bandwidth" in the 435 MHz band. This aspect was important as in several countries in Region 1 amateurs could only use part of the 430-440 MHz band. The 1987 Noordwijkerhout conference recommended that Vestigial Sideband *ATV in the 435 MHz band should use the 434-440 MHz segment with the carrier frequency either below 434.5 or above 438.5 MHz*. This, in fact, determined the maximum allowed bandwidth of the modulated signal.

A.3.2. Medium bandwidth ATV (Recommendation V.1.2.)

As in several countries only 6 MHz of the 435 MHz band is allocated, the "normal" ATV transmission is not possible. As an alternative the relatively narrow-band system proposed by DC6MR has been recommended as an alternative.
A.3.3. FM-ATV (Recommendation V.2.)

For ATV experiments above 1 GHz a recommendation was adopted at the 1991 Torremolinos Conference. The recommendation was based upon the emerging standards for satellite TV transmitters, but as in many of the microwave amateur bands the available spectrum was limited, a *channel bandwidth of 18 MHz (-60 dB)* was recommended. Although the standard was adopted without much discussion, at the 1996 Tel Aviv conference it was decided that it was not possible to adhere to the given bandwidth limitation when complying with all other parts of the recommendation. This was due to the recommended audio sub-carriers at 5.5 or 6 MHz . At the Lillehammer 1999 Conference the standard was amended in the shared microwave bands. Although the level of the spectrum outside the main spectral lobe is not yet ideal, the standard is now more realistic.

A.4. FACSIMILE (Recommendation V.3)

At the 1978 Conference in Miscolc-Tapolca a standard for facsimile was adopted, based upon wide-spread practice on HF and VHF . Frequency modulation with a "shift" of 800 Hz is the basic modulation method, but above 144.5 MHz a compound modulation (FM/AFM with the audio FM between 1500 and 2300 Hz) is permitted. The implication is that with (preferred) FM the channel bandwidth required is in the order of 1 kHz but that for the same type of transmission some 12 kHz bandwidth is used for FM/AFM on 145 MHz. The 1978 standard is not complete, but no society has since proposed additions. In practice "slow-scan" ATV transmissions use the same basic standard.

B. REPORTING

B.1. SIGNAL REPORTING (Recommendation R.1; R.2)

Although from the beginning of amateur radio signal reports have been essential, no formal standard for the reports exists. But the "Readability, Strength, Tone" system with R,S and T values between 1 and 9 is in widespread use. Several handbooks gave and give in words indications how the values are to be understood.

The readability and tone reports are in principle "subjective" but the strength report can be objective as a simple measurement of the received signal in voltage or power is possible. Such reports are in particular at the VHF and higher frequencies useful for more precise evaluation of propagation, antenna properties and receiver sensitivities.

At the IARU Region 1 Conference in Hungary 1978 the need for a harmonised standard for the "S-meter scale" was expressed and a proposal was accepted for publication in society journals. The essential recommendation was *1 S-point is 6 dB* . At the Brighton Conference in 1981 the recommendation was formally adopted as a standard for amateur radio equipment manufacturers.

At the 1990 Torremolinos conference an amendment was adopted which reconfirmed the -93 dBm reference level for frequencies above 144 MHz, but no statement was issued for the bands between 30 and 144 MHz.
Although not explicitly stated the implication of the recommendation is that on VHF and higher frequencies the S-meter will deviate on the thermal noise only (S2 in 3 kHz bandwidth, S3 in 12 kHz bandwidth). Although the recommendation is not too complex it seems to be rather difficult to implement by commercial manufacturers.

Another matter is the „tone“ report. This is a subjective measure. It was important in the „old days“ when rather primitive oscillators were used in the TX. Modern transmitters, even on the millimeter bands, have in most cases a very good oscillator, resulting in a „pure tone“ and a T9 report is generally given. On VHF and higher, however, the characteristics of the propgation medium can significantly „modulate“ the signal (doppler shift, spreading) and a T9 report is not possible. Definitions of tone reports below 9 are rather vague. At the Region 1 conference 1999 in Lillehammer a recommendation (**R.2**) has been accepted to use special letters for signal tone reports when the influence of the propagation is detectable. Such reports can support propagation studies.

C. ANTENNA POLARISATION (Recommendation P.1.)

At several conferences the antenna polarisation has been discussed. Interestingly enough the use of horizontal polarisation, almost exclusively used for non-channelised amateur traffic on VHF and higher frequencies has never been formally recommended. Part of recommendation FM.2. recommends vertical polarisation for NBFM repeaters .
At the Lausanne conference in 1953 (this is really the oldest technical recommendation of Region 1) the helical antenna thread direction was laid down. Why that was done at the time is unclear, but 30 years later (Cefalu 1984) the EME community felt a need for the definition of circular polarisation for EME contacts. 12 years later, however, it was recommended to use for EME above 3 GHz linear polarisation for the time being.
As using circular polarisation appears to have advantages for repeater stations the matter may come up again at future conferences.

D. BEACONS (Recommendation B.1)

Although any type of beacon (including the TX of repeaters) can be used as a propagation indicator and/or receiver quality refrence, some standards for the beacon parameters are useful. In particular the frequency spacing and tolerance are of importance for the planning of the Region 1 beacon coordinator. The frequency tolerances have been tightened at recent conferences due to the requirements for a more efficient "packing" in the rather narrow exclusive beacon segments. The recommendation, however, leaves room for "specialities".

IARU Region 1 Technical Recommendation B.1.

DÜSSELDORF 1989, Tel Aviv 1996

GUIDELINES FOR THE CONSTRUCTION OF BEACONS ON THE VHF/UHF/MICROWAVE AMATEUR BANDS

Band---->		**50 MHz**	**145 MHz**	**435 MHz**	**1.3 GHz**	**higher bands**
Aerial		general purpose : omnidirectional special purpose : directional				
Transmitting period		24 hours per day				
Keying	Mode	F1A/A1A (A1 preferred)	F1A / A1A			
	Carrier	nominal frequency un-shifted				
	Carrier transm.period	40 seconds				
	Keying direction (F1A)	From shift position to nominal frequency[1]				
	Carriershift (F1A)	Fnom minus 250 Hz	Nominal frequency minus 400 Hz			
	Keying text	Call, Locator, etc.				
	Transm.period text	Maximum 20 seconds				
	Cyclus period = carrier period + text period	30 seconds				
	Repetition frequency text	1 time/cycle				
	Data transmission	not yet considered				
Frequency tolerance		± 250 Hz	± 250 Hz	± 500 Hz	± 2.5 kHz	

[1] When using F1A the identification procedure is the following : Before the start of the identification transmission the carrier shall jump to a frequency 250 or 400 Hz below the nominal frequency and shall be morse-keyed to the nominal frequency. After the identification transmission, hence after at least 7 dot lengths, the frequency shall jump back to the nominal frequency.

IARU Region 1 Technical Recommendation D.1.1

WARSAW 1975,CEFALU 1984

GENERAL RTTY STANDARD

The RTTY signalling speed to be 45.45 bit/s. The use of a higher speed than 50 bit/s is not considered appriate at this time,

The RTTY transmission mode to be FSK on all bands with a preferred shift of 170 MHz on the bands below 30 MHz an 170 or 850 Hz above 30 MHz. The mark signal shall be the higher radiated frequency,

Reception of RTTY by means of a two-tone system is encouraged for optimum communications effectiveness,

In the interests of bandwidth efficiency and communications effectiveness AFSK operation on AM transmitters is not encourgaded. Were AFSK operation is used on VHF-UHF for local and autstart communications the use of NBFM transmitters is strongly encouraged. In the interests of bandwidth efficiency the use of a standard AFSK shift of 170 Hz is recommended. In this case the standard AFSK tones should be 1275 Hz "space" and 1445 HZ "mark". If 850 Hz shift is used the "mark" frequency should be 2125 Hz.

AMTOR/RTTY STANDARD

All IARU member societies shall adopt CCIR 476-1 in both modes "A" and "B" and Region 1 shall be asked to liaise with Regions 2 and 3 so that AMTOR may become a truly international standard

A speed of 45.45 bit/s is currently recommended , however speeds op 50, 75 and 100 bit/s should be encouraged

Each society - only where such requirements still exist- should press their respective licensing authorities to remove the requirement for "dual indentification " when using the international standard CCITT number 2 code

The minimum specification for the signalling format should be 1 start bit, 7 data bits, 1 parity bit, 1 stop bit. The parity should be as follows :

if generated even parity

if not generated parity bit set to space.

IARU Region 1 Technical Recommendation D.1.2

NOORDWIJKERHOUT 1987

STANDARDS FOR DIGITAL COMMUNICATIONS

1. Modulation methods

- FM/AFSK (where allowed in the bandplans)
- FSK : at speeds below 300 bit/s FSK is preferred
- PSK : at speeds above 300 bit/s PSK is preferred

General Applications :

Shifts for FSK and FM/AFSK :

at 1200 bits per second	-1 kHz
below 1200 bits per second	-850 Hz, 170 Hz (preferred)

Mark is always the higher frequency.

Note. For FM/AFSK the audio frequencies are :
- space 1275 Hz
- mark 1445 Hz or 2125 Hz, depending on shift

Packet-Radio Applications: [1])

for 300 bit/s transmissions using FSK a shift of 200 Hz should be used;

for 1200 bit/s transmissions using FM/AFSK audio frequencies of 1200 and 2200 Hz should be used (as in the Bell 202 standard).

On the bands below 30 MHz the signalling speed shall not be more than 300 bit/s.

2. Coding/bit- rates [2])

- Baudot : 45.45, 50, 100 bits per second (50 bit/s preferred)

- ASCII : 1 start bit, 7 data bits, 1 parity bit, 1 stop bit.
  Parity: if generated - even parity
  if not generated - parity bit set to space

  110 bits per second preferred.

3. Protocols

- Packet Radio : AX-25 as published by ARRL

- AMTOR : CCIR 476-1, modes A and/or B.

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[2] Packet-Radio : It is recognised that in the future higher data rates will be achievable through the use of different modulation methods. It is recommended, however, that in all cases for the frequencies used for communication between the user and a network access point the bandwidth should not exceed 12 kHz. For links between packet-radio nodes higher data rates and larger bandwidths may be used. For such high speed links (greater than 1200 bit/s) FM/AFSK is not preferred

IARU Region 1 Technical Recommendation D.2

CEFALU 1984

PROVISIONAL STANDARD FOR DELTA-MODULATION

For experiments with digital speech transmission CSVD (Continuously Variable Slope Delta) modulation based on the IC's commercially available for this purpose should be used with the following parameters :

- 3 bit adaptive algorithm as used in the IC's FX309, HC55516, MC3417
- bit rate : 16 kbit/second ± 50 ppm
- primary integrator time constant : 1 millisecond
- syllabic integrator time constant : 4 milliseconds
- modulation : F1E with)f = ± 10 kHz

IARU Region 1 Technical Recommendation FM.1

BRUSSELS 1969, SCHEVENINGEN 1972

A. TECHNICAL STANDARD FOR NARROW BAND FM

For NBFM within Region 1 a Maximum Modulation Index of 1 and an audio band restricted to 3 kHz shall be used

B. TECHNICAL STANDARDS FOR FIXED CHANNEL NBFM STATIONS

1. Traffic mode

Simplex on one channel.

2. Maximum Deviation

± 3 kHz, 12K0F3E.

3. AF response

300 - 3000 Hz, outside this band down with 12 dB/octave.

4. Pre-emphasis

+6 dB/octave in the transmitter.

5. De-emphasis

-6 dB/octave in the receiver.

IARU Region 1 Technical Recommemdation FM.2

SCHEVENINGEN 1972, TEL AVIV 1996

TECHNICAL STANDARDS FOR NBFM REPEATERS IN THE 145 MHz and 435 MHz BANDS

1. Polarisation: Antennas in the repeater service shall have vertical polarisation.

2. Operation: Without a new selective call the operating time for a repeater shall be between 3 - 10 minutes. The frequency of the selective call shall be 1750 ± 50 Hz. As an alternative the CTCSS and/or DTMF as described in below can be used. When the signal to be relayed has disappeared or the operating time has come to an end the repeater station shall send its own call, and 15 seconds thereafter the transmission shall be interrupted. It should not be possible to interrupt the automatic identification transmission by a selective call. For the station identification F2A modulation shall be used.
When working through a repeater station the lowest usable power consistent with good communication is recommended.

3. Power : The effective radiated power of the repeater transmitter shall not exceed 15 Watts.

4. Traffic mode: Simplex using demodulation/remodulation on a single channel / frequency pair.

5. Deviation: The maximum deviation of the repeater transmitter shall be ± 3 kHz (12K0F3E).

6. A.F. response: Audio frequency response shall be 300 - 3000 Hz. Outside this band the response shall go down with 12 dB/octave.

7. Pre-emphasis: The transmitter pre-emphasis shall be +6 dB/octave.

8. De-emphasis: The receiver de-emphasis shall be -6 dB/octave.

9. Responsibility:The repeater shall be under the control of the national IARU member society or their agent. The member society shall be responsible for the allocation of the adopted channel frequencies.

10. CTCSS: The use of CTCSS as an alternative or an addition to 1750Hz tone access shall be encouraged for VHF and UHF repeaters in Region 1 with the aim of reducing inadvertent interference by users to repeaters sharing the same input channel.
For CTCSS the frequencies listed in table FM2.1 shall be adopted as a standard so that compatibility between repeater systems in different countries can be maintained, aiding the traveller who moves between countries.(The frequencies shall be accurate ± 1%)
The CTCSS frequencies shall be allocated by member societies to their country*s repeaters. The reference letters shown in the table may be used to identify CTCSS frequencies in a compact way.

11. DTMF: The DTMF system as specified below can be used as an alternative to the control of repeaters, voice mail boxes etc.
The hardware part of the DTMF system consists of a keyboard with 12 push-buttons using the symbols #,*,A,B,C,D and figures from 0 to 9. When pressed each push-button will activate 2 tones simultaneously, one above, the other below 1000 Hz, according to the following scheme in table FM.2.2.
For example, if No. 5 is pressed, the tone combination 770 Hz/1336 Hz will be the result. The tone frequencies have to be accurate within ± 1.5 % .
Each tone burst should be betwen 65 and 105 msec long. The pause between tones should be at least 200 msec.

