

INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK



2006, IARU Region 1, CH-6330 CHAM ZG, Switzerland

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Vienna, April 2006

Dear YL and OM,

After my predecessor Arie, PA0EZ, has digitized the VHF manager handbook, I now have updated and consolidated it as a PDF file. The idea was to simplify handling and to allow searches in one file.

This PDF file contains the text of the IARU Region 1 VHF Managers' Handbook, Version 5.03.

All relevant decisions of the Davos Region 1 Conference of 2005 have been taken into account. Also the address lists and the records table have been updated.

Neither the Handbook itself, nor its updates, will be distributed automatically to the members of the VHF/UHF/Microwaves Committee. Important updates are mentioned in the VHF Newsletter and will be available as PDF files at the IARU Region 1 homepage.

Addresses will generally be updated once the information has been received. Please check for current files on-line.

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IARU REGION 1 VHF MANAGER'S HANDBOOK

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1 IARU INFORMATION

1.1 IARU Region 1 VHF/UHF/Microwaves Committee

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.

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 and Bye-Laws of the IARU Region 1

Please visit: www.iaru-r1.org

Constitution and Bye-Laws of the IARU

Please visit: www.iaru.org

1.2 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.1.18
Function 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 society¹.

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.

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

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.

1.3 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 member 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 1a.

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 (see 1.3.1.) 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 vigorous 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 a 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 recommendation 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.

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 committee meeting in Vienna 1995 the threat 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.

1.3.1 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.

1.4 MICROWAVE MANAGERS SUB-COMMITTEE (Dec 93)

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 1.8.](#)

1.5 Coordinators of the VHF/UHF/Microwaves Committee

1.5.1 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. In April 2000 Heinz-Günter Böttcher, DK2NH, accepted this post.

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 1f 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 bandplanning. 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).

1.5.2 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 1.5.2 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 1.5.2 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)

1.5.3 PROPAGATION COORDINATORS

a. Ionospheric Propagation Coordinator

t.b.f.

b. Auroral Propagation Coordinator

t.b.f.

c. Tropospheric Propagation coordinator

t.b.f.

1.5.4 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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1.7 IARU REGION 1 VHF/UHF/SHF CO-ORDINATORS AND CONVENORS

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

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1.9 MICROWAVE MANAGERS

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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.

1.10 Addresses of IARU REGION 1 Member Societies

In order to avoid differences in the list of IARU societies, the R1 list has been deleted and you are kindly requested to look at the official IARU list:

www.iaru-r1.org

visit “Member Societies”

2 FREQUENCY ALLOCATIONS, BANDPLANNING

2.1 INTRODUCTION TO VHF/UHF/Microwaves BANDS AND BANDPLANS

2.1.1 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 WARC 1979 and maintained at the WARC 1991 (Torremolinos), are set out in section 2.2., 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).

2.1.2 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.

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

In accordance with the IARU principle of using Primary and Primary Exclusive allocations in preference to secondary allocations, it is recommended that Amateur and Amateur Satellite weak-signal operation should, wherever possible, use the 500 MHz segment 75.5 GHz to 76.0 GHz as per CEPT Footnote EU35 in the European Frequency Tables. Region 1 societies in CEPT countries should encourage their administrations to implement EU35 as soon as possible. The IARU bandplan should be amended accordingly. (Davos 2005)

In the bands above 76 GHz, for example 241 GHz, users are encouraged to use the Primary Exclusive (Davos 2005)

Remarks on the practical implementation

- a. The definition of the Amateur Service implies that bandplanning should take into account all aspects of amateur radio - selftraining, 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 practically 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 9).

- 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.

2.1.3 SOME DEFINITIONS

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 VIIm).

2.2 THE AMATEUR SERVICES: FREQUENCY ALLOCATIONS ABOVE 30 MHz

2.2.1 ITU definitions

The ITU Regulations define the Amateur Services as follows:

1.56 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.

1.57 Amateur-Satellite Service:

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

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 5.120 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.

2.2.2 ITU Radio Regulations: Frequency allocations above 30 MHz

ITU Website: www.itu.int

2.2.2.1 Categories of services and allocations

5.23 Primary and Secondary Services

5.24 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:

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

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

5.27 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

5.28 Stations of secondary service:

5.29 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;

5.30 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;

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

5.32 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).

5.33 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 .

5.34 Additional Allocations

5.35 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).

5.36 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.

- 5.37 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.
- 5.38 Alternative Allocations
- 5.39 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).
- 5.40 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.
- 5.41 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.
- 5.42 Miscellaneous Provisions
- 5.43 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.
- 5.44 Except if otherwise specified in a footnote, the term "fixed service", where appearing in the Table, does not include systems using ionospheric scatter propagation.
- 5.45 Before bringing into use and notifying the Bureau of any assignment in a service which is subject to this regulation, the procedure of Article 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

2.2.2.2 Description of the Table of Frequency Allocations

- 5.46 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.
- 5.47 The frequency band referred to in each allocation is indicated in the left-hand top corner of the part of the Table concerned.
- 5.48 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.
- 5.49 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.
- 5.50 The footnote references which appear in the Table below the allocated service or services apply to the whole of the allocation concerned.
- 5.51 The footnote references which appear to the right of the name of a service are applicable only to that particular service.

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

2.2.2.3 Regions and Areas

For the allocation of frequencies the world has been divided into three Regions, labelled Regions 1, 2 and 3.

ITU map removed for a small file size

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.

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 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.

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.

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.

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.

2.2.2.4 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:

5.120 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

5.138 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.

5.149 (note : in this handbook only the frequencies in or 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, **76-78** Ghz, 111.8-114.25 Ghz, 130-134 Ghz, **136-148.5** Ghz, **241-250** Ghz are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from space- or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **4.5** and **4.6** and Article **29**).

5.150 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. **15.13**.

2.2.3 47 – 68 MHz

Allocation to services		
Region 1	Region 2	Region 3
47 -68 BROADCASTING 5.164 5.165 5.169	50 - 54 AMATEUR 5.166 5.167 5.168 5.170	

- 5.164** *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, Morocco, Nigeria, Norway, the Netherlands, Poland, the German Democratic Republic, the United Kingdom, Senegal, Sweden, Switzerland, Tunisia, 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
- 5.165** *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
- 5.166** *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
- 5.167** *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.
- 5.168** *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.
- 5.169** *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.

2.2.4 144 - 145 MHz

Allocation to services		
Region 1	Region 2	Region 3
144 - 146 AMATEUR 5.120 AMATEUR-SATELLITE 5.215 .216		
146 - 149.9 FIXED MOBILE except aeronautical mobile(R)	146 - 148 AMATEUR 5.217	146 - 148 AMATEUR FIXED MOBILE 5.216 5.217

- 5.215** *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.
- 5.216** *Additional allocation*:in China, the band 144 - 146 MHz is also allocated to the aeronautical mobile(OR) service on a secondary basis.
- 5.217** *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.

2.2.5 174 – 230 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>174 - 223</p> <p>BROADCASTING</p> <p>5.235 5.237 5.243</p>	<p>220 - 225</p> <p>AMATEUR</p> <p>FIXED</p> <p>MOBILE</p> <p>Radiolocation 5.241</p>	<p>174 - 223</p> <p>FIXED</p> <p>MOBILE</p> <p>BROADCASTING</p>
<p>223 - 230</p> <p>BROADCASTING</p> <p>Fixed</p> <p>Mobile</p> <p>5.236 5.243</p>		<p>223 - 230</p> <p>FIXED</p> <p>MOBILE</p> <p>BROADCASTING</p> <p>AERONAUTICAL RADIONAVIGATION</p> <p>Radiolocation</p>

- 5.235** *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.
- 5.236** *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. **5.33**). 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.
- 5.237** *Additional allocation* : in the Congo, Ethiopia, Gambia, 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.
- 5.241** 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.
- 5.243** *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.

2.2.6 420 - 450 MHz

Allocation to services		
Region 1	Region 2	Region 3
420 - 430 FIXED MOBILE except aeronautical mobile Radiolocation 5.268 5.270 5.271		
430 -440 AMATEUR RADIOLOCATION 5.138 .271 .272 .273 5.274 .275 .276 .277 5.280 .281 .282 .283	430 - 440 RADIOLOCATION Amateur 5271 .276 .277 .278 .279 .281 .282	
440 - 450 FIXED MOBILE except aeronautical mobile Radiolocation 5.268 .270 .271 .274 .284 .285 .286		

- 5.268** *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. **5.33**).
- 5.270** *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.
- 5.271** *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.
- 5.272** *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.**5.32**).
- 5.273** *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.**5.32**).
- 5.274** *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.
- 5.275** *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.