12. User functions:To control the basic functions of repeaters and voice-mailboxes, the following codes should be used :
Basic commands :
* Repeater opens, (like the 1750 Hz)
* + 0 Repeater opens and transmits callsign, location and - if necessary- the CTCSS tone.
* + 1..9 Additional functions (squelch control, power level and others)
These basic commands can be extended and it is possible to control special functions of the repeaters or voice-mailboxes

CTCSS FREQUENCIES IN Hz TO BE USED FOR REPEATER ACCESS			
71.9 - B	100.0 - L	141.3 - V	203.5 - AF
74.4 - C	103.5 - M	146.2 - W	210.7 - AG
77.0 - D	107.2 - M	151.4 - X	218.1 - AH
79.7 - E	110.9 - O	156.7 - Y	225.7 - AI
82.5 - F	114.8 - P	162.2 - Z	233.6 - AJ
85.4 - G	118.8 - Q	167.9 - AA	241.8 - AK
88.5 - H	123.0 - R	173.8 - AB	250.3 - AL
91.5 - I	127.3 - S	179.9 - AC	
94.8 - J	131.8 - T	186.2 - AD	

Table FM.2.1.

DTMF FREQUENCY PAIRS				
Hz	1209	1336	1477	1633
697	**1**	**2**	**3**	**4**
770	**4**	**5**	**6**	**B**
852	**7**	**8**	**9**	**C**
941	*	**0**	#	**D**

Table FM.2.2.

STANDARDS FOR SIGNAL POLARISATION

1. Helical aerials

Looking into the direction of transmission, helical beam aerials shall have a right-hand thread.

2. Moonbounce aerials

The polarisation of microwave signals used for communication via moonbounce shall be right-hand circular, i.e. the wave travelling away from the observer should rotate in a clockwise direction for operation below 3 GHz.

For operation above 3 GHz linear polarisation shall be used. European stations should use vertical polarisation. All stations shall include provision for adjustable polarisation and be prepared to agree the offset beforehand. Exact polarisation offsets shall be checked at the commencement of activity.

Should technical developments occur to make circular polarisation practical for general adoption this will be considered at a future conference.

3. NBFM Repeater aerials

Vertical (see recommendation FM.2.)

IARU Region 1 Technical Recommendation R.1

BRIGHTON 1981, TORREMOLINOS 1990

STANDARDISATION OF S-METER READINGS

1. One S-unit corresponds to a signal level difference of 6 dB,

2. On the bands below 30 MHz a meter deviation of S-9 corresponds to an available power of -73 dBm from a continuous wave signal generator connected to the receiver input terminals,

3. On the bands above 144 MHz this available power shall be -93 dBm,

4. The metering system shall be based on quasi-peak detection with an attack time of 10 msec ± 2 msec and a decay time constant of at least 500 msec.

ALTERNATIVE „TONE“ REPORTS

In order to make the indication of special propagation modes possible the Tonality (T) component of the RST reporting system (the 1-9 scale) will be extended with the following:

"a"	For signals distorted by auroral propagation
"s"	For signals distorted by "rain-scatter" propagation
"m"	for signals distorted by multipath propagation.

(other letters can be added once the need arises)

and

the IARU contest rules shall be amended in such a way that for telegraphy contacts a letter may be given in stead of the numbers 1-9 for the tonality report

BRUSSEL 1969, WARSAW 1975,NOORDWIJKERHOUT 1987

BASIC FAST SCAN AMATEUR TV STANDARD

The standard transmission system for Amateur Television shall be the CC
system following the Gerber standard.

The use of vestigial sideband techniques should be encouraged for use in
435 MHz band.

ATV in the 435 MHz band should use the 434-440 MHz segment with the car
frequency either below 434.5 MHz or above 438.5 MHz.

SATV - A SECOND TECHNICAL STANDARD FOR ATV

The technical parameters of SATV (small-bandwidth ATV) are as follows:

1. Picture frequency and line frequency as for the CCIR-2 system.

2. Maximum video bandwidth between 500 kHz and 1 MHz.

3. No audio carrier; the audio information is NBFM modulated on the video carrier, maximum deviation ±5 kHz.

Note : SATV transmitters are very easy to construct : no audio transmission is required and the tuning of the PA stages is simple.

At the receiving end there are two possible concepts:

a. The bandwidth of the TV receiver is made smaller and an I.F. limiter plus an FM detector are added.

b. A normal FM receiver is used for the audio part of the signal. From between the mixer and the I.F. filter of this receiver the broadband signal is coupled to a separate I.F. amplifier and detector, and the video signal obtained is sent to a video monitor.

Modern TV receivers can be easily modified for SATV.

Note: Advantages: Better use of the bands - e.g. several simultaneous QSO's possible in the bandwidth available in the 435 MHz band - and better signal range.

IARU Region 1 Technical Recommendation V.2

LILLEHAMMER1999,TORREMOLINOS 1991

STANDARDS FOR MICROWAVE FM ATV

	> 1 Ghz < 24 GHz	> 24 GHz
Mode of emission:	F5/F3	F5/F3
Video bandwidth (3 dB):	5 MHz	5 MHz
Pre-emphasis:	CCIR rec 405.1	CCIR Rec 405.1
Colour sub-carrier frequency:	4.433618 MHz	4.433618 MHz
Maximum instant. mod. index:	-	.05
Peak dev.(with pre-emphasis):	3.5 MHz	3.5 MHz
Channel bandwidth:	12 MHz at -40 dB 18 MHz at -50 dB	12 MHz at -40 dB 5.5 or 6 MHz
Sound sub-carrier frequency:	5.5 MHz	-14 dB
Sound sub-carrier amplitude (with respect to peak video):	-	0.2
Sound sub-carrier modulation index:	0.07	

Notes

1. A video filter having a -3 dB bandwidth of 5 MHz should be included in the modulating amplifier.

2. A video peak clipper should be included after the the pre-emphasis but before the video filter.

3. DC clamping of the video signal should be included to prevent the nominal carrier frequency from changing with different television scenes.

4. An RF output filter should be included to prevent out of band energy from whatever source from reaching the aerial system.

5. When it is necessary to reduce the transmitted bandwidthon frequencies >24.0 Ghz below that shown above the sound carrier should be reduced in level or be removed altogether.

FACSIMILE STANDARDS

For facsimile transmissions in the Amateur Service the following characteristic values are preferred:

1. The video (picture) modulated signal is generated at the audio frequency level, similar to the technique used for SSTV. The edge frequencies for "black" and "white" are 1500 Hz and 2300 Hz respectively ; the frequencies corresponding to the half-tones are between these two frequencies. The audio frequency bandwidth is maximally 3000 Hz.

2. The rotation speed of the picture drum is switchable between 60, 90, 120, 150, 180 and 240 rpm, with 60, 120, 180 and 240 rpm being the preferred values.

3. The index of co-operation shall provisionally be 288, in accordance with CCIR recommendation. Minor deviations from this value are permissable.

4. Phasing-in signals and end-of-picture signals will be chosen at a later stage, taking into account practical considerations based on the state-of-the-art.

5. All Amateur Service allocations should be open for this mode of transmission. Operation via repeaters and amateur satellites should also be allowed.

6. For the transmissions F1C should be used. (e.g. frequency shift keying of an audio frequency sub-carrier, which modulates the main carrier in SSB, or direct FSK (shift-keying) of the main carrier by the modulating signal.)
Additionally, on frequencies above 144.5 MHz mode F2C, i.e. FM/AFSK modulation of the RF carrier by a frequency-modulated sub-carrier, is permitted.

MICROWAVE HAZARDS

At the IARU Region I Conference in Warsaw (1975) the following recommendation was adopted:

> Microwave radiation hazards : Member Societies should bring the dangers of microwave radiation (from 100 MHz upwards) to the attention of their members. Information on standards should be sought from national Administrations. For general guidance see the information provided by the RSGB and attached as Appendix 1.

The original information provided by the RSGB in Warsaw (1975, document WA29) and later in Miskolc-Tapolca (1978, document M/T 34) has been superseded by an update received from the RSGB in October 1990. The new material is attached to this section as Appendix 1.

MICROWAVE HAZARDS: SAFETY RECOMMENDATIONS

1. Introduction

RF and microwave energy is absorbed by the human body, the energy being dissipated as heat. Excessive heating may cause damage to body tissues. At VHF and UHF there is usually little danger because the power density of the radiation is low and antennas carrying high power are almost always mounted well above head height.

Equipment for the higher frequencies, however, tends to be operated near ground level in order to facilitate pointing the highly directive antennas and to minimise feeder losses. The additional potential hazard that this way of operating produces is compounded by the increase in power density with decreasing wavelength for equipment with a given output power.

The guidelines listed below should minimise the risk to both bystanders and operators. These precautions are based on a power density reference level of 50 W/sq m, as advised in the UK National Radiological Protection Board publication GS-11 [1] for the frequency range 2 - 300 GHz. The corresponding value for 1.3 GHz is 32.5 W/sq m.It should be noted that these values are for continuous whole-body exposure; practical amateur operations are unlikely to give rise to such exposure conditions.

The basis for restriction of exposure has focussed on the concept of absorbed energy rate in the body. Since this is difficult to implement in practical situations, advised reference levels of maximum power density are still used, on the understanding that they are not limits. Adherence to the reference levels will ensure that basic restrictions on absorbed energy rate are met.

2. Guidelines for Protection against Microwave Hazards

Very high RF power densities are acceptable provided they are contained within the equipment. Loose connectors or waveguide flanges, for example, can represent a hazard. The operator must take steps to ensure that the equipment is RF-tight at all times. An open waveguide represents the greatest potential hazard in most Amateur stations, since the temptation to look down the guide is great.

It should be recognised that low power devices do not represent a hazard. For example, a 10 mW Gunn oscillator is incapable of depositing enough energy in any practical situation to be considered a hazard.

High RF power densities can exist anywhere within the physical structure of an antenna. Access to the antenna structure should be prevented whilst the antenna is energised, and also for a nominal distance of 1 m to the sides of the antenna, and at least 1 m in front (see below).

The highest power densities outside the structure of the antenna will occur in the forward direction, quite close by. For a given power level, the power density close to the antenna (the near field region) will be smaller, the larger the antenna. The following formula can be used to estimate the maximum power density PD in W/sq m:

$$PD = \frac{4 * W}{A} \quad \ldots\ldots\ldots (1)0$$

where W is the power in W and
A is the aperture area in sq m.

For example, with the commonly-used 0.6 m dishes power densities will not exceed 50 W/sq m at powers of up to 3.5 W.

In the case of antennas which do not have a physical aperture, such as Yagis, an equivalent aperture can be obtained from gain or beamwidth information. The equivalent aperture for a given gain is:

$$A = \frac{G * \lambda^2}{4 * \pi} \quad \ldots\ldots\ldots (2)$$

where A is the equivalent aperture in sq m,
G is the linear gain of the antenna over isotropic and
λ is the wavelength in m.

For example a 23 cm Yagi with a gain of 18 dBi (linear ± 63 times) has an equivalent aperture of about 0.26 sq m. If this antenna was fed with 100 W then the maximum power density, obtained from equation (1) above, would be about 1500 W/sq m.

The above power density formula (1) provides a pessimistic estimate, and can be used at the system planning stage to determine desirable antenna gains or maximum transmitter powers for various situations.

If the estimated peak power density is less than 50 W/sq m then no further action is needed, apart from restricting access to the antenna structure itself. It is expected that the majority of amateur microwave operations will fall into this category.

If the estimated peak power density is more than 50 W/sq m then the distance D in m to the 50 W/sq m point can be found from :

$$D = \sqrt{\frac{W * A}{PD * \lambda^2}} \quad \ldots\ldots\ldots (3)$$

where W is the power in W,
A is the aperture area in sq m,
λ is the wavelength in m and
PD is the power density wanted, in this case 50 W/sq m.

For example, for a 25 * 25 cm horn antenna fed with 25 W at 10 GHz, the 50 W/sq m point will be about 6 m away.

For the 23 cm Yagi discussed earlier, the distance to the 32.5 W/sq m point is about 4 m.

Access should be prevented within this range in the direction of the main lobe of the antenna. Since in the majority of amateur microwave installations using antennas close to the ground, the operator will be very close by, satisfactory protection can be achieved very simply. If this is not possible, then any of the following steps could be taken:

a) Raise antennas above ground level in order to reduce power densities at head height.

b) Keep outside the projection of the aperture as the decrease in power density outside this is at least -10 dB, if the feed is positioned correctly.

c) Check the power densities by measurement if you have access to the equipment (because the above estimates tend to be pessimistic).

d) Reduce output power until satisfactory protection can be achieved by the above means.

Reference

[1] NRPB-GS11 Guidance as to Restrictions on Exposures to Time Varying Electromagnetic Fields and the 1988 Recommendations of the International Non-Ionizing Radiation Committee. HMSO 1989 ISBN 0 85951 314 9

(Information provided by the RSGB, October 1990)

KEYING OF BEACONS

In order to facilitate the recognition of beacons, at the IARU Region I Conference in Miskolc-Tapolca (1978) the following recommendation was adopted:

> For identification beacons shall be keyed in F1A with a shift of approximately 850 Hz. Before the start of the identification transmission the carrier shall jump to a frequency 850 Hz below the nominal frequency and shall be Morse-keyed to the nominal frequency. After the identification transmission, hence after at least 7 dot lengths, the carrier shall jump back to the nominal frequency. The identification transmission shall be repeated after an interval (during which an uninterrupted carrier is transmitted) of 15 - 30 seconds.

PACKET RADIO DEFINITIONS

At the IARU Region 1 Conference at De Haan (September 1993) it was decided to adopt the following definitions of terms which are used in connection with packet radio. These definitions are considered to be provisional and will be reviewed at the next IARU Region 1 Conference.

Packet Radio :A form of digital communication commonly based on the use of the AX.25 protocol.

AX.25 Protocol : This protocol is based on the Amateur Radio Packet link layer protocol as described in the ARRL booklet "Amateur Packet-Radio Link Layer Protocol, AX.25".

Network : Packet radio stations may be joined by links and use a mutually agreed network protocol to allow data to be transferred automatically from one station to another station. Such a set of interconnected stations is known as a network.

Network station : A network station is an amateur radio station offering network capabilities and may establish links with other network stations. It transmits data over the network and may store data for a long or short term. It may consist of one or a combination of the following types:
Network Node : A network station supporting the transport of data over the network without long term storage.

Bulletin Board (also BBS or Mailbox) : A network station that stores messages and other information. Users can examine the stored information and messages (downloading) and supply further information and messages (uploading) once they have first established a connection with the bulletin board. A bulletin board may establish connections with other network stations for the transfer of messages and other information.

Cluster : Network stations may be interconnected in such a way that input provided to any of the stations in the cluster may be automatically passed to all the other members of the cluster and to some or all of the stations connected to the cluster. A packet radio user may connect to a cluster by first establishing a link with any station that is part of the cluster.