- 5.276** *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, Switzerland, 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.
- 5.277** *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.
- 5.278** *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).**
- 5.279** *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.5.45 shall apply.
- 5.280** 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**.
- 5.281** *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.
- 5.282** **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.5.43). 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.**
- 5.283** *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.
- 5.284** *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.**
- 5.285** *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.5.33)
- 5.286** 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. **5.45** shall apply.

2.2.7 890 – 942 MHz

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 5.325	890 - 942 FIXED MOBILE BROADCASTING Radiolocation 5.326

5.325 *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.5.33). No. 5.45 shall apply.

5.326 *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.5.33).

2.2.8 1240 - 1300 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>1240 - 1260 SPACE RESEARCH (active) RADIOLOCATION EARTH EXPLORATION SATELLITE(active) RADIONAVIGATION-SATELLITE (space-to-earth) Amateur 5.330 .331 .332 .334 .335</p>		
<p>1260 - 1300 SPACE RESEARCH (active) RADIOLOCATION EARTH EXPLORATION SATELLITE(active) RADIONAVIGATION-SATELLITE (space-to-earth) Amateur 5.282 .330 .331 .332 .334 .335</p>		

5.330 *Additional allocation:* in Angola, Saudi Arabia, Bahrain, Bangladesh, Cameroon, China, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kuwait, Lebanon, Libya, Morocco, Mozambique, Nepal, Nigeria, Pakistan, the Philippines, Qatar, Syria, Somalia, Sudan, Sri Lanka, Chad, Togo and Yemen, the band 1 215-1 300 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-97)

5.331 *Additional allocation:* in Algeria, Germany, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Burundi, Cameroon, China, Croatia, Denmark, the United Arab Emirates, France, Greece, India, the Islamic Republic of Iran, Iraq, Kenya, The Former Yugoslav Republic of Macedonia, Liechtenstein, Luxembourg, Mali, Mauritania, Norway, Oman, Pakistan, the Netherlands, Portugal, Qatar, Senegal, Slovenia, Somalia, Sudan, Sri Lanka, Sweden, Switzerland, Turkey and Yugoslavia, the band 1 215-1 300 MHz is also allocated to the radionavigation service on a primary basis.

5.332 In the band 1 215-1 300 MHz, active spaceborne sensors in the earth exploration-satellite and space research services shall not cause harmful interference to, claim protection from, or otherwise impose constraints on operation or development of the radiolocation service, the radionavigation-satellite service and other services allocated on a primary basis. (WRC-97)

5.334 *Additional allocation:* in Canada and the United States, the bands 1 240-1 300 MHz and 1 350-1 370 MHz are also allocated to the aeronautical radionavigation service on a primary basis.

5.335 In Canada and the United States in the band 1 240-1 300 MHz, active spaceborne sensors in the earth exploration-satellite and space research services shall not cause interference to, claim protection from, or otherwise impose constraints on operation or development of the aeronautical radionavigation service. (WRC-97)

Allocation to Services		
Region 1	Region 2	Region 3
2300 - 2450 FIXED MOBILE Amateur Radiolocation 5.150 .282 .395	2300 - 2450 FIXED MOBILE RADIOLOCATION Amateur 5.150 .282 .393 .394 .396	

- 5.393** *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).
- 5.394** 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.
- 5.395** 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
- 5.396** Space stations of the broadcasting-satellite service in the band 2310 - 2360 MHz operating in accordance with No. **5.393** 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.

3300 – 3600 MHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>3300 - 3400</p> <p>RADIOLOCATION</p> <p>5.149 .429 .430</p>	<p>3300 - 3400</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>Fixed</p> <p>Mobile</p> <p>5.149 .430</p>	<p>3300 - 3400</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>5.149 .429</p>
<p>3400 - 3600</p> <p>FIXED</p> <p>FIXED-SATELLITE (space-to-earth)</p> <p>Mobile</p> <p>Radiolocation</p> <p>5.431 .434</p>	<p>3400 - 3500</p> <p>FIXED</p> <p>FIXED-SATELLITE (space-to-Earth)</p> <p>Amateur</p> <p>Mobile</p> <p>Radiolocation 5.433</p> <p>5.282 .432</p>	

- 5.429** *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.
- 5.430** *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
- 5.431** *Additional allocation* : in the **Federal Republic of Germany, Israel and the United Kingdom, the band 3400 - 3475 MHz is also allocated to the amateur service on a secondary basis.**
- 5.432** *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.5.33)
- 5.433** 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.

5650 – 5850 MHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>5650 - 5725</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>Space Research (deep space)</p> <p>5.282 .451 .453 .454 .455</p>		
<p>5725 - 5850</p> <p>FIXED-SATELLITE (Earth-to-space)</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>5.150 .451 .453 5.455 .456 .457</p>	<p>5725 - 5850</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>5.150 .453 .455 .457</p>	
<p>5850 - 5925</p> <p>FIXED</p> <p>FIXED-SATELLITE (Earth-to-space)</p> <p>MOBILE</p> <p>5.150</p>	<p>5850 - 5925</p> <p>FIXED</p> <p>FIXED-SATELLITE (Earth-to-space)</p> <p>MOBILE</p> <p>Amateur</p> <p>Radiolocation</p> <p>5.150</p>	<p>5850 - 5925</p> <p>FIXED</p> <p>FIXED-SATELLITE (Earth-to-space)</p> <p>MOBILE</p> <p>Radiolocation</p> <p>5.150</p>

5.451 *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.

5.453 *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.

5.454 *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. **5.33**).

5.455 *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.

5.456 *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.

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

10.0 - 10.5 GHz

Allocation to Services		
Region 1	Region 2	Region 3
10- 10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10 - 10.45 RADIOLOCATION Amateur 5.479 .480	10 - 10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479
10.45 - 10.5 RADIOLOCATION Amateur Amateur-Satellite 5.481		

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

5.480 *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.

5.481 *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.

2.2.10 24 - 24.25 GHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>24 - 24.05</p> <p>AMATEUR</p> <p>AMATEUR-SATELLITE</p> <p>5.150</p>		
<p>24.05 - 24.25</p> <p>RADIOLOCATION</p> <p>Amateur</p> <p>Earth Exploration-Satellite (active)</p> <p>5.150</p>		

2.2.11 47 - 47.2 GHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>47 - 47.2</p> <p>AMATEUR</p> <p>AMATEUR-SATELLITE</p>		

75.5 - 81.5 GHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>75.5 - 76</p> <p>FIXED FIXED-SATELLITE MOBILE BROADCASTING BROADCASTING-SATELLITE Space Research (space-to-Earth)</p> <p>5.559A</p>		
<p>77.5 - 78</p> <p>AMATEUR AMATEUR-SATELLITE Radio astronomy Space Research (space-to-Earth) 5.560</p>		
<p>78 - 79</p> <p>RADIOLOCATION Amateur Amateur-Satellite Radio Astronomy Space Research (space-to-Earth)</p> <p>5.149 5.560</p>		
<p>79 - 81</p> <p>RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)</p> <p>5.149</p>		
<p>81-84</p> <p>FIXED FIXED-SATELLITE (Earth to Space) MOBILE MOBILE-SATELLITE (Earth to Space) RADIO ASTRONOMY Space Research (Space to Earth)</p> <p>5.149, 5.561A</p>		

5.560

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.

5.559A

The band 75.5-76 GHz is also allocated to the amateur and amateur-satellite services on a primary basis until the year 2006.(WRC 2000)

5.561A

The 81-81.5 GHz band is also allocated to the amateur and amateur-satellite services on a secondary basis (WRC -2000)

2.2.12 122.25- 123 GHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>122.25 - 123</p> <p>FIXED INTER-SATELLITE MOBILE (5.558) Amateur 5.138</p>		
<p>134-136</p> <p>AMATEUR AMATEUR-SATELLITE Radio Astronomy</p>		
<p>136-141</p> <p>RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite</p>		
<p>144 - 148.5</p> <p>RADIOLOCATION FIXED MOBILE RADIO ASTRONOMY</p> <p>5.149</p>		
<p>148.5 - 149</p> <p>EARTH EXPLORATION SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)</p> <p>5.340</p>		

2.2.13 241 – 250 GHz

Allocation to Services		
Region 1	Region 2	Region 3
<p>241 - 248</p> <p>RADIOLOCATION</p> <p>RADIO ASTRONOMY</p> <p>Amateur</p> <p>Amateur-satellite</p> <p>5.138 5.149</p>		
<p>248 - 250</p> <p>AMATEUR</p> <p>AMATEUR-SATELLITE</p> <p>5.149</p>		

2.3 Article 25 of the Radio Regulations

(as amended by WRC03; the final paragraph numbering still has to be determined by the ITU)

2.3.1 Section I. Amateur Service

- 25.1 ' 1 Radiocommunication between amateur stations of different countries shall be permitted unless the administration of one of the countries concerned has notified that it objects to such radiocommunications. (WRC-03)
- 25.2 ' 2 1) Transmissions between amateur stations of different countries shall be limited to communications incidental to the purposes of the amateur service, as defined in No. 1.56 and to remarks of a personal character. (WRC-03)
- 25.2A 1bis) Transmissions between amateur stations of different countries shall not be encoded for the purpose of obscuring their meaning, except for control signals exchanged between earth command stations and space stations in the amateur-satellite service. (WRC-03)
- 25.3 (2) It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.
- 25.4 supp.
- 25.5 ' 3 1) Administrations shall determine whether or not a person seeking a licence to operate an amateur station shall demonstrate the ability to send and receive texts in Morse code signals. (WRC-03).
- 25.6 2) Administrations shall verify the operational and technical qualifications of any person wishing to operate an amateur station. Guidance for standards of competence may be found in the most recent version of Recommendation ITU-R M.1544. (WRC-03).
- 25.7 ' 4 The maximum power of amateur stations shall be fixed by the administrations concerned. (WRC-03).
- 25.8 ' 5 1) All pertinent Articles and provisions of the Constitution, the Convention and of these Regulations shall apply to amateur stations. (WRC-03)
- 25.9 (2) During the course of their transmissions, amateur stations shall transmit their callsign at short intervals.
- 25.9A Administrations are encouraged to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief. (WRC-03)
- 25.9B An administration may determine whether or not to permit a person who has been granted a licence to operate an amateur station by another administration to operate an amateur station while that person is temporarily in its territory, subject to such conditions or restrictions it may impose. (WRC-03)

2.3.2 Section II. Amateur-Satellite Service

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

25.11 '7 Administrations authorizing space stations in the amateur-satellite service shall ensure that sufficient earth command stations are established before launch to ensure that any harmful interference caused by emissions from a station in the amateur-satellite service can be terminated immediately (see No. 22.1). (WRC-03)

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 25.11 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.

3 IARU REGION 1 VHF/UHF/Microwaves BANDPLANS

On the following pages the official IARU Region 1 bandplans currently valid for the 50 MHz, the 70 MHz, the 145 MHz, the 435 MHz and the microwave bands are set out. In accordance with the policy outlined in section 2.1. 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.

At the IARU Region 1 Conference in San Marino (2002) it appeared that a not negligible number of DXCC countries (e.g. EI, G, GD, GI, GJ, GM, GU, GW, S5, ZB, ZS, 5B4, ZC4) had got access to the 70 MHz band and it was decided to add the bandplan for that band (based upon the RSGB planning) to the Region 1 bandplan.

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 8.

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	till 31-12-2003 (San Marino 2002)
47.000 -	47.002	GHz	
77.500 -	77.501	GHz	from 1-1-2004 (San Marino 2002)
122.250 -	122.251	GHz	from 1-1-2004 (San Marino 2002)
134.000 -	134.001	GHz	from 1-1-2004 (San Marino 2002)
248.000 -	248.001	GHz	from 1-1-2004 (San Marino 2002)

note : As it cannot be expected that NBFM repeater systems will become operational at the microwave bands above 77 GHz the NB segment in those bands is currently limited to 1 MHz

At the Conference in San Marino it was decided to change the basic set-up of the bandplan.

Till then the bandplans show two columns(plus a column for the frequency segments):

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 San Marino conference started to change this, beginning with the 50 MHz and 145 MHz bands. The other bands to follow at a later moment.

In this new planning there are three columns.

maximum bandwidth	Mode	Usage
-------------------	------	-------

The maximum bandwidth determines the maximum spectral width (-6 dB points) of all emissions allowed in a segment. The mode indicates the modulation methods (e.g. telegraphy, telephony, MGM, etc) allowed in a segment. M(achine) G(enerated) M(ode) indicates those transmission modes relying fully on computer processing such as RTTY, AMTOR, PSK31, FSK441 and the like. The usage column indicates the main usage (sometimes country dependant) of a segment. In case only one application is allowed, the word Aexclusive@ is added.

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"

3.1 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 A00A for 51.000 MHz and increment by one for each 10 kHz.
- 5) In the 145 Mhz band the channel numbers start at A00A for 145.000 MHz and increment by one for each 12.5 kHz.
- 6) In the 435 MHz band the channel numbers start at A000A 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

3.2 50 - 52 MHz BANDPLAN (Davos 2005)

Frequency	Maximum Bandwidth	Mode	Usage
50000	500 Hz	Telegraphy (a)	50.000 - 50.080 Beacons
50100			50.090 Telegraphy center of activity
50100	2700 Hz	Telegraphy SSB MGM	50.100 - 50.130 Intercontinental Telegraphy/SSB
			50.110 DX Calling (c)
			50.150 SSB Center of activity
			50.185 Crossband activity center MS center of activity
			50.200 PSK31 center of activity
			50.250 JT44
			50.255 FSK441 FSK441 Calling freq
			50.260 - 50.280 50.270
50500	12 kHz	All modes	50.510 SSTV (FSK)
50.500			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 FM calling frequency
			51.510 FM repeaters output channels, 20 kHz spacing (e)
52.000			51.810 - 51.990

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 and the 2002 San Marino 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.

2. USAGE

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section 3, 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 telephony see section 7.2.1

For the numbering of NBFM telephony channels see 3.1.

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 51 MHz, repeater output frequencies may be 500 kHz below the repeater input frequencies. (Tel Aviv 1996)

3.3 70.0 - 70.5 MHz BANDPLAN (Davos 2005)

Frequency (MHz)	maximum Bandwidth	MODE	Usage
70.000 70.050	500Hz	TELEGRAPHY MGM	Beacons 70.030 Personal beacons
70.050 70.250	2700Hz	TELEGRAPHY SSB MGM	70.150 MS calling 70.185 Crossband center of activity 70.200 Telegraphy/SSB calling
70.250 70.294	12kHz	AM / FM a)	70.260 AM/FM calling
70.294 70.500	12kHz	NBFM CHANNELS, 12.5 kHz spacing	70.3000 RTTY/FAX 70.3125 Packet radio 70.3250 Packet radio 70.4500 FM calling 70.4625 70.4750 70.4875 Packet radio

NOTES ON THE 70 MHz BANDPLAN

- a) No MGM traffic between 70.250 and 70.294 MHz.

3.4 144 - 146 MHz BANDPLAN (Davos 2005)

Frequency (MHz)	Maximum Bandwidth (-6dB)	MODE	USAGE
144.000	500Hz	Telegraphy (a)	EME exclusive
144.035			
144.035	500Hz	Telegraphy(a)	144.050 Telegraphy calling
			144.100 Random MS(m)
144.110	500Hz	Telegraphy, MGM	144.138 PSK31 center of activity
144.110			144.120-144.150 FAI & EME MGM (JT65)
144.150	2700Hz	Telegraphy, SSB, MGM	144.150-144.160 FAI & EME activity SSB
144.150			
144.165	2700Hz	Telegraphy & SSB	144.195-144.205 Random MS SSB (m)
144.165			
144.360	2700Hz	Telegraphy, SSB, MGM	144.300 SSB calling
144.360			144.370 FSK441 Random calling(m)
144.399	500Hz	Telegraphy, MGM	Beacons exclusive(b)
144.400			
144.490	20kHz	All mode (f)	144.500 SSTV calling
144.500			144.525 ATV SSB talk back
			144.600 RTTY calling(n)
			144.630-144.660 Linear Transponder OUT
			144.660-144.690 Linear Transponder IN
			144.700 FAX calling
144.794			144.750 ATV talk back
144.794	12kHz	MGM (h)	144.800 APRS
144.990			

144.994 145.194	12kHz	FM	Repeater Input exclusive (c)
145.194 145.206	12kHz	FM	Space communication (p)
145.206 145.5935	12kHz	FM	145.300 RTTY local 145.500 (mobile) calling
145.594 145.7935	12kHz	FM	Repeater Output exclusive (c,d)
145.794 145.806	12kHz	FM	Space communication (p)
145.806 146.000	12kHz	ALL MODE (e)	Satellite exclusive

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 telephony repeaters shall be allowed to operate between 144.000 and 144.794 MHz.
- ii. Except in the part of the band allocated to the Amateur Satellite Service and the linear transponders 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, San Marino 2002).
- 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 144.000 - 144.110 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 an ERP of 10 Watts or more shall be communicated to the Beacon Coordinator. (see section IX).
- c. For technical standards on NBFM and repeaters see section 7

If there is a real need for more repeater channels (see section 9.1.), 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 telephony 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, except for linear transponders and ARDF beacons. (Tel Aviv 1996, San Marino 2002)
- 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).
- q. It is recognised that in the IARU Region 1 rules for the Championships in Amateur Radio Direction Finding (ARDF) competitions, the frequencies for the unmanned beacons are in the segment 144.500 – 144.900 MHz. These beacons run low power and are on the air only during ARDF events. (Davos 2005)