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part VII

Fourth Edition
2nd Upgrade

AMATEUR SATELLITES

1. Introduction

Amateur Satellites are currently named within two generic groups, one is OSCAR which is an acronym for Orbital Satellite Carrying Amateur Radio and the other is RS which is an acronym for Radio Sport, the description used for Amateur Radio in the former Soviet Union. More recently a nomenclature has developed that includes a reference to either the group that built the satellite or a name that the builders would like assigned to their satellite e.g. UoSAT-OSCAR-22 which was built by the University of Surrey and Fuji-OSCAR-20 which was built in Japan where Fuji has an obvious significance. Also, for simplicity most Amateur Satellite names are abbreviated to XX-yy e.g. UoSAT-OSCAR-22 is known as UO-22 and Fuji-OSCAR-20 is known as FO-20. Most of the Russian built Amateur Satellites are simply known as RS-yy.

Apart from beacons and data transmitters amateur satellites often carry linear transponders,
previously specified by a mode type as per the table below:

MODE	Uplink between	Downlink between
A	145.8 - 146.0 MHz	29.3 - 29.5 MHz
B	435 - 438 MHz	145.8 - 146.0 MHz
J	145.8 - 146.0 MHz	435 - 438 MHz
K	21.26 + 21.30 MHz	29.40 - 29.50 MHz
L	1260 - 1270 MHz	435 - 438 MHz
S	435 + 438 MHz	2400 - 2450 MHz
T	21.26 - 21.30 MHz	145.8 - 146.0 MHz

A second letter may be attached to the mode letter:

A - Analog
D - Digital

Combinations of mode letters are also possible:

BLS - B+L+S

However, a *new transponder mode designator* has been developed where the input (uplink) is always specified first. A slash „/“ is used to separate input and output.

Link Designators

Frequency	Wavelength	Designator
21 MHz	15m	H
29 MHz	10m	T
145 MHz	2m	V
435 MHz	70cm	U
1.2 GHz (uplink only)	23cm	L
2.4 GHz	13cm	S

5.7 GHz	6cm	C
10.5 GHz	3cm	X
24.0GHz	1.5cm	K

Transponder Names

Old Name	New Name
Mode A	V/T
Mode B	U/V
Mode J	V/U
K	H/T
KA	H,V/T
KT	H/T,V
L	L/U
S	U/S
T	H/V

In the IARU Region 1 bandplans for the bands allocated to the Amateur (Satellite) Service the following frequency segments are designated for use by the Amateur Satellite Service:

145.800	-	146.000	MHz
435.000	-	438.000	MHz
1.260	-	1.270	GHz
2.400	-	2.450	GHz
5.830	-	5.850	GHz
10.450	-	10.500	GHz
24.000	-	24.050	GHz

2. **Historical overview**

Amateur Satellites have gone through several phases:

Phase 1 - were short-lived (low earth orbit) and designed to gather information on basic satellite system performance. i.e. OSCARs 1 to 5

Phase 2 - were characterised by low altitudes (a fraction of an Earth radius), long lifetimes and communications capabilities. i.e. OSCARs 6-9, OSCARs 11, 12, 14 - 20, RS 1-6 and RS 10-14

Phase 3 - satellites reside in highly elliptical orbits having an apogee of several Earth radii. They have high power transmitters, high gain antennas and complex telemetry and control systems offering predictable long distance communications. i.e. OSCAR 10 and OSCAR 13. The next satellite in this category is Phase 3D and is expected to be launched in 2000.

Phase 4 - is applied to geostationary satellites. Although such spacecraft only exist in design study stage the concept has received much attention but to date has been judged as not a suitable global option.

Phase 5 - has been applied to satellites designed for lunar or Mars missions that have a significant Amateur Radio component.

OSCAR-1 was launched December 12, 1961 and lasted 20 days. Its 140 mW transmitter on 144.983 MHz sent "HI-HI" in Morse code. The speed of the „HI-HI“ message was controlled by a temperature sensor inside the spacecraft. Power was supplied by non-rechargeable batteries. It re-entered the earth’s atmosphere on January 31, 1962.

OSCAR-2 was launched June 2, 1962 and lasted for 18 days. It was similar to OSCAR-1 except it had improved thermal coatings to improve the internal temperature, modified sensing system so that satellite temperature could be measure more accurately as the batteries decayed and lowered the transmitter power output to extend battery life.

OSCAR-3 was launched March 9, 1965 and was the first Amateur communication satellite and the first to have solar power. It lasted 15 days and contained a 50 KHz wide 1W linear transponder from 145.9 MHz uplink to 144.1 MHz downlink, but this was only partially successful. It also had 2 beacon transmitters that continued operating for several months.

OSCAR-4 was launched December 21, 1965 and lasted for three months but due to a rocket failure went into a highly elliptical orbit. It had a 3W 10KHz wide transponder with 144 MHz uplink and 432 MHz downlink. Due to failure of the solar cells operation stopped in March 1966 and re-entered April 12, 1976.

Australis-OSCAR-5 was launched January 23, 1970 and was the first Amateur Satellite to be ground controlled. This satellite, built by students at the University of Melbourne, Australia, was equipped with two transponders in the 144 MHz and the 29 MHz bands, as well as with two telemetry systems (50mW on 144.050 MHz and 250mW on 29.450 MHz) transmitting internal information via beacon transmitters. It also had two bar magnets to provide passive magnetic attitude stabilisation. It lasted for slightly more than one month.

AMSAT-OSCAR-6 was launched October 15, 1972, the first of the Phase II Amateur satellites and had a 2W PEP 100 KHz wide transponder with uplink on 144 MHz and downlink on 29 MHz (mode A) and also carried a forward message relay system (codestore) and a beacon on 435 MHz. Its lifetime was 4.5 years. It had solar panels powering NiCd batteries which failed on June 21, 1977. Subsystems were built on U.S., Australia nd Germany.

AMSAT-OSCAR-7 was launched November 15, 1974 and survived for 6.5 years until battery failure in mid 1981. In addition to various beacons transmitting telemetry data and codestore, it carried two transponders, one with 145 MHz uplink and 29 MHz downlink (mode A) and the other with 432 MHz uplink and 145 MHz downlink (mode B), both with 2W transmitting power. Under normal conditions OSCAR-7 worked two days in mode B, followed by one day in mode A. If the battery voltage dropped below 60 % of its maximum value, the transponders were switched off and a 24 hours charging period was started. The 2304.1 MHz beacon was never switched on because of international treaty constraints.

AMSAT-OSCAR-8 was launched March 5, 1978 and was the third Phase II satellite and carried two transponders, 145 MHz uplink and 29 MHz downlink (mode A) and 145 MHz uplink and 435 MHz downlink (mode J) plus two telemetry/beacon transmitters. It also failed due to battery failure on June 24, 1983.

RS-1 and **RS-2** were launched by the Soviet Union on October 26, 1978. These satellites transponded 145 MHz uplink to 29 MHz downlink (mode

A) and contained a beacon on 29.400 MHz, transmitting telemetry data in CW at a speed of 25 words per minute. These satellites were operational for about 5 months before battery problems disabled both spacecraft. RS-1's beacon can still be heard when there is sufficient there solar illumination.

AMSATs first attempt at a **Phase 3** experiment (the satellite known as Phase-3A) never achieved orbit because the Ariane launch rocket plunged into the South Atlantic Ocean on May 23, 1980.

UoSAT-OSCAR-9 (UO-9) was the first research satellite in the Amateur Satellite Service. Constructed by the University of Surrey and also known as UoSAT-1, it did not contain transponders but was equipped with telemetry/beacon transmitters, enabling Amateurs to participate in scientific/educational experiments. It was also the first Amateur satellite to have a onboard computer for battery and attitude management, remote control and experiments. It was launched into a polar orbit on October 6, 1981 and made its re-entry into the atmosphere on October 13, 1989.

RS-3 to **RS-8** were all ejected from the same rocket December 17, 1983. RS-3 and RS-4 were retired from 29 MHz beacon duty in the summer of 1983, and RS-6 became defunct in 1985. RS-5, RS-7 and **RS-8**, which carried transponders with 145 MHz uplink and 29 MHz downlink (mode A), went out of operation in the course of 1990.

RS-5 and **RS-7** carried a "Robot", that allowed making of a QSO with the satellite using Morse code. The Robot called CQ and expected to be called back with its own callsign as well as that of the calling station. It then responded with a sequential serial number. A ground station in the USSR extracted the callsigns by interrogating the RS satellite, and QSL cards were sent via the normal channels.

ISKRA-2 and **ISKRA-3**, two "get-away-special" satellites, were ejected from the Soviet space station Salyut-7, ISKRA-2 on May 17, 1982 which re-entred July 9, 1982 and ISKRA-3 on November 18 1982 which re-entered on December 16, 1982. These ISKRAs were low-orbit satellites, carrying transponders with 145 MHz uplinks and 29 MHz downlinks. They had only limited success, and lifetime before re-entry was about six weeks for each of them.

AMSAT-OSCAR-10 (AO-10), AMSATs second attempt at a Phase 3 satellite, was successfully launched on June 16, 1983. The world's VHF/UHF/SHF radio Amateurs, after 10.5 years of low-orbit satellites and associated short visibility periods at last enjoyed the equivalence of a permanently open 14 MHz band with practically world-wide communications coverage through two transponders, 435 MHz uplink and 145 MHz downlink (mode B) and 1296 MHz uplink to 436 MHz downlink (mode L). AO-10 is still operational in mode B, albeit on a predictable but intermittent basis when there is sufficient solar illumination to power the transponder. This is due to the fact that the onboard computer used to manage the satellite failed due to radiation damage.

UoSAT-OSCAR-11 (UO-11) was launched into a polar orbit on March 1, 1984. As it's predecessor UoSAT-1, UoSAT-2 satellite was intended for scientific and educational purposes, and was equipped with digital communication-systems to demonstrate store-and-forward packet communications and is still operational today.

Fuji-OSCAR-12 (JAS-1A or FO-12) a Japanese satellite developed by the Japan Amateur Radio League (JARL) with system design and integration by NEC was launched on August 12, 1986. It contained a mode J transponder, split up in two parts: mode JA for analogue work

(SSB voice etc.), and mode JD for digital communication with 1.5 Mb RAM for store-and-forward. From the beginning this satellite experienced trouble with the power budget and on November 5 1989 FO-12 was taken out of service because of battery failure, though there still is the possibility to switch it on for a limited time.

RS-10 and **RS-11** were launched together with the COSMOS 1861 navigation satellite on June 23, 1987. These two satellites were launched into a transfer orbit with a SKEAN C-1 rocket, and at a later stage with the aid of a second burn were put into a circular orbit at a height of approx. 1000 km (lower than all other RS satellites) with an inclination of 82 degrees. Both satellites are still operational, mainly in mode A.

AMSAT-OSCAR-13 (AO-13) was constructed by a group of international Amateurs from many countries including Germany, United States, Hungary and South Africa and was the third of the Phase III satellites. AO-13 was launched on June 15, 1988 and had mode B, mode L and mode S transponders, four beacons and the RUDAK-I digital experiment. Unfortunately, due to perturbations not fully appreciated at launch time a fully operational AO-13 decayed in December 1996.

On January 22, 1990, a group of 6 satellites, OSCAR 14-19, were ejected from the same Ariane 4 launch vehicle.

UoSAT-OSCAR-14 (UO-14) know as UoSAT-D at the University of Surrey where it was constructed was the first of Amateur Satellite to feature a 9600 bit/s store-and-forward packet-radio mailbox, intended to be used for scientific/educational purposes. In 1992 this satellite was withdrawn from the Amateur Satellite Service and moved to commercial frequencies.

UoSAT-OSCAR-15 (UO-15 or UoSAT-E) was intended as a testbed for new space techniques. It contained a transputer (parallel CPUs) and a high-resolution CCD camera. Due to an unknown cause this satellite ceased transmitting a few days after its launch.

AMSAT-OSCAR-16 (MicroSat-C, PACSAT, AO-16) built by AMSAT-North America features a Mode J 1200 bit/s PSK store-and-forward packet radio mailbox (PACSATs). It also carries a 2401 MHz beacon.

DOVE-OSCAR-17 (MicroSat-A, DO-17) was developed and built on behalf of AMSAT-Brazil. This satellite was intended to ‘advertise’ Amateur Radio in educational institutes. It is equipped with a multi-language speech synthesizer for the transmission of messages. A 2M 1200 bit/s AFSK/FM packet radio telemetry transmitter was also included. Like AO-16 a 2401 MHz beacon was included.

WEBERSAT-OSCAR-18 (MicroSat-D, WO-18) was developed at the Weber State College in Ogden, Utah, USA. A CCD camera transmits images using 1200 bit/s PSK packet-radio on 70cm. The satellite also contains an ATV experiment with the NTSC image-system, and pictures were transmitted regularly.

LUSAT-OSCAR-19 (MicroSat-B, LO-19) was partly developed in Argentina by AMSAT-LU and features a Mode J 1200 bit/s PSK store-and-forward packet-radio mailbox similar to AO-16 and also has digipeater facility as does AO-16.

Fuji-OSCAR-20 (JAS-1B or FO-20) is a satellite developed in Japan by JARL and produced by NEC. It was launched on February 7, 1990, as a successor to FO-12. It has been designed in such a way that mode JA and JD can be used simultaneously. In practice it operates mainly in

mode JD which is a 1200 bit/s PSK digital store-and-forward mailbox, but regularly tests in mode JA which is an analogue voice transponder are carried out.

RS-14 (AMSAT-OSCAR-21 or AO-21) was launched by a Wostock rocket on January 29, 1991 as a piggy-back satellite on board of a GEOS scientific satellite. This was cooperative effort between AMSAT-Russia and AMSAT-DL. After a successful test period command stations in Russia left the satellite uncontrolled for an appreciable period. Due to the political changes in Russia and some difficulties with the control of the satellite it took considerable time before the actual experiments could be started. The satellite contains an analogue transponder and a RUDAK digital experiemnt which served as a testbed for future Amateur digital experiments. Perfect quality speech synthesis using DSP (Digital Signal Processing) were amongst the many possible experiments. As of September 16, 1994 the spacecraft was switched off including the Amateur payload due to the cost of maintaining the satellite when the usefulness of the primary payload was exhausted.