3.5 430 - 440 MHz BANDPLAN (DAVOS 2005)

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
430.000 SUB-REGIONAL (national bandplanning) (d)	20kHz	ALL MODES	430.025 - 430.375	NBFM repeater output-channel freqs (F/PA/ON), 12,5 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)
431.975			431.625 - 431.975	Repeater input channel freqs (F/PA/ON), 12.5 kHz spacing, 1.6 MHz shift
432.000)	500Hz	Telegraphy (a)	432.000 - 432.025 432.050	EME Telegraphy centre of activity
432.100			432.088	PSK31 centre of activity
432.100	2700Hz	Telegraphy SSB MGM	432.200 432.350	SSB centre of activity Microwave talkback centre of activity
432.400			432.370	FSK441 random calling
432.400 432.490	500Hz	Telegraphy, MGM		Beacons exclusive (b)

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
432.500	12kHz	ALL MODES	432.500	Narrow-band SSTV
432.500-432.600			LINEAR TRANSPONDER IN(e)	
			432.600	RTTY (ASK/PSK)
			432.700	FAX (ASK)
			432.600-432.800	LINEAR TRANSPONDER OUT (e)
			432.800	(APRS) (n)
432.975				REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 2 MHz shift (Channel freq 432.600 - 432.975MHz)
433.000	12 kHz	FM repeater		In the UK repeater OUTPUT channels.
433.375				REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 1.6 MHz shift (Channel freq 433.000--433.375 MHz) I
433.400	12 kHz	FM	433.400	SSTV(FM/AFSK)
433.575			433.500	(Mobile) NBFM calling
433.600				SIMPLEX CHANNELS, 25 kHz spacing, (Channel freq 433.400 -- 433.575 MHz)
433.600	20kHz	ALL MODES	433.600	RTTY (AFSK/FM)
433.625 - 433.775			Digital communications channels (g) (h) (i)	
433.700			FAX channel (FM/AFSK)	
434.000			434.000	Centre frequency of digital experiments as defined on note m
434.400	12kHz (c)	ALL MODES ATV (c)	434.450 -	Digital communications channels
434.594			434.575	(by exception !!) (i)

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
434.594 ATV (c) & FM	20kHz (c)	ALL MODES		REPEATER OUTPUT (region 1 system), 25 kHz spacing, 1.6 MHz shift, (Channel freq 434.600 -- 434.975 MHz)
434.981				In the UK repeater INPUT channels
435.000	20kHz (c)	Satellite service & ATV (c)		
438.000				
438.00			438.025 - 438.175	Digital communications channel freqs (g)
			438.200 - 438.525	Digital communications repeater channels (g) (j) (l)
ATV (c) & SUB-REGIONAL (national bandplanning) (d)	20kHz (c)	ALL MODES	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)
439.000			439,9875	POCSAG centre

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 telephony repeaters shall be allowed to operate between 432 and 433 MHz. (From 1-1-2004 those frequencies arebetween 432.000 and 432.600 MHz
- ii. Beacons, irrespective of their ERP, will have to be located in the exclusive beacon part of the band.
- iii. NBFM telephony 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 - 432.100 MH. PSK31, however, can be used as well in this segment
- 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.
- 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 (ASK/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 (except where Aexclusive@is mentioned@).

2.1. General

deleted

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 and Belgium, which IARU Region 1 supports as a useful measure to fill a hitherto unused part of the band. For the numbering of NBFM telephony channels see 3.1.

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.
438.194 - 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 432.500, 432.525, 432.550, 432.575, 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 not 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)
- n. that this only applies in cases where 144,800 MHz cannot be used (DAVOS 2005)

3.6 1240 - 1300 MHz BANDPLAN

Frequency MHz	Maximum Bandwidth	MODE	USAGE
1240.000 1243.250	20kHz	ALL MODE	1240.000-1241.000 Digital communications 1242.025-1242.250 Repeater output, ch. RS1 - RS10 1242.275-1242.700 Repeater output, ch. RS11 - RS28 1242.725-1243.250 Packet radio duplex, ch. RS29 -RS50
1243.250 1260.000	(d)	ATV Digital ATV	1258.150-1259.350 Repeater output, ch. R20 - R68
1260.000 1270.000	(d)	Satellite Service	
1270.000 1272.000	20kHz	All Mode	1270.025-1270.700 Repeater input, ch. RS1 -- RS28 1270.725-1271.250 Packet Radio duplex, ch. RS29 -- RS50
1272.000 1290.994	(d)	ATV Digital ATV	
1290.994 1291.481	12kHz	FM Repeater INPUT	RM0 (1291.000) -- RM19 25kHz spacing RM19 (1291.475)
1291.481 1296.000	(d)	ALL MODES	1293.150-1294.350 Repeater input, R20 (1293.150) R68 (1294.350)
1296.000 1296.150	500Hz	Telegraphy MGM	1296.00-1296.025 Moonbounce 1296.138 PSK31 centre of activity
1296.150 1296.800	2700Hz	Telegraphy SSB MGM	1296.200 Narrow-band centre of activity 1296.370 FKS441 MS calling 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 1296.994	500Hz	Telegraphy MGM	Beacons exclusive (b)

1296.994	12kHz	FM Repeater OUTPUT	RM0 (1297.000) 25 KHz spacing RM19 (1297.475)	
1297.481				
1297.494	12kHz	FM (c)	SM20 (1297.500) (25 KHz spacing - SIMPLEX) 1297.500 NBFM center of activity (25 KHz spacing - SIMPLEX) SM39 (1297.975)	
1297.981				
1298.000	20kHz	All Modes	1298.025-1298.500	Repeater output channel freqs, ch. RS1 -- RS28
			1298.500-1300.000	Digital communications (within RS channels) d)
1300.000			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.

1.1. Footnotes

- a. ~~deleted~~
- 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.
- d. **Bandwidth limits according to national regulations.**

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.

3.7 2300 -2450 MHz BANDPLAN

Frequency	Mode	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 2320.150	TELEGRAPHY EXCLUSIVE (c)	2320.000-2320.025 EME 2320.138 PSK31 centre of activity
2320.150 2320.800	TELEGRAPHY/ SSB (c)	2320.200 SSB centre of activity
2320.800 2321.000	BEACONS EXCLUSIVE (c)	
2321.000 2322.000	NBFM SIMPLEX & REPEATERS (b)	
2322.000 2400.000	All Modes (b)	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 2450.000	Amateur Satellite Service	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

3.8 3400 -3475 MHz BANDPLAN

IARU Region 1 bandplan	Usage
3400.000 NARROW-BAND MODES 3402.000	3400.100 Center of activity
3402.000 ALL MODES 3475.000	3420.000-3430.000 Digital Communications 3450.000-3455.000 Digital Communications

3.9 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)	5668.200	Narrow band center of activity
5670.000			
5670.000	DIGITAL		
5700.000			
5700.000	ATV		
5720.000			
5720.000	ALL MODES		
5760.000			
5760.000	NARROW BAND MODES (a)	5760.200	Narrow band center of activity
5762.000			
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.

3.10 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	10.3682	Narrow band center of activity
10.370			
10.370	ALL MODES		
10.450			
10.450	AMATEUR SATELLITE SERVICE & ALL MODES	10.450-10.452	Narrow band modes in countries where 10.368-10.370 is not available
10.500			

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.

3.11 24.000 - 24.250 GHz BANDPLAN (San Marino 2002)

IARU Region 1 bandplan	Usage
24.000 ALL MODES 24.048	
24.048 AMATEUR SATELLITE SERVICE & NARROW BAND MODES 24.050	24.0482 Narrow band center of activity
24.050 ALL MODES (not preferred) (a) 24.250	24.125 Preferred operating frequency for wide-band equipment

1. Footnotes

a. In the lower 50 MHz of the 24 GHz band the amateur and amateur satellite service have a primary/exclusive status, while the status is secondary in the upper 200 MHz .
 The all mode section in the secondary segment should only be used in case the preferred segment cannot be used.

3.12 47.000 - 47.200 GHz BANDPLAN (Vienna 2004)

IARU Region 1 bandplan	Usage
47.000 ALL MODES 47.088	
47.088 AMATEUR SATELLITE SERVICE & NARROW BAND MODES 47.090 47.090 ALL MODES 47.200	47.088200 Narrow band center of activity

3.13 75.50-81.50 GHz BANDPLAN (Davos 2005)

IARU Region 1 bandplan	Usage
75.500 AMATEUR SATELLITE SERVICE & ALL MODES (Preferred [1]) 76.000	75976.200 MHz : Preferred Narrow band centre of activity
76.000 ALL MODES (not preferred) [2] 77.500	76032.200 MHz :Narrow Band Centre of activity in some countries
77.500 AMATEUR SATELLITE SERVICE & NARROW BAND MODES (non-preferred / preferred)[3] 77.501	77500.200 MHz: Preferred NB centre of activity in countries outside the CEPT area
77.501 ALL MODES (Preferred segment) 78.000	
78.000 ALL MODES (not preferred) 81.500	

Footnotes

1. Preferred in those CEPT countries having implemented EU35.
2. Between 77.5 and 78 GHz the amateur and amateur satellite service have a primary/exclusive status and a primary status through ECA footnote EU35 in CEPT countries, while the status is secondary in the remainder of the allocation. The all mode section in the secondary segment should only be used in case the preferred segment cannot be used
3. Preferred in those countries not having implemented EU35

3.14 122.25 - 123 GHz Bandplan (San Marino 2002)

IARU Region 1 bandplan	Usage
122.250 NARROW BAND MODES 122.251	
122.251 ALL MODES 123.000	

3.15 134 - 141 GHz BANDPLAN (San Marino 2002)

IARU Region 1 bandplan	Usage
134.000 AMATEUR SATELLITE SERVICE & NARROW BAND MODES 134.001	
134.001 ALL MODES (Preferred segment) 136.000	
136.000 ALL MODES (not preferred) (a) 141.000	

1. Footnotes

a. Between 134 and 136 GHz the amateur and amateur satellite service have a primary/exclusive status, while the status is secondary in the remainder of the allocation.

The all mode section in the secondary segment should only be used in case the preferred segment cannot be used

3.16 241 - 250 GHz BANDPLAN (San Marino 2002)

IARU Region 1 bandplan	Usage
241.000 ALL MODES (not preferred) (a) 248.000	
248.000 AMATEUR SATELLITE SERVICE & NARROW BAND MODES 248.001	
248.001 ALL MODES (Preferred segment) 250.000	

Footnotes

a. Between 248 and 250 GHz the amateur and amateur satellite service have a primary/exclusive status, while the status is secondary in the remainder of the allocation.
 The all mode section in the secondary segment should only be used in case the preferred segment cannot be used

4 IARU REGION 1 VHF/UHF/MICROWAVES CONTESTS

4.1 Introduction

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. In San Marino 2002 the date was changed into the third weekend of June.

Hence, currently four official IARU Region 1 contests are organised annually :

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Hence, currently four 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 ATV contest during the second weekend of September;
4. The 50 MHz contest during the third 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 chapter 4.2. 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), 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.

4.2 PROCEDURE FOR ORGANISING IARU REGION 1 VHF/UHF/MICROWAVES CONTESTS

In January of each year the Chairman of the VHF/UHF/Microwaves Committee shall send a letter to the societies organising the IARU Region 1 VHF, UF/Microwaves, 50 MHz and ATV contests in that year, containing an up-to-date copy of the rules for these contests.

After receipt the organising societies shall 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 shall contain details on where to send the logs etc. This shall be done before the end of March of that year.

Not later than the seventh Sunday after the contest the national VHF Manager or properly nominated Contest Committee shall 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. Stations operating temporarily outside their "home-country" are for the purpose of the contest participating as stations in the country where they operate and their logs must to be submitted to the VHF-Manager/Contest Committee of that country. Logs sent to the contest committee of their home country shall not be submitted to the adjudicating society!

In order to obtain the most important results as quickly as possible the following checking procedure shall be followed: The VHF Manager or properly nominated Contest Committee in each country shall verify the details of each participating station (callsign, locator, band, section, having obeyed the rules ...) Upon completion, the logs shall be sent to the organising society, separated in sections (bands, where applicable).

Two weeks shall be allowed for transit to the organising society and thus all national contributions should be in by the ninth Sunday after the contest weekend.

The organising society shall allow a margin of three weeks for possible postal delays and shall declare the entry closed on the twelfth Sunday after the contest weekend. Entries received after this date shall be returned to sender or -if agreed by the sender by mail or fax- be destroyed.

The organising society shall publish the results based on the claimed scores not later than thirteenth Sunday after the contest on their web site. The organising society will perform full computer/automatic cross check on all the received logs and will publish the final results not later than fourteenth Sunday after the contest on their web site. The list of results should include at least the following data: call sign, Locator, score, number of QSOs, number of deleted QSOs, percentage of deleted points, ODX call sign, ODX Locator and ODX QRB. The organising society shall judge the contest and publish the official results on their web site and send the results to the Webmaster of the IARU Region I web site for publication. These results shall also be sent in electronic format to all VHF Managers and/or Contest Committees of Societies who sent logs and also to the Chairman of Region 1 VHF/UHF/Microwave Committee, not later than two months after the date mentioned in F. above (e.g. not later five months after the contest took place). Optionally certificates for all participants may be provided for distribution by national societies. See also section III m.

All QSOs including unique QSOs shall count for points even if they only appear in the log of one contest entrant.

4.3 LIST OF MEMBER SOCIETIES CHARGED WITH ORGANISING THE IARU REGION 1 145 MHz AND UHF/MICROWAVES CONTESTS

1956	DARC	
1957	RSGB	
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	VERON	1981
1988	SRAL	
1989	ARI	(on invitation)

1990	BFRA	Düssel-
1991	RSGB	dorf 1989
1992	DARC	
1993	ÖVSV	
1994	USKA	
1995	UBA	
1996	CRCC	
1997	FRR	Tel Aviv
1998	VERON	1996
1999	RSGB	
2000	DARC	
2001	ARI	Lillehammer
2002	SRAL	1999
2003 Sept	SARA	San Marino
2003 Oct	ZRS	2002
2004 Sept	ÖVSV	
2004 Oct	REF	
2005 Sept	REF	
2005 Oct	URE	
2006 Sept	CRC	
2006-Okt.	REF	
2007 Spt.	MARSZ	
2007 Okt.	CRC	
2008 Sept.	HRS	
2008 Okt.	RSGB	

4.4 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	
2003	DARC	(San Marino 2002)
2004	VERON	
2005	REF	
2006	UBA	
2007	DARC	
2008	RSGB	

4.5 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)
2004	EDR	(San Marino 2002)
2005	PZK	
2006	VERON	
2007	PZK	
2008	ZRS	

4.6 RULES IARU REGION 1 145 MHz SEPTEMBER CONTEST (Davos 2005)

4.6.1 Eligible entrants

All licensed radio amateurs in Region 1 may 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.

Stations operating temporarily outside their "home-country" are for the purpose of the contest participating as stations in the country where they operate and their logs must be submitted to the VHF-Manager/Contest Committee of that country. Logs sent to the Contest Committee of their home country shall not be submitted to the adjudicating society.

4.6.2 Contest sections

The contest shall comprise the following sections :

- i) Stations operated by a single operator, with no assistance during the contest.
- ii) All other entrants

No more than one transmitter may be in use at any one time. All the equipment of the station (transmitters, receivers and antennas, etc) must be located within a single circle of no greater than 500 metres diameter. " A participating station must operate from the same location throughout the event.

4.6.3 Date of contest

The contest shall start on the first Saturday of September.

4.6.4 Duration of contest

The contest shall commence at 1400 hours UTC on the Saturday and end at 1400 hours UTC on the Sunday.

4.6.5 Contacts

Each station may only be worked once, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact may count for points, but any duplicate contacts shall be logged without claim for points and clearly marked as duplicates. Contacts made via active repeaters do not count for points.

4.6.6 Type of emission

Contacts may be made in A1A J3E or F3E(G3E).

4.6.7 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

4.6.8 Scoring

Points shall 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 centre of each locator square is used for distance calculations. 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).

4.6.9 Entries

The entries must be set out in digital/electronic form fulfilling the requirements under rule 12. Logs must be sent to the national VHF Manager or the national Contest Committee 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.

4.6.10 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.

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. The national VHF Manager/Contest Committee is responsible for disqualification based upon the results of monitoring. The claimed contact shall be disqualified for any error in the information logged by the station. Claiming points for a duplicate contact shall be penalised 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 shall result in the loss by the receiving station of all points for that contact.

4.6.11 Awards

The winner in each section shall receive a certificate.

4.6.12 Logs

The logs shall be in the format defined in Section 4.10.
See also section IIIaa1, item D

4.7 RULES IARU REGION 1 UHF/MICROWAVES OCTOBER CONTEST (Davos 2005)

4.7.1 Eligible entrants

All licensed radio amateurs in Region 1 may participate in the contest. Multiple operator entries shall be accepted, provided only one callsign is used during the contest (see footnote 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.

Stations operating temporarily outside their "home-country" are for the purpose of the contest participating as stations in the country where they operate and their logs will have to be submitted to the VHF- Manager/Contest Committee of that country. Logs sent to the contest committee of their home country shall not be submitted to the adjudicating society!

4.7.2 Contest sections

1) Stations operated by a single operator, with no assistance during the contest.