RS-12 and **RS-13** were launched February, 1991 and are operationally very similar to RS-10 and RS-11 but have an additional uplink on 21MHz in the 15M (mode-K). RS-12 and RS-13 are still currently operational

UoSAT-Oscar-22 (UoSAT-E or UO-22) was launched on July 17, 1991. It was intended to replace the failed OSCAR 15 (UO-15) and to provide store-and-forward facilities to Satelife (a non-profit humanitarian organization). Due to practical problems, UO-14 was dedicated to VITA - Satellite and UO-22 to the Amateur Satellite Service. The satellite features a 9600 bit/s FSK store-and-forward system and a CCD camera, and operates primarily as a satellite link for a global terrestrial packet radio using satellite gateway ground stations.

KITSAT-OSCAR-23 (KO-23) was launched on August 10, 1992. This satellite was built at the University of Surrey for KAIST, the Korean Advanced Institute for Science and Technology and is similar to UO-22. It has 2 CCD cameras and a 9600 bit/s FSK up and down link. It is controlled by HL0ENJ and provides excellent wide angle pictures.

ARSENE-OSCAR-24 (AO-24) was launched May 13, 1993 into an equatorial elliptical orbit. It had Mode B (145.975 MHz downlink (1200 bps FM AFSK)) and Mode S (2446.54 MHz downlink) transponders. ARSENE was a French packet relay satellite built by French Radio Amateur Club de l'Espace. The packet system was never implemented because the 2M transponder failed soon after launch. ARSENE was then used to relay SSB and CW signals on 2.4 GHz for several months until this transponder failed as well.

On September 26, 1993, a group of 3 satellites, OSCAR 25-28, were ejected from the same Ariane 4 launch vehicle.

KITSAT-OSCAR-25 (KO-25) is a South Korean experimental microsatellite based on the SSTL UoSAT bus built by the Korean Advanced Institute of Science and Technology (KAIST). KO-25 is operated from The Satellite Technology Research Center (SaTReC) in South Korea. KO-25's mission is to take CCD pictures, process numerical information, measure radiation, and receive and forward messages. The Infrared Sensor Experiment (IREX) is designed to acquire I/V characteristics of IR sensors. A passive cooling structure was devised for this experiment and currently the ground controllers are monitoring the temperature of this experiment. KO-25 is presently operating as a packet store-and-forward satellite, very

similar to UO-22 and KO-23.

Italy-OSCAR-26 (IO-26) was built by AMSAT-ITALY. Its mission is to store and forward amateur radio messages like AO-16, LO-19, UO-22, KO-23 and KO-25. IO-26's operation is identical to the 1200 bit/s PSK microsatellites AO-16 and LO-19. The ITAMSAT Command Team can be contacted via internet: Alberto Zagni, I2KBD, i2kbd@amsat.org or Luca Bertagnolio, IK2OVV, ik2ovv@amsat.org.

AMRAD-OSCAR-27 (AO-27) is a secondary amateur communications payload carried aboard the EYESAT-1 experimental MICROSAT satellite built by Interferometrics Inc. of Chantilly, Virginia. The commercial side of the spacecraft's mission is the experimental monitoring of mobile industrial equipment. The amateur equipment aboard the satellite was constructed by members of AMRAD, a technically-oriented, non-profit organization of radio amateurs based in the Virginia suburbs of Washington, D.C., to meet the needs of amateurs for a platform to conduct digital satellite communications experiments. AO-27 is available on all daylight passes over the Northern Hemisphere. The "TEPR" states describe the time in minutes from when the spacecraft enters and then leaves eclipse. The current schedule has the TX off during TEPR period/state "4", which is the one after the satellite exits eclipse. The TX is on for TEPR 5. So if the schedule is

TEPR 4 12.5 minutes
TEPR 5 18 minutes (not current numbers, just an example)

Then the amateur TX is on for a total of 18 minutes from 12.5 minutes after the satellite exits eclipse until 30.5 minutes after end of eclipse. These numbers get adjusted every few months to account for the seasonal north/south movement of the latitudes where AO-27 enters/exits eclipse.

PoSAT-OSCAR-28 (PO-28 or PoSAT-1) is Portugal's first satellite achieved through a technology transfer program with Surrey Satellite Technology, Ltd. (SSTL) and was built at the University of Surrey in a collaborative program between a consortium of Portuguese academia and industry. Like KO-23, PoSAT-1 carries a wide range of technology experiments, including earth imaging cameras, DSP and space-radiation experiments. In addition, PoSAT-1 carries the first microsatellite GPS experiment and an ultra-low-cost CCD star sensor. PoSAT-1 is operated jointly by the University of Surrey command station at Guildford and the Portugese command station at Sintra. PoSAT was operated on amateur frequencies for several weeks in early 1994. Presently, PO-28 is not operational on Amateur frequencies but may after the primary mission has been completed.

RS-15 was launched December 16, 1994 from Baykonur Space Center aboard a "Rokot" launcher which is made on base of rocketry boosters (1st and 2nd stages) of missile well known as SS-19 and new booster "Briz" (3th stage).
Satellite is spherical like unit about 1 meter diameter and his weight is approximately 70 kg. (used the same trunk as on RS-3 - RS-8). On the board exist transponder, two beacons, CW - broadcast bulletin board (2kb), remote control system and telemetry system. The satellite has no orientation and stabilization systems. All electronics onboard equipment was designed and produced by a group of radio amateurs from Kaluga town (180 km s-w from Moscow) under leaderships of Aleksander Papkov. Ground control of RS-15 as with RS-10/11 and RS-12/13 is performed by RS3A ground control station at Moscow and is sponsored by "Unicom", Russia and "UTC", RI, USA.

UNAMSAT-1 (Mexico) and **TechSat-1a (Israel)**

Both satellites were launched from Plesetsk, Russia on March 28, 1995. Unfortunately the Russian Start-1 launcher failed and destroyed both spacecraft. In a second attempt, UNAMSAT-B was launched September 5, 1996 and was designated as Mexico-OSCAR 30 (see below). Unfortunately, it failed after about a day of transmitting due to a dead uplink receiver. Israel's successful second attempt is called TechSat-1b.(see below)

Fuji-OSCAR-29 (FO-29 or JAS-2) was launched August 17, 1996 and like its predecessors FO-20 and FO-29 contains digital and analogue transponders and has a digi-talker. FO-29 is currently operational and rotates between analogue, digital and digi-talker modes on a schedule published monthly basis controlled by ground control station in Japan.

Mexico-OSCAR-30 (MO-30 or UNMSAT-B) was launched September 5, 1996 was the second nearly identical Microsat satellite constructed by the Autonomous University of Mexico by students and staff led by David Liberman, XE1TU. Due to unforeseen circumstances MO-30 was not released from the launch vehicle and the spacecraft temperature dropped to –30 degrees centigrade which caused the crystal oscillator in the uplink receiver to fail.

RS-16 was launched March 4, 1997 and had a Mode A transponder and two 70cm transmitters but was never activated due to technical problems. RS-17 decayed October 25, 1999.

RS-17 (Spoutnik–40) was a scale model satellite built by high school students to commemorate the 40th anniversary of the launching of Sputnik I. It was launched by hand on November 4, 1997 by Russian cosmonauts from the MIR space station. RS-17 broadcast its bip-bip signal for 55 days. The last known recordings were made on December 29, 1997, at about 2100 utc by an American radio amateur from Washington State, USA and by FR1AJ from Reunion Island, France.

Thai-Microsatellite-OSCAR-31 (TO-31 or TMSAT-1) was launched July 10, 1998 from the Russian Baikonur Cosmodrome. TO-31 is the first Thai Microsatellite, and stands for Thai-Microsatellite and was constructed by Thai engineers with engineers at SSTL at the University of Surrey. TMSAT is also the name of a company that Mahanakorn University of Technology (MUT) and Thai Satellite Communication (TSC) are investing in, in order to develop satellite technology in Thailand. TO-31 can take multispectral images. They are produced by combining data from the Narrow Angle Camera, sensing in the green, red, and near-IR spectra. Each image has 1020 x 1020 pixels, covering an area of 100 x 100 km at mean ground resolution of 98 meters / pixel. Red areas indicate healthy vegetation (due to the strong near-IR reflectance of chlorophyll). Urban areas are generally blue-grey. The different colors of fields provides an indication of the state of vegetation (bare soil, marsh, young or mature vegetation, etc). These images can be downloaded from TO-31 on Amateur frequencies using the pacsat protocol as used on UO-22, KO-23 and KO-25.

Gerswin-OSCAR-32 (GO-32 or TechSat-1B) was launched July 10, 1998 from the Russian Baikonur Cosmodrome. GO-32 is a micro-satellite project conducted at the Technion Institute of Technology in Haifa, Israel by an academic group of scientist and students. The Israel Amateur Radio Club is involved in the TechSat project. GO-32 has a camera onboard and did take some pictures soon after launch but is now only transmitting short burst of telemetry on its beacon frequency but it is hoped that ion time it will be made fully operational again.

SEDSat-OSCAR-33 (SO-33) was launched October 24, 1998 built at the University of Huntsville, Alabama, in conjunction with Students for the Exploration and Development of Space (SEDS) USA, designed and constructed SEDSAT-1. Unfortunately, SO-33 can not be controlled from the ground and therefore operates autonomously and transmits short burst of telemetry once every minute when the spacecraft has sufficient solar illumination.

PANSAT-OSCAR 34 (PANSAT) was launched October 30, 1998 and was designed and built by the Naval Postgraduate School in Monterey, California. This amateur satellite is unique among the PACSAT style satellites in that it will employ direct sequence spread-spectrum communications. This experiment is yet to be activated for general use.

RS-18 (Sputnik-41) was launched by hand November 4, 1998 from the MIR space station and was basically a repeat of RS-17 (Spoutnik-40).

SUNSAT-OSCAR-35 (SUNSAT) was launched February 23, 1999 and is a micro-satellite designed and built by post-graduate engineering students in the Electronic Systems Laboratory, in the Department of Electrical and Electronic Engineering at the University of Stellenbosch. Payloads include NASA experiments, Radio Amateur communications, a high resolution imager, precision attitude control, and school experiments. The 70cm/2M FM voice repeater has been already been activated and has been most popular amongst Radio Amateurs who have simple 70cm and 2M FM equipment.

UoSAT-OSCAR-36 (UO-36 or UoSAT-12) was launched from Baikonur Cosmodrome on April 21, 1999 by ISC Kosmotras aboard the first orbital demonstration launch of the SS-18 Dnepr vehicle. UO-36 was built by SSTL at the University of Surrey and is a the 325-kg satellite that validates their key minisatellite bus and payload technologies. The UoSAT-12 mission enables SSTL to offer flight-proven minisatellite solutions for commercial, scientific, military and know-how transfer programs. UO-36 carries payloads for multi-spectral and panchromatic Earth imaging; experimental S-band/L-band communications; and operational VHF / UHF store-and-forward messaging. In addition to these payloads, UoSAT-12 will demonstrate Surrey's new minisatellite bus subsystems, including GPS orbit and attitude determination; cold-gas orbit and attitude control; Nitrous Oxide resistojet orbit control; star imagers; reaction wheels; Ethernet LAN; and 28-V power system.

3. Operational Amateur Satellites (November 1999)

AO= Amsat OSCAR RS= Radio Sport Satellite
UO= UoSAT OSCAR KO= Kitsat OSCAR
WO= Weber OSCAR LO= Lusat OSCAR
FO= Fuji OSCAR

Satellite	Mode	Uplink	Downlink

AO-10	B	435.025 - 435.175	145.825 - 145.975
Beacon	B		145.810 2 Watt GB
UO-11		no transponder operation	Beacon : 145.825 350 mW
UoSAT-2			435.025 1 W
			2401.500
RS-10	K	21.160 - 21.200	29.360 - 29.400
	T	21.160 - 21.200	145.860 - 145.900
	A	145.869 - 145.900	29.360 - 29.400
	KT	21.160 - 21.200	29.360 - 29.400
		21.160 - 21.200	145.860 - 145.900
	KA	21.160 - 21.200	29.360 - 29.400
		145.860 - 145.900	29.360 - 29.400
Robot		21.120 / 145.820	29.403
Beacons			29.357
			29.403
			145.857
			145.903
RS-11	K	21.210 - 21.250	29.410 - 29.450
	T	21.210 - 21.250	145.910 - 145.950
	A	145.910 - 145.950	29.410 - 29.450
	KT	21.210 - 21.250	29.410 - 29.450
	KT	21.210 - 21.250	145.910 - 145.950
	KA	21.210 - 21.250	29.410 - 29.450
	KA	145.910 - 145.950	29.410 - 29.450
Robot		21.130 / 145.830	29.453
Beacon			29.407
			29.453
			145.907
			145.953
AO-16	JD	145.900/920/940/960	437.026 PSK
PACSAT			437.051 raised cosine
	S		2401.143 MHz
DO-17			145.825 FM/AFSK
DOVE			145.824 FM/AFSK
	S		2401.220 MHz
WO-18		1265 MHz ATV NTSC	437.075 PSK
WEBERSAT			437.102 raised cosine
LO-19	JD	145.900/880/860/840	437.153 PSK
LUSAT			437.125 raised cosine
	JA	145.900 -- 146.000	435.800 -- 435.000
FO-20	JD	145.850	435.910
FUJI-2	JD	145.870	435.910
	JD	145.890	435.910
	JD	145.910	435.910
Beacon	JA	145.910	435.795 if Mode JA ON
RS-12	A	145.91-.95/29.41-29.45	29.408 - 29.545 MHz
	K	21.21-21.25/29.41-29.45	29.408 - 29.454 MHz
	T	21.21-21.45/145.91-.95	145.912 - 145.958 MHz
	KA	21.21-21.25/29.41-29.45	29.408 - 29.454 MHz
		145.91-.95/29.41-29.45	
	KT	21.21-21.25/29.41-29.45	29.408 - 29.454 MHz
		21.21-21.25/145.91-.95	145.912 - 145.958 MHz
Robot		21.129	
Robot		145.830	

RS-13	A K T KA KT Robot Robot	145.96-146/29.46-29.5 21.26-21.3/29.46-29.5 21.26-21.3/145.862-146 21.26-21.3/29.46-29.5 145.96-146/29.46-29.5 21.26-21.3/29.46-29.5 21.26-21.3/145.96-146 21.138 145.843	29.458 - 29.504 29.458 - 29.504 145.862 - 145.908 29.458 - 29.504 29.458 - 29.504 145.862 - 145.908
UO-22 Uosat F	JD	145.900 145.975	435.120 435.120
KO-23 Kitsat 1A	JD	145.900 145.850	435.167 or 435.175 435.167 0r 435.175
KO-25	JD	145.980	436.50
AO-27	JD	145.850	436.795
PO-28		Not operational on amateur frequencies	
FO-29 JAS-2 Beacon Digitalker	JA JD JD JD JD	145.900 -- 146.000 145.850 145.870 145.890 145.910	435.800 -- 435.000 435.910 435.910 435.910 435.910 435.795 if Mode JA 435.910
TO-31 TMSAT-1	JD	145.925	436.925
GO-32 Techsat-1b			435.225 Beacon only
SO-23 SEDSAT-1			437.910 Beacon only
PO-24 PANSAT		To be announced	To be announced
SO-35 SUNSAT		436.291 or 145.825	145.825 or 436.291

4. **Planned satellites**

JAWSAT, ASUSAT-1 and StenSaT are 3 new Amateur Radio satellites that are scheduled to be launched on December 3, 1999 aboard an Orbital Sciences Corporation's launcher called Minatour (which is a converted Minuteman II missile) from Vandenberg Air Force Base. Amateur payloads associated with this launch are JAWSAT built at the Weberstate University, Utah, ASUSAT-1 from the Arizona State University, and StenSat by a group of Amateurs in the Washington, D.C. area. See table of frequencies below.

Phase-3D is expected to be launched in early 2000 onboard an Ariane 5 launcher from Kourou, French Guiana and is AMSAT’s most ambitious satellite to date. It is a collaborative effort involving builders from Belgium, Finland, Germany, Great Britain, Hungary, Japan, South Africa, U.S.A. and Yugoslavia. It will be the largest Amateur Radio satellite ever launched and has the largest array of transponders using most Amateur Satellite Service allocations (see table of frequencies below) and experiments. It is another of the Phase-III satellites but is designed to ultimately be 3-axis stabilised instead of being spin stabilised as were Phase-3B (AO-10) and Phase-3C (AO-13).

Swedish Satellite AMSAT-SM Easy to use "Microsat" design, two analogue NBFM channels on 70cm, Channel 1 - A "parrot" with 10 seconds of memory in half duplex mode, meaning TX for max 10 seconds and then listen to the parrot repeating your transmission on the same frequency. Channel 2 - A fax/SSTV downlink with a high-resolution CCD camera. Proposed frequencies: 437.250 and 437.225 or 437.275 MHz.

VOXSAT AMSAT-LU built by AMSAT-Argentina will be launched a Russian launch vehicle in late 1999 into a 1000 km polar orbit, Downlink 1 2.5W FM (telemetry, broadcast, parrot) 145.990, Downlink 2 4W FM (cross band uhf/vhf repeater) 145.910 Uplink 435.990 FM.

BremenSat - Olaf Hänßler DG6BCC from Polytechnic Electronics Department, is in the early planning stage of a small satellite (picosat, around 5kg). Planned orbit altitude of 1000km with a camera-payload. Uplink 1.2 GHz and downlink on 2M using 9600 bit/s.

Citizen Explorer - Colorado Space Grant Consortium is a low-cost small satellite proposed launch December 1999. Targeted at K-12, University students and Amateur Radio Satellite enthusiasts. Measures atmospheric ozone and UV radiation. Downlinks data at 9600 or 300 bit/s on 436.750 FM.
Uplink on 2M for Command Station operations. Similar in concept to UoSAT-OSCAR-9 and UoSAT-OSCAR-11 except with 70cm downlink.

LEAST Project - Harold Price NK6K first proposed to AMSAT in November 1998. LEAST is an acronym for Lots of Extra Amateur Stuff on the Telescope an Amateur Radio package onboard the Canadian Telescope satellite known as MOST. Low power, high MIPS processor fed by a tuneable receiver covering 50MHz to 3GHz with 500KHz bandwidth. Also simple L/S transponder with LEILA strong signal attenuator, store and forward spectrum analyser, radiolocation via Doppler, highly encoded modulation schemes, studies of interfering signals in higher ham bands and pure fun projects. Frequency coordination is currently in progress: Uplink: L-band, Downlink: S-band, Data: 153.6 Kb PSK

NATSWeb Satellite - Bob Bruninga WB4APR Built by teams at U.S. Naval Academy and Weber State University in less than 6 weeks for launch in February 1999. Missed launch due to State Department requirement for Export Licence. Mission to provide APRS mobile position and status reporting link from mobiles anywhere back to into a worldwide APRS infrastructure. The frequency chosen was 144.390MHz which fitted with North American bandplan but not IARU Regions 1 and 3. Therefore a frequency in the 145.800 to 146.000 was the only worldwide solution and 145.815 was chosen as the downlink with 144.390 as the uplink. If APRS activity increases in IARU Regions 1 and 3 then an alternate uplink in 145.800 to 146.000 would be needed.

Emerald/Orion Project - Stanford & Santa Clara Universities California, U.S. 3 satellites due for launch in first quarter of 2002 from a Shuttle. 2 satellites called Emerald and 1 called Orion which will fly in formation using GPS with inter spacecraft and ground communications using Amateur Satellite frequencies. SQ hardware and BekTtek software will provide the Amateur Radio community with Pacsat (9600 bit/s half duplex) capability and bent pipe features of the modem when not in use for the primary mission. Primary mission completed in first 3 months after launch. Frequency coordination is currently in progress with Bob Twiggs KE6QMD - 70cm for crosslinking and 2M uplink.

Nanosatellite - Bristol University, U.K - Contacted by Ross Wilkinson G0WJR about proposed undergraduate project by Aerospace Engineering Department. Nanosat to be deployed by astronaut from I.S.S. Life expectancy only a few days because it is planned to have only battery-power i.e. no solar cells. 70 cm telemetry downlink only - 100bit/s data rate.

SAREX – MIR – International Space Station - Since the first amateur-radio experiment on board of a shuttle (STS-9) several additional experiments have been carried out, both on board of U.S. shuttles and the Russian Space Station MIR. In many of these experiments frequencies outside the Amateur Satellite Service bands were used, e.g. 145.550 MHz for an uplink and downlink frequency and 144.950, 144.910, 144.930, 144.970, 144.990, 145.030, 145.050, 145.070 and 145.090 MHz as uplink frequencies.

In recent years there has been an increase in amateur-radio activity on board MIR with almost continuous operations on 145.985 MHz FM simplex primarily packet radio but more recently slow scan TV interspersed with frequent voice contacts between ground stations and MIR crew. Also a 70cm repeater was installed on MIR that was a cooperative effort between groups in Germany and Russia but due to various power supply and antenna issues was not fully utilised even though the repeater was fully operational. Unfortunately, MIR has been left unmanned since August 1999.

However, it is expected that operations on 2M (primary downlink frequency 145.800 MHz) will commence in early 2000 from the ISS (International Space Station). There are also well advanced plans to have 70cm equipment operational in the 437.5 to 438.0 MHz region of the Amateur Satellite Service band. Plans for other bands are also in the progress. The effort is being coordinated by a relatively large group with worldwide representation and has met on numerous occasions in the last few years to address a wide range of issue associated with such a significant project. Frank Bauer KA3HDO has been the main motivator of this project.

Balloon Flights have seen a resurgence in recent times as has amateur **Rocket Launches** (using home-built rockets or surplus military hardware) that have carried Amateur Radio communications payloads aloft with transmissions on many of the Amateur Satellite Service bands including 2M and 70cm.

N.B. This is not an complete review of all projects but a general overview of the diversity of exciting projects that are planned in the foreseeable future.

JAWSAT:

Downlinks: 0 to 8W 437.175 MHz Voice and 4k8, 9k6, 19k2, 38k4 GMSK Digital

1.5W 437.075 MHz Voice and 9k6, 19k2, 38k4 GMSK Digital

2W 2403.2 MHz Voice and 9k6, 19k2, 38k4 GMSK Digital

Uplinks: 145.860 MHz Voice and 9k6 GMSK Digital

145.xxx MHz Voice and 9k6 GMSK Digital

to be announced after commissioning

The current plans are to have 145.860 MHz voice up and 437.175 MHz voice down with 100 Hz CTSS as soon as possible after launch.

ASUSat1:

Downlink: 436.700 MHz
Uplinks: 145.980 MHz primary and 145.850 MHz backup

Voice repeater and 9k6 bit/s AX.25 operations.

OPAL:

Downlink and Uplink: 437.100 MHz half duplex 9k6 for spacecraft management and controlling the launch of StenSat.

StenSat:

Downlink: 436.625 MHz (0.1 to 0.25W) periodic 1200 bit/s AX.25 telemetry.
Uplink: 145.840 MHz

You will be able to PING the spacecraft using a 6-digit DTMF code.

Official Transponder Frequencies for P3-D last revised on August 20, 1998.

UPLINK	Digital	Analog Passband
15 m	none	21.210 - 21.250 MHz
	none	24.920-24.960 MHz
2 m	145.800 - 145.840 MHz	145.840 - 145.990 MHz
70cm	435.300 - 435.550 MHz	435.550 - 435.800 MHz
23cm(1)	1269.000 - 1269.250 MHz	1269.250 - 1269.500 MHz
23cm(2)	1268.075 - 1268.325 MHz	1268.325 - 1268.575 MHz
13cm(1)	2400.100 - 2400.350 MHz	2400.350 - 2400.600 MHz
13cm(2)	2446.200 - 2446.450 MHz	2446.450 - 2446.700 MHz
6cm	5668.300 - 5668.550 MHz	5668.550 - 5668.800 MHz

DOWNLINK	Digital	Analog Passband
2m	145.955 - 145.990 MHz	145.805 - 145.955 MHz
70cm	435.900 - 436.200 MHz	435.475 - 435.725 MHz
13cm(1)	2400.650 - 2400.950 MHz	2400.225 - 2400.475 MHz

13cm(2)	**2401.650 - 2401.950 MHz**	**2401.225 - 2401.475 MHz**
3cm	**10451.450 - 10451.750 MHz**	**10451.025 - 10451.275 MHz**
1.5cm	**24048.450 - 24048.750 MHz**	**24048.025 - 24048.275 MHz**

P3-D Telemetry Beacons (IHU)

BEACON	General Beacon (GB)	Middle Beacon (MB)	Engineering Beacon (EB)
2 m	**none**	**145.880 MHz**	**none**
70cm	**435.450 MHz**	**435.600 MHz**	**435.850 MHz**
13cm(1)	**2400.200 MHz**	**2400.350 MHz**	**2400.600 MHz**
13cm(2)	**2401.200 MHz**	**2401.350 MHz**	**2401.600 MHz**
3cm	**10451.000 MHz**	**10451.150 MHz**	**10451.400 MHz**
1.5cm	**24048.000 MHz**	**24048.150 MHz**	**24048.400 MHz**

Remarks:

- X All Receivers are inverting!
- X Telemetry Beacons are for command purposes and are modulated in 400 Bit/s BPSK, AMSAT format.
- X The MB can be switched between IHU-1 or IHU-2 telemetry.

5. **Amateur satellite organizations**

AMSAT-Australia
G.P.O. Box 2141
Adelaide 5001,
Phone: 61-8-897 5104

The Amateur Radio Satellite Group of Bermuda.

AMSAT Belgium (AMSAT-ON)
St Pietersplein, 15
,3071 Erps-Kwerps
Phone : 02/759.80.24

AMSAT-CE
P.O. Box 40 ,Santiago 5
CHILE
Phone: +56 (2) 773-7831
Fax: +56 (2) 774-4693

AMSAT-DL
Holderstrauch 10
D-35041 Marburg
Germany

AMSAT-EA
Velazquez 86 C,
28006 Madrid
Spain

AMSAT-France
14 bis, rue des gourlis,
92500 Rueil Malmaison
France

AMSAT-HS(Amateur Radio Satellite Group of Thailand)
P.O.Box 399, Laksi Bangkok
Thailand 10210

AMSAT Italia
CPA 559
Sassuolo (MO) 41049
ITALY

AMSAT-LU
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1401 Buenos Aires
ARGENTINA

AMSAT-OE
c/o Wolf D. Hoeller
Schuetzenstr. 44c
A-6020 Innsbruck
Austria

AMSAT-OZ
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Gauteng
Republic of South Africa
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6. **Operating procedures**

For amateur-satellites operating procedures see section Vc.

7. **Satellite Coordination**

See sections Id and VIIc

Acknowledgement.

The material for this section was originally prepared by Freddy de Guchteneire, ON6UG and Ron Broadbent, G3AAJ, but has been updated by Graham Ratcliff, VK5AGR, IARU AMSAT Satellite Frequency Coordinator.

AMATEUR SATELLITE BANDPLAN

a. General AMSAT downlink bandplan

As with other amateur band allocations, a bandplan exists for the orderly use of the space sections of the amateur bands. The AMSAT bandplan shown below is based on percentages of the downlink passband and has been generally adopted. It applies to both inverting and non-inverting transponders.

This set-up is used in most satellites, except for some transponders on microwave bands. These microwave transponders do not have a strictly defined bandplan to allow for maximum flexibility and usage and to accommodate more experiments. By not using a strict bandplan, the transponder is often more evenly loaded which contributes to less QRM.

<----------DOWNLINK PASSBAND---------->						
GUARD	TELEGRAPHY	RTTY	MIXED MODES [3])	SSTV	SSB	GUARD
5%	30%	[2])	30%	[2])	30%	5%
<----------100%---------->						

Notes.

1. Guard area to avoid interference with beacons. These frequencies are available for emergency and bulletin stations.

2. RTTY and SSTV are placed at the edge of the telegraphy and the SSB passbands, conforming to their usage at HF where RTTY is present within the telegraphy space and SSTV is transmitted in the SSB sub-band.

3. Mixed modes area, recommended for use by crystal-controlled stations, DX-pedition stations, or anyone wishing to work both telegraphy and SSB stations.

IARU REGION 1 AND IARU SATELLITE COORDINATION

During the final Plenary Session of the IARU Region I Conference in Brighton (1981) a Satellite Working Group was established as a forum for the exchange of information and the coordination of amateur satellite work in Region 1.

Dr. A. Gschwindt, HA5WH, was nominated as Chairman/Convenor of this Working Group.

At the Region 1 Conference in Cefalu (1984) it was decided that Region 1 did not need a Working Group but only required a Satellite Coordinator, and HA5WH was nominated to this function.
At the International Day of the 1989 AMSAT-UK Colloquium at the University of Surrey, through the good offices of Ron Broadbent, G3AAJ, Hon. Secretary of AMSAT-UK, IARU Region 1 officials were able to organize a meeting with the officers of the many AMSAT groups represented there. This meeting was aimed at discussing ways and means of improving the contacts between IARU (Region 1) and the AMSAT groups to the mutual benefit of both parties.

At this meeting a policy statement regarding Amateur Satellites was drafted, intended to be considered by the Administrative Council of IARU.