2) All other entrants

For 432 MHz and for the higher frequency amateur bands up to 10 GHz inclusive there will be two sections, as defined above. Furthermore, there will be two sections, as defined above, for the combined group of amateur bands above 10 GHz, the so-called millimetre group (see footnote 2).

No more than one transmitter per band may be in use at any one time. All the equipment of the station (transmitters, receivers and antennas, etc) must be located within a single circle of no greater than 500 metres diameter. "A participating station must operate from the same location throughout the event.

4.7.3 Date of contest

The contest will start on the first Saturday of October.

4.7.4 Duration of contest

The contest will commence at 1400 hours UTC on the Saturday and will end at 1400 hours UTC on the Sunday.

4.7.5 Contacts

Each station can be worked only once per band, whether it is fixed, portable or mobile. If a station is worked again during the same contest and on the same band, 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.

4.7.6 Type of emission

Contacts may be made in A1A J3E or F3E (G3E).

4.7.7 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 on each band and increasing by one for each successive contact on that band. 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.

4.7.8 Scoring

For the amateur bands up to 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. The centre of each locator square is used for distance calculations. 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

4.7.9 Entries

The entries must be set out in digital/electronic form fulfilling the requirements under rule 12. Logs must be sent to the national VHF Manager or the national Contest Committee 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.

4.7.10 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 .

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. The national VHF Manager/Contest Committee is responsible for disqualification based upon the results of monitoring. The claimed contact will be disqualified for any error in the information logged by the station.

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.

4.7.11 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 3) will be combined, using an adaptive multiplier system:

435 MHz
1.3 GHz
2.4 GHz
5.7 GHz
10 GHz

4.7.12 millimetre group

The multipliers to be used for the determination of the overall scores in each section 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 for that section and the highest number of points scored by any participating station on the band for that section 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 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.

4.7.13 Logs

The logs shall be in the format defined in Section 4.10. See also section IIIaa1, item D

4.7.14 Footnotes

1 Multi-operator entries are accepted for participation. When such stations use a different call sign on each band, the logs of that Multioperator 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. All the equipment of the stations (transmitters, receivers and antennas, etc) must be located within a single circle of no greater than 500 metres diameter. "

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.

3 As the 3.4 GHz band is not yet 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)

4.8 RULES IARU REGION I SEPTEMBER ATV CONTEST

4.8.1 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.

4.8.2 Eligible entrants

No more than one transmitter may be in use at any one time. All the equipment of the station (transmitters, receivers and antennas, etc) must be located within a single circle of no greater than 500 metres diameter.

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.

4.8.3 Date of contest

The contest will begin on the second Saturday of September.

4.8.4 Duration of contest

The contest will commence at 1800 UTC on the Saturday and will end at 1200 UTC on the Sunday.

It is recommended that the national societies will run their ATV contests at the same time as the IARU Region 1 ATV contest takes place (1800 UTC – 1200 UTC).

4.8.5 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.

4.8.6 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.

4.8.7 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.

4.8.8 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).

4.8.9 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.

4.8.10 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.

4.8.11 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.

4.8.12 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.

4.9 RULES IARU REGION 1 50 MHz JUNE CONTEST

4.9.1 Eligible entrants

All licensed 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.

Stations operating temporarily outside their "home-country" are for the purpose of the contest participating as stations in the country where they operate and their logs will have to be submitted to the VHF- Manager/Contest Committee of that country. Logs sent to the contest committee of their home country shall not be submitted to the adjudicating society!

4.9.2 Contest sections

The contest will comprise the following sections :

i) Stations operated by a single operator, with no assistance during the contest.

ii) All other entrants

No more than one transmitter may be in use at any one time. All the equipment of the station (transmitters, receivers and antennas, etc) must be located within a single circle of no greater than 500 metres diameter.

4.9.3 Date of contest

The contest will begin on the third Saturday of June.

4.9.4 Duration of contest

The contest will commence at 1400 hours UTC on the Saturday and will end at 1400 hours UTC on the Sunday.

4.9.5 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.

4.9.6 Type of emission

Contacts may be made in A1A, J3E or F3E (G3E).

4.9.7 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 IN55).

Note: for the "T" part of the report, see section Vib

4.9.8 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 centre of each locator square is used for distance calculations. In case only a 4-character locator has been received, the distance calculated should be the shortest distance between the claiming station and the given Locator square.

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).

4.9.9 Entries

The entries must be set out in digital/electronic form fulfilling the requirements under rule 12. Logs must be sent to the national VHF Manager or the national Contest Committee 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.

4.9.10 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 (see footnote 1) on monitoring.

The claimed contact will be disqualified for any error in the information logged by the station. 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 errors in the logged information will result in the loss of all points for that contact by the receiving station.

4.9.11 Awards

The winner in each section will receive a certificate.

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4.9.12 Logs

The logs shall be in the format defined in Section 4.11. See also section IIIaa1, item D. (See footnote 2)

4.9.13 Footnotes :

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 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 telegraphy sub band 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.

2.)

Contest entries for the year 2006 may still be submitted on paper logsheets.

4.10 IARU REGION 1 VHF/UHF/Microwaves SWL contest

The conference in DAVOS (2005) decided to discontinue the Region 1 VHF/UHF/Microwaves SWL contest

4.11 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.

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.

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.

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

4.12 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.

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 San Marino 2002 conference it was agreed to recommend that such field days should coincide with the IARU Region1 VHF/UHF/Microwave contest in July.

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 ².

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.

² 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).

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.

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 chapter 4.2.

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 calendar - 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.

4.13 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 to 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

4.14 THE LOCATOR SYSTEM

4.14.1 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.

4.14.2 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. 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.

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 :

4.14.3 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.

4.15 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 adjudicating 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.

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.

PLEASE NOTE THAT THE RESULTS OF SOME CONTESTS ARE NOT KNOWN.
THE NAME OF THE ORGANISING SOCIETY IS PRINTED NEXT THE YEAR.

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
1982	PZK			
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	M1A	352922	MOV	418298
2000	M6T	317786	HB2MS	457192
2001	DG3FK	277383	IO3V	412850
2002	SRAL			
2003	SARA			

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
1982	PZK			
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	DL6NAA	145506	HB9MS	172811
2000	DG2NBN	103044	OK1KIM	142337
2001	OK1IA	116285	TM2W	176889
2002	SRAL			
2003	ZRS			

WINNERS OF THE IARU REGION 1 CERTIFICATES

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	DL0NN	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	PA0EZ	524338	PA6NL	711520
2000	DK2MN	329344	PA6NL	735720
2001	PA0EZ	409.630	DF0MTL	845.843
2002	SRAL			
2003	ZRS			

5 PROPAGATION RESEARCH BY AMATEURS

5.1 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.

5.2 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 consulted³.

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. 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

³ see section IX which deals with the coordination of the allocation of beacon frequencies.

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 propagation effects on the microwaves (such as Arainscatter@)

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. Secretary 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 relevant DUBUS editors will share the information received with the IARU Region 1 coordinators.

VIII. Propagation database

At the IARU Region 1 Conference 1999 in Lillehammer the offer of Michael Kastelic, OE1MCU, was accepted to create a easily accessible database for the collection and distribution of amateur reports.

Appendix Sample reporting forms and information sheets (nov 96)

6 OPERATING PROCEDURES

6.1 OPERATING CODE OF PRACTICE FOR 50 MHz OPERATORS.

50 MHz AS A DX BAND

It should be recognised by all 50 MHz operators that 50 MHz is a DX band. All 50 MHz operators should always treat each other with respect and tolerance.

BAND PLAN

Always respect the band plan as issued by IARU, taking into account the conditions of your license.

LOCAL QSO's

Do not conduct local QSO's within the 50.100 to 50.130 MHz window for Intercontinental contacts.

LEARN TO LISTEN

True 50 MHz band DX'ers spend about five percent of their time transmitting while ninety-five percent of time is spent listening and observing changing band conditions and propagation modes. This will be far more effective than just calling CQ DX at random.

50.100 - 50.130 MHz WINDOW FOR INTERCONTINENTAL CONTACTS

This Window is widely accepted and should be used for Inter-continental QSO's only.

50.110 MHz INTERCONTINENTAL CALLING FREQUENCY

This should be used for Intercontinental contacts only. Do not under any circumstances engage in local continental QSO's on this frequency even for a minute or two. Do not encourage pile-ups on 50.110 MHz.

50.110 MHz CQ'ING

LISTENING is the first rule of working rare DX on the 50 MHz band. So think twice before calling CQ on 50.110 MHz. But the occasional CQ is good as it can discover an unrecognised opening.

QSO TECHNIQUES

Follow the style and take the lead of the DX operator in providing information. Otherwise keep it simple as there are other stations waiting in line.

DX PILE-UP OPERATING

You should listen to the DX stations carefully and not continue to call if they request a particular country or prefix if that is not you. You should NOT call if you cannot hear the DX station!

SPLIT FREQUENCY OPERATION

When a DX station creates a large pile-up, split-frequency operation is recommended. To minimise interference with other DX stations operating simplex, it is recommended that a maximum split of 10 kHz is used.

DUPLICATE QSO's

It is always tempting to call a rare DX station every time you hear it. This should be avoided as it means that you are taking away the opportunity for the DX station to work a new station and give them their first QSO with the DX country.

TELEGRAPHY OPERATION

Telegraphy is probably the best mode of operation on the 50 MHz band due to the nature of many DX openings.

FM QSO's IN EUROPE

All FM transmissions should be made above 50.500 MHz for the obvious reason that FM is wideband and could wipe out weak DX signals.

MUTUAL INTERFERENCE

Proper adjustment of transmitters will minimise distortion and reduce interference with operators on nearby frequencies. The correct level of audio setting for the microphone in use is essential for readability and minimal distortion. Linear amplifiers should be only driven so that they operate in the linear region and in any case should only be used when propagation conditions require it. Please note that poor receiver performance with respect to adjacent channel rejection and overload will also limit your effectiveness.

6.2 OPERATING PROCEDURES FOR METEOR SCATTER QSO'S (Davos 2005)

6.2.1 INTRODUCTION

The goal of the procedures described is to enable valid contacts to be made by meteor scatter (MS) reflection as quickly and easily as possible. Meteor scatter is unlike most other propagation modes, in that neither station can hear the other until an ionised meteor trail exists to scatter or reflect the signals. As the reflections are often of very short duration the normal QSO procedure is not readily applicable and specialised operating techniques must be taken to ensure that a maximum of correct and unmistakable information is received. The two stations have to take turns to transmit and receive information in a defined format, following the procedures as detailed below. Some meteor showers are 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. As with operating procedures in general, the virtues of the MS operating procedures are mainly that they are standard and are widely understood throughout IARU Region 1.

6.2.2 2. SCHEDULED AND RANDOM CONTACTS

Two types of MS contacts, arranged in different ways, may be distinguished:

- a. A scheduled contact, where two interested stations arrange in advance the frequency, timing, transmission mode, e.g. Telegraphy, SSB or MGM and call signs to be used. Scheduling may be carried out by exchange of letters or e-mail, by radio via the European VHF Net on 14,345 MHz, by Internet chat-rooms, packet-radio etc.
- b. A non-scheduled contact, where a station calls CQ or responds to a CQ call, are called "random contacts". Random contacts are far more difficult and because you are starting entirely from scratch, it is particularly important for both stations to follow the standard meteor scatter QSO procedures described in this document.

6.2.3 TIMING

Prior to any MS activity it is absolutely vital that clocks need to be set to better than 1 second of standard time. Any clock inaccuracy will result in wasted time. Accurate timing of transmit and receive periods is important for two reasons: 1) to maximise the chances of hearing the other station, and 2) to avoid interference between local stations. Accurate timing can be accomplished for example by checking against the time-ticks on standard frequency transmissions, TV Teletext, telephone 'speaking-clock', GPS time signals or the Internet.

The recommended time periods for the different modes are:

- Telegraphy: 2.5 minutes periods.
- SSB: 1 minute periods.
- MGM: 30 seconds periods.

This practice gives quite satisfactory results. However developing technology make it possible to use much different periods and amateurs may wish to arrange 1 minute periods for Telegraphy and shorter periods for SSB and MGM especially during major showers. If non-recommended time periods are used the first priority is to avoid causing interference to local stations that are using the recommended periods.

Even though the recommended period for SSB contacts is 1 minute periods a quick-break procedure making a break every 10-15 seconds, in case the QSO can be completed within one long burst, are encouraged during major meteor showers.

6.2.4 TRANSMIT PERIODS

In order to minimise the overall interference with other stations standard transmit periods are recommended. Station in

central and western Europe should use second period. All MS operators living in the same area should, as far as possible, agree to transmit simultaneously in order to avoid mutual interference.

6.2.5 QSO DURATION

Every uninterrupted QSO period must be considered as a separate trial. This means that it is not permissible to break off and then continue the contact at a later time.

6.2.6 FREQUENCIES

Scheduled contacts

These contacts may be arranged on any frequency, taking into consideration the mode and band plan. Scheduled contacts must not use known popular frequencies and the random MS frequencies. Special care should be applied on the frequency selection to avoid interference when using reverse transmit periods according to your location.

Random contacts

The frequency used for CQ calls for random contacts should be according to the IARU Region 1 bandplans.

6.2.7 QSY FREQUENCIES FOR MGM

To avoid -interference, which results from a large number of stations attempting to complete contacts on the various MS calling frequencies, a QSY method is recommended. During the CQ the caller indicates on which frequency he/she will listen for a reply and carry out any subsequent QSO. The procedure for moving a beginning QSO off the calling frequency without losing contact is as follows. If an operator wants to call CQ the following QSY procedure should be used:

- 1) Select the frequency to be used for a QSO by checking whether it is clear of traffic and QRM.
- 2) In the CQ call, immediately following the letters "CQ", kHz is inserted to indicate the frequency that will be used for reception when the CQ call finishes.
- 3) During the receiving period the receiver should be tuned to the frequency indicated by the letter used in the CQ call.
- 4) When the caller receives a signal on the receiving frequency indicated during the call and identifies the reply as an answer on his CQ, the transmitter is moved to the same receiving frequency and the whole QSO procedure takes place there.

If an operator instead of calling CQ wishes to listen for a CQ call the following QSY-procedure should be used:

- 1) Listen on a random contact frequency.
- 2) When a CQ call is received, note the kHz-frequency, which follows the letters "CQ" in the call. From this find the correct receiving frequency which the calling station will use for receiving replies.
- 3) QSY the transmitter to the receiving frequency, and transmit a reply during the appropriate period. The format for the reply can be found in section 8.
- 4) As the QSO will take place on this 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.

5
The QSY frequencies should take place in the segment according to the IARU Region 1 bandplans.

a. MGM, kHz-frequency

Users of MGM indicate the frequency they intend to carry out the QSO by adding the three digits of the absolute frequency, i.e. the kHz-frequency. For example CQ383 indicates that the station will listen on 144,383 MHz for a

subsequent contact.

Example: G4ASR wishes to try a random MS experiment on MGM and wants to start with calling CQ. He first checks his receiver in the MGM range of 144,360 MHz to 144,397 MHz and finds a clear frequency on 144,394 MHz. He calls CQ on 144,370 MHz, and he must now add the kHz- frequency to his CQ call to indicate on which frequency he intends to listen. In this example he will therefore call "CQ394" in his CQ call.

Example: Your receive PA2DW who is calling "CQ274" on the 50 MHz random frequency. This tells you that PA2DW will listen on exactly 50,274 MHz.

b. CW/SSB

This proposal does not describe any procedures for QSY operation on CW/SSB anymore.

6.2.8 QSO PROCEDURE

All modes use the same MS-QSO procedure.

When attempting random SSB contacts, speak the letters clearly, using phonetics where appropriate.

a. Calling

The contact starts with one station calling the other by sending both call signs.

b. Reporting system

The report consists of two numbers:

First number (burst duration)	Second number (signal strength) S-units S/N
2 : up to 0,5 s	6 : below S2 or below 5 dB
3 : 0,5 - 1 s	7 : from S2 to S3 or from 5 dB to 10 dB
4 : 1 - 5 s	8 : from S4 to S5 or from 10 dB to 15 dB
5 : longer than 5 s	9 : above S5 or above 15 dB

Note that the number "1" is not used as the first number/burst duration.

Maximum duration of a ping (Underdense Reflection):

<u>Band</u>	<u>Duration</u>
50 MHz	1000 ms
70 MHz	500 ms
144 MHz	100 ms
432 MHz	13 ms

This means that the duration of bursts (Overdense Reflections) are longer than the above ping durations.

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 one of them. The report should be sent twice between each set of call signs. The report must not be changed during a contact even though signal strength or duration might well justify it.

d. Confirmation procedure

1) As soon as either operator copies both call signs and a report he may start sending a confirmation. This means that all letters and figures have been correctly received.

The message can be pieced together from fragments received over several bursts and pings, but it is up to the operator to ensure that it is done correctly and unambiguously. Confirmation is given by inserting an R before the report.

2) When one 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 call sign after at least 3 R's. When the other operator has received the R's, the contact is complete and he may respond in the same manner.

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 minimum three consecutive "RRR".

6.2.9 VALID CONTACTS

A valid contact is one where both operators have copied both callsigns, the report and an unambiguous confirmation. However no recourse should be made during the contact to obtain the required information, change of frequency, antenna direction, etc. via other methods such as the DX Cluster, talk-back on another band, etc. Such secondary methods invalidate the meteor scatter contact.