After the 1989 AMSAT-UK Colloquium the Executive Committee of IARU Region 1 adopted a proposal made by the Chairman of the Region 1 VHF/UHF/Microwaves Committee, PA0QC, to extend and improve the liaison between IARU Region 1 and the various AMSAT groups active in the Amateur Satellite Service by nominating a second IARU Region 1 Satellite Coordinator, Ron Broadbent, G3AAJ, as from October 1, 1989.

At its meeting in Orlando, September 1989, the Administrative Council of IARU adopted (in slightly re-worded form) the satellite policy statement drafted at the Guildford meeting as Resolution 89-3; it is attached as Appendix 1. Subsequently this AC Resolution was adopted at IARU Conferences of Regions 2 and 3, as well as by the IARU Region 1 Conference in Torremolinos (April 1990).

At their Orlando meeting the IARU Administrative Council also proposed to nominate an IARU Satellite Activity Coordinator (AC Resolution 89- 4) and requested the IARU Regions to come up with proposals for nominations.

At the International Day of the 1990 AMSAT-UK Colloquium at the University of Surrey the AMSAT groups represented there welcomed the IARU idea of nominating a Satellite Activity Coordinator. Consultation between officers of IARU Region 1 and the officers of AMSAT groups represented at this Symposium resulted in a proposal for Terms of Reference for such an Coordinator. On behalf of Region 1 and with the support of all AMSAT groups present at the 1990 Dataspace Symposium it was proposed to the Administrative Council of the IARU to nominate Fred de Guchteneire, ON6UG, as IARU Satellite Activity Coordinator, and to adopt the above-mentioned Terms of Reference for this position.

In 1991 the Administrative Council of the IARU nominated ON6UG as IARU Satellite Coordinator. They also adopted the proposed Terms of Reference under the provision that a re-write may be undertaken, without changing the essential contents, in order to bring them in line with the Terms of Reference of other IARU bodies as far as form is concerned. This re-write was finalized and adopted at the meeting of the Administrative Council in Brussels (September 1993), where also the name of the officer was changed to IARU Satellite Liaison Officer.

The IARU Region 1 Conference in De Haan (September 1993) decided that, as

far as the liaison IARU (Region 1) with the various AMSAT groups was concerned, one liaison officer should suffice. Consequently, the two Region 1 Satellite Coordinators, HA5WH and G3AAJ, who agreed with this view, were not renominated. The Conference recorded a vote of thanks for the excellent work they had done in this field.

The IARU Administrative Council at its meeting in Singapore (September 1994) decided that the existing coordination structure did not work well enough and decided to replace the function of Satellite Liaison Officer by two functions. The first was the "IARU Satellite Adviser", the second the "IARU Satellite Frequency Coordinator". They also nominated Hans van de Groenendael, ZS5AKV, as 'Adviser' and Bruce Lockhart, SMoTER, as 'Coordinator'. At the AC Meeting in Niagara Falls 1995 the terms of reference of the Satellite Advisor were slightly changed and the Satellite Advisor could elect the IARU AMSAT Satellite Frequency Coordinator. For this function Graham Ratcliff, VK5AGR, was chosen. The terms of reference for those functions are given in appendix 2.
At the Region 1 Conference 1999 in Lillehammer it was decided that in order to optimize communications with the IARU Advisor, the AMSAT groups in order to support the VHF/UHF/MW Committee a special Region 1 Satellite Coordinator was required. The T.o.R are given in section Id

The following recommendations regarding the Amateur Satellite Service were adopted at IARU Region 1 Conferences:

> Support should be given by IARU Region 1 for developments in the Amateur Satellite Service. The Executive Committee of Region I, in consultation with the Satellite Coordinator(s)/Liaison Officers, shall determine how this support shall be effected. (Cefalu, 1984)
>
> IARU Region 1 recognizes the valuable contribution of simple satellites to the amateur community, elementary disaster communications and the education of very young children in satellite communications. (Torremolinos, April 1990)
>
> As the IARU Region 1 144 - 146 MHz bandplan contains no provision for satellite communication in the lower part of the 144 - 146 MHz band, it is recommended that the mode J transponder in OSCAR 13 not be used by amateurs in Region 1. If member societies would report serious interference to terrestrial communications from the non-recommended use of the satellite transponder, IARU Region 1 recommends that the mode J transponder in OSCAR 13 be permanently switched to "Off". (Torremolinos, April 1990)
>
> IARU Region 1 considers the Phase 3D satellite project to be an outstanding example of the contributions amateurs make to the development of state-of-the-art technology and techniques. Therefore member societies of IARU Region 1 are urged to find ways and means to collect private and other donations to support this project.
> The funds gathered should be sent to one (or more) of the organizations involved in the realization of this project.
> Member societies participating in this fund gathering scheme are asked to report on their activities and resulting contributions to IARU Region 1. (De Haan, September 1993)

Note.
Organizations involved in the Phase 3D project construction:

Belgium :	AMSAT Belgium - 24 GHz transmitter
Finland :	AMSAT-OH - 10 GHz transmitter
Germany :	AMSAT-DL - (Project leader) Spacecraft (bus) launch + VHF + UHF + L-band receivers
Germany :	München group - 2.4 GHz transmitter
Hungary :	University of Budapest - BCR control
South Africa :	AMSAT SA - 29 MHz transmitter
UK :	AMSAT UK - 145 MHz transponder

USA : AMSAT-NA - VHF Transmitter and GPS experiment
USA : Weber State University - Structure

This list is not exhaustive; other organizations may participate in the construction.

RESOLUTION 89-3
CONCERNING AMATEUR SATELLITE USAGE

The IARU Administrative Council, Orlando, September 1989, recognises the important contributions made by amateur societies in the following areas:

- o demonstration to the professional community that radio amateurs contribute to the development of state-of-the-art technology and techniques
- o provision of new and challenging operational opportunities and training ground for radio amateurs to acquire new skills
- o providing opportunities for training in an exciting technological field by direct participation, in schools, universities and professional organisations, and
- o stimulating the interest of young people in a worthwhile activity, and encouraging the pursuit of a technological career to provide the next generation of industrial and research engineers.

Wishing to stimulate the growth of the Amateur Satellite Service in an orderly manner, the Administrative Council strongly supports the following goals:

- o the encouragement of a wide dynamic range of activities stimulating training through increasing intellectual challenge
- o the stimulation of young people in schools and universities to develop an interest in amateur radio through participation in amateur satellite activities
- o where allowed, the provision of emergency services, especially to parts of the world that are less technologically developed, and
- o the adoption of a "code of practice" that ensures the use of amateur frequency allocations by satellites in accordance with the spirit and ethos of amateur radio.

The Administrative Council resolves

1. Member societies shall make Administrations more aware of the value and achievements of the Amateur Satellite Service.
2. Satellites operating within amateur frequency allocations shall carry payloads and experiments that are relevant to, of interest to and available for participation by radio-amateurs world-wide.
3. Operational frequencies of amateur satellites shall be in accordance with all applicable IARU bandplans
4. The use of higher frequency bands by amateur satellites shall be encouraged.

A.TERMS OF REFERENCE OF THE IARU SATELLITE ADVISER

General : An advisory and representational role, requiring technical knowledge and good interpersonal skills.

Function : To keep the Administrative Council informed on all technical and operational aspects of the amateur-satellite service, and to provide advice and assistance to enable the Council to adopt appropriate policies, and also to better inform the satellite community of the IARU.

Appointment : The IARU Satellite Adviser shall be appointed by the Administrative Council and the position, the appointment and these terms of reference shall continue until the next meeting of the Administrative Council, which may or may not reconfirm this position, the appointment and these terms of reference.

Tasks : Report to the Administrative Council, providing information as to all developments in the satellite area, including all planned amateur satellites.

At the request of the Administrative Council, provide technical and operational advice to assist the representation of the amateur-satellite service to the ITU.

And attend such meetings of the satellite community as are appropriate.

Represent generally the IARU to the satellite community and particularly to new or non-AMSAT satellite groups.

To consult with and liaise with the satellite Community as appropriate.

To appoint any assistants that may be required.

B. TERMS OF REFERENCE OF THE IARU AMSAT SATELLITE FREQUENCY COORDINATOR

General : The IARU AMSAT (Amateur Satellite) Frequency Coordinator (IAFC) is an operational role, requiring high technical competence and a detailed knowledge of amateur satellites, frequency management as well as of IARU band plans.

Function : The IAFC shall assist the IARU Satellite Adviser and provide a service to enable any group to coordinate frequencies and emissions of a planned satellite intended to operate on Amateur Frequencies, under the license from the group's national administration, with existing and other planned amateur satellites.

Appointment : The IAFC is appointed jointly by the IARU Satellite Adviser (ISA) in consultation with the consensus of the recognized AMSAT Groups. The necessary liaison for this purpose with and among AMSAT Groups is to be conducted at the Annual IARU International Satellite Forum and, between Forum meetings, via Internet (amsat-international@amsat.org).

The IAFC shall report both to the ISA and to the AMSAT

Groups.

The appointment is to last until the next Annual IARU International Satellite Forum, at which it may be reconfirmed or a new appointment made. The ISA after obtaining the concurrence of the AMSAT Groups as above, may revoke the appointment at any time, and the appointment shall thereupon cease. Any vacancy in this position, whether by resignation or revocation, shall be filled as soon as possible in the manner set forth above.

Tasks: A. Maintain a data base of all operating and planned satellites on Amateur Frequencies including frequencies, emissions and orbits.

B. Upon request of an individual or group proposing to build a satellite to operate on Amateur Frequencies, provide information and advice to assist that prospective builder in the choice of frequencies and modes with the view of minimizing interference.

C. Through publicity and direct communication, seek out prospective satellite builders and to encourage them to make use of this service. This function is jointly shared with the ISA.

D. Promptly provide all information required by the ISA.

E. After taking into account the input from various groups of experts, it is the IAFC's task to make appropriate recommendations to the satellite builder(s). The IAFC is supported in this task by the ISA.

F. Publish quarterly reports for distribution to the ISA, IARU national Societies and AMSAT Groups. Distribution to the AMSAT Groups will be considered fulfilled if said reports are posted on the amsat-international@amsat.org Internet distribution.

G. While this position is a technical position, the IAFC has an important role in assisting in the protection of bands allocated to the amateur satellite service.

To this end the IAFC is tasked to work with the AMSAT Groups to develop a protection plan which should be submitted to the IARU Satellite Adviser who's task it is to achieve endorsement from the IARU Regions and incorporation in band plans.

H. It is also important that the role of the IAFC is not confused with that of the ISA. To this end :

1. The role of the IAFC is restricted to providing advice as set out above, and in particular shall not make any statement(s) that could be understood to be expressing IARU policy, which will be the role of the ISA.

2. The IAFC shall promptly inform the ISA of any matters that may affect bands allocated to the amateur services, particularly the amateur satellite service.

I. The IAFC shall work closely with the AMSAT Groups and

national IARU Societies as appropriate while maintaining consistent contact with the ISA and the AMSAT Groups, via Internet.

J. The IAFC will be expected to attend the Annual IARU International Satellite Forum and such other meetings as agreed to, or directed by, the ISA from time to time. However all travel and other expenses associated with such meeting attendance must be budgeted for in advance and is subject to approval of the ISA who is responsible for the budget.

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

Part VIII

Fourth Edition
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CO-ORDINATION OF REPEATER ACTIVITIES

Extensive 145 MHz and 435 MHz repeater networks are operational in Western Europe, and activity on 1.3 GHz is growing.

It is highly important that these developments are internationally guided, so that a coordinated approach is followed for the benefit of all IARU Region 1 amateurs.

The aim of repeater networks has been defined as follows (see chapter IIa, Principles of bandplanning):

> FM repeaters provide a communication service to mobile amateur-stations (including hand-held equipment). In some cases they may be installed to aid the accessibility of stations in mountainous areas.
>
> They are **not intended to make DX contacts possible**, and hence their coverage under normal propagation conditions should be limited.
>
> The number of repeater stations installed should be determined by
>
> - the required regional coverage
> - the expected number of intended users
>
> FM repeaters should not regularly be used as local chat channels for fixed (home) stations. This interferes with their defined use.

Careful bandplanning is required (section II), as well as timely agreement on the technical specifications of repeaters and equipment used with repeaters (section VI).

The problem of mutual interference (overlapping coverage pattern) makes it mandatory that in neighbouring countries the allocations of locations and especially of frequencies are coordinated.

For this reason at the IARU Region 1 Conference in Miskolc-Tapolca (1978) the following recommendation was adopted:

> Coverage measurements shall be made for repeaters planned to be installed. In cases of international boundary crossing the VHF Managers concerned should co-ordinate repeater coverage.

A suitable way of presenting the expected coverage, set out in document M/T 59, submitted by ÖVSV, was recommended for this purpose, and is attached as Appendix 1.

REPEATER CO-ORDINATION: COVERAGE PRESENTATION

1.Introduction

In the event that signals of repeaters or other un-manned stations could cause interference beyond the boundaries of the country in which they are operating, all designers, constructors and other persons responsible for such stations are obliged to contact the VHF-UHF-SHF Managers of the neighbouring countries concerned, in order to avoid such interference by coordinating channel use.

As far as Austria is concerned, the VHF Manager entered all areas from where repeaters might be operated on a map, so that all repeater problems could be easily be discussed and solutions found. A copy of such a map, a description of the methods used to prepare such a map, as well as proposed general rules for the use of repeaters are given below.

2.General rules for operating via repeaters

Users of repeaters shall limit their transmissions to the shortest necessary time and the stations in QSO shall not start their transmission before having left some time to give other stations a chance to make "distress calls", if necessary.

3.Recommended methods to prepare coverage map

Attached as fig. 1 is an example map showing repeater coverage from some locations in Austria. The entries should be made in accordance with CCIR recommendation 370-1.

A full line designates the area where during at least 50 % of the time contacts via repeaters can be made by a mobile station, running 10 Watts into a 5/8 wavelength vertical antenna.

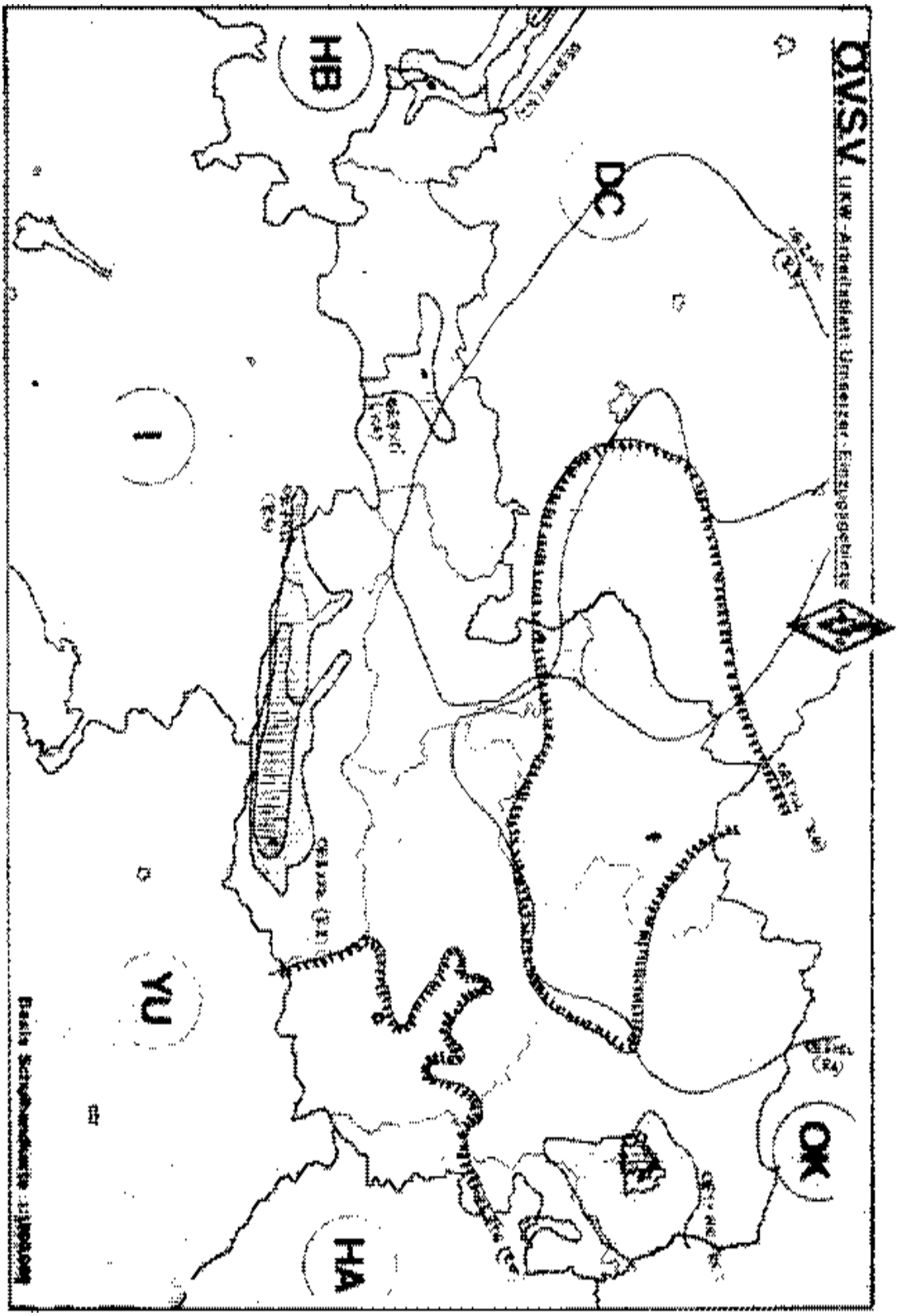
A dotted line designates the area where during 50 % of the time a fixed station with an effective radiated power of 100 Watts can operate via the repeater.

All locations from where under extraordinary conditions contacts could be made (e.g. mountain tops) should also be entered.

For the above delineations normal propagation conditions should be taken; contact possibilities via rare tropospheric conditions or sporadic-E reflections shall be disregarded.

The person(s) responsible for the planned repeater shall prepare a map according to the method outlined above. This map shall be sent to the national VHF Manager for further (international) co-ordination.

(From document M/T 59, submitted by ÖVSV at the IARU Region I Conference in Miskolc-Tapolca, 1978)


OVSV
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VU
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OK

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BEACONS: COORDINATION OF FREQUENCY ALLOCATIONS

At the IARU Region 1 Conference in Brussels (1969) the following recommendation was adopted:

> RSGB shall co-ordinate the frequency allocation of beacons with the aim of achieving minimum mutual interference.

At the IARU Region 1 Conference in Warsaw (1975) it was agreed that the need for each beacon should be closely scrutinized by the national VHF Manager/VHF Committee with a view to reducing the total number, especially in the 145 MHz band, where the increasing number of repeaters can be will require more bandwidth. Of course, beacons required for scientific observations should be retained.

At the IARU Region 1 Conference in Warsaw (1975) and at the Region 1 Conference in Miskolc-Tapolca (1978) the following recommendation, slightly amended at the 1991 Conference in Torremolinos, was agreed upon:

> Coordination of beacon frequencies will only be required for so-called Regional beacons, defined as beacons with an effective radiated power (ERP) of more than 50 Watts. Requests for a frequency allocation for a (new) Regional beacon should be addressed to the IARU Region 1 Beacon Coordinator.

In order to keep the Beacon Coordinator informed, at least once every year each VHF Manager/VHF Committee should send him an up-to-date list of all (Regional) beacons operational in their country.

The Beacon Coordinator (address in section If) shall be advised immediately on any additions, changes in characteristics etc. regarding operational beacons.

At the IARU Region 1 Conference in Torremolinos, April 1990, the following recommendation was adopted:

> The Conference recommends that the Administrative Council study paper 90/TS/C4.24 as a basis for a thorough examination aimed at an effective control and organisation of frequencies set aside for the beacon service in the 28 and 50 MHz bands.

IARU REGION 1 VHF/UHF/MW Beacon list

The beacon list will not be published in this handbook anymore as it is updated more frequently than the handbook itself.

The most recent version can be downloaded from the internet. The URL is :

www.scit.wlv.ac.uk/vhfc/iaru.r1.beacons/

Please send comments/updates/etc. To

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IARU REGION 1 VHF / UHF BEACONS
A GUIDE TO GOOD PRACTICE
(Tel Aviv 1996,Lillehammer 1999)

Beacon transmitters have long been used to indicate the presence of VHFopenings and have contributed significantly to our knowledge of propagation. As numbers of beacons, particularly on 50MHz, is increasing rapidly and the amount of spectrum available for them is under pressure, it is important that beacon builders are aware of the technical parameters required, the reasons for them and the procedure to be followed to obtain an agreed frequency.

It is not intended that this document should specify the exact purpose of a beacon, its power level or the number of beacons in any country as this should be agreed within the national society concerned. It is also not intended to be applied rigorously to experimental beacons or beacons with a special purpose. it should however apply to the vast majority of VHF/UHF beacons for propagation monitoring purposes.

1. CO-ORDINATION PROCEDURE.

The existing requirement for co-ordination of regional beacons will be retained. For non co-ordinated beacons the beacon proposal should be agreed with the national society (with consultation with neighboring societies where appropriate) and a provisional frequency chosen. If the frequency is below 146 MHz or the beacon has an ERP of greater than 10W then the frequency should be submitted to the IARU VHF beacon co-ordinator to check for potential interference problems.
(See also section IXa of the Handbook)

2. TRANSMISSION MODE

Amplitude or Frequency shift keying (A1A or F1A) may be used. However for F1A the old standard of 850 Hz is too wide a shift for the number of beacons currently in use.

When F1A is used on frequencies above 52 MHz the frequency shift must be 400Hz, arranged so that the beacon radiates on its nominal frequency during the short period of carrier between sending its call and locator (see para 4). It then moves to "space", 400Hz below and then keys back to nominal for "mark". In this way the transmission sounds like A1A in a USB receiver.

In the 50 MHz band, where beacons are closely spaced, A1A is the preferred mode. If F1A is used it is recommended that the frequency shift be 250Hz.

Care must be taken to ensure that the transmission has very low levels of spurious signals, key clicks and phase noise as beacons are often located on good sites where the potential for interference is high.

3. FREQUENCY SPACING

All co-ordinated and notified beacons should operate within the beacon segment of the band plan and be on a frequency which is a multiple of the frequency spacings in the following table. For example, beacons in the 435 MHz band should be on 432.900, 432.902, 432.904 MHz etc.

Band	Freq. Spacing
50 MHz	1 kHz[1]
70 MHz	1kHz
145 MHz	1 kHz
435 MHz	2 kHz
1.3 GHz	5 kHz

[see also Technical Recommendation B.1 in Section VIb]

4. MESSAGE

As beacons are often heard at very low signal levels together with spurious signals it is important the message is simple, unambiguous and repeated frequently. It is also necessary to have a short period of carrier for frequency checking purposes and to make it easy to distinguish the mark and the frequency when using FSK.

The beacon message should consist of a callsign, (for identification,) and a carrier of 10 seconds, (for signal strength measurement for propagation studies purposes.) The message may also contain other information if required, e.g. locator, automatic identification (on packet radio or some other means), antenna direction, (if the beacon switches between several antennas). The total message should not exceed 30 seconds. The keying speed should be approximately 12 wpm.

5. OPERATION

Operation should be 24 hour continuous. This does not preclude beacons that switch to different beam headings or power levels on a regular basis. Switched beacons must be clearly identified as such and must be submitted to the IARU VHF Beacon Co-ordinator.

Beacon operators must try to ensure that the operational parameters of their beacons remain as stable as possible and that non operational periods are kept to a minimum.

6. STATUS

It is important that the operational parameters and status of each beacon are widely known. The information should be sent to the IARU VHF beacon co-ordinator via the local beacon co-ordinator or spectrum manager at least once per annum or when the operational parameters are changed to ensure the IARU list is up to date.

---

[1] In this band it is likely that the frequency spacing will need to be reduced to half these values if the number of beacons continues to grow at the present rates.

TRANSATLANTIC BEACON PROJECT

At the IARU Region 1 Conference in Tel Aviv 1996 a proposal from URE for a coordinated project whereby beacons at the (North-)West-coast of European countries would be installed in order to test the possibilities of 145 MHz propagation over the Atlantic Ocean, resulted in a recommendation, unanimously accepted by the Conference :

To help investigate VHF transatlantic propagation, Member Societies are encouraged to participate in an IARU Region 1 co-ordinated programme to establish "Conjugate Beacons" in the 145 MHz band. (These would be similar to the conjugate beacons in the HF bands, emitting sequential signals which are repeated.)

To help manage this project, a co-ordinator is required.

The tasks of this Beacon Project Co-ordinator will be:

1. To make contact with the IARU Region 1 and Region 2 VHF/UHF Beacon Co-ordinators and to make contact with societies/amateurs in Region 1 and Region 2 who are interested in participating in this programme.
2. To consult with technical experts with the aim of establishing the technical specifications of the beacons.
3. To liaise and co-ordinate between groups building beacons and also those build listening equipment.
4. To collect the results of the experiments and to report them to IARU Region 1.

This action of IARU Region 1 should be communicated to IARU Region 2 with the request that they consider similar action.

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VHF/UHF/Microwaves RECORDS

The desirability of having a list of national and international records on VHF, UHF, and MICROWAVES, which would give a good impression of the progress made by amateurs in the course of the years, has been recognized for a long time. At the meeting of the VHF Working Group in Amsterdam (1976) SM5AGM, Folke Rasvall, then VHF Manager of SSA, offered to compile an IARU Region I record table for the different modes of wave propagation. This offer was accepted with thanks, and it was agreed that:

> a) VHF Managers shall send SM5AGM a list of their national DX records, covering the various modes of propagation, i.e. tropospheric, aurora, meteor scatter, sporadic-E and EME, for each of the VHF, UHF and Microwaves bands; b) the information, after having been collated by SM5AGM, shall be sent to the Hon. Secretary of IARU Region I for publication in the Region I News, e.g. once per annum; c) the VHF Manager shall sent the information on any new record established in his country immediately to SM5AGM.

The following recommendation was adopted at the IARU Region I Conference in Opatija (1966):

> In principle all QSO's via a translator system shall be in a special class and shall not be eligible for inclusion in normal Countries Worked lists or for DX-record awards. A special list for translator QSO's shall be established.

At the IARU Region I Conference in Cefalu (1984) SM5AGM was nominated as IARU Region I Coordinator for VHF/UHF/Microwaves DX records. SM5AGM made the following suggestions on the procedures for establishing the record table:

> Each year the IARU Region I record table as well as the national record table should be published in the national amateur radio magazine, accompanied by a request to the readers for submitting necessary changes. Claimed records should be carefully checked. For instance, for tropo records check the weather map for the day in question, for sporadic-E records check the time of the year and the time of day and, if possible, compare the claim with reports on other QSO's made during the opening. It has occurred that long meteor- scatter bursts were taken for a short sporadic-E opening! Be also aware of the possibility that 28, 21 or 14 MHz QSO's may mistakenly be reported as 145 MHz QSO's by stations using transverter systems. Check whether QSL cards have been exchanged. Please note that records are only established for different propagation modes, and that the Region I list does not deal with different transmission modes (CW, SSB etc.) or with "firsts". From the above it is clear that a sound record table can only be established in close co-operation with all national VHF and Microwave Managers or Committees.

At the IARU Region I Conference in De Haan (1993) John Morris, GM4ANB, was elected as the successor of SM5AGM. His address is given on page If of this handbook.

Appendix 1 contains the latest list of records, as compiled by the IARU Region I VHF/UHF/Microwaves DX Record Coordinator. Updated versions of this list will be published regularly.