In essence: if anything concerning the ongoing QSO attempt is agreed through other means than the QSO attempt frequency a new start is required.

6.2.10 DOCUMENT HISTORY:

This procedure was adopted at the IARU Region 1 Conference in Miskolc-Tapolca (1978), later slightly amended at the IARU Region 1 Conference in Noordwijkerhout (1987), Torremolinos (1990), de Haan (1993), San Marino (2002) and Vienna (2004).

6.3 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 *Ashort@* 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 *Aping@* and *Aburst@* 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

6.4 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 was 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.

a) 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.

You will find document 90/TS/C3.53 contained the IARU Administrative Council Resolution 87-2 (revised in 1989) in chapter 6.6.

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 chapter 6.7.

6.5 Definition of a complete contact

A contact between stations on VHF/UHF/Microwaves can only be judged as having been complete when have been exchanged

- Both Callsigns
- The signal reports
- Confirmation of reception of the above.

6.6 CONCERNING THE RELAYING OF MESSAGES TO AMATEUR STATIONS

RESOLUTION 87 2 (Revised 1989)

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.

6.7 CONCERNING GUIDELINES FOR PACKET RADIO

RESOLUTION 91-2

The IARU Administrative 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.

7 Technical Recommendations of IARU Region 1

7.1 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.

7.2 FREQUENCY MODULATED TELEPHONY

7.2.1 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.

7.2.2 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.

7.3 DIGITAL TRANSMISSION

7.3.1 Data-transmission (Recommendations D.1.1. and D.1.2.)

removed

7.3.2 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 $\sqrt{10}$ kHz shifted FSK channel seems a good compromise between bandwidth, quality and communications efficiency.

7.4 AMATEUR (wide band) TELEVISION

7.4.1 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.

7.4.2 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.

7.4.3 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.

7.5 FACSIMILE (Recommendation V.3)

At the 1978 Conference in Miscolec-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.

7.6 REPORTING

7.6.1 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 *Atone@* report. This is a subjective measure. It was important in the *Aold 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 *Apure tone@* and a T9 report is generally given. On VHF and higher, however, the characteristics of the propagation medium can significantly *Amodulate@* 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.

7.7 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.

7.8 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 reference, 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

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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 ⁴			
	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

⁴ 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.

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 appropriate 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 and 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 encouraged. Where AFSK operation is used on VHF-UHF for local and outstart 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 of 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 identification" 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.

STANDARDS FOR DIGITAL COMMUNICATIONS1. 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 ⁵⁾

- 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.

⁵⁾ 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

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 $\Delta f = \nabla$ 10 kHz

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.

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 between 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

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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.)

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 30 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.

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BRUSSEL 1969, WARSAW 1975, NOORDWIJKERHOUT 1987

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ALTERNATIVE ATONE@ 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

BASIC FAST SCAN AMATEUR TV STANDARD

The standard transmission system for Amateur Television shall be the CCIR-2 system following the Gerber standard.

The use of vestigial sideband techniques should be encouraged for use in the 435 MHz band.

ATV in the 435 MHz band should use the 434-440 MHz segment with the carrier 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.

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:		
Colour sub-carrier frequency:	CCIR rec 405.1	CCIR Rec 405.1
Maximum instant. mod. index:		
Peak dev.(with pre-emphasis):	4.433618 MHz	4.433618 MHz
Channel bandwidth:	-	.05
Sound sub-carrier frequency:		
Sound sub-carrier amplitude (with respect to peak video):	3.5 MHz	3.5 MHz
Sound sub-carrier modulation index:	12 MHz at -40 dB 18 MHz at -50 dB	12 MHz at -40 dB
	5.5 MHz	5.5 or 6 MHz
	-	-14 dB
	0.07	0.2

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 permissible.
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.

8 Amateur Satellites Services

AN ANTHOLOGY OF AMATEUR SATELLITES AND ORGANISATIONS

8.1 Introduction

Amateur Satellites are currently named within two generic groups, one is OSCAR which is an acronym for Orbiting 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 that 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 A/@ is used to separate input and output.

	Wavelength	Designator
21 MHz	15m	H
29 MHz	10m	T
144MHz	2m	V
435MHz	70cm	U
1260MHz	24cm	L
2400MHZ	13cm	S
5650MHz	6cm	C
10GHz	3cm	X
24GHz	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 uplink only
2.400 - 2.450 GHz
5.650 - 5.670 GHz uplink only
5.830 - 5.850 GHz downlink only
10.450 - 10.500 GHz
24.000 - 24.050 GHz
47.000 - 47.200 GHz
76.000 - 81.000 GHz
142.000 - 144.00 GHz
248.000 - 250.00 GHz

8.2 Historical overview

Please visit: <http://www.amsat.org/amsat-new/satellites/>

8.3 Amateur satellite organizations

Please visit for a actual list: [http://www.uk.amsat.org/Other AMSATs/default.php](http://www.uk.amsat.org/Other_AMSATs/default.php)

8.4 Operating procedures

For amateur-satellite operating procedures see section [Fehler! Verweisquelle konnte nicht gefunden werden.](#)

8.5 AMATEUR SATELLITE BANDPLAN

8.5.1 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.

8.6 IARU REGION 1 AND IARU SATELLITE COORDINATION

Visit: <http://www.iaru.org/satellite/>

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. 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 a 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.

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.

8.7 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.

8.8 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.

8.9 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.

9 REPEATERS

9.1 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 2.1., 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 2), as well as timely agreement on the technical specifications of repeaters and equipment used with repeaters (section 7).

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 (see 9.2.) .

9.2 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 OeVSV at the IARU Region I Conference in Miskolc-Tapolca, 1978)

10 Beacons

10.1 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.

The current list of known beacons, as compiled by the IARU Region 1 VHF/UHF/SHF Beacon Coordinator is available in the internet (see 10.4).

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.

10.2 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 VHF openings 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 ⁶
70 MHz	1kHz
145 MHz	1 kHz
435 MHz	2 kHz
1.3 GHz	5 kHz

[see also Technical Recommendation B.1 in Section **Fehler! Verweisquelle konnte nicht gefunden werden.**]

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.

¹In 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.

10.3 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.

10.4 IARU REGION 1 VHF AND MICROWAVE BEACON LIST - June 2005

This list of VHF/UHF Beacons is compiled for IARU Region 1 by G0RDI of the RSGB VHF Committee, and it builds upon the valuable work contributed by G3UUT. Many thanks to the VHF/UHF/ Microwave managers of radio societies across Region 1, beacon keepers, beacon coordinators and VHF/UHF DXers too numerous to mention.

The main region 2 & 3 6m beacons are included in the list in italics for completeness. Thanks to G3USF, the IARU HF beacon coordinator for these. All inputs are welcome and should be sent to the address below.

You are free to use information from this beacon list but please acknowledge IARU Region 1 and G0RDI.

Iain Philipps G0RDI
IARU Region 1 VHF Beacon Coordinator
4 Acres End
Amersham
Buckinghamshire HP7 9DZ England

Email: g0rdi@rsgb.org.uk
Phone: +44 1494 432144

The list is also posted on the RSGB Data Communications Committee web site at

http://www.dcc.rsgb.org/beacons/R1_VHF_Beacon_List.pdf

11 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 send 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. In 2001 he had to step down due to his permanent stay in the US. Tommy Bjornstrom, SM7NZB offered to take over the work.

For the the latest list of records please visit:

<http://home.swipnet.se/telecom/esr/VUSHF/dxrecord.html>

(link is broken)

The records table being continuously updated, it is not printed here anymore. You will find the latest version at the website of the records coordinator, SM7NZB.

12 IARU REGION 1 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⁽⁷⁾:

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.

DB6NT

At the interim meeting of the IARU Region 1 VHF/UHF/Microwaves committee in Vienna 1995 it was decided to propose to the Executive Committee to issue the Region 1 Medal to Michael Kuhne, DB6NT,

for his outstanding contributions to the promotion of microwave activities. He not only is a keen microwave dx-er on all bands up to 245 Ghz but has published his designs, allowing other amateurs to construct microwave equipment.

The executive Committee supported this proposal and the Medal and Certificate were presented to DB6NT by PA0EZ at the 1995 Friedrichshaven International Meeting

S53MV

The Executive Committee of IARU Region 1 has at its April 1999 Meeting decided to offer the IARU Region 1 Medal to Matjaz Vidmar, S53MV,

in recognition of his contributions to amateur radio in the field of satellites, microwaves and digital communications.

The medal and certificate were presented by PA0EZ to representatives of the Slovenian Society at an official ceremony at the Region 1 Conference in Lillehammer 1999.

⁷

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

12.1 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⁽⁸⁾ 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.

⁸Wording brought in accordance with the IARU Region 1 Constitution adopted at the IARU Region 1 Conference in Noordwijkerhout (1987)