IARU Region 1 VHF/UHF/SHF/EHF DX records 19990930

50 MHz

Mode	Station A		Station B		Mode	Date	Distance
	Call	Locator	Call	Locator			
Tropo	G4UPS	IO80JV	SM7AED	JO65NI	CW	93-12-16	1197
	GJ4ICD	IN89WF	OZ5W/P	JO64GX	SSB	96-06-01	1188
	ZS2FM	KF26TA	ZS6PJS	KG46RC	SSB	95-03-27	1178
Aurora	G0JHC	IO83PR	OH7AXB	KP32XH	SSB	89-03-13	2022
	OH2TI	KP20KE	GI4OWA	IO64IX	CW	89-11-17	1987
	ES1CW	KO29HK	GI0KOW	IO64PG	CW	98-08-27	1975
Spor-E	JY7SIX	KM71WX	WD4KPD	FM15	CW	94-06-09	9674
	I0JX	JN61GW	W5EU	EM12OM	CW	95-07-07	9059
	YO4AUL	KN44HE	JE1BMJ	QM05BR	CW	99-07-10	8787
Meteor	G4IGO	IO80NW	SV1OE	KM17VX	?	90-08-12	2542
	G0JHC	IO83PR	OX3LX	HP15MP	CW	89-08-11	2296
	ES1CW	KO29HK	G3YIY	IO70OG	SSB	98-11-16	2123
EME	OZ5IQ	JO65AO	W6JKV	CM87MM	CW	93-10-10	8841
	GD0TEP	IO74SD	K6QXY	CM88QL	CW	98-09-17	8169
	GD0TEP	IO74SD	K6MYC	DM06DX	CW	98-11-21	8168
F2	ZS6LN	KG46RC	KH6IAA	BK29LA	SSB	79-04-15	19305
	EL2AV	IJ46	H44PT	RI00AO	SSB	82-04-04	18873
	GJ4ICD	IN89WF	VK2FLR	QF56OB	CW	91-10-14	17243
TEP	G4IGO	IO80NW	CE8BHI	FD46	?	91-11-02	13117
	G0JJL	IO83PT	LU8YYO	FF50	SSB	89-08-24	12031
	G0JHC	IO83PR	LU8YYO	FF50	SSB/CW	89-08-24	12025
Aur-Es	SM3EQY	JP81FI	VE8HL	FP53	SSB	95-06-14	4018
	OH2TI	KP20KE	OX3LX	GP44EG	CW	94-06-07	3761
	OH5LK	KP30ON	OX3LX	GP36NP	CW	90-07-01	3748

70 MHz

Tropo	GJ3YHU	IN89WF	GM3WOJ	IO77WS	CW	98-08-09	960

	G4PIQ	**JO01MU**	**GM4DHF/P**	**IO89QC**	**SSB**	**97-08-10**	**840**
	GM3WOJ	**IO77WO**	**G4RFR**	**IO90AS**	**SSB**	**88-09-18**	**774**
Aurora	**G3SHK**	**IO90DX**	**GM3WOJ/P**	**IO89KB**	**CW**	**82-08-11**	**904**
Spor-E	**GW4ASR/P**	**IO82JG**	**5B4AZ**	**KM64MR**	**CW**	**81-06-07**	**3465**
	GM4DIJ	**IO85JW**	**ZB2BL**	**IM76HD**	**SSB**	**83-06-03**	**2206**
	G0EHV	**IO94FW**	**ZB2IQ**	**IM76HE**	**SSB**	**88-06-03**	**2105**
Meteor	**GJ3YHU**	**IN89XI**	**GM3WOJ/P**	**IO89KB**	**SSB**	**82-08-12**	1083

145 MHz

Tropo	GM0KAE	IO86CD	EA8BML	IL27GX	SSB	88-09-09	3264
	GM4COX	IO85JX	EA8BML	IL27GX	SSB	88-09-09	3260
	EB8BTV	IL18QI	GM4JJJ	IO86GB	SSB	88-08-08	3252
Aurora	PA3EKK	JO32HA	UA4ANV	LO44	CW	92-05-10	2724
	GM4BYF	IO85JV	RB5CCO	KN59XG	CW	89-12-01	2465
	G4VBG	IO94FV	UA3IFI	KO76WT	CW	86-02-07	2324
Spor-E	OE1XLU	JN88FF	RI8TA	MM37TE	SSB	89-07-21	4281
	OE1SBB	JN88FF	RI8TA	MM37TE	SSB	89-07-21	4281
	EA8XS	IL28GA	HG0HO	KN07RU	SSB	83-07-16	3865
Meteor	GW4CQT	IO81LP	UW6MA	KN97VE	CW	77-08-12	3101
	JX7DFA	IQ50OV	DK8ZJ	JO30IX	CW	97-01-04	2356
	OZ1IUK	JO66GB	UA4CDT	LO41BV	?	84-08-11	2354
EME	ZS6ALE	KG46RC	K6MYC/KH6	BK29AO	CW	84-07-18	19287
	DK9ZY	JO40BE	ZL1PE	RF74DG	CW	93-06-24	18054
	PA2CHR	JO22XA	ZL1BVU	RF74DG	CW	92-09-23	17975
TEP	I4EAT	JN54VG	ZS3B	JG73	CW	79-03-30	7784
	SV1AB	KM18VC	ZS4BU	KG33VE	CW	81-09-17	7196
	SV1DH	KM18UA	ZS6DN	KG44DC	CW	79-02-13	7091
Iono	DF9PY/P	JO30JF	SM2EKM	KP05UW	CW	89-06-09	1947
	G4SWX	JO02PB	SM2CEW	KP15CR	CW	91-06-11	1923
	PE1OGF	JO21QJ	SM2CEW	KP15CR	CW	98-06-07	1860
Aur-Es	JX7DFA	IQ5DOV	SM1BSA	JO97IO	CW	96-08-05	1959
	GW4SWX	JO02PB	SM2EKM	KP05UW	CW	90-07-28	1922

	PA2CHR	JO22XA	SM2CEW	KP15CR CW	91-06-11	1780
FAI	YU7EW	KN05HP	EB4TT	IN70XJ CW	95-06-02	2084
	5B4/DL5MAE	KM65FA	I4LCK	JN54RK CW	96-06-10	2073

435MHz

Tropo	EA8XS	IL28GA	GW8VHI	IO81CM	SSB	84-07-05	2786
	OZ2OE	JO45VV	UA6LGH	KN97LF	CW	85-10-26	2219
	GM3ZBE/P	IO86RW	UT5DL/P	KN18KS	SSB	94-07-02	1923
Aurora	PA0FRE	JO21FW	RA3LE	KO64AR	CW	89-03-13	1851
	PA0WWM	JO22FE	RA3LE	KO64AR	CW	89-03-13	1842
	PA0RDY	JO22KJ	RA3LE	KO64AR	CW	86-02-08	1807
Meteor	SM3AKW	JP92AO	UA9FAD	LO88DA	CW	99-08-12	2141
	LY2WR	KO24OQ	UA9FAD	LO88DA	CW	98-08-12	1939
	SM2CEW	KP15CR	PA3DZL	JO21HM	CW	89-08-12	1869
EME	G3SEK	IO91IP	ZL3AAD	RE66GR	CW	89-03-12	18970
	F9FT	JN29AG	ZL3AAD	RE66GR	CW	80-04-18	18907
	OZ7UHF	JO65ER	ZL3AAD	RE66GR	?	85-03-31	18029

1.3 GHz

Tropo	EA8XS	IL28GA	G6LEU	IO70ME	SSB	85-06-29	2617
	SP6GWB/6	JO80JG	GI4OPH	IO74GN	?	87-11-04	1582
	CT1DYX	IN51PE	EA8ACW	IL28GC	FM	96-07-10	1577
EME	PA0SSB	JO11WI	ZL3AAD	RE66GR	CW+SSB	83-06-13	18773
	EA6ADW	JM19LU	VK5MC	QF02EJ	CW	94-10-29	16348
	OZ4MM	JO55FJ	VK5MC	QF02EJ	?	91-09-28	15811

2.3 GHz

Tropo	EA7BVD/P	IM78JD	EA8XS/P	IL27GW	SSB	84-07-08	1481
	OE5VRL/5	JN78DK	G8JHL	IO83UM	CW	87-11-06	1291
	G4PMK	IO93GT	OE5VRL/5	JN78DK	SSB/CW	87-11-06	1249
EME	ZS6AXT	KG33VV	NU7Z	CN87ST	CW	99-06-13	16475
	OK1KIR	JN79DW	W7GBI	DM43	CW	91-08-03	9216
	PA0SSB	JO11WI	W6YFK	CM87WJ	CW+SSB	81-04-05	8860

3.4 GHz

Tropo	G3LQR	JO02QF	SM6HYG	JO58RG	CW	83-07-11	927
	G6DER	IO93GN	DL6NAQ/P	JO40XI	SSB	95-10-08	860
	PA0WWM	JO22FE	LA6LCA	JO59FB	SSB	97-06-03	853

5.7 GHz

Tropo	PA0EZ	JO22OE	SM4DHN/P	JP60VA	CW	96-01-04	1020
	G3ZEZ	JO01MS	SM6HYG	JO58RG	CW+SSB	83-07-12	982
	G6DER	IO93GN	SM6HYG	JO58RG	SSB/CW	95-07-31	959
EME	ZS6AXT	KG33VV	OE9ERC	JN47VL	CW	99-09-26	8347
	OK1KIR	JN79DW	VE4MA	EN19LU	CW	95-05-10	7169
	OE9PMJ	JN47UL	VE4MA	EN19LU	CW	94-12-11	7140

10 GHz

Tropo	I0SNY/EA9	IM75IV	I0YLI/IE9	JM68NR	FM	83-07-08	1660
	G3GNR	IO70WT	SM6ESG	JO67CC	CW	97-01-14	1276
	F6DKW	JN18CS	SM6HYG	JO58RG	CW	94-10-13	1218
EME	DJ7FJ	JN48EG	ZL1GSG	RF72GW	CW	97-03-12	18336
	G3WDG	IO92RG	VK2ALU	QF55KN	CW	96-08-18	17000
	S56UUU	JN76	WA7CJO	DM33	CW	94-11-27	9542

24 GHz

Tropo	F5CAU/P	JN33DU	F6BVA/P	JN02SV	SSB	97-10-25	399
	DH6FAE/P	JO40PL	HB9MIN/P	JN37OE	SSB	93-02-03	397
	PA0EZ	JO22OE	G4KGC	IO92RG	CW	97-01-14	390

47 GHz

Tropo	F5CAU/P	JN24PD	F6BVA/P	JN12GM	SSB	98-12-26	287
	F6BVA	JN33DU	F5CAU	JN14SC	SSB	98-10-03	222
	F6BVA/P	JN12GM	F5CAU/P	JN14SC	SSB	98-05-15	194

75 GHz

Tropo	HB9MIO/P	JN36VR	DK4GD/P	JN47BR	SSB	95-07-07	114
	OZ1UM/P	JO55WX	OZ/F1OIH/P	JO56GC	SSB	96-06-16	84

145 GHz

Tropo	DB6NT/P	JO50XL	DL6NCI/P	JO50VA	SSB	97-04-07	52
	OZ1UM/P	?	OZ9ZI/P	?	?	94-07-02	11

241 GHz

Tropo	DB6NT/P	JO60TH	DF9LN/p	JO60TI	SSB	95-06-26	2
	OZ/DB6NT/p	?	OZ/DF9LN/p	?	?	93-06-18	0.5

Notes
The abbreviations used in the propagation mode column are:

Tropo	Tropospheric
Aurora	Auroral
Spor-E	Sporadic E
Meteor	Meteor scatter
EME	Earth-Moon-Earth (Moonbounce)
F2	F2 propagation
TEP	Trans-Equatorial Propagation
Au-Es	Auroral sporadic E
Iono	Ionospheric scatter
FAI	Field Aligned Irregularities

The distances were calculated using the International Ellipsoid of 1924 (polar radius 6356.912 km, equatorial radius 6378.388 km).
Propagation modes are those reported by the stations concerned. However, it can sometimes be very difficult to distinguish between propagation modes. This is especially so on 50 MHz, where mixed-mode QSOs are common, and to a lesser extent it applies on 144 MHz. The propagation information should be read with this in mind.
Station positions were taken from the best available information, in the following order of preference:
Exact latitude and longitude where knownLocator sub-square center if givenApproximate latitude and longitude from geographical location.Distance as claimed by the QSO participants.Corner of locator square nearest to QSO partner.
Calculated distances may change if better information on station location becomes available.If you have any information on a possible record or exceptionally long distance QSO please send it to the IARU Region 1 VHF/UHF/Microwave DX record co-ordinator:
John Morris, GM4ANB, john@kirsta.demon.co.uk

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IARU REGION I CERTIFICATES AND MEDALS

IARU Region I can recognize meritorious performance in the wide field of amateur activities by awarding

a) an IARU Region I certificate

b) an IARU Region I medal.

With respect to the amateur activities on the VHF/UHF/SHF bands the following recommendations are relevant.

At the IARU Region 1 Conference in Folkestone (1961) the following resolution was adopted:

> It is recommended that the Executive Committee of IARU Region I issue a certificate to those amateurs within Region I who make first QSO's by unusual modes of propagation, such as meteor-scatter, sporadic-E and moonbounce.

At the IARU Region 1 Conference in Malmo (1963) the following additional recommendation was adopted([1]):

> The Chairman of the VHF/UHF/Microwave Committee is authorized to request the IARU Region 1 Executive Committee to issue Region 1 certificates for special VHF/UHF/SHF performances.

[1] Wording brought in accordance with the IARU Region 1 Constitution adopted at the IARU Region 1 Conference i Noordwijkerhout (1987).

NATIONAL VHF/UHF/Microwaves AWARDS AND CERTIFICATES

A large number of awards and certificates are issued by the member societies in the various countries in Region I, inter alia for achievements on the VHF/UHF/Microwaves bands. The official opinion of IARU Region 1 is that it would be best to have a restricted number of worthwhile awards/certificates, as can be judged from the following adopted recommendations:

> The increasing number of awards and contests in Region I is viewed with deep concern and it is recommended that member societies limit the number of such awards and contests in the best interests of amateur radio.
>
> (Meeting of the VHF Working Group at Bad Godesberg, 1958)
>
> The number of awards and certificates, at present in circulation, is not in the best interests of amateur radio. It is recommended to place the matter before the IARU with a view to the preparation of a list of awards in good standing which could bear the official approval of the IARU.
>
> (IARU Region 1 Conference in Folkestone, 1961)

In order to enable VHF Managers/VHF Committees to inform the active VHF/UHF/Microwaves amateurs in their countries on the available awards and certificates, the following recommendation([1]) was adopted at the IARU Region 1 Conference in Malmö (1963):

> All VHF/UHF/Microwaves Managers are requested to send a list of the VHF/UHF/Microwaves certificates available in their country, with all relevant data, to the Chairman of the VHF/UHF/Microwaves Committee, in order to enable him to issue a complete list.

Note

In view of the two first recommendations set out on this page, it should be self-explanatory that some screening has to be applied, and that only worthwhile certificates/awards, as e.g. issued by member societies, should be listed.

In order to make it easier for amateurs to apply for a certificate or award, at the IARU Region 1 Conference in Malmö (1963) the following recommendation was adopted:

> Bearing in mind the difficulty and expense of sending QSL cards with applications for certificates it is recommended that all member societies of IARU Region shall issue certificates on the production of a declaration signed by the Traffic Manager or QSL Manager of the member society in the residence country of the applying amateur.

In view of some questions that arose with the counting for "Number of Countries Worked" certificates, at the IARU Region 1 Conference in Brussels (1969) the following recommendation was adopted:

> VHF/UHF/Microwaves Certificates:
> For the issue of certificates concerning **countries worked** the ARRL DXCC list of countries shall be used.

[1] Wording brought in accordance with the IARU Region 1 Constitution adopted at the IARU Region 1 Conference i Noordwijkerhout (1987)